

# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARNIM SCIENCE COLLEGE

### DEPARTMENT OF BIOTECHNOLOGY

#### ENVIRONMENTAL BIOTECHNOLOGY

Subject Code: 253010503

B.SC. Semester -5

#### Teaching & Evaluation Scheme

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 3               | -  | - | 3     | 3       | 30                | -  | 70       | -  | 100   |

#### Objectives

- To provide students the basic knowledge of Environmental of biotechnology.
- The purpose of the course is to give student to introduce about biotechnology field like environmental biotechnology.
- To provide an understanding of various types of pollutions, bioleaching process, biomagnifications, biodegradation and bioremediation process and knowledge of biosensor mechanism.

#### Prerequisites

Student must have studied B.Sc. with biotechnology as a major subject and knowledge of basic Environmental biotechnology.



## Course outline

| Unit No. | Course Contents   | Teaching hours |
|----------|---|----------------|
| 1.       | <b>Bioremediation :</b> <ul style="list-style-type: none"> <li>• Bioremediation principles</li> <li>• Strategies and techniques of bioremediation: in situ and ex situ</li> <li>• Bioremediation of metals</li> <li>• Phytoremediation</li> <li>• GMOs and their impact on bioremediations</li> </ul> | 10             |
| 2.       | <b>Biodegradation :</b> <ul style="list-style-type: none"> <li>• Principles of biodegradation and mechanism of detoxification</li> <li>• Biodegradation of detergent, pesticide, lignin, hydrocarbon and dyes</li> </ul>  | 10             |
| 3.       | <b>Biodeterioration:</b> <ul style="list-style-type: none"> <li>• Principles and mechanisms of biodeterioration</li> <li>• Methodology to assess biodeterioration</li> <li>• Prevention and control of biodeterioration</li> <li>• Biodeterioration of selected materials</li> </ul>                  | 10             |
| 4.       | <b>Environmental Problems &amp; monitoring:</b> <ul style="list-style-type: none"> <li>• Biosensor: types, principle, applications and limitations.</li> <li>• Bioplastic- Introduction, technology and applications,</li> <li>• Biotransducer</li> </ul>   | 10             |
|          |   | 40             |

## Learning Outcomes

- The students will be able to understand the Knowledge of the environmental biotechnology to understand concepts of various types of pollution, waste water treatment process, Bioleaching process, biomagnification, Biosensor process.
- Student should be able to understand basic concepts of Environmental biotechnology such as water treatment process, bioleaching of metal, application of bioremediation process.
- Access information on a topic from a variety of sources, and be able to learn new things on one's own.



## Teaching & Learning Methodology

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

## Books Recommended

- U. Satyanarayana- Biotechnology
- B.C. Bhattacharyya and R. Banerjee- Environmental Biotechnology
- G. M. Evans and J. C. Furlong- Environmental Biotechnology
- S. C. Santra, Central, India- Environmental Science





# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARNIM SCIENCE COLLEGE

### DEPARTMENT OF BIOTECHNOLOGY

#### FERMENTATION TECHNOLOGY- I

CODE: 253010501

B.Sc. 5<sup>th</sup> SEM

#### Teaching & Evaluation Scheme:-

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 3               | -  | - | 3     | 3       | 30                | -  | 70       | -  | 100   |

#### Objectives: -

- To provide basic knowledge of bioprocess technology in the industry, how to isolate the micro-organisms, its preservation. How the strain can be improved for industrially important organisms. What are primary and secondary screening, how to isolate enzymes producing microbes.
- Need to know the importance of strain improvement, what different methods can be used for strain improvement. Students get to know about the use of precursors in the fermentation process.
- This study gives idea about the bioreactor design. Types of bioreactor used in the industry. how the sterilization of media and air can be done. Importance of mass transfer and determination of  $K_L a$ , inoculum development.
- The student will get an idea about kinetic of substrate and utilization of batch, types of fermentation i.e fed batch and batch fermentation. What can be control system for monitoring the fermentation process.
- To provide the idea about down streaming process how to get end product in the fermentation.

#### Prerequisites:-

Student must be passed second year B.Sc in Microbiology as major subject along with the knowledge of biology.

#### Course outline:-



| Sr. No. | Course Contents  | Number of Hours |
|---------|--|-----------------|
| 1.      | <b>Introduction to fermentation technology</b> <ul style="list-style-type: none"> <li>Fundamental concepts of fermentation</li> <li>Chronological development in industrial microbiology</li> <li>Introduction to the component parts of fermentation process</li> <li>Range of fermentation processes</li> </ul>  | 10              |
| 2.      | <b>Industrially important microorganisms</b> <ul style="list-style-type: none"> <li>SCREENING:               (A) Characteristics of industrially important microorganisms               (B) Primary screening of organic acid producers, Primary screening of antibiotics, growth factors, and enzyme producers.               (C) Significance of secondary screening             </li> <li>STRAIN IMPROVEMENT               (A) STRATEGIES               i. Selection of induced mutants               ii. Selection of recombinants               (B) Strain improvement for modification of properties other than yield               (C) Preservation: Principle, methods and quality control             </li> </ul> | 10              |
| 3.      | <b>Fermenter Design &amp; Fermentation Process</b> <ul style="list-style-type: none"> <li>Stirred tank bioreactor               (A) Basic functions of fermenter and design               (B) Structural components of fermentor               (C) Devices of aeration and agitation               (D) Devices for monitoring pH, temperature, foam and dissolved oxygen             </li> <li>Types of fermentation - Submerge (Batch, Fed batch and Continuous).</li> <li>Solid state fermentation.</li> </ul>   | 10              |
| 4.      | <b>Fermentation media and inoculum development</b> <ul style="list-style-type: none"> <li>Fermentation media               (A) Principles of media formulation               (B) Media ingredients: water, carbon sources, nitrogen sources, minerals, growth factors, buffers, chelators, precursors, inducers, inhibitors, antifoam agents             </li> <li>Methods of sterilization               (A) Use of high pressure steam: principle, batch and Continuous sterilization process               (B) Use of filtration: principle, types of filter.             </li> </ul>   | 10              |



|  |  |    |
|--|--|----|
|  | <ul style="list-style-type: none"> <li>Inoculum development: general principles for development of seed culture for bacterial, yeast and fungal processes</li> </ul> |    |
|  |  | 40 |

### Learning Outcomes:

- Student will learn about the bioprocess technology in the industry, how to isolate the micro-organisms, its preservation. How the strain can be improved for industrially important organisms. Types of substrate used for fermentation and about medium optimization.
- Provide an idea about the bioreactor design. Types of bioreactor used in the industry. how the sterilization of media and air can be done. Importance of mass transfer and determination of  $K_L a$ , inoculum development.
- Get knowledge about kinetic of substrate and utilization of batch, types of fermentation i.e fed batch and batch fermentation. What can be control system for monitoring the fermentation process.
- To provide the idea about down streaming process how to get end product in the fermentation. What different methods can be used for down streaming process.

### Teaching & learning Methodology:

- We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.
- The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:
- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.



**Basic Text & Reference Books:**

- Principles of Fermentation Technology : Whitaker & Stanbury Comprehensive
- Biotechnology : Murray Moo Young
- Methods in Industrial Microbiology : Sikyta
- Fermentation Microbiology and Biotechnology, El Mansi and Bryc



# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARNIM SCIENCE COLLEGE

DEPARTMENT OF BIOTECHNOLOGY  
Genetic Engineering and Tissue culture  
Subject Code: 253010504  
B.Sc. Semester-5

### Teaching & Evaluation Scheme

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Th | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 3               | -  | - | 3     | 3       | 30                | -  | 70       | -  | 100   |

### Objectives

- To provide basic knowledge of Applications of Biotechnology
- The purpose of the course is to introduce students to methods of 'Biotechnology' combines utilizing the living systems - microorganisms, plants, animals with basic scientific and engineering, for providing various solutions for improving our lives.
- The present course opens the door to all of the abundant careers in and out of the area of biological sciences including health/ Industrial field/ medical / Environmental Sciences.

### Prerequisites

Student Must have studied BS.c with Biotechnology as a major subject and knowledge of genetic engineering



## Course outline

| Unit No. | Course Contents   | Teaching hours |
|----------|---|----------------|
| 1        | <b>Recombinant vectors</b> <ul style="list-style-type: none"> <li>• Characteristics of an Ideal Vector</li> <li>• Plasmid(pBR322)</li> <li>• pUC vectors</li> <li>• Bacteriophage Lambda</li> <li>• Cosmid</li> <li>• Construction of recombinant DNA and transformation</li> <li>• Visual selection by antibiotic</li> <li>• Blue-white selection.</li> </ul>            | 10             |
| 2        | <b>Genetic engineering</b> <ul style="list-style-type: none"> <li>• Introduction of Genetic Engineering</li> <li>• Molecular tools of Genetic Engineering</li> <li>• Restriction endonucleases</li> <li>• DNA Cutting enzyme</li> <li>• DNA Ligation Techniques</li> <li>• DNA Modifying Enzymes</li> <li>• Gene transfer methods</li> </ul>                              | 10             |
| 3        | <b>Tissue culture-I</b> <ul style="list-style-type: none"> <li>• Introduction of tissue culture</li> <li>• Types of tissue culture</li> <li>• Plant tissue culture</li> <li>• Method and significance of PTC</li> <li>• Application of PTC</li> </ul>   | 10             |
| 4        | <b>Tissue culture-II</b> <ul style="list-style-type: none"> <li>• Animal tissue culture introduction</li> <li>• Primary culture and established cell line cultures</li> <li>• Equipment and material for animal cell technology</li> <li>• Basic media and techniques of mammalian cell culture</li> <li>• Manipulation and application of animal cell culture</li> </ul> | 10             |
|          |   | 40             |



### **Learning Outcomes**

- The students will be able to understand and the basic principles and, the tools and techniques of Genetic engineering
- The course is designed to give students an understanding of the applications of genetic engineering in various fields.
- This is a course where the topics to be studied include different types of plant cultures, to understand principles of animal culture, media preparation , To describe meristem culture and clonal propagation of plants on a commercial scale.
- To get insight in applications or recombinant DNA technology in agriculture, production of therapeutic proteins.

### **Teaching & Learning Methodology**

- We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.
- The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:
- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.



### **Books Recommended**

- PRINZIPIEN DER BIOCHEMIE Textbook by Albert L. Lehninger, David L. Nelson, and Michael M. Cox
- Elements of Biotechnology P. K. Gupta Rastogi Publications, 1994 - Biotechnology
- A TEXTBOOK OF BIOTECHNOLOGY BY R C DUBEY
- Biotechnology and genomics P. K. Gupta, Rastogi Publication
- Molecular biology and genetic engineering P. K. Gupta



# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARRNIM SCIENCE COLLEGE

### DEPARTMENT OF BIOTECHNOLOGY

#### MOLECULAR TECHNIQUES

Subject Code :253010502

B.Sc. Semester- 5

#### Teaching & Evaluation Scheme:-

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 3               | -  | - | 3     | 3       | 30                | -  | 70       | -  | 100   |

#### Objectives:-

- To provide basic knowledge Molecular Techniques
- **Molecular biology** is the branch of biology that concerns the molecular basis of biological activity in and between cells, including molecular synthesis, modification, mechanisms and interactions. The central dogma of molecular biology describes the process in which DNA is transcribed into RNA then translated into protein.
- Particular areas of interest include the following: stability and expression of cloned gene products, cell transformation, gene cloning systems and the production of recombinant proteins, protein purification and analysis, transgenic species, developmental **biology**, mutation analysis, the applications of DNA fingerprinting, RNA interference, and PCR technology, microarray technology..
- Molecular Biotechnology publishes original research papers on the application of molecular biology to both basic and applied research in the field of biotechnology.
- Increasing knowledge of the molecular basis of disease and advances in technology for analyzing nucleic acids and gene products are changing pathology practice.
- The explosion of information regarding inherited susceptibility to disease is an important aspect of this transformation.



### Prerequisites:-

- Student Must have studied 2years B.Sc. with microbiology/Biotechnology as a major subject and knowledge of basic microbiology.
- Students must have basic knowledge of Molecular Techniques

### Course outline:-

| Unit No. | Course Contents   | Teaching Hours |
|----------|---|----------------|
| 1.       | <b>Gene libraries:</b> <ul style="list-style-type: none"><li>• Genomic libraries, cDNA libraries,</li><li>• PCR: types and applications-Basic PCR and RT-PCR</li></ul>  | 10             |
| 2.       | <b>Techniques:</b> <ul style="list-style-type: none"><li>• Nucleic acid hybridization,</li><li>• Colony and plaque hybridization,</li><li>• Southern, Northern and Western blotting,</li><li>• Dot-Blot,</li><li>• Differential screening.</li><li>• In situ hybridization,</li><li>• FISH (radioactive and non-radioactive detection of hybridization),</li><li>• Autoradiography.</li></ul> | 10             |
| 3.       | <b>Molecular markers:</b> <ul style="list-style-type: none"><li>• RFLP,</li><li>• RAPD,</li><li>• AFLP,</li><li>• SNP,</li><li>• Satellite DNA.</li><li>• DNA Fingerprinting- process and its application.</li></ul>  | 10             |
| 4.       | <b>DNA sequencing:</b> <ul style="list-style-type: none"><li>• Chain termination, chemical cleavage and automated.</li><li>• DNA Foot printing- types and application.</li><li>• <i>In vitro</i> transcription and <i>in vitro</i> translation, various systems and application.</li></ul>  | 10             |
|          |   | 40             |



## Learning Outcomes:

- At the end of the course the student would have basic knowledge of molecular techniques.
- Increasing knowledge of the molecular basis of disease and advances in technology for analyzing nucleic acids and gene products are changing pathology practice
- The practice of anatomic and clinical pathology is being transformed by new knowledge in molecular pathology and human genetics and by advances in the application of molecular biology technology.
- Many residents enter pathology training with sophisticated backgrounds in molecular biology and human genetics obtained from research experiences, graduate programs, and medical school courses

## Teaching & Learning Methodology

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

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- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

## Books Recommended

- Winnacker, Ernst L. (1987), *From genes to clones* : introduction to gene technology
- R. W. Old and S. B. Primrose, *Principles of Gene Manipulation. An Introduction to Genetic Engineering*. 1981
- PK Gupta. *Biotechnology and Genomics*
- RC Dubey. *A text of biotechnology* –





# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARNIM SCIENCE COLLEGE

### DEPARTMENT OF CHEMISTRY

#### Analytical Chemistry- C-I

CODE : 253020504

B.Sc. 5<sup>th</sup> Semester

#### Teaching & Evaluation Scheme:-

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 4               | -  | 2 | 6     | 6       | 30                | 50 | 70       | -  | 150   |

**Objectives:** - To provide basic knowledge Chemistry

**Prerequisites:-**

**Course outline:-**

| Sr. No. | Course Contents  | Number of Hours |
|---------|--|-----------------|
| 1       | <b>(A) Ultraviolet Spectroscopy</b><br>Origin of UV Spectra, Principle, Electronic transition ( $\sigma\text{-}\sigma^*$ , $n\text{-}\sigma^*$ , $\pi\text{-}\pi^*$ and $n\text{-}\pi^*$ ), relative positions of $\lambda_{\text{max}}$ considering conjugative effect, steric effect, solvent effect, red shift (bathochromic shift), blue shift (hypsochromic shift), hyperchromic effect, hypochromic effect (typical examples). Aromatic and Polynuclear aromatic hydrocarbons.<br><b>(B) Ultraviolet Spectroscopy (Problems)</b><br>Problems of Dienes and enones using Woodward-Fieser rules. Problems of aromatic ketones, aldehydes and esters using empirical rules. | 14              |
| 2       | <b>(A) Infrared Spectroscopy</b><br>Introduction, principle of IR spectroscopy, instrumentation, sampling technique, selection rules, types of bonds, absorption of common functional groups. Factors affecting frequencies, applications. Application of Hooke's law, characteristic stretching frequencies of O-H, N-H, C-H, C-D, C=C, C=N, C=O functions; factors affecting stretching frequencies (H-bonding, mass effect, electronic factors, bond  | 14              |



|   |  |    |
|---|--|----|
|   | multiplicity, ring size).<br><b>(B) Raman Spectra</b><br>Basic principal, Instrumentation, Application of Raman spectra, Comparison of IR and Raman spectra.   |    |
| 3 | <b>(A) Nuclear Magnetic Resonance</b><br>Principal, Magnetic and non magnetic nuclei, absorption of radio frequency. Equivalent and non equivalent protons, chemical shifts, anisotropic effect, relative strength of signals, spin-spin coupling, long range coupling, coupling constant, Deuterium labelling, applications to simple structural problems.<br><b>(B) Problems based on Spectral data</b><br>Structural problems based on UV, IR and NMR   | 14 |
| 4 | <b>(A) Visible Spectroscopy</b><br>Introduction, Beer Lambert's law, instrumentation (light source, optical system, wavelength selector, light sensitive device), Accuracy and error of Spectrophotometry.<br><b>(B) Atomic Spectroscopy</b><br>Introduction, Principle, Flame Emission Spectroscopy (FES) and Atomic adsorption Spectroscopy (AAS), Principal, comparison and applications, Burners (Total consumption burner and Premix burners), Inductively coupled plasma Emission Spectroscopy (ICPES) | 14 |

### Learning Outcomes:-

At the end of the course the student would have sufficient knowledge of Biochemistry

### Teaching & Learning Methodology:-

- Use of audiovisual aids.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

### Books Recommended:

1. Introduction to Spectroscopy: Donald L. Pavia, Gary M. Lampman, George S. Kriz
2. Cengage Learning; 4<sup>th</sup> Edition.
3. Spectrometric Identification of Organic Compounds: Robert M. Silverstein, Francis X. Webster, David Kiemle Wiley; 7<sup>th</sup> Edition.
4. Infrared spectra of Complex molecules: J. Bellamy, John Wiley & Sons, Inc., 3<sup>rd</sup> Edition.
5. Spectroscopic Method in Organic Chemistry: Dudley Williams, Ian Fleming McGraw-Hill Education; 6<sup>th</sup> Edition.
6. Applications of spectroscopic techniques in Organic Chemistry: P.S. Kalsi, New Age International; 6<sup>th</sup> Edition.
7. Elementary Organic Spectroscopy; Principles And Chemical Applications: Y. R. Sharma, S. Chand & Co Pvt Ltd.
8. Fundamentals of Molecular Spectroscopy: C. M. Banwell and E. McCash, Tata McGraw Hill, 4<sup>th</sup> Edition.
9. Modern Raman Spectroscopy: A Practical Approach; Ewen Smith, Geoffrey Dent., Wiley 1<sup>st</sup> Edition.





# SWARNIM STARTUP & INNOVATION UNIVERSITY

SWARNIM SCIENCE COLLEGE

DEPARTMENT OF CHEMISTRY

CHEMISTRY PRACTICAL

CODE : 253020505

B.Sc. 5<sup>th</sup> Semester

## Teaching & Evaluation Scheme:-

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 4               | -  | 2 | 6     | 6       | 30                | 50 | 70       | -  | 150   |

**Objectives:-** To provide basic knowledge Chemistry

## Practical [I] (Inorganic and Physical Practicals)

### [A] Inorganic Qualitative Analysis:

Inorganic Qualitative Analysis of mixture containing six radicals only.

(Minimum 08 mixtures to be done)

### [B] Physical Chemistry (Kinetics, Solubility & Instruments)

#### (1) Kinetics and solubility:

Investigate the order of reaction in experiments no. 1, 2 and 3 by graphical method.

Exp 1: Reaction between  $K_2S_2O_8$  and KI (a  $\square$  b)

Exp 2: Reaction between  $KBrO_3$  and KI (a = b)

Exp 3: Reaction between  $H_2O_2$  and HI (a  $\square$  b)

Exp 4: Determine the heat of solution of a given substance (Oxalic acid and Benzoic acid) by solubility method.

#### (2) Instruments:

Exp 1: Determine dissociation constant of monobasic acid ( $CH_3COOH$ ) using pH meter.

Exp 2: Determine the amount of bases in given mix ( $NaOH+NH_4OH$ ) Conductometrically using standard solution of HCl

Exp3: Determine the amount of ferrous in the given solution of Ferrous Ammonium Sulphate potentiometrically using standard  $KMnO_4$  solution.

Exp 4: Determine the concentration of  $Cu^{2+}$  and  $Fe^{3+}$  in the given solution by Colourimetry.



## Reference Books

- (1) Vogel's "Textbook of Quantitative Chemical Analysis": Pearson Education Ltd. 6<sup>th</sup> Edition, 2008.
- (2) Vogel's "Qualitative Inorganic Analysis": Pearson Education Ltd. 7<sup>th</sup> Edition, 2009.
- (3) Gurdeep Raj, "Advanced Practical Inorganic Chemistry": Krishna Prakashan, Meerut, 21<sup>st</sup> Edition, 2009.
- (4) J. B. Yadav, "Advanced Practical Physical Chemistry": Krishna Prakashan, Meerut, 29<sup>th</sup> Edition, 2010.
- (5) P. H. Parsania, "Experiments in Physical Chemistry": Neminath Printers Rajkot 1<sup>st</sup> Edition 2004.
- (6) A. M. James and F. E. Prichard, "Practical Physical Chemistry": Longman Group Limited London 3<sup>rd</sup> Edition Reprinted 1979. Guj. Uni. Chemistry Syllabus – B.Sc. Sem-V Page 12



## **Practical [II] (Organic and Analytical Practicals)**

### **[A] Organic Preparation:**

- (i) Nitration of Acetanilide
- (ii) Acetanilide from Aniline (Green Preparation)
- (iii) Benzilic Acid from Benzil (Green Preparation)
- (iv) 1,5-Diphenyl-penta-1,4-diene-3-one from Benzaldehyde and Acetone (Green Preparation)
- (v) Diels-Alder reaction between furan and maleic acid (Green Preparation)

### **[B] Analytical:**

#### **(B-1) Organic Estimation:**

- (i) Unknown Acid (e.g., Oxalic, Succinic, Citric, Tartaric, Benzoic, Phthalic and Cinnamic acid)
- (ii) Ketone (Acetone)
- (iii) Ester

#### **(B-2) Chromatography [TLC]**

Analysis of the following drugs by Thin Layer Chromatography.

- (i) Aspirin (ii) Paracetamol (iii) Ibuprofen

### **Reference Books**

- (1) A. I. Vogel, "Elementary Practical Organic Chemistry Part-II, Qualitative Organic Analysis": CBS Publishers & Distributors, New Delhi, 2<sup>nd</sup> Edition, 2004.
- (2) A. I. Vogel, "Elementary Practical Organic Chemistry Part III Quantitative Organic Analysis": CBS Publishers & Distributors, New Delhi, 2<sup>nd</sup> Edition, 2004.
- (3) Hand book of Organic qualitative analysis by H. T. Clarke.
- (4) Practical Organic Chemistry: F. G. Mann and B. C. Saunders. Low – priced Text Book. ELBS, Longman.
- (5) V.K. Ahluwalia, Sunita Dhingra, "Comprehensive Practical Organic Chemistry –Qualitative Analysis": University Press (India) Private Limited, Hyderabad, 1<sup>st</sup> Indian Edition, 2010.
- (6) "Advanced Practical Organic Chemistry": Stanley Thornes Publishers Ltd., J Leonard, B Lygo, G Procter, 1<sup>st</sup> Indian Edition, 2004.
- (7) "Quantitative Analysis": R. A. Day, A. L. Underwood, Prentice-Hall of India Pvt. Ltd., New Delhi, 6<sup>th</sup> Edition, 2004.



# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARNIM SCIENCE COLLEGE

### DEPARTMENT OF CHEMISTRY

#### Inorganic Chemistry C-I

CODE : 253020502

B.Sc. 5<sup>th</sup> Semester

#### Teaching & Evaluation Scheme:-

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 4               | -  | 2 | 6     | 6       | 30                | 50 | 70       | -  | 150   |

**Objectives:-** To provide basic knowledge Chemistry

**Prerequisites:-**

**Course outline:-**

| Sr. No. | Course Contents  | Number of Hours |
|---------|--|-----------------|
| 1       | <b>Molecular symmetry</b><br>Introduction, symmetry operations and symmetry elements: $C_n$ , $\sigma$ , $S_n$ , $i$ and $E$ . Point groups for the molecules (excluding $S_{2n}$ and $I_h$ ).<br>Multiplication tables of $C_{2v}$ , $C_{2h}$ and $C_{3v}$ point groups.  | 14              |
| 2       | <b>(A) Chemical bonding (I)</b><br>VB and MO treatment of $H_2$ and $H_2^+$ , comparison of VB and MO<br>MO treatment of $[FeF_6]^{4-}$ , $[Fe(CN)_6]^{4-}$ , $[V(CN)_6]^{3-}$ , $[IrF_6]^{4-}$ , $[NiF_4]^{2-}$ , $[PtCl_4]^{2-}$ and $[Ni(CN)_4]^{2-}$ .<br><b>(B) Boron hydrides</b><br>Preparation, properties and structure of diborane. Types of bonds found in higher boranes. Structure of $B_4H_{10}$ , $B_5H_9$ , $B_5H_{11}$ , $B_6H_{10}$ and $B_{10}H_{14}$ . | 14              |
| 3       | <b>(A) Co-ordination chemistry</b><br>Reaction, kinetics and mechanism. Trans effect and trans influence, Applications of trans effect in synthesis and analysis.<br>Theories of trans effect: Polarisation theory, $\pi$ -bonding theory, MO theory. Lability, inertness, stability and instability.  | 14              |



|   |  |    |
|---|--|----|
|   | <b>(B) Kinetics and reaction rates of substitution</b><br>Ligand field effect and reaction rates, mechanism of substitution reaction. Nucleophilic substitution reaction ( $S_N1$ and $S_N2$ ) in octahedral complexes. Substitution in square planar Pt (II) complexes. Substitution in octahedral Co (III) complexes. Acid hydrolysis, base hydrolysis. Cis effect. Electron transfer reaction. Mechanism of redox reaction (inner-sphere and outer-sphere). |    |
| 4 | <b>(A) Inorganic polymers</b><br>Classification of inorganic polymers. Polymers containing boron and silicon: methods of preparation, physical and chemical properties, structures and their uses.<br><b>(B) Mossbauer Spectroscopy</b><br>Principle and Instrumentation.<br>Experimental technique<br>Application for iron complexes  | 14 |

### Learning Outcomes:-

At the end of the course the student would have sufficient knowledge of Biochemistry

### Teaching & Learning Methodology:-

- Use of audiovisual aids.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

### Books Recommended:

1. Concise Inorganic Chemistry: J.D. Lee; Wiley India, 5<sup>th</sup> Edition (1996).
2. 'Shriver and Atkins' Inorganic Chemistry: Atkins, Overton, Rourke, Weller, Armstrong;
3. Oxford University Press, 5<sup>th</sup> Edition (2011).
4. Advanced Inorganic Chemistry: F.A. Cotton and Wilkinson G.; John Wiley, 5<sup>th</sup> Edition (1988).
5. Introductory Quantum Chemistry: A.K. Chandra; Tata- McGraw Hill, 4<sup>th</sup> Edition (1994).
6. Quantum chemistry: R.K. Prasad; New Age International, 4<sup>th</sup> Edition (2010).
7. Electron and chemical bonding: H. B. Grey, W.A. Benjamin. INC, New York.
8. Inorganic chemistry: James E. Huheey, 4<sup>th</sup> Edition, Wesley Publishing Company.
9. Mechanism of Inorganic reaction: Basalo and Pearson, 2<sup>nd</sup> Edition, Wiley Eastern Pvt Ltd.
10. Introduction to Advanced Inorganic chemistry, Durrant and Durrant, John Wiley.
11. Advanced Inorganic chemistry: (Vol. 1) Satya Prakash, Tuli, Basu and Madan; S. Chand
12. Advanced Inorganic chemistry: Gurdeep Raj; Goel Publishing House, 23<sup>rd</sup> Edition (1998).





# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARNIM SCIENCE COLLEGE

### DEPARTMENT OF CHEMISTRY

#### Organic Chemistry C -I

CODE : 253020501

B.Sc. 5<sup>th</sup> Semester

#### Teaching & Evaluation Scheme:-

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 4               | -  | 2 | 6     | 6       | 30                | 50 | 70       | -  | 150   |

**Objectives:-** To provide basic knowledge Chemistry

| Sr<br>No. | Prerequisites:-<br>Course outline:- | Course Contents   | Number<br>of<br>Hours |
|-----------|-------------------------------------|---|-----------------------|
| 1         |                                     | <b>(A) Carbohydrates</b><br>Disaccharides, structure of (+) maltose, (+) cellobiose, (+) lactose and (+) sucrose.<br><b>(B) Purine and Pyrimidines</b><br>(i) Purines – Synthesis of Purines, Adenine and Guanine.<br>(ii) Pyrimidines – Synthesis of Pyrimidine, Uracil, Thymine and Cytosine.   | 14                    |
| 2         |                                     | <b>(A) Nucleophilic Substitution at a Saturated Carbon Atom</b><br>Mechanism and scope of reaction-available mechanism, Kinetic Characteristics, Scope of reaction, Stereochemistry of SN1 and SN2 reactions, Relative reactivity in substitution, Solvent effect, variation at carbon site, Relative leaving group activity, SNi (substitution nucleophilic internal) Mechanism and Neighboring group participation. Elimination Reactions, E1, E2 and E1cB mechanism, Orientation E1 and E2 reactions, Elimination Vs | 14                    |



|   |  |    |
|---|--|----|
|   | <p>Substitution.</p> <p><b>(B) Nucleophilic Aromatic Substitution</b></p> <p>Nucleophilic aromatic substitution, Bimolecular displacement and its mechanism, Reactivity, Orientation, Electron withdrawal by resonance, Evidence for the two steps-mechanism, Elimination-addition mechanism-Benzyne.</p>  |    |
| 3 | <p><b>(A) Inorganic reagents for Organic synthesis</b></p> <p>Use of specific reagents and their synthetic applications with mechanism.</p> <p>(i) Aluminium Isopropoxide (ii) Lithium Aluminium Hydride (iii) Adams's catalyst (PtO<sub>2</sub>)</p> <p>(iv) Selenium Dioxide (v) Osmium Tetroxide (vi) Lead Tetraacetate</p> <p><b>(B) Molecular rearrangements and Name Reactions</b></p> <p>Rearrangements occurring through Carbocations, carbenes and nitrenes Principle, Mechanism and Synthetic applications of the reactions:</p> <p>(i) Wolf rearrangement (ii) Fries migration (iii) Hoffmann reaction</p> <p>(iv) Oppenauer oxidation reaction (v) Diels-Alder reaction (vi) Birch Reduction</p> | 14 |
| 4 | <p><b>(A) Stereo Chemistry (I)</b></p> <p>Optical activity in the absence of chiral carbon (Biphenyls, Allenes and Spirans)</p> <p><b>(B) Stereoselectivity and Stereospecificity</b></p> <p>Stereoselective and stereospecific reactions. Mechanism "Addition of halogens to alkenes". Stereochemistry of E2 reaction (syn and anti elimination).</p>   | 14 |



## Learning Outcomes:-

At the end of the course the student would have sufficient knowledge of Biochemistry

## Teaching & Learning Methodology:-

- Use of audiovisual aids.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

## Books Recommended:

1. Organic Chemistry: I. L. Finar, Vol-II, 5<sup>th</sup> Edition, Pearson Education Ltd.
2. (2) Organic Chemistry: Morrison & Boyd, 6<sup>th</sup> Edition, Prentice Hall of India Pvt. Ltd.
3. (3) Stereochemistry of carbon compounds: E. L. Eliel, Wiley Eastern Ltd.
4. (4) Stereochemistry and mechanism through solved problems: P. S. Kalsi, New Age International.
5. (5) Stereochemistry of Organic Compounds: Principles and Applications: D. Nasipuri; New Academic Science; 4<sup>th</sup> Revised Edition.
6. (6) Organic Chemistry: Hendrickson, Cram, Hammond, Mc Graw-Hill.
7. (7) Organic Chemistry: 6<sup>th</sup> Edition, John McMurry, Brooks Cole, International Edition.
8. (8) Organic Chemistry: T.W. Graham Solomons and Craig B. Fryhle Wiley, 8<sup>th</sup> Edition



(9) Organic Chemistry: Francis A. Carey, Mc Graw-Hill, 7<sup>th</sup> Edition (10) Organic Chemistry: Leroy G.Wade, Prentice Hall, 6<sup>th</sup> Edition.

(11) Organic Chemistry: Jonathan Clayden, Nick Greeves, Stuart Warren and Peter Wothers. Oxford University Press, USA





# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARNIM SCIENCE COLLEGE

### DEPARTMENT OF CHEMISTRY

#### Physical Chemistry C-I

CODE : 253020503

B.Sc. 5<sup>th</sup> Semester

#### Teaching & Evaluation Scheme:-

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 4               | -  | 2 | 6     | 6       | 30                | 50 | 70       | -  | 150   |

**Objectives:-** To provide basic knowledge Chemistry

**Prerequisites:-**

**Course outline:-**

| Sr. No. | Course Contents   | Number of Hours |
|---------|---|-----------------|
| 1       | <b>Thermodynamics</b><br>Zeroth law of Thermodynamics, Clausius - Clapeyron equation, Trouton's Rule, Craft's equation, van't Hoff's isotherm and isochore equations.   | 14              |
| 2       | <b>Electrochemistry</b><br>Electrochemical cell and Electrolytic cell, Reversible and irreversible electrodes and cell, Poggendorff's compensation method and Weston cell, Reference electrodes (i) Saturated Calomel Electrode (ii) Standard Hydrogen Electrode (iii) Quinhydrone Electrode, Nernst's single electrode potential equation, Applications of emf measurements to calculate $\Delta G$ , $\Delta G^\circ$ , $\Delta H$ , $\Delta S$ , $K_{eq}$ , $K_{sp}$ , $K_w$ and $K_h$ . | 14              |
| 3       | (A) <b>Chemical Kinetics</b><br>Prediction of reaction rate, Primary and secondary salt effect, Heterogeneous reactions, Retarded reaction.<br>(B) <b>Polymer Chemistry</b><br>Polymerization and types of Polymerization, Co-polymers, Bio-  | 14              |



|   |   |    |
|---|---|----|
|   | polymers, Polymer additives, Thermodynamics of polymer solution, Molecular weight determination of polymers: Number average molecular weight, Weight average molecular weight, Viscosity and Osmotic pressure method.   |    |
| 4 | <b>(A) Nuclear Chemistry</b><br>Detection of isotopes, Velocity focusing mass spectrograph, Bainbridge and Neiers mass spectroscopy, Double focusing mass spectroscopy, Applications of isotopes and trace technique examples<br><b>(B) Molecular spectra</b><br>Pure rotational spectra, Equation for frequency of pure rotational spectral line, Vibrational-Rotational spectra, Equation for frequency of vibrational-rotational spectral line, Ortho and Para hydrogen. | 14 |

### Learning Outcomes:-

At the end of the course the student would have sufficient knowledge of Biochemistry

### Teaching & Learning Methodology:-

- Use of audiovisual aids.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

### Books Recommended:

1. Physical Chemistry: G. M. Barrow, 5<sup>th</sup> Edition, McGraw-Hill education, India.
2. Advanced Physical Chemistry: Gurdeep Raj, 35<sup>th</sup> Edition (2009), Goel / Krshina Publishing House.
3. Principles of Physical Chemistry: Puri, Sharma and Pathania, 42<sup>nd</sup> Edition, Vishal Publishing Company.
4. Polymer Science: Gowariker, Viswanathan and Sreedhar, 1<sup>st</sup> Edition (2012 reprint) New Age International.
5. Essentials of Nuclear Chemistry: Arnika, 4<sup>th</sup> Edition (2012 reprint), New Age International.
6. Physical Chemistry: Atkins, 9<sup>th</sup> Edition. Oxford University Press.
7. Advanced Physical chemistry: Gurtu and Gurtu, 11<sup>th</sup> Edition , Pragati Prakashan.

Physical chemistry: Levine, 6<sup>th</sup> Edition, McGraw-Hill edu



# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARNIM SCIENCE COLLEGE

### DEPARTMENT OF MATHEMATICS

#### ABSTRACT ALGEBRA

Subject Code: 253030504

B.Sc. Semester -5

### Teaching & Evaluation Scheme

The objective of evaluation is not only to measure the performance of student, but also to motivate them for better performance. Student are evaluated on the basis of Midterm examination and end examination Conducted by university.

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 3               | -  | - | 3     | 3       | 30                | -- | 70       | -  | 100   |

### Objectives

Because of its generality, abstract algebra is used in many fields of science. OBJECTIVE OF THIS COURSE: This course is intended to provide a first approach to the subject of algebra by **studying some basic algebraic structures, mapping between them and their substructures.**

### Prerequisites

A Candidate for admission to the Bachelor of Science (Mathematics) must have a 10+2 Science with A and B (Maths and Physics) Group. Provisional admission shall be provided subject to the Clearance of examinations and eligibility.

### Course outline:

This Course designed for undergraduate and graduate students working on scientific, engineering, statistics, and mathematics majors This course serves as an introduction to numerical methods used to applied mathematics problems, with applications across the spectrum of description.



| Sr. No. | Course Contents  | Teaching hours |
|---------|--|----------------|
| 1       | <b>Unit I:-Binary operations &amp; groups</b><br><br>Binary operations, division algorithm for integers, congruent modulo relation relation in $\mathbb{Z}$ , definition and examples of groups, elementary properties of group, equivalent definition of a group, finite groups and their tables, commutative and non commutative groups  | 10             |
| 2       | <b>Unit II:- Subgroups and lattice diagrams</b><br><br>Subgroups, definition and examples, normalize and centralizers, order of an element , order of a group, cyclic group generated by an element, lattice diagrams of finite groups, cosets and its properties, Lagrange's theorem and its application, Euler's theorem, mFermat's theorem  | 12             |
| 3       | <b>Unit III :- Permutations &amp; normal subgroups</b><br><br>Permutations, definition and examples, cycle, transposition, even and odd permutation, order of a permutation, inverse of a permutation, symmetric groups and alternating groups, examples, quotient group, normal subgroup: definition and Examples.  | 12             |
| 4       | <b>Unit IV :- Homomorphism &amp; isomorphism of groups</b><br><br>Isomorphism of groups: definition and examples, isomorphism and equivalence relation, cyclic groups, properties OG cyclic groups, isomorphism of cyclic groups, Homomorphism of groups: definitions and examples, kernel of a homomorphism, fundamental theorem of Homomorphism, Caley's theorem, automorphism of groups | 10             |



## LEARNING OUTCOMES:-

- In this Math student will learn the concept of Group theory.
- Students will learn the concept of permutation.
- Students will learn Homomorphism & isomorphism of groups.
- Students will learn the fundamental theorem of homomorphism.

## Teaching & Learning Methodology:-

- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties.
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge.
- Particularly at the start of a programme/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.
- Include inquiry based learning exercises in international or intercultural contexts.
- Include group work, with groups representing diverse cultures and nationalities.

## Reference Books:-

- I N Herstein, *Topics in Algebra*, Wiley Eastern Ltd.
- N. Jacobson, *Basic Algebra Vol I & II*, Hindustan Publishing company.
- Shanti Narayan, *A text book of Modern Algebra*, S.Chand & Co.
- P.B.Bhattacharya, S.K.Jain, S R Nagpal, *Basics Abstract Algebra, (second Edition)* Cambridge University Press.
- N.S. GopalKrishna, *University Algebra*, Wiley Eastern, New Delhi MacLane Saunders and Birkhoff Garrett, *Algebra*, MacMillan, New York.
- G.F.Simmons, *Introduction to Topology and Modern Analysis*, MacGrawHill Inc., U.S.A.

## E-LEARNING WEBSITES:-

[http://www.universityofcalicut.info/SDE/Abstract\\_algebra.pdf](http://www.universityofcalicut.info/SDE/Abstract_algebra.pdf)

<https://pkalika.in/2019/10/21/abstract-algebra-linear-algebra/>

<http://math.nevai.net/courses/mas4301/misc/syllabus.pdf>





# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARNIM SCIENCE COLLEGE

### DEPARTMENT OF MATHEMATICS

#### Complex Analysis

Subject Code: 253030501

B.Sc. Semester -5

### Teaching & Evaluation Scheme

The objective of evaluation is not only to measure the performance of student, but also to motivate them for better performance. Students are evaluated on the basis of Mid term examination and end examination Conducted by university.

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 4               | -  | - | 4     | 4       | 30                | -  | 70       | -  | 100   |

### Objectives

- The aim of this subject is to present the important ideas in Linear equation using multiple method to student whose principal interest lie outside the field of mathematics.
- It is a subject which provide a vital arena where students can see the interaction of mathematics and machine computation.

### Prerequisites

A Candidate for admission to the bachelor of Science (Mathematics) must have a 10+2 Science with A and B (Maths and Physics ) Group. Provisional admission shall be provided subject to the Clearance of examinations and eligibility.

### Course outline:

This Course designed for undergraduate and graduate students working on scientific engineering, statistics , and mathematics majors This course serves as an introduction to numerical methods used to applied mathematics problems, with applications across the



spectrum of discription.

| Sr. No. | Course Contents   | Teaching hours |
|---------|---|----------------|
| 1       | <b>Unit: I</b><br>Sum and product of complex numbers with properties, moduli and conjugate, triangle inequality, polar coordinates, product and quotients in exponential form, roots of complex numbers, De Moivre's theorem and application, the exponential function, trigonometric functions, hyperbolic functions, convergence of sequence and series.  | 8              |
| 2       | <b>Unit: II</b><br>Functions of complex variables, theorems on limits, continuity, derivatives, differentiation formulas, Cauchy-Riemann equations, sufficient condition for differentiability, polar coordinates, analytic functions and harmonic functions.<br>Mapping and Conformal mapping: Elementary functions, mapping by elementary functions , mobius mapping, linear function. Bilinear mapping $w = (az+b)/(cz+d)$ , $w=z$ , $w = z^2$ , $w = \frac{1}{z}$ , $w = \exp(z)$ | 12             |
| 3       | <b>Unit: III</b><br>Line integral(complex),Cauchy' integral formula,maximum modulus,(only statement),liouville's theorem.Definition of complex sequence, complex series and power series. Expansion of complex function in Taylor's series and Laurent's series.  | 14             |



|   |   |    |
|---|---|----|
| 4 | <b>Unit: IV</b><br><br>Residues and poles:<br><br>Definition of a singular point, Isolated singular points, Zeros of complex functions, Poles and residues of complex function, Cauchy's residue theorem, Evaluation of improper real integrals by residue theorem and evaluation of definite integral of trigonometric functions by residue theorem. | 10 |
|---|---|----|

### Learning Outcomes

After Successfully Completion of the Course the student will be ....

- Derive Numerical methods for various mathematical operation and tasks , such as interpolations,differentiations ,integration,the solution of linear and nonlinear equations, and the solution of linear and nonlinear equation, and the solution of differential equations.
- Analyse and evaluate the accuracy of common numerical methods.
- Derive numerical methods for various mathematical operations and tasks , such as interpolation,differentiations, integrations , the solution of Linear and nonlinear equations..

### Teaching & Learning Methodology

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups.
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties.
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.



## Books Recommended

1. S.S.Sastry, Introductory methods of Numerical analysis, Prentice hall of India, 1990.
2. Numerical Analysis by G. Shankar Rao.
3. Numerical Analysis, B.S.Grawal.
4. Numerical methods by Dr. P. kandasamy.
5. Introduction of Numerical analysis by Josef Stoer and Roland Bulirsch.
6. Analysis of Numerical Methods by Isaacson and Herbert Keller.

## E-Resources

- SWAYAM PORTEL/ NPTEL- online courses on mathematical and quantum mechanics.  
<https://swayam.gov.in/> and <https://nptel.ac.in/>
- [cims.nyu.edu/~cfgranda/pages/OBDA\\_fall17/notes...](https://cims.nyu.edu/~cfgranda/pages/OBDA_fall17/notes...)
- [www.sxccal.edu/mathematics-lecture-notes](http://www.sxccal.edu/mathematics-lecture-notes)



# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARRNIM SCIENCE COLLEGE

### DEPARTMENT OF MATHEMATICS

#### Discrete Mathematics

Subject Code: 253030503

B.Sc. Semester -5

### Teaching & Evaluation Scheme:-

The objective of evaluation is not only to measure the performance of student, but also to motivate them for better performance. Student are evaluated on the basis of Midterm examination and end examination Conducted by university.

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 3               | -  | - | 3     | 3       | 30                | -  | 70       | -  | 100   |

### Objectives: –

- The aim of the discrete mathematics is the study of mathematical structures that are fundamentally discrete rather than continuous.
- In contrast to real numbers that have the property of varying "smoothly", the objects studied in discrete mathematics – such as integers, graphs, and statements in logic do not vary smoothly in this way, but have distinct, separated values.
- Discrete mathematics therefore excludes topics in "continuous mathematics" such as calculus and analysis. Discrete objects can often be enumerated by integers.
- More formally, discrete mathematics has been characterized as the branch of mathematics dealing with countable sets (sets that have the same cardinality as subsets of the natural numbers, including rational numbers but not real numbers).



## Prerequisites

A Candidate for admission to the Bachelor of Science (Mathematics) must have a 10+2 Science with A and B (Maths and Physics) Group. Provisional admission shall be provided subject to the Clearance of examinations and eligibility.

## Course outline:

This Course is designed to enable student to acquire the understanding and practice The application how to solve discrete mathematics.

| Sr. No. | Course Contents   | Teaching hours |
|---------|---|----------------|
| 1       | <b>Unit-I:- Sets and functions</b><br>Sets, operations on sets , relations ,functions , binary operations , algebraic structures , operations on functions.   | 10             |
| 2       | <b>Unit: II: - basics of graph theory</b><br>Definition of graph, simple graph ,degrees of vertices ,equivalence relation, random graph model ,digraph , paths , sub graphs , direct graph ,trail , walk , vertex sequence , circuit , cycle, multiple paths .  | 8              |
| 3       | <b>Unit: III: - lattice theory</b><br>Introduction , product sets , relations , properties of relation , reflexive ,symmetric , antysymmetric , irreflexive, transitive ,equivalence relation ,partition , partially ordered set, hasse diagram ,minimal member , maximal member ,lattice as poset , properties of meet and join , lattice as an algebraic system , product of two lattices , order preserving , order isomorphism , lattice homomorphism , lattice isomorphism ,sub lattice , complete lattice , bounded lattice . | 14             |



|   |  |    |
|---|--|----|
| 4 | <p><b>Unit: IV:- Boolean algebra</b></p> <p>Properties of Boolean algebra, Boolean algebra of switching circuits, sub-Boolean algebra, homomorphism and isomorphism of Boolean algebra Boolean ring, direct product of two Boolean algebras, join irreducible element, atom, and the stone representation theorem.</p> | 10 |
|---|--|----|

### Learning Outcomes:–

- In this Math student will understand the Concept of discrete Mathematics.
- They will learn Boolean expression, lattice, basics of graph theory and mathematical induction.

### Teaching & Learning Methodology: –

- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties. ☐ Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge.
- Particularly at the start of a programme/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.
- Include inquiry based learning exercises in international or intercultural contexts.
- Include group work, with groups representing diverse cultures and nationalities.

### Reference Books:-

- Boolean Algebra and its Application – J. E. Whitesitt, Addison-Wesley Publishing Co. Inc.
- Foundation of Discrete Mathematics – K. D. Joshi, New Age International Limite Publishers, ISBN 81-224-0120-1.
- Logic and Boolean algebra – B. H. Arnold, P H Inc LCCN 62-19100.
- Introduction to Lattice Theory – D. E. Rutherford, University Mathematical Oliver and Boyd Ltd.
- Modern Applied Algebra - Garret Birkhoff and Thomas C Bartee, CBS Publishers and Distributors.
- Sets Lattices and Boolean Algebras - James C Abbott.
- Combinatorics including concepts of Graph Theory - V. K. Balakrishnan, Schaum's Outline Series, McGraw-Hill, INC.



### E- Learning websites:-

- <http://www.freebookcentre.net/maths-books-download/Lecture-Notes-for-College-Discrete-Mathematics.html>
- [https://edurev.in/studytube/Discrete-Mathematics-Class-Notes--Handwritten---En/1e99d2ca-6edf-4078-80a1-31d104ba010e\\_p](https://edurev.in/studytube/Discrete-Mathematics-Class-Notes--Handwritten---En/1e99d2ca-6edf-4078-80a1-31d104ba010e_p)
- <http://math.bit.edu.cn/docs/20200928043347839160.pdf>



# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARNIM SCIENCE COLLEGE

### DEPARTMENT OF MATHEMATICS

Operation research

Subject Code: 253030502

B.Sc. Semester -5

### Teaching & Evaluation Scheme:-

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 3               | -  | - | 3     | 3       | 30                | -  | 70       | -  | 100   |

### Objectives: –

- The aim of this subject is to present the important ideas in operation research using multiple method to student whose principal interest lie outside the field of mathematics.
- It is a subject which provides a vital arena where students can see the interaction of industrial mathematics and practical problems.

### Prerequisites

- A Candidate for admission to the Bachelor of Science (Mathematics) must have a 10+2 Science with A and B (Maths and Physics) Group. Provisional admission shall be provided subject to the Clearance of examinations and eligibility.

### Course outline:

- This Course designed for undergraduate and graduate students working on scientific, engineering, statistics, and mathematics majors this course serves as an introduction to operation research used to applied mathematics problems, with applications across the spectrum of description.



| Sr. No. | Course Contents  | Teaching hours |
|---------|--|----------------|
| 1       | <p><b><u>Unit: I</u></b></p> <p>Convex Set and Linear Programming Problem Convex set, Extreme points of a convex set, Convex combination, Examples of convex sets and Theorems on Convexity. Formulation Techniques of LP problems (Only Examples). Problem solving techniques for LP problems :Simplex method for solving LPP, Big-M (Penalty) method, Two- Phase method, Integer programming problem (Only Gomory's cutting plane method).</p>   | 10             |
| 2       | <p><b><u>Unit: II</u></b></p> <p>Duality and Dual simplex method Introduction, Definition of the dual problem, General rules for converting any primal problem into its dual, How to interpret the solution of the dual from its primal and vice versa, Comparison of the solution of the primal and its dual. Find initial solution for dual simplex table, Mathematical procedure to find solution by dual simplex method</p>  | 8              |
| 3       | <p><b><u>Unit: III</u></b></p> <p>Introduction of Transportation problems and Assignment problems Mathematical formulation, Tabular representation, Definitions, Methods for finding initial basic feasible solution (North West Corner Rule, Least Cost Method, Vogel's Approximation Method), Optimality test (MODI method), Degeneracy in Transportation Problem, Unbalanced Transportation Problem. Introduction of Assignment problem, Mathematical formulation of Assignment problem, Method for solving Assignment problem (Hungarian Method), Unbalanced Assignment problem, Examples.</p> | 14             |
| 4       | <p><b><u>Unit: IV</u></b></p> <p><b>Introduction to game</b></p>   | 10             |



## Learning Outcomes:-

- In this Mathematics student will learn how to convert real life problems into linear equations.
- They will learn to solve set of linear equations.
- Students will learn the concept transportation and assignment problems NWC rules and MODI method.

## Teaching & Learning Methodology: –

- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties.
- Provide learning materials in different formats (written, online, audio, video Podcast etc) to support key concepts/knowledge.
- Particularly at the start of a program /module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.
- Include inquiry based learning exercises in international or intercultural contexts.
- Include group work, with groups representing diverse cultures and nationalities.

## Reference Books:-

- Mathematical models in O.R. - J. K. Sharma, Tata-McGraw Hills book-company.
- Operations Research – Nita H Shah, Ravi Gor and Hardik Soni. PHI –Learning.
- Optimization method in O.R. & System Analysis - K. V. Mittal, New Age inter. Publishers.
- Operation Research - S. D. Sharma, Kedarnath Ramnath & Co.
- Operation Research - Kanti Swaroop & Man Mohan, Sultan Chand & Co.
- Linear Programming - L. I. Gass, Tata McGraw Hills book-company.
- Linear Programming - G. Hadley, Narosa Publishing house.
- Operation Research- A. M. Natarajan, P. Balasubramani, A. Tamilarasi, Pearson Education.

## E-learning websites for operation research:-

[https://www.mathcity.org/msc/notes/operation\\_research](https://www.mathcity.org/msc/notes/operation_research)

<https://web.itu.edu.tr/topcuil/ya/OR.pdf>

<http://www.svecw.edu.in/Docs%5CCSEOSLNotes2013.pdf>

<https://www.mathcity.org/msc/notes/operation-research-haidar-ali>

<https://www.math.cuhk.edu.hk/course/1920/math3215>





**SWARRNIM STARTUP & INNOVATION UNIVERSITY**  
**SCHOOL OF SCIENCE**  
**DEPARTMENT OF MATHEMATICS**

**CODE: 253030505**

**B.Sc.: SEM 5**

**Practicals list (practical of paper 501&502)**

**Unit I:**

1. Application of De-Moivre's theorem (to find the roots of an equation and simplify common statements)
- 2 Verification of Cauchy-Riemann equations (Cartesian & polar form).
- 3 Find the harmonic conjugate of a function and hence find corresponding analytic function.
4. If  $f(z) = u + iv$  is an analytic function then find  $f(z)$  when  $u, u - v, u + v$  is given

**Unit II:**

5. Problems on transformation under function  $w = \frac{1}{z}$ .
6. Problems on verification of conformality.
7. Find the Fourier series of functions –I.
8. Find the Fourier of functions-II.

**Unit III:**

9. Solve Linear programming problem by graphical method for two variable problem (3 problems)
10. Solve Linear Programming Problem by simplex method-I (3 problems)
11. Solve Linear Programming Problem by big-M method (3 problems)
12. Solve Linear Programming Problem by Two-phase method (3 problems)

**Unit IV:**

13. Using duality solve Linear Programming Problem (3 problems)
14. Using modi method to solve Transportation problem (Balanced) (3 problems)
15. Using modi method to solve Transportation problem (Unbalanced) (3 problems)
16. Using "Hungarian method" to solve Assignment problem (Balanced and Unbalanced) (3 Problems)

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**SWARRNIM STARTUP & INNOVATION UNIVERSITY**  
**SCHOOL OF SCIENCE**  
**DEPARTMENT OF MATHEMATICS**

**CODE: 253030505**  
**B.Sc.: SEM 5**

**Practical's list (practical of paper 503&504)**

**Unit I:**

1. Examples of binary relation.
2. Examples of reflexive and irreflexive relation
3. Examples of symmetric, antisymmetric & transitive relative.
4. Examples of partial ordering relation
5. Examples based on hasse diagram
6. Examples based on properties of lattice.
7. Examples of group theory.
1. Subgroup and illustrations, Lagrange's theorem and its applications.

**Unit II:**

1. Examples based on Lattice
2. Examples of Sublattice,
3. Examples of Homomorphism
4. Examples of Boolean Algebra
5. Examples of Subalgebra
6. Examples of Normal subgroup, Quotient group isomorphism

**Unit III:**

1. To simplify Boolean expression.
2. To find equivalent Boolean expression
3. To find minterms and maxterms in Boolean algebra.
4. To find value of Boolean expression
5. To check the homomorphism between to Boolean algebra.
6. Examples of Isomorphism of group
7. Examples of cyclic groups.

**Unit IV:**

1. Examples of Definite integral & contours, line integrals.
2. Examples of cyclic group.
3. Examples of kernel of homomorphism
4. Examples based on the Cauchy's theorem.



# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARNIM SCIENCE COLLEGE

### DEPARTMENT OF MICROBIOLOGY

#### BACTERIAL METABOLISM

Subject Code: 253040502

B.SC. Semester -5

#### Teaching & Evaluation Scheme

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 3               | -  | - | 3     | 3       | 30                | -  | 70       | -  | 100   |

#### Objectives

- To provide students the basic knowledge of Bacterial metabolism.
- The purpose of the course is to give student to introduction of enzyme kinetics, chemoheterotrophic, chemoautotrophic, phototrophic metabolism and biosynthesis.
- To provide an understanding of various pathways about metabolism process like TCA cycle, PPP pathways Glycolysis pathway etc.

#### Prerequisites

Student Must have studied B.Sc. with microbiology as a major subject and knowledge of basic Bacterial Metabolism.

#### Course outline



| Unit No. | Course Contents  | Teaching hours |
|----------|--|----------------|
| 1        | <b>Enzymes and Energy:</b> <ul style="list-style-type: none"> <li>Enzyme kinetics (A) Michaelis-Menten equation. (B) Lineweaver-Burk plot and its significance</li> <li>Metabolic regulation: Types and Significance.</li> <li>Energy: its generation and conservation.</li> <li>Modes of ATP generation.</li> </ul>   | 10             |
| 2        | <b>Chemo heterotrophic Metabolism:</b> <ul style="list-style-type: none"> <li>Utilizable substrates.</li> <li>Catabolism of glucose.</li> <li>TCA Cycle.</li> <li>Catabolism of Fatty acids and Proteins.</li> </ul>   | 10             |
| 3        | <b>Chemoautotrophic and Phototrophic metabolism:</b> <ul style="list-style-type: none"> <li>Physiological groups of chemoautotrophs.</li> <li>Generation of ATP and reducing power in chemoautotrophs, Phototrophic metabolism.</li> <li>Types of photophosphorylation-Cyclic and Non-cyclic photophosphorylation.</li> <li>Pathway for CO<sub>2</sub> fixation. Calvin-Benson cycle.</li> </ul> | 10             |
| 4        | <b>Biosynthesis:</b> <ul style="list-style-type: none"> <li>Principles governing biosynthesis.</li> <li>Assimilation of ammonia, nitrate, molecular nitrogen &amp; sulfate. Biosynthesis of saturated and unsaturated fatty acids.</li> <li>Biosynthesis of Phospholipids.</li> <li>Methods of studying of Biosynthesis.</li> </ul>  | 10             |
|          |  | 40             |



## Learning Outcomes

- The students will be able to understand the Knowledge of the Bacterial Metabolism to understand concepts of various pathways like PPP pathway, glycolysis pathways, TCA cycle etc.
- Student should be able to understand basic concepts of enzymes and energy, chemo heterotrophic metabolism, chemoautotrophic and phototrophic metabolism, Biosynthesis.
- Access information on a topic from a variety of sources, and be able to learn new things on one's own.

## Teaching & Learning Methodology

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

## Books Recommended

- General Microbiology, Stanier, R. Y., Ingrahm, J. L., Wheelis, M. L. and Painter, P. R. 5<sup>th</sup> edition (1995), Mac Millan Press Ltd., Hong Kong.
- Prescott, Harley, and Klein's Microbiology, J. M. Willey, L. M. Sherwood, C. J. Woolverton 7<sup>th</sup> Edition (2008), McGraw Hill Higher Education- USA .
- Principles of Microbiology, R. M. Atlas, 2nd Edition (Indian Edition) (2015), McGraw Hill.



- Principles of Biochemistry, Cox, M. M. and Nelson, D. L. Lehninger 5 thedn (2008), W. H. Freeman and Company, USA.





# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARNIM SCIENCE COLLEGE

### DEPARTMENT OF MICROBIOLOGY

#### BIOSAFETY, BIOETHICS & IPR

Subject Code: 253040504

B.Sc. Semester -5

#### Teaching & Evaluation Scheme

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 3               | -  | 3 | 3     | 3       | 30                | -  | 70       | -  | 100   |

#### Objectives

- To provide students basic knowledge of Biosafety & Risk assessment, Regulatory affairs, Bioethics and IPR
- The purpose of the course is to give students to introduction of biosafety and biosafety levels, GLP, GMP, QC and QA and also about Bioethics.
- To provide an understanding of Intellectual property and intellectual property rights, Patent process about novel innovation.

#### Prerequisites

Student must have studied Second year (SY) of B.Sc. with Microbiology as a major subject and knowledge of basic microbiology.

#### Course outline



| Sr. No. | Course Contents   | Teaching hours |
|---------|---|----------------|
| 1       | <b>Biosafety</b> <ul style="list-style-type: none"> <li>• Introduction of Biosafety</li> <li>• Mechanisms of Biosafety: Standard Laboratory practices &amp; Containment strategies</li> <li>• Biosafety levels</li> <li>• Biosafety guidelines in India</li> <li>• Laboratory biosecurity concept</li> <li>• Risk and Risk assessment</li> </ul>  | 10             |
| 2       | <b>Regulatory affairs</b> <ul style="list-style-type: none"> <li>• Good Laboratory Practices</li> <li>• Good Manufacturing Practices</li> <li>• Basic principles of Quality Control and Quality Assurance</li> <li>• Guidelines of QA and QC (raw materials, sterilization, media, products)</li> <li>• Validation study</li> <li>• Role of culture collection center, public health laboratories and regulatory agencies</li> </ul>                                      | 10             |
| 3       | <b>Bioethics</b> <ul style="list-style-type: none"> <li>• Basics of bioethics</li> <li>• Principles of bioethics</li> <li>• Regulatory concerns</li> <li>• International codes and guidelines in India</li> <li>• Role of NGOs in biological regulations</li> </ul>   | 10             |
| 4       | <b>Intellectual property rights</b> <ul style="list-style-type: none"> <li>• Introduction of intellectual property</li> <li>• International organization of IP</li> <li>• Types of IPR</li> <li>• Benefits, problems and management of IPR</li> <li>• Patent process</li> <li>• International harmonization of patent law</li> <li>• Patents of biotechnological process and their protection</li> <li>• Indian scenario</li> <li>• Infringement, case studies</li> </ul> | 10             |
|         |   | 40             |



## Learning Outcomes

- The students will be able to apply the knowledge of the biosafety to understand concepts of various fields like research fields, fermentation industries, food industries, analytical laboratories, QC and QA, etc.
- Student should be able to understand basic concepts of biosafety levels, Risk and Risk assessment, Biosecurity, basic knowledge of GLP and GMP, fundamentals of Quality control and Quality assurance, basic introduction and principles of bioethics as well as get some idea about intellectual properties and rights.
- Access information on a topic from a variety of sources, and be able to learn new things on one's own.
- Communicate verbally, graphically, and/or in writing the theoretical data and live examples clearly and concisely that incorporates the stylistic conventions used by microbiologists and researchers worldwide.

## Teaching & Learning Methodology

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc.) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

## Books Recommended

1. Deepa Goel., & Shomini Parashar. (2013) *IPR, Biosafety and Bioethics*
2. Raj Mohan Joshi. (2006) *Biosafety and Bioethics*



3. Michael R.W. Brown., & Peter Gilbert. (1995) *Microbiological Quality Assurance*
4. B.D. SINGH., (2003). *Biotechnology – expanding horizons*, Kalyani publication, Chapter 8
5. R Radhakrishnan., & S. Balasubramanian.(2008) *Intellectual Property Rights: Text and Cases*
6. V K Ahuja. (2015) *Intellectual Property Rights in India*



# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARNIM SCIENCE COLLEGE

### DEPARTMENT OF MICROBIOLOGY

#### Enzymology

Subject Code: 253040503

B.Sc. Semester-5

#### Teaching & Evaluation Scheme

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 3               | -  | - | 3     | -       | 30                | -  | 70       | -  | 100   |

#### Objectives

- To provide students basic knowledge of Enzymology.
- The purpose of the course is to introduce students to methods of microbiology and to develop required microbiological skills which will be helpful in their future.
- The present course opens the door to all of the abundant careers in and out of the area of biological sciences including health/ medical / Environmental Sciences.

#### Prerequisites

Student Must have Basic knowledge about terminology Enzymes and their industrial applications.

#### Course outline



| Unit. No. | Course Contents  | Teaching hours |
|-----------|--|----------------|
| 1         | <b>Enzymology</b> <ul style="list-style-type: none"> <li>General characteristics and classification, Terminology: Holoenzymes, coenzymes, Apo enzymes, cofactors, activators, inhibitors, units of enzyme activity, isoenzymes</li> <li>Turn over number, specific activity</li> <li>First order and zero order reactions</li> <li>Structure of active site of enzymes, specificity of enzyme action- Types and factors affecting enzyme activity. Brief introduction of allosteric enzymes</li> </ul> | 10             |
| 2         | <b>Enzyme kinetics</b> <ul style="list-style-type: none"> <li>Derivation of Michaelis and Menten equation and its modifications Line Weaver &amp; Burk plot</li> <li>Eadie-Hofstee and Hannes &amp; Woolf plots</li> <li>Enzyme Inhibition –competitive</li> <li>Non-competitive, uncompetitive, mixed &amp; substrate inhibition.</li> </ul>  | 10             |
| 3         | <b>Enzyme immobilization</b> <ul style="list-style-type: none"> <li>Types of immobilization</li> <li>Methods of immobilization</li> <li>Application, Advantages &amp; limitations of immobilization</li> <li>Introduction to reverse micelles and whole cell immobilization</li> </ul>   | 10             |
| 4         | <b>Industrial Important Enzymes</b> <ul style="list-style-type: none"> <li>Sources and applications of enzymes-</li> <li>Amylase, Protease and Lipase in industries (detergent, leather, food, dairy, Textile and medical).</li> <li>Methods of Industrial production of enzymes.</li> </ul>   | 10             |
|           |  | 40             |

### Learning Outcomes



- The students will be able to understand and deals with the biochemical nature and activity of enzymes and is a subject that has relevance to students from a wide range of disciplines.
- Student should be able to understand basic concepts of the present day scope and applications of enzymology.
- The course is designed to give students an understanding of procedures involved in purification of enzymes, enzymes assays and quantitative evaluation of the influencing parameters such as concentrations of substrate / enzyme, pH, temperature and effects of inhibitors on enzyme activity.
- This is a course where the topics to be studied include enzyme active sites / mechanisms of enzyme action; enzyme kinetics and regulation; Isozymes and their clinical significances /function relationship etc as tools for understanding functions of enzymes.

### **Teaching & Learning Methodology**

- We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.
- The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:
- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

### **Books Recommended**



- Enzymes: Biochemistry, Biotechnology, Clinical Chemistry 2nd Edition, *authored* by Trevor Palmer and Philip Bonne(2007)
- Textbook of biochemistry – Vasudevan Shreekumari(2017)
- Biochemistry – Lehninger 6<sup>th</sup> edition(2013)
- Topics in Enzyme & Fermentation Biotechnology Volumes by Wisemen(1983)
- Biology of Industrial Microorganisms A.L. Duncun(2016)
- Molecular Industrial Mycology Leong & Berka(1992)



**SWARNIM STARTUP & INNOVATION UNIVERSITY**

**SWARNIM SCIENCE COLLEGE**

**DEPARTMENT OF MICROBIOLOGY**

**FERMENTATION TECHNOLOGY- I**

**CODE: 253040501**

**B.Sc. 5<sup>th</sup> SEM**

**Teaching & Evaluation Scheme:-**

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 3               | -  | - | 3     | 3       | 30                | -  | 70       | -  | 100   |

**Objectives: -**

- To provide basic knowledge of bioprocess technology in the industry, how to isolate the micro-organisms, its preservation. How the strain can be improved for industrially important organisms. What are primary and secondary screening, how to isolate enzymes producing microbes.
- Need to know the importance of strain improvement, what different methods can be used for strain improvement. Students get to know about the use of precursors in the fermentation process.
- This study gives idea about the bioreactor design. Types of bioreactor used in the industry. how the sterilization of media and air can be done. Importance of mass transfer and determination of  $K_L a$ , inoculum development.
- The student will get an idea about kinetic of substrate and utilization of batch, types of fermentation i.e fed batch and batch fermentation. What can be control system for monitoring the fermentation process.
- To provide the idea about down streaming process how to get end product in the fermentation.

**Prerequisites:-**

Student must be passed second year B.Sc in Microbiology as major subject along with the knowledge of biology.

**Course outline:-**



| Sr. No. | Course Contents   | Number of Hours |
|---------|---|-----------------|
| 1.      | <b>Introduction to fermentation technology</b> <ul style="list-style-type: none"> <li>Fundamental concepts of fermentation</li> <li>Chronological development in industrial microbiology</li> <li>Introduction to the component parts of fermentation process</li> <li>Range of fermentation processes</li> </ul>   | 10              |
| 2.      | <b>Industrially important microorganisms</b> <ul style="list-style-type: none"> <li>SCREENING:               (A) Characteristics of industrially important microorganisms               (B) Primary screening of organic acid producers, Primary screening of antibiotics, growth factors, and enzyme producers.               (C) Significance of secondary screening             </li> <li>STRAIN IMPROVEMENT               (A) STRAGIES               i. Selection of induced mutants               ii. Selection of recombinants               (B) Strain improvement for modification of properties other than yield               (C ) Preservation: Principle, methods and quality control             </li> </ul> | 10              |
| 3.      | <b>Fermenter Design &amp; Fermentation Process</b> <ul style="list-style-type: none"> <li>Stirred tank bioreactor               (A) Basic functions of fermenter and design               (B) Structural components of fermentor               (C) Devices of aeration and agitation               (D) Devices for monitoring pH, temerpature, foam and dissolved oxygen             </li> <li>Types of fermentation - Submerge (Batch, Fed batch and Continuous).</li> <li>Solid state fermentation.</li> </ul>  | 10              |
| 4.      | <b>Fermentation media and inoculum development</b> <ul style="list-style-type: none"> <li>Fermentation media               (A) Principles of media formulation               (B) Media ingredients: water, carbon sources, nitrogen sources, minerals, growth factors, buffers, chelators, precursors, inducers, inhibitors, antifoam agents             </li> <li>Methods of sterilization               (A) Use of high pressure steam: principle, batch and Continuous sterilization process             </li> </ul>   | 10              |



|  |   |    |
|--|---|----|
|  | (B) Use of filtration: principle, types of filter. <ul style="list-style-type: none"> <li>Inoculum development: general principles for development of seed culture for bacterial, yeast and fungal processes</li> </ul> |    |
|  |   | 40 |

### Learning Outcomes:

- Student will learn about the bioprocess technology in the industry, how to isolate the micro-organisms, its preservation. How the strain can be improved for industrially important organisms. Types of substrate used for fermentation and about medium optimization.
- Provide an idea about the bioreactor design. Types of bioreactor used in the industry. how the sterilization of media and air can be done. Importance of mass transfer and determination of  $K_L a$ , inoculum development.
- Get knowledge about kinetic of substrate and utilization of batch, types of fermentation i.e fed batch and batch fermentation. What can be control system for monitoring the fermentation process.
- To provide the idea about down streaming process how to get end product in the fermentation. What different methods can be used for down streaming process.

### Teaching & learning Methodology:

- We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.
- The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:
- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.



### Basic Text & Reference Books:

- Principles of Fermentation Technology : Whitaker & Stanbury Comprehensive
- Biotechnology : Murray Moo Young
- Methods in Industrial Microbiology : Sikyta
- Fermentation Microbiology and Biotechnology, El Mansi and Bryc



# 2SWARNIM STARTUP & INNOVATION UNIVERSITY (SSIU)

## SWARRNIM SCIENCE COLLEGE

### DEPARTMENT OF PHYSICS

#### Electronic Spectra-1, Solid State Physics & Stat. Mech-1

Subject Code: 253050502

B.Sc. Semester 5

#### Teaching & Evaluation Scheme

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 3               | -  | 2 | 5     | 5       | 50                | 50 | 50       | -  | 150   |

#### Objectives

- Develop a solid grasp of core concepts and applications of molecular spectra, Raman spectra, quantum statistics and solid state physics. They learn how physics and other disciplines have impacted and continue to impact each other and society
- They develop laboratory skills throughout our curriculum via hands-on experiences with diverse experimental techniques and tools. They learn various approaches to data analysis and become comfortable using computational methods to analyze and solve problems.

#### Prerequisites

Fundamentals of spectroscopy, quantum mechanics and solid state physics.



## Course outline

| Sr. No. | Course Contents   | Teaching Hours |
|---------|---|----------------|
| 1       | <p><b>Types of Molecular Spectra and Molecular Energy States:</b> Separation of electronic and nuclear motion - The Born Oppenheimer approximation, types of molecular spectra.</p> <p><b>Pure Rotational Spectra:</b> Salient features of Rotational spectra, Molecular requirement for rotation spectra, experimental arrangement, Molecule as a rigid rotator, explanation of rotational spectra (without the process of solving Schrodinger equation to get energy formula), the non-rigid rotator, Isotope effect on rotational spectrum, tunable laser and pulse laser - introduction</p> <p><b>Vibrational - Rotational Spectra:</b> salient features of vibrational - Rotational spectra, Molecule as a harmonic oscillator, Molecule as anharmonic oscillator, Vibrational frequency and force constant for anharmonic oscillator, Fine structure of Infrared bands: Molecule as vibrating rotator, Diatomic molecule as symmetric top, Thermal distribution of vibrational and rotational levels.</p> | 14             |
| 2       | <p><b>Raman Spectra :</b> Nature of the Raman spectra, experimental arrangement for Raman spectra, Classical theory of Raman effect, Quantum theory of Raman effect, Raman spectra and Molecular structure, Infrared spectra versus Raman spectra, Laser as intense source.</p> <p><b>Classification of Molecular Electronic States:</b> Molecular electronic states, Symmetry properties of electronic eigenfunctions (symmetry classification of electronic states) <b>Fluorescence and Phosphorescence:</b> Luminescence, Mechanism of fluorescent emission, Mechanism of phosphorescent emission, Fluorescence spectrum compared with Raman spectrum.</p>   | 14             |
| 3       | <p><b>Formulation of Quantum Statistics:</b> Density matrix, Liouville's theorem in Quantum Statistical Mechanics, Condition for Statistical equilibrium, Ensemble in Quantum Mechanics, Problems</p> <p><b>Bose Einstein and Fermi Dirac Distributions:</b> Symmetry of wave functions, the Quantum Distribution functions, the Boltzmann limit of Boson and Fermions Gases, Evaluation of the Partition function, Partition function for Diatomic Molecules (a) translation partition function (b) rotational partition function (c) vibration partition function (d) electronic partition function Equation of state for an Ideal gas, The quantum mechanical Para magnetic susceptibility, problems</p>   | 14             |
| 4       | <p><b>Solid State Physics:</b></p> <p><b>Elastic constants and elastic waves:</b> Analysis of elastic strains, Dilation, stress components, Elastic compliance and stiffness constants, Elastic energy density, elastic stiffness constants of cubic crystals, Bulk modulus and compressibility. Elastic waves in cubic crystals, waves in the [100] direction, waves in the [110] direction.</p> <p><b>Free electron Fermi gas:</b> Introduction, Energy levels in one</p>   | 14             |



|  |   |  |
|--|---|--|
|  | dimension, Effect of temperature on the Fermi-Dirac distribution, Free electron gas in three dimensions and density of states, Heat capacity of the electron gas and experimental heat capacity of metals, Electrical conductivity and ohm's law, Experimental electrical resistivity of metals, Thermal conductivity of metals, ratio of thermal to electrical conductivity. |  |
|--|---|--|

### Learning Outcomes

- Exercise the use of physical intuition, including the ability to guess an approximate or conceptual answer to a physics problem and recognize whether or not the result of a calculation makes physical sense.
- Access information on a topic from a variety of sources, and be able to learn new things on one's own.
- Communicate verbally, graphically, and/or in writing the results of theoretical calculations and laboratory experiments in a clear and concise manner that incorporates the stylistic conventions used by physicists worldwide.

### Teaching & Learning Methodology:-

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the programme/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a programme/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.



## Books Recommended

- Atomic and Molecular Spectra : Laser by Rajkumar, Kedar Nath & Ram Nath
- Fundamentals of Statistical Mechanics by B. B. Laud, New Age International Publishers
- Introduction to Solid State Physics by C. Kittel, (Eight Edition) John Wiley and Sons
- Elements of Solid State Physics by J. P. Srivastava, Prentie-Hall of India Private Limited, New Delhi

## Resources

- The Flying Circus of Physics 2nd edition by Jearl Walker, Wiley India
- Six Ideas that shaped physics by Thomas A Moore, McGraw Hill education
- <http://www.howstuffworks.com/> -- Tech stuff
- How things works by Louis A Bloomfeild, Wiley Publications
- Physics of Everyday Phenomena by W. Thomas Griffith, Juliet Brosing, McGraw Hill Education
- Latest journals like BBC Knowledge, How things work-everyday technology explained by National Geographics.
- <http://www.sciencefairadventure.com/>



# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARNIM SCIENCE COLLEGE

### DEPARTMENT OF PHYSICS

#### Linear Electronic Circuits-1

Subject Code: 253050504

B.Sc. Semester 5

#### Teaching & Evaluation Scheme:-

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 3               | -  | 2 | 5     | 5       | 50                | 50 | 50       | -  | 150   |

#### Objectives: -

Physics students will:

- Develop a solid grasp of core concepts and applications of differential equation, 2<sup>nd</sup> order differential equation, classical mechanics and quantum mechanics. They learn how physics and other disciplines have impacted and continue to impact each other and society
- They develop laboratory skills throughout our curriculum via hands-on experiences with diverse experimental techniques and tools. They learn various approaches to data analysis and become comfortable using computational methods to analyze and solve problems.

#### Prerequisites

Basics of Electronic circuits.



## Course outline

| Sr. No. | Course Contents   | Teaching Hours |
|---------|---|----------------|
| 1       | <b>General amplifier characteristics:</b><br>Introduction, concept of amplification, amplifier notations, current gain, voltage gain, power gain, amplifier input resistance, amplifier output resistance, maximum power transfer, conversion efficiency, classes of amplifier operation, harmonic distortion, three point method of calculating harmonic distortion, five point method of calculating harmonic distortion, oscilloscope display of an amplifier dynamic transfer curve, measurement of harmonic distortion, other types of amplifier distortion, decibels, other equations for decibel computation, zero dB reference level, use of voltmeter as dB indicator, voltmeter range correction factor, impedance correction factor, frequency response curves, amplifier bandwidth, phase relationship in amplifier square wave testing.  | 14             |
| 2       | <b>Frequency response of a transistor amplifier:</b> Low frequency response of a transistor amplifier: Effect of an emitter by pass capacitor on low frequency response, effect of coupling capacitor on low frequency response, cascading of CE stages, mid frequency gains, low frequency response of cascaded stages amplifier, low frequency response to a square wave, transformer coupled transistor amplifier, low frequency response of TC amplifier, step response of a TC amplifier.<br><b>High frequency response of a transistor amplifier:</b> High frequency model for a CE amplifier, approximate CE high frequency model with a resistive load, CE short circuit current gain, high frequency current gain with a resistive load, high frequency response of cascaded CE stages, amplifier high frequency response to a square wave high frequency response of a transformer coupled amplifier. | 14             |
| 3       | <b>Circuit analysis, design and Flip-Flop:</b> Circuit analysis and design: Boolean laws and theorems, sum of products method, truth table to Karnaugh map, pairs, quads and octets, Karnaugh simplification, don't care conditions, product of sums method product of sums simplification, Exclusive OR gate.<br><b>FLIP- FLOP:</b> RS flip flop, clocked RS flip flop, D flip flop, Edged triggered D flip flop, JK flip flop, JK master slave flip flop  | 12             |
| 4       | <b>Network Transformations:</b> Reduction of complicated network, conversion between T and $\pi$ sections, bridge T network, the lattice network, superposition theorem, the reciprocity theorem, thevenin's theorem, Norton theorem, maximum power transfer theorem, compensation theorem.<br><b>Resonance :</b> Definition of Q, the figure of merit, series resonance, Bandwidth of the series resonant circuit, parallel resonance or antirsonance, current in antiresonant circuits, Bandwidth of antiresonant circuits.   | 12             |



## Learning Outcomes

- Exercise the use of physical intuition, including the ability to guess an approximate or conceptual answer to a physics problem and recognize whether or not the result of a calculation makes physical sense.
- Access information on a topic from a variety of sources, and be able to learn new things on one's own.
- Communicate verbally, graphically, and/or in writing the results of theoretical calculations and laboratory experiments in a clear and concise manner that incorporates the stylistic conventions used by physicists worldwide.

## Teaching & Learning Methodology

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the programme/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a programme/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

## Books Recommended

- Mathematical Physics by P.K. Chattopadhyay, New Age International Publishers (2006)
- Mathematical Methods for Physicists by G. Arfken, Academic Press
- Introduction to Classical Mechanics by R. G. Takawale and P. S. Puranik, Tata McGraw-Hill Publishing Co. Ltd.
- Classical Mechanics by A. B. Bhatia, Narosa Publication
- A Text Book of Quantum Mechanics by P. M. Mathews and K. Venketeshan, Tata McGraw-Hill Publishing Co. Ltd.
- Quantum Mechanics : Theory and Applications by A. Ghatak and S. Lokanathan, Macmillan India Limited



## E-Resources

- The Flying Circus of Physics 2nd edition by Jearl Walker, Wiley India
- Six Ideas that shaped physics by Thomas A Moore, McGraw Hill education
- <http://www.howstuffworks.com/> -- Tech stuff
- How things works by Louis A Bloomfeild, Wiley Publications
- Physics of Everyday Phenomena by W. Thomas Griffith, Juliet Brosing, McGraw Hill Education
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- <http://www.sciencefairadventure.com/>



# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARRNIM SCIENCE COLLEGE

### DEPARTMENT OF PHYSICS

#### Mathematical Physics, Quantum & Classical Mechanics-1

Subject Code: 53050501

B.Sc. Semester 5

#### Teaching & Evaluation Scheme:-

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 3               | -  | 2 | 5     | 5       | 50                | 50 | 50       | -  | 150   |

#### Objectives

- Develop a solid grasp of core concepts and applications of differential equation, 2<sup>nd</sup> order differential equation, classical mechanics and quantum mechanics. They learn how physics and other disciplines have impacted and continue to impact each other and society
- They develop laboratory skills throughout our curriculum via hands-on experiences with diverse experimental techniques and tools. They learn various approaches to data analysis and become comfortable using computational methods to analyze and solve problems.

#### Prerequisites

Basics of calculus and mathematics, classical mechanics and quantum mechanics.



## Course outline

| Sr. No. | Course Contents  | Teaching Hours |
|---------|--|----------------|
| 1       | <b>Differential equations:</b><br>Some partial differential equations in physics, the method of Separation of variables, separation of Helmboltz equation in Cartesian coordinates, in spherical polar and cylindrical Coordinates, Laplace's equation in various coordinates, Choice of coordinate system and separability of a partial differential equation, Parabolic coordinates system, Prolate Spheroidal coordinates system, various examples based on the separation of variables.  | 12             |
| 2       | <b>2nd order differential equations:</b><br>Ordinary and Singular points, Series solution around an ordinary point, Series solution around a regular singular point: the method of Frobenius, Getting a second solution, Alternative method of getting the second solution, System of linear first order differential equations, Non-linear differential equations, related examples.  | 12             |
| 3       | <b>Classical Mechanics:</b><br><b>Lagrangian Formulation:</b> Introduction, Constraints, holonomic and non-holonomic constraints, scleronomous and rheonomous constraints, generalized coordinates, D'alembert's principle, Lagrange's equations, a general expression for kinetic energy, Symmetries and the laws of conservation, Cyclic or ignorable coordinates (including illustrations), Velocity dependent potential of electromagnetic field, Rayleigh's dissipation function. <b>Motion of a rigid body:</b> Introduction, Euler's theorem, Angular momentum and kinetic energy, The inertia tensor, Euler's equations of motion, Torque free motion, Euler's Angles, Motion of a symmetric top, Nutational motion. | 14             |
| 4       | <b>Quantum Mechanics: Exactly soluble Eigenvalue problems:</b><br>Introduction, the simple harmonic oscillator, the Schrödinger equation and energy eigenvalues, the energy eigenfunctions, properties of stationary states, the abstract operator method, Coherent states, the angular momentum operators, the eigenvalue equation for $L^2$ , separation of variables, admissibility conditions on solutions, eigenvalues, the eigenfunctions, Spherical harmonics, Physical interpretation, Parity. Angular momentum in stationary states of systems with spherical symmetry  | 14             |



## Learning Outcomes

- Exercise the use of physical intuition, including the ability to guess an approximate or conceptual answer to a physics problem and recognize whether or not the result of a calculation makes physical sense.
- Access information on a topic from a variety of sources, and be able to learn new things on one's own.
- Communicate verbally, graphically, and/or in writing the results of theoretical calculations and laboratory experiments in a clear and concise manner that incorporates the stylistic conventions used by physicists worldwide.

## Teaching & Learning Methodology

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the programme/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
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- Introduction to Classical Mechanics by R. G. Takawale and P. S. Puranik, Tata McGraw-Hill Publishing Co. Ltd.
- Classical Mechanics by A. B. Bhatia, Narosa Publication
- A Text Book of Quantum Mechanics by P. M. Mathews and K. Venketeshan, Tata McGraw-Hill Publishing Co. Ltd.
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- <http://www.sciencefairadventure.com/>



# SWARNIM STARTUP & INNOVATION UNIVERSITY (SSIU)

## SWARNIM SCIENCE COLLEGE

### DEPARTMENT OF PHYSICS

#### Nuclear physics-1 & Electrodynamics-1

Subject Code: 253050503

B.Sc. Semester 5

#### Teaching & Evaluation Scheme:-

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 3               | -  | 2 | 5     | 5       | 50                | 50 | 50       | -  | 150   |

#### Objectives: -

Physics students will:

- Develop a solid grasp of core concepts and applications of electromagnetic induction, Electromagnetic radiation, alpha, beta ray and gamma rays. They learn how physics and other disciplines have impacted and continue to impact each other and society
- They develop laboratory skills throughout our curriculum via hands-on experiences with diverse experimental techniques and tools. They learn various approaches to data analysis and become comfortable using computational methods to analyze and solve problems.

#### Prerequisites

Fundamentals of Electromagnetics and Nuclear Physics.



## Course outline

| Sr. No. | Course Contents   | Teaching Hours |
|---------|---|----------------|
| 1       | <b>Electromagnetic induction:</b> Hysteresis, Maxwell's equations, Decay of free charge, Potentials of electromagnetic fields, More about the Lorentz gauge condition, Field energy and Field momentum.<br><b>Electromagnetic waves:</b> Plane waves in non-conducting media, Polarizations, Energy flux in a plane wave, Radiation pressure and Momentum, Plane waves in conducting medium, Skin effect.   | 12             |
| 2       | <b>Electromagnetic Radiation:</b> Retarded Potential, Radiation from an oscillating dipole, Linear Antenna, Lienard-Wiechert Potentials, Potentials for a charge in uniform motion – Lorentz formula, Fields of an accelerated charge, Radiation from an acceleration charged particle at low velocity, Radiation when the velocity and acceleration of the particles are collinear, Radiation from a charged particle moving in a circular orbit, Electric quadrupole radiation.   | 12             |
| 3       | <b>Alpha and Beta Rays:</b><br><b>Alpha Rays:</b> Range of alpha particles, Disintegration energy of the spontaneous alpha decay, Alpha decay paradox - barrier penetration.<br><b>Beta Rays:</b> Introduction, Continuous Beta ray spectrum - difficulties encountered to understand it, Pauli's Neutrino Hypothesis, Fermi's theory of Beta decay, the detection of neutrino, Parity non-conservation in Beta decay.  | 12             |
| 4       | <b>Gamma Rays and The liquid drop model of the nucleus:</b><br><b>Gamma Rays:</b> Introduction, Gamma-ray emission – selection rules, Internal conversion, Nuclear isomerism.<br><b>The liquid drop model of the nucleus:</b> Introduction, Binding energies of nuclei : plot of $B/A$ against $A$ ., Weizsacher's semi empirical mass formula Mass parabolas: prediction of stability against Beta decay for members of an isobaric family, Stability limits against spontaneous fission, Barrier penetration - decay probabilities for spontaneous fission, Nucleon emission. | 14             |

## Learning Outcomes

- Exercise the use of physical intuition, including the ability to guess an approximate or conceptual answer to a physics problem and recognize whether or not the result of a calculation makes physical sense.
- Access information on a topic from a variety of sources, and be able to learn new things on one's own.
- Communicate verbally, graphically, and/or in writing the results of theoretical calculations and laboratory experiments in a clear and concise manner that incorporates the stylistic conventions used by physicists worldwide.



## Teaching & Learning Methodology:-

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

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## Books Recommended

- Introduction to Electromagnetics by D.J.Griffiths by PHI publication.
- Electromagnetics by B. B. Laud, 2nd Edition, Wiley Eastern Ltd
- Nuclear Physics - An Introduction by S.B. Patel, New Age International
- Nuclear Physics by D. C. Tayal, Himalaya Publisher

## E-Resources

- The Flying Circus of Physics 2nd edition by Jearl Walker, Wiley India
- Six Ideas that shaped physics by Thomas A Moore, McGraw Hill education
- <http://www.howstuffworks.com/> -- Tech stuff
- How things work by Louis A Bloomfeild, Wiley Publications
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- <http://www.sciencefairadventure.com/>



# SWARNIM STARTUP & INNOVATION UNIVERSITY (SSIU)

## SWARNIM SCIENCE COLLEGE

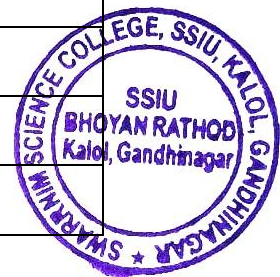
### DEPARTMENT OF PHYSICS

#### PHYSICS

#### B.Sc. Semester 5

#### Practical List

| Sr. No. | Practical Name  |
|---------|---|
| 1       | Acceleration due to gravity by Kater's pendulum (fixed knife edges).  |
| 2       | To determine melting point of a substance by platinum resistance thermometer using Callender- Griffiths bridge              |
| 3       | Characteristics of G.M. Tube  |
| 4       | Viscosity by Log decrement  |
| 5       | Hall effect   |
| 6       | Refractive index by total internal reflection using Gauss eye piece   |
| 7       | Fabry-Perot etalon. Determination of the thickness of air film and wavelength of light using spectrometer                   |
| 8       | Michelson interferometer. To determine the wavelength of monochromatic light  |
| 9       | To measure a threshold current of a LASER diode at room temperature   |
| 10      | An optical method of determining dielectric constant, dipole moment and polarizability of a polar liquid using Hollow prism |
| 11      | Mutual Inductance by Ballistic Galvanometer   |
| 12      | Determination of capacity of Schering Bridge  |
| 13      | Determination of Curie temperature of ferroelectric ceramic   |
| 14      | I -V Characteristics of Solar Cell and to determine fill-factor, voltage-factor and efficiency                              |
| 15      | Determination of unknown frequency using Wein Bridge  |
| 16      | Hartley Oscillator. Measurement of frequency by C.R.O. (Transistorized).  |
| 17      | Series and parallel resonance. To find the band width and Q value of a coil.  |
| 18      | Frequency response of CE amplifier  |
| 19      | RS Flip flop using gates (IC 7400, 7402) and D Flip flop using IC 7474  |
| 20      | A.C. Circuit analysis by C.R.O. Measurement of frequency and phase difference   |





# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARNIM SCIENCE COLLEGE

### DEPARTMENT OF BIOTECHNOLOGY

#### BIOSAFETY, BIOETHICS & IPR

Subject Code: 253010604

B.Sc. Semester -6

#### Teaching & Evaluation Scheme

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 3               | -  | - | 3     | 3       | 30                | -  | 70       | -  | 100   |

#### Objectives

- To provide students basic knowledge of Biosafety & Risk assessment, Regulatory affairs, Bioethics and IPR
- The purpose of the course is to give students to introduction of biosafety and biosafety levels, GLP, GMP, QC and QA and also about Bioethics.
- To provide an understanding of Intellectual property and intellectual property rights, Patent process about novel innovation.

#### Prerequisites

Student must have studied Second year (SY) of B.Sc. with Microbiology as a major subject and knowledge of basic microbiology.



## Course outline

| Sr. No. | Course Contents   | Teaching hours |
|---------|---|----------------|
| 1       | <b>Biosafety</b> <ul style="list-style-type: none"> <li>• Introduction of Biosafety</li> <li>• Mechanisms of Biosafety: Standard Laboratory practices &amp; Containment strategies</li> <li>• Biosafety levels</li> <li>• Biosafety guidelines in India</li> <li>• Laboratory biosecurity concept</li> <li>• Risk and Risk assessment</li> </ul>  | 10             |
| 2       | <b>Regulatory affairs</b> <ul style="list-style-type: none"> <li>• Good Laboratory Practices</li> <li>• Good Manufacturing Practices</li> <li>• Basic principles of Quality Control and Quality Assurance</li> <li>• Guidelines of QA and QC (raw materials, sterilization, media, products)</li> <li>• Validation study</li> <li>• Role of culture collection center, public health laboratories and regulatory agencies</li> </ul>                                      | 10             |
| 3       | <b>Bioethics</b> <ul style="list-style-type: none"> <li>• Basics of bioethics</li> <li>• Principles of bioethics</li> <li>• Regulatory concerns</li> <li>• International codes and guidelines in India</li> <li>• Role of NGOs in biological regulations</li> </ul>   | 10             |
| 4       | <b>Intellectual property rights</b> <ul style="list-style-type: none"> <li>• Introduction of intellectual property</li> <li>• International organization of IP</li> <li>• Types of IPR</li> <li>• Benefits, problems and management of IPR</li> <li>• Patent process</li> <li>• International harmonization of patent law</li> <li>• Patents of biotechnological process and their protection</li> <li>• Indian scenario</li> <li>• Infringement, case studies</li> </ul> | 10             |
|         |   | 40             |

## Learning Outcomes

- The students will be able to apply the knowledge of the biosafety to understand concepts of various fields like research fields, fermentation industries, food industries, analytical laboratories, QC and QA, etc.



- Student should be able to understand basic concepts of biosafety levels, Risk and Risk assessment, Biosecurity, basic knowledge of GLP and GMP, fundamentals of Quality control and Quality assurance, basic introduction and principles of bioethics as well as get some idea about intellectual properties and rights.
- Access information on a topic from a variety of sources, and be able to learn new things on one's own.
- Communicate verbally, graphically, and/or in writing the theoretical data and live examples clearly and concisely that incorporates the stylistic conventions used by microbiologists and researchers worldwide.

### Teaching & Learning Methodology

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc.) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

### Books Recommended

1. Deepa Goel., & Shomini Parashar. (2013) *IPR, Biosafety and Bioethics*
2. Raj Mohan Joshi. (2006) *Biosafety and Bioethics*
3. Michael R.W. Brown., & Peter Gilbert. (1995) *Microbiological Quality Assurance*
4. B.D. SINGH., (2003). *Biotechnology – expanding horizons*, Kalyani publication, Chapter 8
5. R Radhakrishnan., & S. Balasubramanian.(2008) *Intellectual Property Rights: Text and Cases*
6. V K Ahuja. (2015) *Intellectual Property Rights in India*



# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARNIM SCIENCE COLLEGE

### DEPARTMENT OF BIOTECHNOLOGY

#### Enzymology and Kinetics

Subject Code: 253010602

B.Sc. Semester-6

#### Teaching & Evaluation Scheme

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 3               | -  | - | 3     | 3       | 30                | -  | 70       | -  | 100   |

#### Objectives

- To provide students basic knowledge of Enzymology.
- The purpose of the course is to introduce students to methods of microbiology and to develop required microbiological skills which will be helpful in their future.
- The present course opens the door to all of the abundant careers in and out of the area of biological sciences including health/ medical / Environmental Sciences.

#### Prerequisites

Student Must have Basic knowledge of Enzymes and their industrial application.

#### Course outline



| Unit No. | Course Contents  | Teaching hours |
|----------|--|----------------|
| 1        | <b>Enzymology</b> <ul style="list-style-type: none"> <li>General characteristics and classification Terminology: Holoenzymes, coenzymes, Apo enzymes, cofactors, activators, inhibitors units of enzyme activity and isoenzymes</li> <li>Turn over number, specific activity first order and zero order reactions Structure of active site of enzymes, specificity of enzyme action Types and factors affecting enzyme activity</li> <li>Brief introduction of Allosteric enzymes</li> </ul> | 10             |
| 2        | <b>Enzyme kinetics</b> <ul style="list-style-type: none"> <li>Derivation of Michaelis and Menten equation and its modifications Line Weaver &amp; Burk plot</li> <li>Eadie-Hofstee and Hannes &amp; Woolf plots</li> <li>Enzyme Inhibition – competitive, non competitive</li> <li>Uncompetitive, mixed &amp; substrate inhibition.</li> </ul>   | 10             |
| 3        | <b>Enzyme immobilization</b> <ul style="list-style-type: none"> <li>Types of immobilization</li> <li>Methods of immobilization</li> <li>Application, advantages &amp; limitations of immobilization.</li> <li>Introduction to reverse micelles.</li> </ul>   | 10             |
| 4        | <b>Industrial enzymes:</b> <ul style="list-style-type: none"> <li>Sources and applications of enzymes-</li> <li>Amylase, protease and lipase in industries (detergent, leather, food, dairy, Textile and medical). Industrial production of enzymes.</li> </ul>  | 10             |
|          |  | 40             |



## Learning Outcomes

- The students will be able to understand and deals with the biochemical nature and activity of enzymes and is a subject that has relevance to students from a wide range of disciplines.
- Student should be able to understand basic concepts of the present day scope and applications of enzymology.
- The course is designed to give students an understanding of procedures involved in purification of enzymes, enzymes assays and quantitative evaluation of the influencing parameters such as concentrations of substrate / enzyme, pH, temperature and effects of inhibitors on enzyme activity.
- This is a course where the topics to be studied include enzyme active sites / mechanisms of enzyme action; enzyme kinetics and regulation; Isozymes and their clinical significances /function relationship etc as tools for understanding functions of enzymes.

## Teaching & Learning Methodology

- We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.
- The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:
- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.



### Books Recommended

- Enzymes: Biochemistry, Biotechnology, Clinical Chemistry 2nd Edition, *authored* by Trevor Palmer and Philip Bonne(2007)
- Textbook of biochemistry – Vasudevan Shreekumari(2017)
- Biochemistry – Lehninger 6<sup>th</sup> edition(2013)
- Topics in Enzyme & Fermentation Biotechnology Volumes by Wisemen(1983)
- Biology of Industrial Microorganisms A.L. Duncun(2016)
- Molecular Industrial Mycology Leong & Berka(1992)



# SWARRNIM STARTUP & INNOVATION UNIVERSITY

## SWARRNIM SCIENCE COLLEGE

### DEPARTMENT OF Biotechnology

#### Fermentation Technology-II

CODE: 253010601

B.Sc. 6<sup>th</sup> Sem

#### Teaching & Evaluation Scheme:-

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 3               | -  | - | 3     | 3       | 30                | -  | 70       | -  | 100   |

#### Objectives:-

- To provide the idea about down streaming process how to get end product in the fermentation. Different methods used for separation of products from fermentation broth.
- Students will get an idea about quality control of the fermented products made using different methods.
- To provide students basic knowledge of Microbial Biotechnology. It covers up general concept of microbial production and fermentation of various products.
- The purpose of the course is to give knowledge about production process using fermentation technology and microorganisms of antibiotics, enzymes, industrial alcohol, organic acids, vitamins, SCP, as well as mushrooms.

#### Prerequisites:-

Students must have passed 2<sup>nd</sup> year B.Sc in Microbiology along with basic knowledge of biology



**Course outline:-**

| Sr. No. | Course Contents  | Number of Hours |
|---------|--|-----------------|
| 1.      | <b>Downstream processing</b> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Removal of microbial cells and suspended solids                             (A) Foam separation                             (B) Precipitation                             (C) Filtration                             (D) Centrifugation                         </li> <li>• Cell disruption methods                             (A) Physico-mechanical methods                             (B) Chemicals methods                         </li> <li>• Product concentration and purification                             (A) Liquid -liquid extraction                             (B) Membrane processes                         </li> <li>• Finishing stages                             (A) Drying                             (B) Crystallization                         </li> <li>• Effluent treatment</li> </ul> | 10              |
| 2.      | <b>Quality control of fermentation products-</b> <ul style="list-style-type: none"> <li>• Detection and assay of fermentation products                             (A) Physical assays: Titration and gravimetric analysis, turbidity and cell yield determination                             (B) Chemical assay: Chromatography, spectrophotometry                             (C ) Biological assays: Microbial assay                         </li> <li>• Microbial quality assurance                             (A) Sterility testing                             (B)LAL test                         </li> <li>• Fermentation economics</li> </ul>   | 10              |
| 3.      | <b>Fermentation production of :</b> <ul style="list-style-type: none"> <li>• Alcohol</li> <li>• Cheese</li> <li>• Baker's Yeast</li> <li>• Glutamic acid</li> <li>• Citric acid</li> </ul>   | 10              |
| 4.      | <b>Fermentative production of:</b> <ul style="list-style-type: none"> <li>• Penicillin and its conversion to semisynthetic derivatives,</li> <li>• Cyanocobalamin</li> <li>• Steroids</li> <li>• Amylase</li> <li>• carotenoids</li> </ul>   | 10              |



### Learning Outcomes:

- To provide the idea about down streaming process how to get end product in the fermentation. What different methods can be used for down streaming process.
- The students will be able to apply the knowledge of the Microbial production to understands concepts of various fields like food and dairy industries, pharmaceutical industries, Fermentation industries, beverages industries, etc.
- Student should be able to understand basic concepts of various products like alcohol, cheese, amino acids like glutamic acid, citric acid fermentation economics.
- Access information on a topic from a variety of sources, and be able to learn new things on one's own.
- Communicate verbally, graphically, and/or in writing the theoretical data clearly and concisely that incorporates the stylistic conventions used by Microbiologists, biotechnologist, researchers and scientists worldwide.

### Teaching & Learning Methodology

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc.) to support key concepts/knowledge. Particularly at the start of a program/module



or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

### Books Recommended

1. **“Principles of Fermentation Technology**, Stanbury P F, Whitaker A and Hall SJ, (1995) 2<sup>nd</sup> edition, Pergamon Press, London, UK.
2. **Industrial Microbiology: An Introduction**, Waites, M J and Morgan N L, (2002) Blackwell Science.
3. **Biotechnology: A Textbook of Industrial Microbiology**, Crueger W and Crueger A, (2000) 2<sup>nd</sup> edition, Panima Publishing Corporation, New Delhi, India.
4. **Fermentation Microbiology and Biotechnology**, El-Mansi E M T, Bryce CFA, Dahhou B, Sanchez S, Demain AL, Allman AR (eds), (2011) 3<sup>rd</sup> edition, CRC Press; Taylor and Francis Group, Boca Raton.
5. **Industrial Microbiology**, Casida LE, Jr. (1968), Wiley Eastern Ltd, New Delhi, India.



# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARNIM SCIENCE COLLEGE

### DEPARTMENT OF BIOTECHNOLOGY

#### MOLECULAR BIOLOGY-II Subject Code: 253010603 B.Sc. Semester -6

#### Teaching & Evaluation Scheme

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 3               | -  | - | 3     | -       | 30                | -  | 70       | -  | 100   |

#### Objectives

- To provide students basic knowledge of Molecular biology about eukaryotes.
- The purpose of the course is to give students to introduction of replication, transcription and translation in eukaryotes.
- To provide an understanding of DNA damage and repair system and also get idea about transposons and its applications.

#### Prerequisites

Student must have knowledge about basic molecular biology with basic idea about central dogma of life.



## Course outline

| Unit No. | Course Contents   | Teaching hours |
|----------|---|----------------|
| 1        | <b>Replication in eukaryotes</b> <ul style="list-style-type: none"> <li>Genome organization and DNA packaging</li> <li>Replication in Eukaryotes-Problems associated with eukaryotic replication</li> <li>Enzymes &amp; Proteins involved in replication with its function</li> </ul>   | 10             |
| 2        | <b>Transcription in Eukaryotes</b> <ul style="list-style-type: none"> <li>Central Dogma: The flow of genetic information</li> <li>Initiation, Elongation and Termination.</li> <li>Types of RNA polymerase</li> <li>Types of promoter, enhancers &amp; silencers</li> <li>Post Transcriptional modification-types of introns, splicing of RNA, t-RNA, r-RNA, modification of 5' and 3' ends.</li> </ul>   | 10             |
| 3        | <b>Translation in Eukaryote</b> <ul style="list-style-type: none"> <li>Eukaryotic ribosome</li> <li>Initiation, Elongation and Termination</li> <li>Post-translational modification</li> <li>Protein targeting</li> </ul>   | 10             |
| 4        | <b>Mutation and DNA repair</b> <ul style="list-style-type: none"> <li>Types of mutation: Spontaneous &amp; Induced mutation</li> <li>Effect of mutation in protein coding gene: Forward, Reverse &amp; Suppressor mutation</li> <li>DNA repair mechanisms: Direct, Indirect &amp; SOS repair system</li> <li>Transposable elements: Structure, Properties, Insertion Sequences (IS), Tn elements, Transposon mutagenesis, Application of transposons</li> </ul> | 10             |
|          |   | 40             |

## Learning Outcomes

- The students will be able to apply the knowledge of the Molecular biology to understand concepts of various fields like research fields, Gene manipulation, Genetic engineering, etc.
- Student should be able to understand basic concepts of Replication, transcription and translation in eukaryotes, protein targeting, DNA mutation and repair mechanisms, transposons, application of transposons.
- Access information on a topic from a variety of sources, and be able to learn new things on one's own.
- Communicate verbally, graphically, and/or in writing the theoretical data clearly and concisely that incorporates the stylistic conventions used by biotechnologist worldwide.

## Teaching & Learning Methodology



We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc.) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

### **Books Recommended**

1. Lynne Cassimeris, Viswanath R Lingappa, George Plopper (Eds) (2011). *Lewin's Cells* (II Edn). Jones and Bartlett Publishers.
2. Gerald Karp (2008). *Cell and Molecular biology: Concepts and experiments* (V Edn). John Wiley & Sons.
3. James D Watson, Tania A Baker, Stephen P Bell, Alexander Gann, Michael Levine, Richard Losick (2009). *Molecular biology of the gene* (V Edn). Pearson.
4. Wayne M Becker, Lewis J Kleinsmith, Jeff Hardin (2007). *The world of the cell* (VI Edn). Pearson



# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARNIM SCIENCE COLLEGE

### DEPARTMENT OF CHEMISTRY

#### Analytical Chemistry-C -II

CODE : 253020604

B.Sc. 6<sup>th</sup> Semester

#### Teaching & Evaluation Scheme:-

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 4               | -  | 2 | 6     | 6       | 30                | 50 | 70       | -  | 150   |

**Objectives:-** To provide basic knowledge Chemistry

**Prerequisites:-**

**Course outline:-**

| Sr. No. | Course Contents   | Number of Hours |
|---------|---|-----------------|
| 1       | <b>(A) Errors and treatment of Analytical data:</b><br>Significant figures, Accuracy and precision, Types of errors and minimization of errors. Ways of expressing accuracy and precision. Rejection of a result, Test of significance (Q-Test, Student t-Test and F-Test) correlation coefficient. Literature of Analytical Chemistry.<br><b>(B) Organic reagents used in quantitative Analysis</b><br>Separation of methods with 8-Hydroxy Quinoline, Cupferron and DMG | 14              |
| 2       | <b>(A) Chromatographic methods:</b><br>General principle, classification of chromatographic separation. Ion exchange chromatography (Ion Exchange equilibria, Types of Ion Exchange capacity, Application of Ion Exchange resins). Gas Chromatography, Instrumentation and evolution of data. High Performance Liquid Chromatography (HPLC) Principle and Instrumentation.  | 14              |



|   |  |    |
|---|--|----|
|   | <b>(B) Solvent Extraction Separation:</b><br>Principles of solvent extraction, choice of solvent, distribution coefficient, distribution ratio, percentage (%) extraction. The extraction process, solvent extraction of metals, selective extraction and separation efficiency.   |    |
| 3 | <b>(A) Polarography:</b><br>Introduction, Principle, electrode, Types of currents, Determination of half wave potential, Ilkovic equation, methods of determining concentration (Standard addition method and Calibration method)<br><b>(B) Potentiometry:</b><br>The scope of potentiometric titrations, Precipitation and neutralization titrations, Graphical method including Gran's plot for selecting end point, Differential titration, Dead stop titration, Ion selective Electrode, various types of Ion selective Electrodes and use of Calcium ion selective electrode.   | 14 |
| 4 | <b>Miscellaneous Titrations:</b><br><b>(A) Acid Base Titrations:</b><br>Titration of polyprotic acid and mixture of acids, titration of salts, Differential Alkali titration.<br><b>(B) Redox titration:</b><br>Titration involving Iodine: iodimetry and iodometry, Titration with reducing agents and oxidising agents, metallic reductors.<br><b>(C) Complexometric titration:</b><br>EDTA titration techniques-Direct, Back, Displacement and Indirect Titration, Masking, Demasking agent, ligand effect and Hydrolysis of EDTA complex, Auxiliary complexing agent- EDTA titration with an auxiliary complexing agent. | 14 |

### Learning Outcomes:-

At the end of the course the student would have sufficient knowledge of Biochemistry

### Teaching & Learning Methodology:-

- Use of audiovisual aids.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

### Books Recommended:

- (1) Analytical Chemistry: Gary D. Christian, 6<sup>th</sup> Edition; Wiley & Sons
- (2) Fundamentals of Analytical Chemistry: D. A. Skoog, D. M. West and F. J. Holler, 9<sup>th</sup> Edition, Cengage Learning.
- (3) Instrumental Methods of analysis: (CBS) H.H. Willard, L.L. Merritt, J.A. Dean
- (4) Solvent extraction in Analytical Chemistry: G.H. Morrison, F. Friessner, John Wiley & Sons, NY.
- (5) Instrumental Methods of Inorganic Analysis: A.I. Vogel, ELBS
- (6) Chemical Instrumentation: A Systematic approach- H.A. Strobel
- (7) The principles of ion-selective electrodes and membrane transport: W.E. Morf



- (8) Principles of Instrumental Analysis: Douglas A. Skoog., F. James Holler, Stanley R. Crouch, Cengage Learning; 6th Edition.
- (9) Quantitative Chemical Analysis: Daniel C. Harris, W H Freeman, New York.
- (10) Ion exchange and solvent extraction of metal compounds: Y. Macros, A.S.Kertes, Wiley, Interscience.





# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARNIM SCIENCE COLLEGE

### DEPARTMENT OF CHEMISTRY

#### CHEMISTRY PRACTICAL

CODE : 253020605

B.Sc. 5<sup>th</sup> Semester

#### Teaching & Evaluation Scheme:-

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 4               | -  | 2 | 6     | 6       | 30                | 50 | 70       | -  | 150   |

**Objectives:-** To provide basic knowledge Chemistry

#### Practical [I] (Inorganic and Physical Practicals)

##### [A] Inorganic Quantitative Analysis:

##### (I) Gravimetric determination of the radicals:

(After removal of interfering radicals in mixed solution)

- (a) BaCl<sub>2</sub>, FeCl<sub>3</sub> and HCl (Determination of Ba as BaSO<sub>4</sub>)
- (b) CuCl<sub>2</sub>, MnCl<sub>2</sub> and HCl (Determination of Mn as Mn<sub>2</sub>P<sub>2</sub>O<sub>7</sub>)
- (c) CuSO<sub>4</sub>, FeSO<sub>4</sub>(NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> and H<sub>2</sub>SO<sub>4</sub> (Determination of Fe as Fe<sub>2</sub>O<sub>3</sub>)
- (d) CuSO<sub>4</sub>, Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> and H<sub>2</sub>SO<sub>4</sub> (Determination of Al as Al<sub>2</sub>O<sub>3</sub>)

##### (II) Analysis of Alloy:

- (a) Brass ( Cu → Volumetrically, Zn → Gravimetrically)
- (b) German Silver ( Cu → Volumetrically, Ni → Gravimetrically)

##### [B] Physical: (Kinetics and Instruments)

##### (1) Kinetics:

Investigate the order of reaction in the following experiments by graphical method .

Exp 1: Reaction between K<sub>2</sub>S<sub>2</sub>O<sub>8</sub> and KI (a =b)



Exp 2: Reaction between  $\text{KBrO}_3$  and  $\text{KI}$  ( a □ b )

Exp 3: Reaction between  $\text{H}_2\text{O}_2$  and  $\text{HI}$  ( a = b )

## (2) Instruments:

Exp 1: Titration of unknown strength of  $\text{HCl}$  with standard  $\text{NaOH}$  solution using pH meter.

Exp 2: Conductometric titration involving precipitation of  $\text{BaCl}_2$  with  $\text{K}_2\text{CrO}_4$ .

Exp 3 : To determine the concentration of  $\text{CrO}_4^{2-}$  and  $\text{Ni}^{2+}$  in solution by colourimetry.

Exp 4 : To determine specific rotation of glucose and hence to find out unknown concentration of glucose in given solution by optical (polarimetric) measurements.

## Reference Books

(1) Vogel's "Textbook of Quantitative Chemical Analysis": Pearson Education Ltd. 6th Edition, 2008.

(2) Vogel's "Qualitative Inorganic Analysis": Pearson Education Ltd. 7th Edition, 2009.

(3) Gurdeep Raj, "Advanced Practical Inorganic Chemistry": Krishna Prakashan, Meerut, 21st Edition, 2009.

(4) J. B. Yadav, "Advanced Practical Physical Chemistry": Krishna Prakashan, Meerut, 29th Edition, 2010.

(5) P. H. Parsania, "Experiments in Physical Chemistry": Neminath Printers Rajkot 1st Edition 2004.

(6) A. M. James and F. E. Prichard, "Practical Physical Chemistry": Longman Group Limited London 3rd Edition Reprinted 1979. Guj. Uni. Chemistry Syllabus – B.Sc. Sem-VI Page 13

## Practical [II] (Organic and Analytical Practicals)

### [A] Organic:

#### Organic separation and Identification:

Separation of Binary Mixtures and Identification (Minimum 8 Mixtures)

(i) Solid + Solid (4 Mixtures)

(ii) Solid + Liquid (2 Mixtures)

(iii) Liquid + Liquid (2 Mixtures)

One Mixture from each of the following should be given Acid-Base, Acid-Phenol, Acid-Neutral, Phenol-Base, Phenol-Neutral, Base-Neutral, and Neutral-Neutral. Water soluble compounds are included.

Identification of separated organic compound must be done by physical and chemical tests, sodium fusion test, M.P / B.P., derivatives and crystallization.

### [B] Analytical:

#### Volumetric Analysis:

(1) Estimation of  $\text{Fe}^{3+}$  by EDTA (Back Titration)

(2) Estimation of  $\text{Bi}^{3+}$  by EDTA

(3) Estimation of Chloride by silver nitrate (Mohr's Method)

(4) Estimation of  $\text{Zn}^{2+}$  and  $\text{Cd}^{2+}$  in a mixture by EDTA

(5) Estimation of  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$  in a mixture by EDTA

(6) Determination of percentage purity of  $\text{H}_2\text{O}_2$  solution by Iodometry method.

## Reference Books

(1) A. I. Vogel, "Elementary Practical Organic Chemistry Part-II, Qualitative Organic Analysis": CBS Publishers & Distributors, New Delhi, 2nd Edition, 2004.

(2) A. I. Vogel, "Elementary Practical Organic Chemistry Part III Quantitative Organic Analysis": CBS Publishers & Distributors, New Delhi, 2nd Edition, 2004.

(3) Hand book of Organic qualitative analysis by H. T. Clarke.



(4) Practical Organic Chemistry: F. G. Mann and B. C. Saunders. Low – priced Text Book. ELBS, Longman.

(5) V.K. Ahluwalia, Sunita Dhingra, “Comprehensive Practical Organic Chemistry –Qualitative Analysis”: University Press (India) Private Limited, Hyderabad, 1<sup>st</sup> Indian Edition, 2010.

(6) “Advanced Practical Organic Chemistry”: Stanley Thornes Publishers Ltd., J Leonard, B Lygo, G Procter, 1<sup>st</sup> Indian Edition, 2004.

(7) “Quantitative Analysis”: R. A. Day, A. L. Underwood, Prentice-Hall of India Pvt. Ltd., New Delhi, 6<sup>th</sup> Edition, 2004.



# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARNIM SCIENCE COLLEGE

### DEPARTMENT OF CHEMISTRY

#### Inorganic Chemistry-C-II

CODE : 253020602

B.Sc. 6<sup>th</sup> Semester

#### Teaching & Evaluation Scheme:-

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 4               | -  | 2 | 6     | 6       | 30                | 50 | 70       | -  | 150   |

**Objectives:-** To provide basic knowledge Chemistry

**Prerequisites:-**

**Course outline:-**

| Sr. No. | Course Contents   | Number of Hours |
|---------|---|-----------------|
| 1       | <b>Chemical bonding (II)</b><br>The Huckel Molecular Orbital (HMO) theory, variation principle, solution of Secular equation, HMO treatment to ethylene molecule, allylic cation, allylic free radical and allylic anion, Hybridization: Hybridization wave functions of sp, sp <sup>2</sup> and sp <sup>3</sup> .  | 14              |
| 2       | <b>(A) Term symbol</b><br>Russel Saunders coupling and determination of Term symbols of the ground state. Calculation of number of microstates. Pigeon hole diagram of p <sup>2</sup> and d <sup>2</sup> configurations. Hund's rule. Hole formulation.<br><b>(B) Electronic spectra of metal complexes</b><br>Electronic spectra of transition metal complexes, Laporte orbital and spin selection rules. Orgel energy level diagram of d <sup>5</sup> and combined diagrams of d <sup>1</sup> - d <sup>9</sup> , d <sup>2</sup> - d <sup>8</sup> , d <sup>3</sup> - d <sup>7</sup> , d <sup>4</sup> - d <sup>6</sup> and their spectra. Jahn Teller distortion. Spectrochemical series. | 14              |
| 3       | <b>(A) Metal carbonyls</b><br>Mono and poly-nuclear metal carbonyls: Ni(CO) <sub>4</sub> , Fe(CO) <sub>5</sub> , Cr(CO) <sub>6</sub> ,  | 14              |



|   |  |    |
|---|--|----|
|   | $\text{Fe}_2(\text{CO})_9$ , $\text{Fe}_3(\text{CO})_{12}$ , $\text{Co}_2(\text{CO})_8$ , $\text{Mn}_2(\text{CO})_{10}$ , $\text{Ir}_4(\text{CO})_{12}$ , $\text{Co}_4(\text{CO})_{12}$ .<br>Metal nitrosyl and metal carbonyl hydrides. Application of IR spectra in the determination of structure of metal carbonyls.<br><b>(B) Organometallic compounds</b><br>Definition, classification, synthesis (general methods), properties, structure and application of organometallic compounds of Mg, Al and Be, Structure of Ferrocene and dibenzene chromium. |    |
| 4 | <b>Quantum chemistry</b><br>Setting up of operators for different observables, Hermitian operator, important theorems concerning Hermitian operator, Particle in a three dimensional box, The rigid Rotator, The Schrodinger equation in spherical polar coordinates for hydrogen atom, separation of variables, solution of R, $\Theta$ and $\Phi$ equations  | 14 |

### Learning Outcomes:-

At the end of the course the student would have sufficient knowledge of Biochemistry

### Teaching & Learning Methodology:-

- Use of audiovisual aids.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

### Books Recommended:

- (1) Concise Inorganic Chemistry: J.D. Lee; Wiley India, 5<sup>th</sup> Edition (1996).
- (2) 'Shriver and Atkins' Inorganic Chemistry: Atkins, Overton, Rourke, Weller, Armstrong;
- (3) Oxford University Press, 5<sup>th</sup> Edition (2011).
- (4) Advanced Inorganic Chemistry: F.A. Cotton and Wilkinson G.; John Wiley, 5<sup>th</sup> Edition (1988).
- (5) Introductory Quantum Chemistry: A.K. Chandra; Tata- McGraw Hill, 4<sup>th</sup> Edition (1994).
- (6) Quantum chemistry: R.K. Prasad; New Age International, 4<sup>th</sup> Edition (2010).
- (7) Electron and chemical bonding: H. B. Grey, W.A.Benjamin. INC, New York.
- (8) Inorganic chemistry: James E. Huheey, 4<sup>th</sup> Edition, Wesley Publishing Company.
- (9) Mechanism of Inorganic reaction: Basalo and Pearson, 2<sup>nd</sup> Edition, Wiley Eastern Pvt Ltd.
- (10) Advanced Inorganic chemistry: (Vol. 1) Satya Prakash, Tuli, Basu and Madan; S. Chand
- (11) Advanced Inorganic chemistry: Gurdeep Raj; Goel Publishing House, 23<sup>rd</sup> Edition (1998).





# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARNIM SCIENCE COLLEGE

### DEPARTMENT OF CHEMISTRY

#### Organic Chemistry-C-II

CODE : 253020601

B.Sc. 6<sup>th</sup> Semester

#### Teaching & Evaluation Scheme:-

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 4               | -  | 2 | 6     | 6       | 30                | 50 | 70       | -  | 150   |

**Objectives:-** To provide basic knowledge Chemistry

**Prerequisites:-**

**Course outline:-**

| Sr. No. | Course Contents  | Number of Hours |
|---------|--|-----------------|
| 1       | <b>(A) Synthetic Dyes</b><br>Classification of Dyes- Anionic and Cationic dyes, Mordant and Vat dyes, Reactive and Dispersed dyes, Synthesis of Alizarin, Malachite green, Indigo, Congo red, Eosin.<br><b>(B) Explosives</b><br>Preparation of RDX, PETN, Nitroglycerine, Tetryl.<br><b>(C) Pesticides:</b> Preparation of Aldrine, Malathion, Parathion, Methoxychlor. | 14              |
| 2       | <b>(A) Synthetic Drugs</b><br>General Classification, Chemotherapy, Antipyretics, Analgesics, Hypnotics, Sedatives, Anaesthetics, Antimalerials, Antiseptics, Cardiovascular drugs. (Minimum two illustrations of each, only names without structures). Methods of preparation and uses of Antipyrine, Phenacetin, n-Hexyl resorcinol, Alprazolam, Zaleplon,             | 14              |



|   |  |    |
|---|--|----|
|   | Benzocaine, Lidocaine, Chloroquine, Atenolol, Sulphadiazine, Trimethoprim and Tolbutamide.<br><b>(B) Vitamins</b><br>Structure and Biochemistry of Vitamin-A (A1) (Retinol), Vitamin-B6 (Pyridoxine).  |    |
| 3 | <b>(A) Alkaloids</b><br>Classification, General method of determining structure, analytical and synthetic methods, structure of Coniine, Nicotine, Atropine and Papaverine.<br><b>(B) Isoprenoids (Terpenoids)</b><br>Classification, General method of determining structure, Isoprene rule, Chemistry of Citral, $\alpha$ -Terpineol, Camphor and their synthesis, study of reactions of $\beta$ -carotene (No Synthesis). | 14 |
| 4 | <b>(A) Stereo Chemistry</b><br>Concept of prostereo isomerism and chiral synthesis (Asymmetric Induction), Cram's rule, Prelog's generalization, Prelog's rule and assignment of configuration.<br><b>(B) Stereochemistry of compounds other than Carbon</b><br>Stereo chemistry of the compounds containing Nitrogen. Phosphorus and Sulphur  | 14 |

### Learning Outcomes:-

At the end of the course the student would have sufficient knowledge of Biochemistry

### Teaching & Learning Methodology:-

- Use of audiovisual aids.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

### Books Recommended:

- (1) Organic Chemistry: I. L. Finar, Vol-II, 5th Edition, Pearson Education Ltd.
- (2) Organic Chemistry: Morrison & Boyd, 6th Edition, Prentice Hall of India Pvt. Ltd.
- (3) Stereochemistry of carbon compounds: E. L. Eliel, Wiley Eastern Ltd.
- (4) Stereochemistry and mechanism through solved problems: P. S. Kalsi, New Age International.
- (5) Stereochemistry of Organic Compounds: Principles and Applications: D. Nasipuri; New Academic Science; 4th Revised Edition.
- (6) Organic Chemistry: Hendrickson, Cram, Hammond, Mc Graw-Hill.
- (7) Organic Chemistry: 6th Edition, John McMurry, Brooks Cole, International Edition.
- (8) Organic Chemistry: T.W. Graham Solomons and Craig B. Fryhle Wiley, 8th Edition.
- (9) Organic Chemistry: Francis A. Carey, Mc Graw-Hill, 7th Edition.





# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARNIM SCIENCE COLLEGE

### DEPARTMENT OF CHEMISTRY

#### Physical Chemistry-C -II

CODE : 253020603

B.Sc. 6<sup>th</sup> Semester

#### Teaching & Evaluation Scheme:-

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 4               | -  | 2 | 6     | 6       | 30                | 50 | 70       | -  | 150   |

**Objectives:-** To provide basic knowledge Chemistry

**Prerequisites:-**

**Course outline:-**

| Sr. No. | Course Contents  | Number of Hours |
|---------|--|-----------------|
| 1       | <b>Thermodynamics</b><br>Colligative properties: Boiling point elevation and freezing point depression. Molal elevation constant (K <sub>b</sub> ) and Molal depression constant (K <sub>f</sub> ), Calculation of absolute value of entropy using third law of thermodynamics, Law of mass action using chemical potential, Partial molar quantity.         | 14              |
| 2       | <b>Electrochemistry</b><br>Concentration cell: Cell with and without transference, Electrode concentration cell, Gas electrode concentration cell, Activity and activity coefficient determination, Define liquid junction potential and how it can be avoided, Equation for liquid junction potential, Decomposition potential, Overvoltage, Tafel equation | 14              |
| 3       | <b>(A) Phase Rule</b><br>Binary system : Zn-Cd and Pb-Ag, Zeotropic and azeotropic mixtures, Steam distillation, Zone refining.  | 14              |



|   |  |    |
|---|--|----|
|   | <b>(B) Osmosis</b><br>Desalination and reverse osmosis, Electrodialysis, Electrochemistry and pollution control, Removal of Cu, Ag and Fe from waste water.  |    |
| 4 | <b>(A) Photochemistry</b><br>Laws of Photochemistry : Grothuss-Draper Law, Einstein Law, Quantum yield ,Reasons for high and low quantum yield, Fluorescence and Phosphorescence, Chemiluminescence, Photosensitized reactions.<br><b>(B) Metallic Corrosion</b><br>Types of corrosion, Electrochemical series, Corrosion in acidic and neutral medium, Differential aeration principle, Atmospheric corrosion, Prevention of corrosion by various factor. | 14 |

### Learning Outcomes:-

At the end of the course the student would have sufficient knowledge of Biochemistry

### Teaching & Learning Methodology:-

- Use of audiovisual aids.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

### Books Recommended:

- (1) Physical Chemistry: G. M. Barrow, 5<sup>th</sup> Edition, McGraw-Hill education, India.
- (2) Advanced Physical Chemistry: Gurdeep Raj, 35<sup>th</sup> Edition (2009), Goel / Krshina Publishing House.
- (3) Principles of Physical Chemistry: Puri, Sharma and Pathania, 42<sup>nd</sup> Edition, Vishal Publishing Company.
- (4) Polymer Science: Gowariker, Viswanathan and Sreedhar, 1<sup>st</sup> Edition (2012 reprint) New Age International.
- (5) Essentials of Nuclear Chemistry: Arnikar, 4<sup>th</sup> Edition (2012 reprint), New Age International.
- (6) Physical Chemistry: Atkins, 9<sup>th</sup> Edition. Oxford University Press.
- (7) Advanced Physical chemistry: Gurtu and Gurtu, 11<sup>th</sup> Edition , Pragati Prakashan.
- (8) Physical chemistry: Levine, 6<sup>th</sup> Edition, McGraw-Hill education, India.





# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARNIM SCIENCE COLLEGE

### DEPARTMENT OF MATHEMATICS

#### MATHEMATICS-601 ANALYSIS II

Subject Code: 253030601

B.Sc. Semester -6

### Teaching & Evaluation Scheme

The objective of evaluation is not only to measure the performance of student, but also to motivate them for better performance. Student are evaluated on the basis of Mid term examination and end examination Conducted by university.

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 3               | -  | - | 3     | 3       | 30                | -  | 70       | -  | 100   |

### Objectives

- To provide students the Concept of Riemann integration, Infinite series and Taylor's series, different type of function.
- The aim of this subject is to present the important ideas in advanced calculus using multiple methods to students whose principal interest lies outside the field of mathematics.
- It is a subject which provides a vital arena where students can see the interaction of mathematics and machine computation.

### Prerequisites

A Candidate for admission to the Bachelor of Science (Mathematics) must have a 10+2 Science with A and B (Maths and Physics) Group. Provisional admission shall be provided subject to the Clearance of examinations and eligibility.



**Course outline:** This Course designed for undergraduate and graduate students working on Riemann integration and Infinite series.

| Sr. No. | Course Contents  | Teaching hours |
|---------|--|----------------|
| 1       | <b>Unit I Riemann Integration</b><br><br>Definition of the integral, Properties of the integral Existence theory (monotone, continuous functions etc. (includes Riemann sums) Fundamental theorem Integration by parts and change of variable ,Mean value theorems (Weierstrass's Form and Bonnet's Form) (First and Second) | 14             |
| 2       | <b>Unit: II Infinite series</b><br><br>Basic Theory (covers upto comparison test), Series with positive terms (Condensation Test, Pringsheim's Test) Absolute convergence (includes alternating series), ratio and root tests with $\limsup$ And $\liminf$   | 12             |
| 3       | <b>Unit: III Infinite Series –II</b><br><br>Rearrangement of series, Cauchy Product of Series, Merten's theorem Power Series Improper integrals of the first and second kind.  | 10             |
| 4       | <b>Unit: IV Taylor Series</b><br><br>Taylor's Theorem with Lagrange and Cauchy form of remainders , Expansions of exponential, logarithmic and trigonometric functions Binomial series theorem Power series solutions of differential equations  | 10             |

### Learning Outcomes



After Successfully Completion of the Course the student will be ....

- Student can learn to solve the Riemann Integration, Infinite series and Taylor Series.
- Appreciate how abstract ideas and rigorous methods in mathematical analysis can be applied to important practical problems.
- Describe fundamental properties of the real numbers that lead to the formal development of real analysis.
- Comprehend rigorous arguments developing the theory underpinning real analysis.
- Demonstrate an understanding of limits and how they are used in sequences, series, differentiation and integration;
- Construct rigorous mathematical proofs of basic results in real analysis;

### Teaching & Learning Methodology

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups.
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties.
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

### Books Recommended

1. E.Kreyszing , Advanced Engineering Mathematics , Fifth edition , New Age International (P) Ltd., New Delhi , 1997.
2. B.S.Grewal, Higher Engineering Mathematics.



3. Mathematical Analysis by S.C. Malik, Wiley, Eastern Ltd., New Delhi
4. Mathematical Analysis by T.M. Apostol, Narosa Publishing House, New Delhi
5. A course of mathematical Analysis by Shanti Narayan , S.Chand & Co., New Delhi

**E-Resources :**

- SWAYAM PORTEL/ NPTEL- online courses on mathematical and quantum mechanics.  
<https://swayam.gov.in/> and <https://nptel.ac.in/>
- <http://www.freebookcentre.net/maths-books-download/Real-Analysis-Lecture-Notes-by-Itay-Neeman.html>
- <http://www.freebookcentre.net/maths-books-download/Real-Analysis-Notes-by-Manonmaniam-Sundaranar-University.html>
- <http://www.freebookcentre.net/maths-books-download/Real-Analysis-Notes-by-Prof.-Sizwe-Mabizela.html>



# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARRNIM SCIENCE COLLEGE

### DEPARTMENT OF MATHEMATICS

#### MATHEMATICS-602 ABSTRACT ALGEBRA II

Subject Code: 253030602

B.Sc. Semester -6

### Teaching & Evaluation Scheme

The objective of evaluation is not only to measure the performance of student, but also to motivate them for better performance. Student are evaluated on the basis of Mid term examination and end examination Conducted by university.

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 3               | -  | - | 3     | 3       | 30                | -  | 70       | -  | 100   |

### Objectives

- To provide students the Concept of Ring, Subring and its properties, Polynomial Ring and Field.
- The aim of this subject is to present the important ideas in advanced calculus using multiple methods to students whose principal interest lies outside the field of mathematics.
- It is a subject which provides a vital arena where students can see the interaction of mathematics and machine computation.

### Prerequisites



A Candidate for admission to the bachelor of Science (Mathematics) must have a 10+2 Science with A and B (Maths and Physics ) Group. Provisional admission shall be provided subject to the Clearance of examinations and eligibility.

**Course outline:** This Course designed for undergraduate and graduate students working on Ring and Field. This course serves as an introduction to Ring and Field to Pure mathematics .

| Sr. No. | Course Contents   | Teaching hours |
|---------|---|----------------|
| 1       | <b>Unit I Rings</b><br><br>Definition and examples, commutative ring, division ring, unity and unit elements of a ring, Field, properties of a ring, Boolean ring, Finite rings. Integral Domain: Zero divisor, Definition and examples of Integral Domain (Finite and of infinite order), Characteristic of a ring   | 14             |
| 2       | <b>Unit: II Subrings</b><br><br>Definition and examples, necessary and sufficient criterion for subring, Ideals: Definition and examples, necessary and sufficient criterion for ideal, principal ideal ring, quotient ring and its operation tables Homomorphism: Definition and some examples, Kernel of homomorphism, Isomorphism of rings, Fundamental theorem on homomorphism, homomorphism and characteristic               | 12             |
| 3       | <b>Unit: III Polynomial ring</b><br><br>Introduction and definition of polynomial, degree of polynomial, operation between polynomials, Integral domain $D[x]$ , different types of polynomials, factorization of polynomials, Division algorithm for polynomials, irreducibility of polynomial over field, Remainder and factor theorem, solution of polynomial equation, zero of polynomial, $c$ , rational zero of polynomial. | 10             |



|   |  |    |
|---|--|----|
| 4 | <b>Unit: IV Field</b><br><br>Field, Subfield, Extension field, The field of quotients and integral domain, Prime fields, Finite fields, Maximal ideals, Prime ideals and their characterization through quotient ring. | 10 |
|---|--|----|

### Learning Outcomes

After Successfully Completion of the Course the student will be ....

- Student can understand the concept of Ring , Subring , Polynomial Ring , Field, Factorization of a ring, Homeomorphism and Isomorphism of a ring they can apply different properties on them
- Student able to solve the real word problem by using Ring and Field.
- Students able to solve integration and differentiation of series..
- In Ring .
- Student will understand Field ,integration and differentiation of a series.
- Identify the degree, leading coefficient, and leading term of a polynomial expression

### Teaching & Learning Methodology

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs.
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups.



- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties.
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

### Books Recommended

1. Abstract Algebra by .Scott M Lalonde.
2. Contemoorary abstract algebra-Joseph A. Gallian(Fourth edition).
3. Abstract Algebra by John Perry.
4. Mathematical Analysis by T.M. Apostol, Narosa Publishing House, New Delhi
5. A course of mathematical Analysis by Shanti Narayan , S.Chand & Co., New Delhi

### E-Resources :

- SWAYAM PORTEL/ NPTEL- online courses on mathematical and quantum mechanics.  
<https://swayam.gov.in/> and <https://nptel.ac.in/>
- <https://open.umn.edu/opentextbooks/textbooks/217>
- <https://ocw.mit.edu/courses/mathematics/18-703-modern-algebra-spring-2013/lecture-notes/>
- <https://www.freebookcentre.net/maths-books-download/Notes-on-Abstract-Algebra-by-John-Perry.html>

<https://www.freebookcentre.net/maths-books-download/Notes-on-Abstract-Algebra-by-Scott-M.-LaLonde.html>



# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARRNIM SCIENCE COLLEGE

### DEPARTMENT OF MATHEMATICS

#### MATHEMATICS-603 ANALYSIS III

Subject Code: 253030603

B.Sc. Semester-6

### Teaching & Evaluation Scheme

The objective of evaluation is not only to measure the performance of student, but also to motivate them for better performance. Student are evaluated on the basis of Mid term examination and end examination Conducted by university.

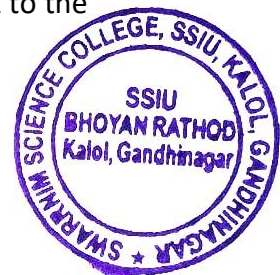
| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 3               | -  | - | 3     | 3       | 30                | -  | 70       | -  | 100   |

### Objectives

- To provide students the Concept of Matric space, Continuity and connectedness and integration and differentiation of series.
- The aim of this subject is to present the important ideas in Analysis-III using multiple method to student whose principal interest lie outside the field of mathematics.
- It is a subject which provide a vital arena where students can see the interaction of mathematics and machine computation.

### Prerequisites

A Candidate for admission to the bachelor of Science (Mathematics) must have a 10+2 Science with A and B (Maths and Physics) Group. Provisional admission shall be provided subject to the Clearance of examinations and eligibility.



**Course outline:** This Course designed for undergraduate and graduate students working on Metric Spaces and integration and differentiation of series. This course serves as an introduction to Metric spaces used to Pure mathematics .

| Sr. No. | Course Contents  | Teaching hours |
|---------|--|----------------|
| 1       | <b>Unit I</b> Metric Spaces<br><br>Definition and Examples, Open Sets.Closed Sets, Convergence, Completeness and Baire's Theorem.  | 10             |
| 2       | <b>Unit: II</b><br>Continuity, Compactness and Connectedness Compact sets, Connected sets, Continuous functions ,Continuity and compactness Continuity and connectedness   | 10             |
| 3       | <b>Unit: III</b><br><br>Uniform Convergence, Pointwise Convergence Uniform Convergence, Uniform Convergence and Continuity, Uniform Convergence and Differentiation Term by Term Integration of Series, Term by Term Differentiation of Series | 12             |
| 4       | <b>Unit: IV</b><br><br>Power series (advanced), Abel's limit theorem, multiplication of power series(Expert sterling's formula),Taylor's series, Weierstrass approximation theorem, exponential, logarithmic and trigonometric functions       | 12             |

### Learning Outcomes

After Successfully Completion of the Course the student will be ....

- Demonstrate understanding of the basic concepts, theorems and calculations of Normed, Metric Spaces.



- Demonstrate understanding of the open-set definition of continuity and its relation to previous notions of continuity, and applications to open or closed sets.
- Demonstrate understanding of the basic concepts, theorems and calculations of the concepts of Compactness, Connectedness and Completeness (CCC).
- Demonstrate understanding of the connections that arise between CCC, their relations under continuous maps, and simple applications.

### Teaching & Learning Methodology

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups.
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties.
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

### Books Recommended

1. E.Kreyszing , Advanced Engineering Mathematics , Fifth edition , New Age International (P) Ltd., New Delhi , 1997.
2. B.S.Grewal, Higher Engineering Mathematics.
3. Mathematical Analysis by S.C. Malik, Wiley, Eastern Ltd., New Delhi
4. Mathematical Analysis by T.M. Apostol, Narosa Publishing House, New Delhi
5. A course of mathematical Analysis by Shanti Narayan , S.Chand & Co., New Delhi
6. W A Sutherland, *Introduction to Metric and Topological Spaces*, OUP.



7. E T Copson, *Metric Spaces*, CUP.
8. W Rudin, *Principles of Mathematical Analysis*, McGraw Hill.

**E-Resources :**

- SWAYAM PORTEL/ NPTEL- online courses on mathematical and quantum mechanics.  
<https://swayam.gov.in/> and <https://nptel.ac.in/>
- [https://www.mathcity.org/msc/notes/metric\\_spaces\\_notes](https://www.mathcity.org/msc/notes/metric_spaces_notes)
- [https://msu.edu/~schenke6/Lecture\\_Notes/921\\_Lecture\\_Notes.pdf](https://msu.edu/~schenke6/Lecture_Notes/921_Lecture_Notes.pdf)



# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARRNIM SCIENCE COLLEGE

### DEPARTMENT OF MATHEMATICS

### MATHEMATICS-604 GRAPH THEORY

Subject Code:253030604

B.Sc. Semester-6

#### Teaching & Evaluation Scheme

The objective of evaluation is not only to measure the performance of student, but also to motivate them for better performance. Student are evaluated on the basis of Mid term examination and end examination Conducted by university.

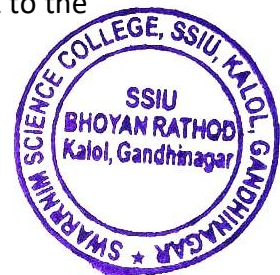
| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 3               | -  | - | 3     | 3       | 30                | -  | 70       | -  | 100   |

#### Objectives

- To provide students the Concept of vector Graph, Representation of a graph and Matrix Representation of a graph . .
- The aim of this subject is to present the important ideas in Graph Theory using multiple method to student whose principal interest lie outside the field of mathematics.
- It is a subject which provide a vital arena where students can see the interaction of mathematics and machine computation.

#### Prerequisites

A Candidate for admission to the bachelor of Science (Mathematics) must have a 10+2 Science with A and B (Maths and Physics ) Group. Provisional admission shall be provided subject to the Clearance of examinations and eligibility.



**Course outline:** This Course designed for undergraduate and graduate students working on Graph Theory . This course serves as an introduction to Graph and Matric representation of Graph used to applied mathematics problems. .

| Sr. No. | Course Contents  | Teaching hours |
|---------|--|----------------|
| 1       | <b>Unit I Introduction of Graphs</b><br>Definition and elementary properties of graphs, Isomorphism of graphs, Sub graphs, Walks, Paths and circuits, Connected graphs, Euler graphs, Operations on graphs, Hamiltonian circuits, Definition and properties of tree.   | 10             |
| 2       | <b>Unit: II Graph Representation</b><br>Centres in a tree, Rooted and Binary tree, Spanning trees, Fundamental circuits, cut set and its properties, Planar graphs and Representation of planar graphs.  | 12             |
| 3       | <b>Unit: III Cut set ,connectivity and Seperability</b><br>Planar graphs and their different representation , Dual of a planar graph ,Euler's formula , Kuratowski's first and second non-planar graph, vector space associated with a graph , Circuit subspace and cut sets subspace Orthogonal space.  | 12             |
| 4       | <b>Unit: IV Matrix Representation of a graph</b><br>Vertex coloring , Chromatic number ,Index number and partition , Cyclic graph and demyelization of cyclic graphs ,Matrix representation of a graph, Adjacency matrix, Incidence matrix, Path matrix circuit matrix ,fundamental circuit matrix and cut set matrix, relationship of these matrices ,rank of the adjacency matrix. | 12             |

### Learning Outcomes

After Successfully Completion of the Course the student will be ....

- Demonstrate knowledge of the syllabus material.



- Write precise and accurate mathematical definitions of objects in graph theory.
- Use mathematical definitions to identify and construct examples and to distinguish examples from non-examples.
- Validate and critically assess a mathematical proof.
- Use a combination of theoretical knowledge and independent mathematical thinking in creative investigation of.
- Reason from definitions to construct mathematical proofs.
- Write about graph theory in a coherent.

### Teaching & Learning Methodology

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups.
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties.
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

### Books Recommended

1. Graph theory with application to engineering and computer science by Narsingh Deo.1993, Prentice Hall of India Pvt. Ltd.
2. Foundation of Discrete Mathematics, K.D. Doshi, New Age International Ltd. Publishers.
3. A first look at Graph theory, by Clark.
4. Discrete Mathematics Structures with application to computer science, by Trembly L.P.



Manohar R.

5. Elements of Discrete Mathematics by L.Liu, Me Edition) by L.Liu, Me.
6. Discrete Mathematics, by Vasta, Vikas Publications.
7. Introduction Graph Theory, By R.J.Willson.
8. Discrete Mathematics Structure, By. Dugragi N.

**E-Resources :**

- SWAYAM PORTEL/ NPTEL- online courses on mathematical and quantum mechanics.  
<https://swayam.gov.in/> and <https://nptel.ac.in/>
- <https://cs.bme.hu/fcs/graphtheory.pdf>
- <https://www.geeksforgeeks.org/mathematics-graph-theory-basics-set-1/>
- <http://www.personal.psu.edu/cxg286/Math485.pdf>



**SWARNIM STARTUP & INNOVATION UNIVERSITY**

**SCHOOL OF SCIENCE**

**DEPARTMENT OF MATHEMATICS**

**CODE: 253030605**

**B.Sc.: SEM 6**

**Practical's list (practical of paper 601&602)**

List of Practical's:

**Unit 1**

1. Verification of rings, commutative ring and ring with unity. Finite ring and their operation tables.
2. Examples of ideals and integral domain.
3. Examples of finite fields and extension fields.
4. Construction of quotient ring and their operation tables.

**Unit 2**

1. Find the g.c.d of two given polynomial and express it as a linear combination of these two polynomials.
2. Check the irreducibility of polynomial over the given field
3. Factorization of polynomial and the rational zeros of given polynomial.
4. Examples of maximal and ideals

**Unit 3**

1. Definition and evaluation of Reimann integral by various methods
2. Verification MVTs and problems based on fundamental theorem of integration
3. Convergence of infinite series of positive terms.
4. Absolute convergence, root and ratio tests using limit inferior and superior

**Unit 4**

1. Power series, radius of convergence
2. Improper integrals
3. Power series expansion of function
4. Power series solution of differential equation



**SWARNIM STARTUP & INNOVATION UNIVERSITY**

**SCHOOL OF SCIENCE**

**DEPARTMENT OF MATHEMATICS**

**CODE: 253030605**

**B.Sc.: SEM 6**

**Practicals list (practical of paper 603&604)**

List of Practicals:

**Unit 1**

1. Metric spaces, examples.
2. Uniform convergence of sequences
3. Uniform convergences of series, term by term differentiation and integration
4. Multiplication of power series.

**Unit 2**

1. Properties of exponential, logarithmic function
2. Problems based on compact and connected spaces.

**Unit 3**

1. Using the adjacency matrix, determine whether the given graph is connected or not.
2. Determine whether the given graph is connected or not using fusion algorithm.
3. Find a minimal spanning tree of a given connected weighted graph using krusakal's algorithm.
4. Find a minimal spanning tree of a given connected weighted graph using prim's algorithm.

**Unit 4**

1. Find the shortest path between vertices of a given graph using breadth first search algorithm.
2. Find shortest path between two vertices of a given connected graph using back – tracking algorithm.
3. Find a shortest path between two vertices of a given connected weighted graph using dijkstra's algorithm
4. Construct an Euler tour in a graph using fleury's algorithm.



**SWARNIM STARTUP & INNOVATION UNIVERSITY  
SWARNIM SCIENCE COLLEGE**

**DEPARTMENT OF MICROBIOLOGY**

**Environmental Microbiology**

**Subject Code: 253040604**

**B.Sc. Semester- 6**

**Teaching & Evaluation Scheme:-**

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 3               | -  | - | 3     | 3       | 30                | -  | 70       | -  | 100   |

**Objectives:-**

- To provide basic knowledge of microbes in environment.
- The main goal is to know and understand the role of microbes in biogeochemical processes in different ecosystems. The students will learn the basic microbiological principles, the methods in microbial ecology and their theoretical and practical use.
- The knowledge can give the base for understanding processes and changes in the environment.
- The students can get some skills to recognise the ecological problems and critical evaluation of the human impacts on pollution, climate changes and as well as environmental protection.
- The lectures will be implemented with individual practical work in the laboratory and presentations of the seminars.
- The students can get general competences in microbial ecology.

**Prerequisites:-**

- Student must have studied 2years B.Sc. with microbiology/Biotechnology as a major subject and knowledge of basic microbiology.

**Course outline:-**



| Unit No. | Course Contents   | Teaching Hours |
|----------|---|----------------|
| 1.       | <b>Nitrogen fixation</b> <ul style="list-style-type: none"> <li>• Symbiotic &amp; asymbiotic nitrogen fixation.</li> <li>• Nitrogenase- Structure &amp; mechanism.</li> <li>• Biofertilizers- Definition, Azotobacter &amp; Rhizobia (With Production )</li> <li>• Microbial insecticides.</li> </ul>   | 10             |
| 2.       | <b>Biodeterioration &amp; Bioremediation</b> <ul style="list-style-type: none"> <li>• Biodeterioration of wood, paint &amp; metal.</li> <li>• Bioremediation-introduction.</li> <li>• Bioremediation of petroleum hydrocarbon &amp; chlorinated compounds.</li> <li>• Microbial enhanced oil recovery..</li> </ul>  | 10             |
| 3.       | <b>Concept of xenobiotics &amp; recalcitrance.</b> <ul style="list-style-type: none"> <li>• Biomagnification.</li> <li>• Biodegradation of environmental pollutants.(ABS, Chlorinated hydrocarbons, Oil pollutants.)</li> <li>• Biodegradable polymers.</li> </ul>  | 10             |
| 4.       | <b>Introduction to biofuels.</b> <ul style="list-style-type: none"> <li>• Renewable &amp; nonrenewable energy resources.</li> <li>• Biofuels: types               <ul style="list-style-type: none"> <li>(a) Biogas - substrate, microorganisms &amp; production.</li> </ul> </li> <li>• Advantages &amp; disadvantages of Biogas production.               <ul style="list-style-type: none"> <li>(b) Hydrogen</li> <li>(c) alcohol</li> </ul> </li> </ul> | 10             |
|          |   | 40             |



### Learning Outcomes:

- At the end of the course the student would have basic knowledge of microbiology techniques and bacteria.
- Students will get the basic knowledge how to prepare and perform sampling and microbial analyses to determine the abundance, growth rate and microbial community composition together with the basic environmental parameters.
- The knowledge can be used to prevent infections and to protect human and environmental health.
- Students will get basic knowledge to determine the role of microbes:
  - in different habitats,
  - in different biogeochemical cycles,
  - to determine their role in nutrient cycling
  - to determine water quality,
  - in degradation of natural organic compounds and selected pollutants in the environment.

### Teaching & Learning Methodology

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.



## Books Recommended

- RM Atlas *Principles of Microbiology*
- Prescott LM *Microbiology*
- BD Singh. (2003) *Fundamentals of genetics.*
- HK Das. (2004) *Textbook of biotechnology*



# SWARRNIM STARTUP & INNOVATION UNIVERSITY

## SWARRNIM SCIENCE COLLEGE

### DEPARTMENT OF MICROBIOLOGY

#### Fermentation Technology-II

CODE: 253040601

B.Sc. 6<sup>th</sup> Sem

#### Teaching & Evaluation Scheme:-

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 3               | -  | - | 3     | 3       | 30                | -  | 70       | -  | 100   |

#### Objectives:-

- To provide the idea about down streaming process how to get end product in the fermentation. Different methods used for separation of products from fermentation broth.
- Students will get an idea about quality control of the fermented products made using different methods.
- To provide students basic knowledge of Microbial Biotechnology. It covers up general concept of microbial production and fermentation of various products.
- The purpose of the course is to give knowledge about production process using fermentation technology and microorganisms of antibiotics, enzymes, industrial alcohol, organic acids, vitamins, SCP, as well as mushrooms.

#### Prerequisites:-

Students must have passed 2<sup>nd</sup> year B.Sc in Microbiology along with basic knowledge of biology



**Course outline:-**

| <b>Sr. No.</b> | <b>Course Contents</b>   | <b>Number of Hours</b> |
|----------------|--|------------------------|
| <b>1.</b>      | <b>Downstream processing</b> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Removal of microbial cells and suspended solids               (A) Foam separation               (B) Precipitation               (C) Filtration               (D) Centrifugation             </li> <li>• Cell disruption methods               (A) Physico-mechanical methods               (B) Chemicals methods             </li> <li>• Product concentration and purification               (A) Liquid -liquid extraction               (B) Membrane processes             </li> <li>• Finishing stages               (A) Drying               (B) Crystallization             </li> <li>• Effluent treatment</li> </ul> | <b>10</b>              |
| <b>2.</b>      | <b>Quality control of fermentation products-</b> <ul style="list-style-type: none"> <li>• Detection and assay of fermentation products               (A) Physical assays: Titration and gravimetric analysis, turbidity and cell yield determination               (B) Chemical assay: Chromatography, spectrophotometry               (C) Biological assays: Microbial assay             </li> <li>• Microbial quality assurance               (A) Sterility testing               (B) LAL test             </li> <li>• Fermentation economics</li> </ul>   | <b>10</b>              |
| <b>3.</b>      | <b>Fermentation production of :</b> <ul style="list-style-type: none"> <li>• Alcohol</li> <li>• Cheese</li> <li>• Baker's Yeast</li> <li>• Glutamic acid</li> <li>• Citric acid</li> </ul>   | <b>10</b>              |
| <b>4.</b>      | <b>Fermentative production of:</b> <ul style="list-style-type: none"> <li>• Penicillin and its conversion to semisynthetic derivatives,</li> <li>• Cyanocobalamin</li> <li>• Steroids</li> <li>• Amylase</li> <li>• carotenoids</li> </ul>   | <b>10</b>              |



### Learning Outcomes:

- To provide the idea about down streaming process how to get end product in the fermentation. What different methods can be used for down streaming process.
- The students will be able to apply the knowledge of the Microbial production to understands concepts of various fields like food and dairy industries, pharmaceutical industries, Fermentation industries, beverages industries, etc.
- Student should be able to understand basic concepts of various products like alcohol, cheese, amino acids like glutamic acid, citric acid fermentation economics.
- Access information on a topic from a variety of sources, and be able to learn new things on one's own.
- Communicate verbally, graphically, and/or in writing the theoretical data clearly and concisely that incorporates the stylistic conventions used by Microbiologists, biotechnologist, researchers and scientists worldwide.

### Teaching & Learning Methodology

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc.) to support key concepts/knowledge. Particularly at the start of a program/module or for



key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

### Books Recommended

1. **“Principles of Fermentation Technology**, Stanbury P F, Whitaker A and Hall SJ, (1995) 2<sup>nd</sup> edition, Pergamon Press, London, UK.
2. **Industrial Microbiology: An Introduction**, Waites, M J and Morgan N L, (2002) Blackwell Science.
3. **Biotechnology: A Textbook of Industrial Microbiology**, Crueger W and Crueger A, (2000) 2<sup>nd</sup> edition, Panima Publishing Corporation, New Delhi, India.
4. **Fermentation Microbiology and Biotechnology**, El-Mansi E M T, Bryce CFA, Dahhou B, Sanchez S, Demain AL, Allman AR (eds), (2011) 3<sup>rd</sup> edition, CRC Press; Taylor and Francis Group, Boca Raton.
5. **Industrial Microbiology**, Casida LE, Jr. (1968), Wiley Eastern Ltd, New Delhi, India.



# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARNIM SCIENCE COLLEGE

### DEPARTMENT OF MICROBIOLOGY

#### IMMUNOLOGY-II

Subject Code: 253040603

B.Sc. Semester -6

#### Teaching & Evaluation Scheme

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 3               | -  | - | 3     | 3       | 30                | -  | 70       | -  | 100   |

#### Objectives

- To provide students the ability to fundamentals of immunology, immune system, immune response and immune disorders.
- The purpose of the course is to give students to introduction of complement system, cells and organs of immune system, antigens and antibodies as well as immune reactions.
- To provide an understanding of immunology of transplantation, autoimmunity, autoimmune diseases, etc.

#### Prerequisites

Student must have studied Second year (SY) of B.Sc. with Microbiology as a major subject and knowledge of basic biology.

#### Course outline



| Unit No. | Course Contents   | Teaching hours |
|----------|---|----------------|
| 1        | <b>Host Defense Mechanisms:</b> <ul style="list-style-type: none"> <li>• Phagocytosis</li> <li>• Complement</li> <li>• Inflammation</li> <li>• Cytokines</li> <li>• Acute Phase Proteins</li> <li>• Cells, Tissues and Organs of the Immune System.</li> </ul>  | 10             |
| 2        | <b>Specific Immune Responses: I</b> <ul style="list-style-type: none"> <li>• Antigens</li> <li>• Hapten</li> <li>• Cluster of Differentiation Molecules</li> <li>• Humoral and Cell Mediated Immunity.</li> <li>• Recognition of Foreignness.</li> <li>• T Cell Biology - T Cell receptors</li> <li>• Types of T Cells, T Cell Activation.</li> </ul>   | 10             |
| 3        | <b>Specific Immune Responses: II</b> <ul style="list-style-type: none"> <li>• Antibodies - (Immunoglobulins - Definition, Structure and Function, Classes of Immunoglobulins.</li> <li>• Antigen-Antibody Reactions: General Features, Measurement of Antigen and Antibody.</li> <li>• Serological Reactions: Precipitation Reactions, Definition, Mechanism - Lattice Hypothesis. Applications-Precipitation in Liquid Medium.</li> <li>• Agglutination reactions- Definition, Applications-Slide agglutination test, Tube agglutination test, Passive agglutination test.</li> <li>• Primary and Secondary Antibody response.</li> <li>• Diversity of Antibodies</li> <li>• Clonal Selection Theory</li> <li>• Monoclonal Antibody Technology.</li> </ul> | 10             |
| 4        | <b>Immune Disorders:</b> <ul style="list-style-type: none"> <li>• Immuno Deficiency</li> <li>• Hypersensitivity</li> <li>• Autoimmunity - Mechanism &amp; Classification of Autoimmune diseases.</li> <li>• Immunology of Transplantation: Classification of Transplants</li> <li>• Allograft reaction (mechanism)</li> <li>• Factors favoring Allograft survival.</li> <li>• Graft v/s Host reaction. I</li> <li>• Immunology of Malignancy.</li> </ul>  | 10             |
|          |   | 40             |



## Learning Outcomes

- The students will be able to apply the knowledge of the immunology, cells and organs of immune system, host defense mechanisms, specific immune responses and immune disorders.
- Student should be able to understand basic concepts of complement system, immune reactions like Ag-Ab reactions, serological reactions, agglutination reactions and also get knowledge about different types of immunity.
- Access information on a topic from a variety of sources, and be able to learn new things on one's own.
- Communicate verbally, graphically, and/or in writing the theoretical data and laboratory experiments clearly and concisely that incorporates the stylistic conventions used by microbiologists worldwide.

## Teaching & Learning Methodology

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc.) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

## Books Recommended

1. Coleman, R.M., Lourbard, M.F and Sicard, R.E., (1992). *Fundamental immunology* 3rd edition
2. Kuby, J. (1997). *Immunology*, W.H Freeman and co., New York.
3. Roitt, I.M. (1988). *Essential of Immunology*, Black Well Scientific Publishers.



4. Tizard, R.I. (1983). *Immunology - An introduction*, Saunder's College publishers Philadelphia.



# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARNIM SCIENCE COLLEGE

### DEPARTMENT OF MICROBIOLOGY

#### MEDICAL MICROBIOLOGY

Subject Code: 253040602

B.SC. Semester -6

#### Teaching & Evaluation Scheme

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 3               | -  | 3 | 3     | 3       | 30                | -  | 70       | -  | 100   |

#### Objectives

- To provide students the basic knowledge of medical microbiology
- The purpose of the course is to introduce students to Introduction of Normal flora of the human, various disease caused microorganism, antigen antibody interaction, and detail study in various diseases.
- To provide an understanding of the various bacterial disease of like skin, eye, digestive system, nervous system, respiratory system etc.

#### Prerequisites

Student Must have studied B.Sc. with Microbiology as a major subject and knowledge of basic medical microbiology.

#### Course outline



| Unit No. | Course Contents  | Teaching hours |
|----------|--|----------------|
| 1.       | <b>Introduction of medical microbiology:</b> <ul style="list-style-type: none"> <li>• Introduction: Normal microflora of human body, nosocomial infections, carriers, septic shock, septicemia, pathogenicity, virulence factors, toxins, biosafety levels. Morphology, pathogenesis, symptoms, laboratory diagnosis.</li> <li>• Preventive measures and chemotherapy of gram positive bacteria: <i>S.aureus</i>, <i>S.pyogenes</i>, <i>B.anthraxis</i>, <i>C.perferinges</i>, <i>C.tetani</i>,</li> <li>• Basic of Bioethics and biosafety guideline related to Contamination, decontamination, disposal and safety from infectious Sources.</li> </ul> | 10             |
| 2.       | <b>Morphology, pathogenesis, symptoms, laboratory diagnosis.</b> <ul style="list-style-type: none"> <li>• preventive measures and chemotherapy caused by gram negative bacteria: <i>E.coli</i>, <i>N. gonorrhoea</i>, <i>N. meningitidis</i>, <i>P.aeruginosa</i>, <i>S. typhi</i>, <i>S. dysenteriae</i>, <i>Y. pestis</i>, <i>B. abortus</i>, <i>H. influenzae</i>, <i>V. cholera</i>.</li> </ul>  | 10             |
| 3.       | <b>Antigens and Antibody:</b> <ul style="list-style-type: none"> <li>• <b>Antigens:</b> Antigen processing and presentation, properties of antigen, Hapten and the study of antigenicity microbes as antigen, antigen recognition and MHC molecules.</li> <li>• <b>Antibodies:</b> Structure and function, clonal selection, antibody diversity, Monoclonal antibodies and its clinical application.</li> </ul>  | 10             |
| 4.       | <b>Bacterial disease.</b> <ul style="list-style-type: none"> <li>• Bacterial disease of skin &amp; Eyes.</li> <li>• Bacterial disease of Digestive system.</li> <li>• Bacterial disease of nervous system.</li> <li>• Bacterial disease of Respiratory tract.</li> </ul>   | 10             |
|          |  | 40             |



## Learning Outcomes

- The students will be able to understand Normal flora of human body , Bioethics and Biosafety guideline , disease caused microorganism , and many bacterial disease in medical microbiology .
- Student should be able to understand basic concepts of blood cells, Antigen antibody reaction and disease caused bacteria.
- Access information on a topic from a variety of sources, and be able to learn new things on one's own.
- Communicate verbally, and/or in writing the results of theoretical and laboratory experiments in a clear and concise manner that incorporates the conventions used by Microbiologist worldwide.

## Teaching & Learning Methodology

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the program/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a program/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

## Books Recommended

- Prescott, Harley, and Klein's Microbiology, J. M. Willey, L. M. Sherwood, C. J. Woolverton, 7 th Edition (2008), McGraw Hill Higher Education- USA.
- Principles of Microbiology, R. M. Atlas, 2nd Edition (Indian Edition) (2015), McGraw Hill Education (India) Private Limited –New Delhi.
- Baker and Silvertown's Introduction to Medical Laboratory Technology, Baker F, Silvertown R E, Pallister C J, 7th edition (1998), Butterworths-Heinemann, Oxford, UK.







# SWARNIM STARTUP & INNOVATION UNIVERSIT

## SWARNIM SCIENCE COLLEGE

### DEPARTMENT OF PHYSICS

#### Electronic Spectra-2, Solid State Physics & Stat. Mech-2

Subject Code: 253050602

B.Sc. Semester 6

#### Teaching & Evaluation Scheme

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 3               | -  | 2 | 5     | 5       | 50                | 50 | 50       | -  | 150   |

#### Objectives: -

Physics students will:

- Develop a solid grasp of core concepts and applications of differential equation, 2<sup>nd</sup> order differential equation, classical mechanics and quantum mechanics. They learn how physics and other disciplines have impacted and continue to impact each other and society
- They develop laboratory skills throughout our curriculum via hands-on experiences with diverse experimental techniques and tools. They learn various approaches to data analysis and become comfortable using computational methods to analyze and solve problems.

#### Prerequisites

Basics of Spectroscopy Properties of solids.



## Course outline

| Sr. No. | Course Contents  | Teaching Hours |
|---------|--|----------------|
| 1       | <b>Electronic Spectra</b><br>Electronic Spectra, salient features, formation of electronic spectra, Vibrational (Gross) structure of electronic band system in emission, electronic band spectra in absorption, Rotational structure of electronic bands; Rotational structure of three branch bands; observed intensity distribution (vibrational) in band systems : Franck-Condon principle; explanation of intensity distribution in absorption bands from Franck-Condon principle. Explanation of intensity distribution in emission bands : Condon parabola. Line intensities in a band: Rotational intensity distribution. Quantum mechanical Exploting Franck-Condon principle. | 14             |
| 2       | <b>Transport Phenomena</b><br>Introduction, Mean collision time, Scattering cross-section, viscosity, electrical conductivity, thermal conductivity, thermionic emission, photoelectric effect, molecular collision, effusion, diffusion, Brownian motion, Einstein's relation for mobility  | 12             |
| 3       | <b>Theory of Dielectrics</b><br>Polarization, Dielectric constant, Local Electric field, Dielectric polarizability, Sources of polarizability, theory of electric polarizability and optical absorption, ionic polarization, polarization from dipole orientation, dielectric losses, Applications to optical phonon modes in ionic crystals, the longitudinal optical mode, the transverse optical mode, the interaction of electromagnetic waves with optical modes, application to the motion of electrons in polar crystals.   | 14             |
| 4       | <b>Diamagnetism and paramagnetism</b><br>Langevin's theory of diamagnetism, Langevin's theory of paramagnetism, theory of atomic magnetic moment, Hund's Rule, Quantum theory of magnetic susceptibility: A quantum mechanical formulation, Dimagnetism, Paramegnetism, application to magnetic ions in solids: effect of the crystal field, van Vleck paramagnetism, Pauli paramagnetism, Nuclear paramagnetism, Cooling by adiabatic demagnetization, magnetic resonance, ESR, NMR, Spin relaxation, line width and line shape   | 14             |



## Learning Outcomes

- Exercise the use of physical intuition, including the ability to guess an approximate or conceptual answer to a physics problem and recognize whether or not the result of a calculation makes physical sense.
- Access information on a topic from a variety of sources, and be able to learn new things on one's own.
- Communicate verbally, graphically, and/or in writing the results of theoretical calculations and laboratory experiments in a clear and concise manner that incorporates the stylistic conventions used by physicists worldwide.

## Teaching & Learning Methodology

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the programme/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a programme/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

## Books Recommended:

- Mathematical Physics by P.K. Chattopadhyay, New Age International Publishers (2006)
- Mathematical Methods for Physicists by G. Arfken, Academic Press
- Introduction to Classical Mechanics by R. G. Takawale and P. S. Puranik, Tata McGraw-Hill Publishing Co. Ltd.
- Classical Mechanics by A. B. Bhatia, Narosa Publication
- A Text Book of Quantum Mechanics by P. M. Mathews and K. Venketeshan, Tata McGraw-Hill Publishing Co. Ltd.
- Quantum Mechanics : Theory and Applications by A. Ghatak and S. Lokanathan, Macmillan India Limited



### E-Resources:

- The Flying Circus of Physics 2nd edition by Jearl Walker, Wiley India
- Six Ideas that shaped physics by Thomas A Moore, McGraw Hill education
- <http://www.howstuffworks.com/> -- Tech stuff
- How things works by Louis A Bloomfeild, Wiley Publications
- Physics of Everyday Phenomena by W. Thomas Griffith, Juliet Brosing, McGraw Hill Education
- Latest journals like BBC Knowledge, How things work-everyday technology explained by National Geographics.
- <http://www.sciencefairadventure.com/>



# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARRNIM SCIENCE COLLEGE

### DEPARTMENT OF PHYSICS

### Linear Electronic Circuits-2

Subject Code: 253050604

B.Sc. Semester 6

#### Teaching & Evaluation Scheme:-

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 3               | -  | 2 | 5     | 5       | 50                | 50 | 50       | -  | 150   |

#### Objectives: -

Physics students will:

- Develop a solid grasp of core concepts and applications of differential equation, 2<sup>nd</sup> order differential equation, classical mechanics and quantum mechanics. They learn how physics and other disciplines have impacted and continue to impact each other and society
- They develop laboratory skills throughout our curriculum via hands-on experiences with diverse experimental techniques and tools. They learn various approaches to data analysis and become comfortable using computational methods to analyze and solve problems.

#### Prerequisites

Basics of Electronic circuits and digital electronics.



## Course outline

| Sr. No. | Course Contents  | Teaching Hours |
|---------|--|----------------|
| 1       | <b>Negative Feedback in transistor amplifier</b><br>General theory of feedback, reasons for negative feedback, loop gain, types of negative feedback in transistor circuits, Transistor Oscillators: Introduction, Effect of positive feedback, requirements for oscillations, the phase shift oscillator, Wien bridge oscillator, LC oscillators, Colpit and Hearley oscillators with analysis  | 14             |
| 2       | <b>Field effect transistor amplifier:</b><br>Advantages and disadvantages of the FET, Basic construction of the JFET, Characteristics curve of the JFET, Principle of operation of the JFET, Effect of the VDS on channel conductivity, Channel ohmic region and pinch off region. Characteristics parameters of the FET, Common source AC amplifier Operational Amplifier: The basic operational amplifier, the differential amplifier, offset error voltages and currents, the basic operational amplifier application,  | 14             |
| 3       | <b>Arithmetic circuits :</b> Binary addition binary subtraction, unsigned binary number, sign magnitude numbers, 2 S compliment representation, 2' S compliment arithmetic building blocks the adder - subtractor, binary multiplication and division, Digital comparator, decoder, demultiplexer, data selector, encoder.   | 14             |
| 4       | <b>Regulated Power Supply:</b> Introduction, stabilization, limitations of Zener diode regulator, Transistor series voltage regulator, transistor shunt voltage regulator, a series regular with two transistors, current regulator<br><b>Electronic Instruments :</b> Cathode ray oscilloscope: CRO, CRT, electron gun, deflecting plates, screen, methods of focusing, deflection systems, mathematical expression for electrostatic deflection sensitivity, electromagnetic deflection system, magnetic deflection in CRT, Time base (without circuits), CRO Parts, operation of a typical oscilloscope control, uses of CRO. | 14             |

## Learning Outcomes

- Exercise the use of physical intuition, including the ability to guess an approximate or conceptual answer to a physics problem and recognize whether or not the result of a calculation makes physical sense.
- Access information on a topic from a variety of sources, and be able to learn new things on one's own.
- Communicate verbally, graphically, and/or in writing the results of theoretical calculations and laboratory experiments in a clear and concise manner that incorporates the stylistic conventions used by physicists worldwide.



## Teaching & Learning Methodology

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

- Work with students at an early stage of the programme/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a programme/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

## Books Recommended

- Mathematical Physics by P.K. Chattopadhyay, New Age International Publishers (2006)
- Mathematical Methods for Physicists by G. Arfken, Academic Press
- Introduction to Classical Mechanics by R. G. Takawale and P. S. Puranik, Tata McGraw-Hill Publishing Co. Ltd.
- Classical Mechanics by A. B. Bhatia, Narosa Publication
- A Text Book of Quantum Mechanics by P. M. Mathews and K. Venketeshan, Tata McGraw-Hill Publishing Co. Ltd.
- Quantum Mechanics : Theory and Applications by A. Ghatak and S. Lokanathan, Macmillan India Limited

## E-Resources

- The Flying Circus of Physics 2nd edition by Jearl Walker, Wiley India
- Six Ideas that shaped physics by Thomas A Moore, McGraw Hill education
- <http://www.howstuffworks.com/> -- Tech stuff
- How things works by Louis A Bloomfeild, Wiley Publications
- Physics of Everyday Phenomena by W. Thomas Griffith, Juliet Brosing, McGraw Hill Education
- Latest journals like BBC Knowledge, How things work-everyday technology explained by National Geographics.
- <http://www.sciencefairadventure.com/>



# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARNIM SCIENCE COLLEGE

### DEPARTMENT OF PHYSICS

Mathematical Physics, Quantum & Classical Mechanics-2

Subject Code: 253050601

B.Sc. Semester 6

#### Teaching & Evaluation Scheme

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 3               | -  | 2 | 5     | 5       | 50                | 50 | 50       | -  | 150   |

#### Objectives

Develop a solid grasp of core concepts and applications of differential equation, 2<sup>nd</sup> order differential equation, classical mechanics and quantum mechanics. They learn how physics and other disciplines have impacted and continue to impact each other and society

They develop laboratory skills throughout our curriculum via hands-on experiences with diverse experimental techniques and tools. They learn various approaches to data analysis and become comfortable using computational methods to analyze and solve problems.

#### Prerequisites

Basics of calculus and basic Quantum Mechanics



## Course outline

| Sr. No. | Course Contents  | Teaching Hours |
|---------|--|----------------|
| 1       | <b>Some special functions in Physics</b><br>Bessel functions, Bessel functions of the second kind, Henkel functions, Spherical Bessel functions, Legendre polynomials, Associated Legendre polynomials and spherical harmonics, Hermite polynomials, Laguerre polynomials, The gamma function, the Dirac delta function, examples.   | 14             |
| 2       | <b>Variational principle</b><br>Lagrange's and Hamilton's equations : Introduction, Configuration space, Some techniques of calculus of variation, the delta-notation, Applications of the variational principle, Hamilton's principle, Equivalence of Lagrange's and Newton's equations, Advantages of the Lagrangian formulation -Electromechanical analogies, Lagrange's undetermined multipliers, Lagrange's equation for non-holonomic systems, Applications of the Lagrangian method of undetermined multipliers, Hamilton's equations of motion, some applications of the Hamiltonian formulation, Phase space, Comments on the Hamiltonian formulation.    | 14             |
| 3       | <b>Three dimensional square well potential</b><br>Solutions in interior region, Solutions in the exterior Region and Matching, Solution of the radial Equation: energy levels, Stationary state wave functions, Discussion of bound states, Solution of confluent hypergeometric functions, non localized states, solution in parabolic coordinates, the anisotropic oscillator, the isotropic oscillator, normal modes of coupled systems of particles, a charged particle in a uniform magnetic field  | 14             |
| 4       | <b>Representations, Transformations and Symmetries</b><br>Quantum states, state vectors and wave function, The Hilbert space of state vectors, Dirac notation, Dynamical variables and linear operators, Representations, Continuous basis - The Schrödinger representation, Degeneracy, Labeling by commuting observable, change of basis, Unitary transformations, Unitary transformation induced by change of coordinate system: translation, Unitary transformation induced by Rotation of coordinate system, The algebra of Rotation generators, transformation of dynamical variables, Symmetries and conservation laws, the space inversion, time reversal. | 14             |



## Learning Outcomes

- Exercise the use of physical intuition, including the ability to guess an approximate or conceptual answer to a physics problem and recognize whether or not the result of a calculation makes physical sense.
- Access information on a topic from a variety of sources, and be able to learn new things on one's own.
- Communicate verbally, graphically, and/or in writing the results of theoretical calculations and laboratory experiments in a clear and concise manner that incorporates the stylistic conventions used by physicists worldwide.

## Teaching & Learning Methodology

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

The following are some examples of learning and teaching strategies and methods which you may wish to develop for use in your subject area:

- Work with students at an early stage of the programme/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a programme/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

## Books Recommended

- Mathematical Physics by P.K. Chattopadhyay, New Age International Publishers (2006)
- Mathematical Methods for Physicists by G. Arfken, Academic Press
- Introduction to Classical Mechanics by R. G. Takawale and P. S. Puranik, Tata McGraw-Hill Publishing Co. Ltd.
- Classical Mechanics by A. B. Bhatia, Narosa Publication
- A Text Book of Quantum Mechanics by P. M. Mathews and K. Venketeshan, Tata McGraw-Hill Publishing Co. Ltd.
- Quantum Mechanics : Theory and Applications by A. Ghatak and S. Lokanathan, Macmillan India Limited



## E-Resources

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- <http://www.howstuffworks.com/> -- Tech stuff
- How things works by Louis A Bloomfeild, Wiley Publications
- Physics of Everyday Phenomena by W. Thomas Griffith, Juliet Brosing, McGraw Hill Education
- Latest journals like BBC Knowledge, How things work-everyday technology explained by National Geographics.
- <http://www.sciencefairadventure.com/>



# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SWARNIM SCIENCE COLLEGE

### DEPARTMENT OF PHYSICS

### Nuclear physics-2 & Electrodynamics-2

Subject Code: 253050603

B.Sc. Semester 6

#### Teaching & Evaluation Scheme

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 3               | -  | 2 | 5     | 5       | 50                | 50 | 50       | -  | 150   |

#### Objectives

- Develop a solid grasp of core concepts and applications of differential equation, 2<sup>nd</sup> order differential equation, classical mechanics and quantum mechanics. They learn how physics and other disciplines have impacted and continue to impact each other and society
- They develop laboratory skills throughout our curriculum via hands-on experiences with diverse experimental techniques and tools. They learn various approaches to data analysis and become comfortable using computational methods to analyze and solve problems.

#### Prerequisites

Basics of Elctrodynamics and Nuclear Physics.



## Course outline

| Sr. No. | Course Contents   | Teaching Hours |
|---------|---|----------------|
| 1       | <b>Motion of charged particles in Magnetic &amp; Electric field:</b><br>Microscopic & Macroscopic description, Maxwell's equation & charge conservation, Motion of a charged particle in electric & Magnetic fields, Uniform magnetic field & Oscillating electric field, Drift velocity in a gravitational field, Magnetic field varying in space & time : adiabatic variance of the magnetic moment, Inhomogeneous magnetic field : gradient drift & curvature drift, peculiarity of drift motions, Converging magnetic field : magnetic mirror, Longitudinal adiabatic invariant, Periodic magnetic field : Gyro relaxation effect, Motion of magnetic lines of force.   | 14             |
| 2       | <b>Characteristics of plasma in magnetic field:</b><br>Description of plasma as gas mixture, Properties of plasma in a magnetic field, Force on plasma in magnetic field, Current in magnetized plasma, Diffusion in a magnetic field, Collisions in fully ionized magnetoplasma, Pinch effect, Oscillations and waves in the Plasma. Application of Boltzmann-Vlasov equation on plasma: Boltzmann equation, Fokker-Planck equation, Debye screening, Equilibrium distribution function and Boltzmann's H-theorem, Application of B-V equation to longitudinal waves: Dispersion relations., Initial value problem: Landau damping, Cyclotron damping, Excitation, two-stream instability: Beam plasma instability, Pinch instability, Plasma sheath, Non-linear effects | 14             |
| 3       | <b>Nuclear Energy</b><br>Introduction, Neutron induced fission, Asymmetrical fission - mass yield, Emission of delayed neutrons by fission fragments, Energy released in the fission of U235, Fission of lighter nuclei, Fission chain reaction, neutron cycle in a thermal nuclear reactor, Nuclear reactors.  | 12             |
| 4       | <b>Nuclear Physics in other areas of Physics</b><br>The Mossbauer effect, some experiments using Mossbauer effect, Natural Fusion - energy production in stars, Possibility of controlled fusion.<br>Elementary particles: The four basic forces, Particles and antiparticles, Families of particles, conservation laws, particle interactions and decays, energetics of particle reactions, the quark model, the standard model, Numerical Examples.   | 12             |

## Learning Outcomes:

- Exercise the use of physical intuition, including the ability to guess an approximate or conceptual answer to a physics problem and recognize whether or not the result of a calculation makes physical sense.



- Access information on a topic from a variety of sources, and be able to learn new things on one's own.
- Communicate verbally, graphically, and/or in writing the results of theoretical calculations and laboratory experiments in a clear and concise manner that incorporates the stylistic conventions used by physicists worldwide.

### Teaching & Learning Methodology

We should aim to provide a range of modes of learning, including, for example, individual work, group work and opportunities for off-campus learning through visit to various research institutions across India or collaborative arrangements.

- Work with students at an early stage of the programme/module, to identify cultural differences in their previous educational experience, their individual learning approaches and needs
- Draw upon the knowledge and understanding brought by students from different backgrounds, by encouraging them to share and discuss personal knowledge and experience of an issue in tutorial/seminar groups
- Use teaching formats such as discussion groups that encourage the participation of all students and help identify areas where students are having difficulties
- Provide learning materials in different formats (written, online, audio, video podcast etc) to support key concepts/knowledge. Particularly at the start of a programme/module or for key areas, providing online or hard copy notes before classes can aid comprehension and accessibility.

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- Classical Mechanics by A. B. Bhatia, Narosa Publication
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- Physics of Everyday Phenomena by W. Thomas Griffith, Juliet Brosing, McGraw Hill Education
- Latest journals like BBC Knowledge, How things work-everyday technology explained by National Geographics.





# SWARNIM STARTUP & INNOVATION UNIVERSITY (SSIU)

## SWARNIM SCIENCE COLLEGE

### DEPARTMENT OF PHYSICS

#### PHYSICS

#### B.Sc. Semester 6

#### Practical list

| Sr. No. | Practical Name   |
|---------|--|
| 1       | Acceleration due to gravity by Kater's pendulum (variable knife edge)  |
| 2       | e/k by power transistor.   |
| 3       | Rubber tubing.   |
| 4       | Susceptibility of ferromagnetic substance by Quink's method (Magnetic fluid).                                    |
| 5       | To find the value of permeability of free space  |
| 6       | Michelson interferometer - To determine "d"  |
| 7       | To calibrate the spectrometer using Edser-Butler plate.  |
| 8       | Absorption spectrum of Iodine molecule   |
| 9       | To determine the charge on electron by Millikan's experiment.  |
| 10      | Determination of dead time of G.M. tube. Comparison of relative intensities of different sources using G.M. Tube |
| 11      | OPAMP Applications: Adder and Subtractor.  |
| 12      | Heaviside mutual inductance bridge.  |
| 13      | Self-inductance of a coil by Rayleigh's method.  |
| 14      | Use of Excel for data analysis and graph plotting.   |
| 15      | Study of voltage regulated circuit using IC7805  |
| 16      | Half adder, Full adder and subtractor using IC 7483.   |
| 17      | Frequency response of a common source FET amplifier.   |
| 18      | Colpitts oscillator.   |
| 19      | Negative feedback amplifier using transistor.  |
| 20      | Nibble Multiplexer and 8:1 Multiplexer   |





# SWARNIM STARTUP & INNOVATION UNIVERSITY (SSIU)

## SCHOOL OF SCIENCE

### DEPARTMENT OF ENVIRONMENTAL SCIENCE

#### Opportunities

- If interest in research & further study, person could be a academician, researcher or an educationist, and further go for corporate jobs in various companies like Steel, Cement, Pharma, Agro based, Power plant, mines, Refineries etc. or you can work in government sector like Environment & Energy department, state pollution control board or Central pollution control board. Candidate can also join an NGO and become a social activist.

#### About Environmental Sciences

- The Environmental Sciences is one of the pioneering centres of environmental research and education. The man-environment relationship indicates that pollution and deterioration of the environment have a social origin. Environment pollution has become a major global concern. Global society is facing the challenge of improving and providing of solution the quality of air, water, soil, environment and maintaining the ecological balance. The growth of industrialization, urbanization, modern agricultural development and energy generation has resulted in the indiscriminate exploitation of natural resources for fulfilling human desires and needs, which has contributed in disturbing the ecological balance on which the quality of our environment depends. In recent time, one of the major issues is the threat to human life from the progressive deterioration of the environment.
- Today we have environmental problems such as Global warming, acid rain, ozone depletion, climate change, effects of pesticides and fertilizer, Solid waste, hazardous waste- Treatment & disposal. Roots of these problems are a lack of adequate awareness, knowledge, and understanding of our environment. Sustainable development emphasizes the use of natural resources and employing eco-friendly technology for production, processing, and operation in industries and making societies ready for environmental development and management.
- The Department of Environmental sciences is offering M.Sc. in Environmental Sciences was introduced during the academic year 2022-23 to support the basic research understanding in the field. Environmental Sciences is a multidisciplinary, interdisciplinary M.Sc. in Environmental Sciences covers ecology; ecosystem; biodiversity; natural resources; environment and energy; environmental pollution; pollution control technology; environmental monitoring and assessment; green technology; environmental laws and regulation; instrumentation and statistics; Industrial hygiene and safety; environmental toxicology; environmental biotechnology and nanotechnology; sustainable development and management.



**Environmental Science and Ecology-ENV-101****Code:****M.Sc. : 1<sup>st</sup> SEM****Teaching & Evaluation Scheme:-**

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 4               | -  | 2 | 6     | 6       | 30                | 50 | 70       | -  | 150   |

Course outline:-

| Sr. No. | Course Contents   | Number of Hours |
|---------|---|-----------------|
| 1       | <b>Basic of Ecology and Ecosystem</b><br>Introduction, Interactions between species, Natural selection, Species richness, Ecological succession, Food chains and food webs, Primary production, Energy flow in ecosystems, Secondary productivity, Decomposition, Ecosystem stability.  | 6               |
| 2       | <b>Terrestrial Biomes and Forest Resources</b><br>Introduction, Tundra and Taiga, Temperate deciduous forest, Mediterranean vegetation, Temperate and tropical grasslands, Desert and tropical rainforest, Forest Resources-Uses, Forest Type and Management, World Forest Cover, Forest Resources of India, Deforestation, Effect of Deforestation on Tribal People, Effect of Dams on Forest, Forest Degradation in India, Sustainable Forest Management. | 8               |
| 3       | <b>Mineral and Food Resources</b><br>Introduction, Exhaustibility, Localized Occurrence, Uses and Exploration of Mineral Resources, Environmental Effects of Mineral Exploration and Usage, World Food Problems and Production, Pesticides in Modern Agriculture and Environmental Problems, Environmental Limits for Increasing Food Production, Solutions: Sustainable Agriculture, Impact of Irrigation on Environmental Quality.                        | 6               |
| 4       | <b>Conservation of Natural Resources and Environmental Management</b><br>Conservation of Natural Resources, Role of Individuals in Sustainable Environmental Management, Value System and Equitable Resources Use for Sustainable Life System, Role of Individuals in Conservation and Prevention of Pollution.   | 4               |
|         |   |                 |



1. Determination of minimum size quadrat by the Species Curve method.
2. Determination of minimum no. of quadrat to be laid down in the field under the study.
3. Study of vegetation using line transect method.
4. Study of vegetation using belt transect method.
5. Study of vegetation using chart quadrat method.
6. Determination of important value index (IVI).

**Reference Books**

- 1) Y. Anjaneyulu, "*Introduction to Environmental Science*", BS Publications, Hyderabad, India, 2004.
- 2) H. Kaur, "*Environmental Studies*", Pragati Prakashan, 2006.
- 3) Andrew R.W., Jackson & Julie M. Jackson, "*Environmental Science – The Natural Environment and Human Impact*", Addison Wesley Longman Limited, 1996.
- 4) S.C. Santra, "*Environmental Science*", 2<sup>nd</sup> Edition, New Central Book Agency (P) Ltd, Kolkata, India, 2005.
- 5) Richard T. Wright, "*Environmental Chemistry*", Pearson Education Inc., South Asia, 2007.
- 6) Sharma B.K., "*Environmental Chemistry*", Goel Publ. House, Meerut, 2001.
- 7) Wanger K.D., "*Environmental Management*", W.B. Saunders Co. Philadelphia, USA, 1998.
- 8) Krebs J.R., Davies N.B., "*Behavioral Ecology: An Evolutionary Approach*", 3<sup>rd</sup> Edition, Oxford: Blackwell Scientific, 1991.
- 9) Ricklifs R.E., "*Ecology*", 3<sup>rd</sup> Edition, W.H. Eereman, New York, 1990.
- 10) O' Neill P., "*Environmental Chemistry*", 2<sup>nd</sup> Edition, Chapman & Hall, London, 1993.
- 11) Bunce N. J., "*Environmental Chemistry*", Wuerz, Winnipeg, 1990.
- 12) Y. Anjaneyulu, "*Introduction to Environmental Science*", BS Publications, Hyderabad, India, 2004.
- 13) H. Kaur, "*Environmental Studies*", Pragati Prakashan, 2006.
- 14) Andrew R.W., Jackson & Julie M. Jackson, "*Environmental Science – The Natural*"



- Environment and Human Impact*", Addison Wesley Longman Limited, 1996.
- 15) Richard T. Wright, "*Environmental Chemistry*", Pearson Education Inc., South Asia, 2007.
  - 16) Sharma B.K., "*Environmental Chemistry*", Goel Publ. House, Meerut, 2001.
  - 17) Wanger K.D., "*Environmental Management*", W.B. Saunders Co. Philadelphia, USA, 1998.
  - 18) Krebs J.R., Davies N.B., "*Behavioral Ecology: An Evolutionary Approach*", 3<sup>rd</sup> Edition, Oxford: Blackwell Scientific, 1991.
  - 19) Ricklifs R.E., "*Ecology*", 3<sup>rd</sup> Edition, W.H. E Freeman, New York, 1990.
  - 20) O' Neill P., "*Environmental Chemistry*", 2<sup>nd</sup> Edition, Chapman & Hall, London, 1993.
  - 21) Bunce N. J., "*Environmental Chemistry*", Wuerz, Winnipeg, 1990.



## ENVIRONMENTAL ISSUES AND IMPACTS-102

Code:

M.Sc. : 1<sup>st</sup> SEM

### Teaching & Evaluation Scheme:-

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 4               | -  | - | 4     | 4       | 30                | 50 | 70       | -  | 150   |

| Sr. No. | Course Contents   | Number of Hours |
|---------|---|-----------------|
| 1       | <b>The Atmosphere and Acid Rain</b><br>Composition of the atmosphere, Residence times, sources and sinks, Evolution of the primitive atmosphere, Temperature profile of the atmosphere, Atmospheres around the other planets, Nature and Development of Acid Rain, Acid Rain and its impacts on geological Environment, Terrestrial Environment, and Build Environment, Impact of Acid Rain on Human Health and Mitigation of its problems.                         | 5               |
| 2       | <b>Stratospheric Ozone and Tropospheric Chemistry</b><br>The ozone layer, Formation and destruction of ozone, Chlorofluorocarbons, The Montreal Protocol, CFC replacement compounds, Nitrogen oxides as ozone depleters, The hydroxyl radical as an oxidant, Oxidation of carbon monoxide by OH, Oxidation of methane, Photochemical smog, Tropospheric concentration of OH, Particles in the atmosphere, London smog, Particles and climate, Control of particles. | 5               |
| 3       | <b>Global Warming and Climate Change</b><br>Introduction, Greenhouse Gases and Global Climate Changes, Global Warming Potential, Possible Impact of Global Warming, Greenhouse Effect – Policy Response, Kyoto Protocol, El Niño- Climate Cycle,  | 5               |



|   |  |   |
|---|--|---|
|   | Ozone in the Atmosphere, Ozone Hole, Worldwide Ozone Trends, Consequence of Ozone Depletion, Consequences of global CO <sub>2</sub> changes, Strategies for Conservation of Environmental Changes Induced by CO <sub>2</sub> Rise.   |   |
| 4 | <b>Radiation Hazardous and Environmental Degradation</b><br>Introduction, Radiation: Atomic and Natural Background, Measurement of Radio Activity, Nuclear Winter, Radioactive Waste, Ionizing Radiation, Anthropogenic Sources and Effects of Radioactive Pollution, Preventive Measurements. | 5 |

Course Outcome: A wide range of aspect is covered about the atmosphere and its correlation with environment. However, addition to this, knowledge on atmospheric radiation dwindling around and its degradation is also notified to give better understanding of global warming and climate change.

#### Reference Books

- 1) Nigel J. Bunce, “*Environmental Chemistry*”, Wuerz Publishing Ltd, Winnipeg, Canada, 1991.
- 2) S.C. Santra, “*Environmental Science*”, 2<sup>nd</sup> Edition, New Central Book Agency (P) Ltd, Kolkata, India, 2005.
- 3) H. Kaur, “*Environmental Studies*”, Pragati Prakashan, 2006.
- 4) Joner J.AA., “*Global Hydrology: Processes, Resources and Environment*”, Longman, Essenx, England, 1997.
- 5) Wilson E.O., “*Biodiversity*”, National Academy Press, Washinton, DC, 1988.
- 6) Tudge, Colin, “*Global Ecology*”, Oup, New York, 1991.
- 7) Moeller, Dave W., “*Environmental Health*”, Mass: Harvard University Press, Cambridge, 1992.
- 8) Eds. J.D. Coyle, R.R. Hill and D.R. Roberts, “*Light, Chemical Change and Life*”, Open University press, Milton Keynes, England, 1982.
- 9) B.J. Finlayson-Pitts and J.N. Pitts, “*Atmospheric Chemistry*”, Wiley-Interscience, New York, 1986.



**ENERGY AND ENVIRONMENT -103****Code:****M.Sc. : 1<sup>st</sup> SEM****Teaching & Evaluation Scheme:-**

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 4               | -  | - | 4     | 4       | 30                | 50 | 70       | -  | 150   |

| Sr. No. | Course Contents   | Number of Hours |
|---------|---|-----------------|
| 1       | <b>Energy Flow and Equilibrium</b><br><br>Introduction, The laws of energy flow, Dynamic equilibrium and spontaneous change, Chemical kinetics, Atoms and elements, Molecules and covalent compounds, Valency and periodic table of the elements, Oxidation states, Compound mixtures, Chemical species and chemical reactions, The atomic nucleus and nuclear reactions. | 4               |
| 2       | <b>Energy Production and Management</b><br><br>Introduction, Energy Production and Consumption, Sources of Energy, Renewable Energy, Energy Conservation, Solar Energy Input, Conventional Fuels, Natural Gas, Uranium, Nuclear Energy and Nuclear Reactions, The Risk of Nuclear Accidents   | 4               |
| 3       | <b>Non-Conventional and Biological Energy</b><br><br>Introduction, Photovoltaics, Solar Heating, Wind Energy, Tidal Power, Biomass and Biofuels, Natural Vegetation, Energy Tree Plantations, Specific Energy Crops, Power from Biomass, Biomass Programs, Biomass and the Environment.   | 5               |



|   |  |   |
|---|--|---|
| 4 | <b>Energy from Wastes</b><br><br>Introduction, Water-Based Biomass, Energy from Wastes, Solid Wastes, Research and Development, Biogas Plants in India and its use, Utilization of Effluent, Cost of Installation and Annual Savings, Financial Assistance from Government, Organization of the Biogas Sector, Potential for Biogas Generation and Digester Construction, Future Energy Scenario of the World. | 5 |
|---|--|---|

#### Reference Books

- 1) Andrew R.W., Jackson & Julie, M. Jackson, “*Environmental Science – The Natural Environment and Human Impact*”, Addison Wesley Longman Limited, 1996.
- 2) S.C. Santra, “*Environmental Science*”, 2<sup>nd</sup> Edition, New Central Book Agency (P) Ltd, Kolkata, India, 2005.
- 3) Fowler, John M., “*Energy and the Environment*”, 2<sup>nd</sup> Edition, McGraw Hill, New York, 1984.
- 4) Atkins P.W. and J.A. Beran, “*General Chemistry*”, 2<sup>nd</sup> Edition, W.H. Ereeman, NewYork, 1992.
- 5) Weast R.C., “*Handbook of Chemistry and Physics*”, CRC Press, 1994.
- 6) Ebbing, D.D., “*General Chemistry*”, (International 4<sup>th</sup> Edition) MA: Houghton Mifflin, Boston, 1993.
- 7) Carless, Jennifer, “*Renewable Energy: A Concise Guide to Green Alternative*”, Walker, New York, 1993.
- 8) Gray, N.E., “*Biology of Wastewater Treatment*”, Oxford University Press, New York, 1992.



**ENVIRONMENT AND SOIL -104****Code:****M.Sc. : 1<sup>st</sup> SEM****Teaching & Evaluation Scheme:-**

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 4               | -  | - | 4     | 4       | 30                | 50 | 70       | -  | 150   |

| Sr. No. | Course Contents  | Number of Hours |
|---------|--|-----------------|
| 1       | <b>Soil Composition, Formation and Morphology</b><br>Preview and Historical Perspectives, Weathering of Soil Minerals, Soil Formation and the factors, Land, Development and Horizons, Degradation and Destruction, Quality Assessment, Soil Individual and Mapping Units, GIS and GPS for Soil.   | 6               |
| 2       | <b>Physical Properties of Soil</b><br>Soil Texture, Rock Fragments, Soil Structure, Particle Density and Bulk Density, Soil Porosity and Permeability, Soil Air, Rhizotrons, Soil Consistence, Soil Color, Soil Temperature, Other Soil Physical Properties.   | 6               |
| 3       | <b>Soil Water Properties</b><br>Water and its Relation to Soil, Terminology and Classifications for Soil Water, Soil as Water Reservoirs, Soil Water Content, Instruments for determining Water Content or Potential, Water Flow into and through Soils, Water Uptake by Plants, Consumptive Use and Water Efficiency, Reducing Water Loss | 6               |
| 4       | <b>Chemical and Acidic Properties of Soil</b><br>Soil Clays, Organic Colloids, Cation/Anion Exchange and Adsorption, Reactions and Buffering in Soils, Ecological Relation of Soil Acidity, Composition and Reactions of Lime, Crops, Lime and Soil, Lime Balance Sheet, Acidifying Soils.   | 6               |



1. Soil moisture measurement.
2. Determination of soil pH.
3. Determination of salt in soil.
4. Determination of calcium and magnesium in soil.
5. Determination of chloride in soil.
6. Determination of carbonate and bicarbonate in soil.
7. Determination of total phosphorus.

**Books Recommended:**

- 1) Raymond W. Miller, Duane T. Gardiner, “*Soil in our Environment*”, 8<sup>th</sup> Edition, Upper Saddle River, New Jersey, 1998.
- 2) Dr. H. Kaur, “*Environmental Chemistry*”, 2<sup>nd</sup> Edition, Pragati Prakashan, Meerut, 2007.
- 3) E.A. FitzPatrick, “*Soils: Their Formation, Classification and Distribution*”, Longman Publishers, 1980.
- 4) Karl Terzaghi, Ralph B. Peck and Gholamreza Mesri, “*Soil Mechanics in Engineering Practice*”, 3<sup>rd</sup> Edition, John Wiley & Sons, New York, 1996.
- 5) R.G. Burns, “*Soil Enzymes*”, Academic Press, New York, 1978.
- 6) S.L. Tisdale, W.L. Nelson, J.P. Beaton and John L. Havlin, “*Soil Fertility and Fertilizers*”, 5<sup>th</sup> Edition, Macmillan, New York, 1993.
- 7) F.R. Troch, J.A. Hobbs, and R.L. Donahue, “*Soil and Water Conservation*”, 2<sup>nd</sup> Edition, Prentice-Hall Englewood Cliffs, NJ, 1991.



# **SWARNIM STARTUP & INNOVATION UNIVERSITY (SSIU)**

## **SCHOOL OF SCIENCE**

### **DEPARTMENT OF ENVIRONMENTAL SCIENCE**

#### **Opportunities**

- If interest in research & further study, person could be a academician, researcher or an educationist, and further go for corporate jobs in various companies like Steel, Cement, Pharma, Agro based, Power plant, mines, Refineries etc. or you can work in government sector like Environment & Energy department, state pollution control board or Central pollution control board. Candidate can also join an NGO and become a social activist.

#### **About Environmental Sciences**

- The Environmental Sciences is one of the pioneering centres of environmental research and education. The man-environment relationship indicates that pollution and deterioration of the environment have a social origin. Environment pollution has become a major global concern. Global society is facing the challenge of improving and providing of solution the quality of air, water, soil, environment and maintaining the ecological balance. The growth of industrialization, urbanization, modern agricultural development and energy generation has resulted in the indiscriminate exploitation of natural resources for fulfilling human desires and needs, which has contributed in disturbing the ecological balance on which the quality of our environment depends. In recent time, one of the major issues is the threat to human life from the progressive deterioration of the environment.
- Today we have environmental problems such as Global warming, acid rain, ozone depletion, climate change, effects of pesticides and fertilizer, Solid waste, hazardous waste- Treatment & disposal. Roots of these problems are a lack of adequate awareness, knowledge, and understanding of our environment. Sustainable development emphasizes the use of natural resources and employing eco-friendly technology for production, processing, and operation in industries and making societies ready for environmental development and management.
- The Department of Environmental sciences is offering M.Sc. in Environmental Sciences was introduced during the academic year 2022-23 to support the basic research understanding in the field. Environmental Sciences is a multidisciplinary, interdisciplinary M.Sc. in Environmental Sciences covers ecology; ecosystem; biodiversity; natural resources; environment and energy; environmental pollution; pollution control technology; environmental monitoring and assessment; green technology; environmental laws and regulation; instrumentation and statistics; Industrial hygiene and safety; environmental toxicology; environmental biotechnology and nanotechnology; sustainable development and management.



# WATER QUALITY AND WASTEWATER TREATMENT TECHNIQUES -ENV-

201 Code:

M.Sc. : 2<sup>nd</sup> SEM

## Teaching & Evaluation Scheme:-

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 4               | -  | 0 | 4     | 4       | 30                | 00 | 70       | -  | 100   |

| Sr. No. | Course Contents   | Number of Hours |
|---------|---|-----------------|
| 1       | <b>Water Resources and Classification of Water Pollutants</b><br>Introduction, Hydrological Cycle, Surface Water, Ground Water, Natural Conditions That Influence Water Quality, Methods for Managing Water Resources, Utilization of water, Origin of Wastewater, Types of Water Pollutants and their Effects. | 5               |
| 2       | <b>Wastewater Sampling and Analysis Methods</b><br>Sampling, Methods of Analysis, Determination of Organic Matter, Determination of Inorganic Substances, Physical Characteristics, Bacteriological Measurement.  | 4               |
| 3       | <b>Wastewater Treatment Techniques</b><br>Basic Process of Water Treatment, Primary Treatment, Secondary (Biological) Treatment, Advanced Wastewater Treatment, Recovery of Materials from Process Effluents.   | 6               |
| 4       | <b>Industrial Chemical Processes and Water Quality Regulations</b><br>Sugar Industry and Distillery, Pesticides, Drugs and Pharmaceuticals, Pulp and Paper Industry, Tanneries, Dye and Dye Intermediates, Paints and Synthetic Resins, Fertilizer Industry, Dairy Industry, Water Quality Regulations.         | 6               |



**Course Outcome:** Water is very important aspect of life and this paper enlightens students about its availability, use, presence of pollutants, conservation and rules and regulations.

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## **ENV PR WATER ANALYSIS**

1. Determination of pH, Conductivity.
2. Determination of Total Hardness.
3. Determination of Chloride, Acidity and Alkalinity.
4. Determination of DO, BOD and COD.
5. Determination of Phosphate, Iron, Sulphate, Fluoride.
6. Determination of Oil and Grease.

### **Reference Books**

- 1) Y. Anjaneyulu, "***Introduction to Environmental Science***", BS Publications, Hyderabad, India, 2004.
- 2) K. Vigil, "***Clean Water- An Introduction to Water Quality and WaterPollution Control***", 2<sup>nd</sup> Edition, Oregon State University Press, USA, 2003.
- 3) C.S. Rao, "***Environmental Pollution Control Engineering***", Wiley Eastern Limited, New Delhi, India, 1995.
- 4) S.C. Bhatia., "***Solid and Hazardous Waste Management***", Atlantic Publishers and Distributors (P) Ltd., 2007.
- 5) Brown, R.L., "***Treatment of Water and Solid Wastes***", Springer Field, New York.
- 6) S.C. Santra, "***Environmental Science***", 2<sup>nd</sup> Edition, New Central Book Agency (P) Ltd, Kolkata, India, 2005.
- 7) S.N. Kaul., Arvind Kumar., "***Waste Water Engineering***", APH Publishing Corporation, New Delhi, India, 2006.
- 8) G.S.Sodhi., "***Fundamental Concepts of Environment Chemistry***", (3<sup>rd</sup> Edition), Narosa Publishing House Pvt. Ltd., New Delhi, India, 2009.
- 9) Mark M. Benjamin., "***Water Chemiatry***", McGraw-Hill, New York, 2002. 10) J.C. Currie and A.T. Pepper, "***Water and The Environment***", Ellis Horwood Limited, England, 1993.



**INTEGRATED SOLID WASTE MANAGEMENT - ENV 202**

**Code:  
M.Sc. : 2<sup>nd</sup> SEM**

**Teaching & Evaluation Scheme:-**

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 4               | -  | - | 4     | 4       | 30                | -  | 70       | -  | 100   |

| Sr. No. | Course Contents  | Number of Hours |
|---------|--|-----------------|
| 1       | <b>Basic Concepts of Solid Waste Management and Volume Reduction Technologies</b><br>Introduction, Types of Solid Waste, Solid Waste Collection, Factors in Planning, Reducing the Amount of Garbage, Hierarchy of Waste Management, Source Reduction Policy: Goals and measurement methodology, initiatives, government programmes, Cost of Environmental Management, Concentrating Methods: vacuum filtration, rotary drum precoat filter, pressure filtration, centrifuge dewatering, Incineration of Municipal Sludge. | 8               |
| 2       | <b>Recycling of Solid Waste</b><br>Introduction, Ways to Recycle, Collection of Recyclables, Processing Equipment for Recycling Facilities: Baling, magnetic separation, screening, Size Reduction, Air classification, Processing Recyclables: source separated recyclables, glass, plastics, can and metal processing, Recycling of PVC and related products, Automotive and Household Batteries.  | 6               |
| 3       | <b>Composting and Landfilling of Municipal Solid Waste</b><br>Introduction, Definition, Classification of Compost Process, Compost Phases, Environmental Factors and Operational parameters affecting Composting, Classification of Compost system, Classification of Landfills, Landfilling Methods, Generation and Composition of Landfill Gases, Formation and Composition of Leachate.   | 5               |



|   |  |   |
|---|--|---|
| 4 | <b>Hazardous Waste</b><br>Introduction, Definition of various Hazardous Waste, Transportation of Hazardous Waste, Treatment, Storage and Disposal, Site Remediation, Hazardous Waste Minimization, Medical and Hospital Wastes, Nuclear Pollution and Radio-active Wastes. | 4 |
|---|--|---|

4

**Course Outcome:** To improve environment it is necessary to eradicate solid waste. Thus, student understand types, source, recycling and management of solid waste by studying this paper.

### Reference Books

- 1) S.C. Bhatia., ***“Solid and Hazardous Waste Management”***, Atlantic Publishers and Distributors (P) Ltd., 2007.
- 2) Curds, C.R. and Hawkes, H.A., ***“Basic Hazardous Waste Management”***, Academic Pres, London.
- 3) Goldberg, E.D., ***“Hazardous Waste Management”***, Gordon and Breach, Science Publishers, New York.
- 4) Odum, E.P., ***“Integrated Solid Waste Management”***, John Wiley & Sons, New York. 5) Lehr, J.H., Tyler, E.G., Wayne, A.P. and Jack, D., ***“Handbook of Solid Waste Management”***, McGraw-Hill, New York.
- 6) Nemerow, N.L., ***“Industrial Waste Management”***, Addison-Wesley Publishing Company, Philippines.
- 7) James, A. and Evison, L., ***“Treatment of Industrial Wastes”***, John Wiley & Sons, New York.



## Aquatic and marine Environmental Chemistry - ENV 203

Code:  
M.Sc. : 2<sup>nd</sup> SEM

### Teaching & Evaluation Scheme:-

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 4               | -  | - | 4     | 4       | 30                | -  | 70       | -  | 100   |

| Sr. No. | Course Contents   | Number of Hours |
|---------|---|-----------------|
| 1       | <b>Fundamentals of Aquatic and Marine Chemistry</b><br>The Aquatic Environment, The Acidity of Water, Metal Complexes in Solution, Oxidation and Reduction, Deposition Dissolution and Processes, Pharmaceuticals from the Sea.   | 8               |
| 2       | <b>Contamination and Pollutants in the Marine Environment</b> Introduction, Pollution of Marine Environment, Sources and Nature of pollutants, Oil Pollution and Marine Biota, Microbial Degradation of Oil and Petrochemical in the Sea, Metallic Pollutant and Aquatic Biota of the Sea, Status of Coastal and Estuarine Pollution in India, Mitigation of Marine Pollution | 6               |
| 3       | <b>The Oceans and Climate</b><br>Introduction, The Complex Medium Called Seawater, Spatial Scales and the Potential for Change, Oceanic Gases and the Carbon Cycle, Oceanic Gases and Cloud Physics, Feedback Processes Involving Marine Chemistry and Climate, Future Prospects  | 5               |
| 4       | <b>Remote Sensing and Geographical Information and Positioning System</b> Principles of Remote Sensing, Types of Remote Sensing, System Overview in Remote Sensing, Application of Remote Sensing, GIS and GPS.   | 4               |



**Course Outcome:** Earth consist of water and thus it is extremely necessary to understand water bodies present as it serves main source of living that is water. So, this paper gives students are wider vision towards the chemistry prevailing in aquatic and marine zone and apart from that their conservation. However, inclusion of remotesensing is also done just to give knowledge about correlation between remote sensing and its usefulness to environment..

6

### Reference Books

- 1) Alan, G. Howard, "*Aquatic Environmental Chemistry*", Oxford University Press, Oxford, New York, 1997.
- 2) R.E. Hester and R.M. Harrison, "*Chemistry in the Marine Environment*", Published by The Royal Society of the Chemistry, Cambridge, UK, 2000.
- 3) S.C. Santra, "*Environmental Science*", 2<sup>nd</sup> Edition, New Central Book Agency (P) Ltd, Kolkata, India, 2005.
- 4) Manahan, S.E., "*Environmental Chemistry*", Lewis Publishers, Chelsea Michigan, 1995.
- 5) Ward, R.C., and Robinson, M., "*Principles of Hydrology*", 3<sup>rd</sup> Edition, McGraw-Hill, Maidenhead, 1989.
- 6) J.A. Knauss, "*An Introduction to Physical Oceanography*", Prentice Hall, Englewood, NJ, 1978.
- 7) G.R. Bigg., "*The Oceans and Climate*", Cambridge University Press, Cambridge, 1996.
- 8) J.T. Houghton, L.G. Meira Filho, B.A. Callander, N. Harris, "*Climate Change*", Cambridge University, Cambridge, 1996.
- 9) S. Grabley and R. Thiericke, "*Drug Discovery from Nature*", Springer, Berlin, 1999.



**AIR POLLUTION: QUALITY AND CONTROL METHODS - ENV 204****Code:****M.Sc. : 2<sup>nd</sup> SEM****Teaching & Evaluation Scheme:-**

| Teaching Scheme |    |   |       | Credits | Evaluation Scheme |    |          |    |       |
|-----------------|----|---|-------|---------|-------------------|----|----------|----|-------|
| Th              | Tu | P | Total |         | Internal          |    | External |    | Total |
|                 |    |   |       |         | Th                | Pr | Th       | Pr |       |
| 4               | -  | - | 4     | 4       | 30                | -  | 70       | -  | 100   |

| Sr. No. | Course Contents  | Number of Hours |
|---------|--|-----------------|
| 1       | <b>Sources and Effects of Air Pollution</b><br>Definition, Classification and Properties of Air Pollutants, Emission Sources, Behavior and Fate of Air Pollutants, Photochemical Smog, Effects of Air Pollution: human health, vegetation and materials, Air (Prevention and Control of Pollution) Act 1981  | 6               |
| 2       | <b>Sampling and Measurement of Air Pollutants</b><br>Types of Pollutant Sampling and Measurement, Ambient Air Sampling, Collection of Gaseous Air Pollutants: grab sampling, absorption in liquids, adsorption on solids, freeze out sampling, Collection of Particulate Pollutants, Stack Sampling: sampling system, particulate and gaseous sampling, Analysis of Air Pollutants.            | 6               |
| 3       | <b>Air Pollution Control Methods and Equipment</b><br>Introduction, Source Correction Methods, Particulate Emission Control Equipments: gravitational settling chambers, cyclone separators, fabric filters, electrostatic precipitators, wet collectors, Control of Gaseous Pollutants: Control of Sulphur, Dioxide Emission, Nitrogen Oxides, Carbon Monoxide, Hydrocarbons, Mobile Sources. | 6               |



|   |  |   |
|---|--|---|
| 4 | <b>Indoor Air Quality</b><br>Nature, Sources and Toxicity of Indoor Air Pollutants, Syndromes related to indoor air quality: Sick building syndrome, building related illness, multiple chemical sensitivity or chemical hypersensitivity syndrome, Sources and Sinks in the Indoor Environment. | 6 |
|---|--|---|

**Course Outcome:** This paper illuminates' students about air quality prevailing in environment. Apart from this it also educates them about the toxicity lead due to air pollution and measures to treat them.

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### Books Recommended:

- 1 C.S. Rao, "*Environmental Pollution Control Engineering*", Wiley Eastern Limited, New Delhi, India, 1995.
- 2 M. Marconi, B. Seifert and T. Lindwall, "*Indoor Air Quality*", Elsevier Science B.V., Netherland, 1995.
- 3 S.H. Stoker, and S.L. Seager, "*Environmental Chemistry: Air and Water Pollution*", Scott Foresman & Co., New York, 1976.
- 4 P.O. Warner, "*Analysis of Air Pollutants*", John Wiley & Sons, New York, 1976. 5 J.D. Butler, "*Air Pollution Chemistry*", Academic Press, London, 1979. 6 S.C. Santra, "*Environmental Science*", 2<sup>nd</sup> Edition, New Central Book Agency (P) Ltd, Kolkata, India, 2005.
- 7 Y. Anjaneyulu, "*Introduction to Environmental Science*", BS Publications, Hyderabad, India, 2004.
- 8 Trivedi, R.K. and P.K. Goal, "*Introduction to Air Pollution*", Techno-Science Publications.






## FINAL VERSION OF COMPETANCY BASED CURRICUUM FOR ANATOMY FOR FIRST BHMS COURSE

Subject- Human Anatomy

Subject Code: Hom UG-AN

| Sl No | Description                               | Page Number |
|-------|---|-------------|
| 1     | Preamble                                  | 2-3         |
| 2     | Program Outcomes (PO)                     | 3           |
| 3     | Course Outcomes (CO)                      | 3-4         |
| 4     | Teaching Hours                            | 4-6         |
| 5     | Course Content                            | 6-34        |
| 6     | Teaching Learning Methods                 | 34-36       |
| 7     | Content Mapping (Competencies Table)      | 36-110      |
| 8     | Practical Topics (Non-Lecture Activities) | 110-111     |
| 9     | Assessment                                | 111-121     |
| 10    | List of Recommended Books                 | 122-123     |
| 11    | List of Contributors                      | 124         |



  
**Principal**  
Arihant Homoeopathic  
Medical College & R.I.  
Bhoyan Rathod, Gandhinagar

## **FINAL VERSION OF COMPETANCY BASED CURRICUUM FOR ANATOMY FOR FIRST BHMS COURSE**

**Subject-** Human Anatomy

**Subject Code:** Hom UG-AN

| <b>Sl No</b> | <b>Description</b>                                 | <b>Page Number</b> |
|--------------|--|--------------------|
| 1            | Preamble   | 2-3                |
| 2            | Program Outcomes (PO)                              | 3                  |
| 3            | Course Outcomes (CO)                               | 3-4                |
| 4            | Teaching Hours                                     | 4-6                |
| 5            | Course Content                                     | 6-34               |
| 6            | Teaching Learning Methods                          | 34-36              |
| 7            | Content Mapping (Competencies Table)               | 36-110             |
| 8            | Practical Topics ( <b>Non-Lecture Activities</b> ) | 110-111            |
| 9            | Assessment   | 111-121            |
| 10           | List of Recommended Books                          | 122-123            |
| 11           | List of Contributors                               | 124                |

## **1. PREAMBLE**

Anatomy is a study of the structural organization and development of man from gross to cellular aspects along with exploring the interrelationship of different tissues, organs and systems.

An important aspect for the homoeopathic student to grasp is the essentially holistic approach emphasized by Hahnemann. From that perspective, study of anatomy is not a study of isolated organs, parts or tissues but that of a hierarchical system which is intimately interconnected and functions with a purpose of striking balance when in a state of adaptation. The subtle ways in which this balance is lost through a malfunctioning of the vital force needs to be appreciated. This can occur when anatomy is taught with applied anatomy in the background.

While anatomy explores the structural organization of man, physiology gives us an understanding of the functional organization of the human being. These subjects, which are in reality the two sides of the coin, need to be taught interdependently. This enables the student to develop an insight into the essential interconnection of both in normal health and how both these alter when the disease process gets initiated in the system. This will also reduce the number of teaching hours due to avoiding duplication of information. While the clinical integration is taking place, homoeopathic connection is emphasized when the relevance of the Homoeopathic subjects being taught in the 1<sup>st</sup> year (Philosophy, Materia Medica, Pharmacy and Repertory), is simultaneously brought to the forefront and hence student-centered teaching of the first BHMS year be achieved.

Advances in the understanding of tissues and cell structures which subsume functions of the organs and systems can afford a fertile area for exploring the action of drugs of Materia medica.

## **2. PROGRAMME OUTCOMES**

At the end of BHMS program, a student should;

1. Develop the competencies essential for primary health care in clinical diagnosis and treatment of diseases through the judicious application of homoeopathic principles.
2. Recognize the scope and limitation of homoeopathy and to apply the Homoeopathic Principles for curative, prophylactic, promotive, palliative, and rehabilitative primary health care for the benefit of the individual and community.
3. Discern the relevance of other systems of medical practice for rational use of cross referral and life saving measures, so as to address clinical emergencies.
4. Develop capacity for critical thinking and research aptitude as required for evidence based homoeopathic practice.
5. Demonstrate aptitude for lifelong learning and develop competencies as and when conditions of practice demand.
6. Be competent enough to practice homoeopathy as per the medical ethics and professionalism.
7. Develop the necessary communication skills to work as a team member in various healthcare setting and contribute towards the larger goals of national policies such as school health, community health, environmental conservation.
8. Identify and respect the socio-demographic, psychological, cultural, environmental & economic factors that affect health and disease and plan homoeopathic intervention to achieve the sustainable development Goal.

## **3. COURSE OUTCOMES**

At the end of the I BHMS course, I BHMS student should be able to;

1. Discuss the evolution of life and the developmental anatomy and genetics of human.
2. Explain the ethics of Anatomy, such as Anatomy act, Body donation & receiving procedure and its legal aspects, develop respect to the human cadaver.
3. Differentiate the structural organization of man from micro to macro and its evolution from embryo.

4. Correlate the structural organization of man with functional organization and its applied aspect.
5. Apply anatomy knowledge to achieve vertical integration with clinical subjects.
6. Correlate structural organization of man with Homeopathic Philosophy and concept of man, Homoeopathic Materia Medica, Repertory and Pharmacy.
7. Correlate structural organization in interpreting different investigations.

#### 4. TEACHING HOURS

| Sl. No. | Subject | Theoretical Lecture | (Non – Lecture hours) Practical / Tutorials / Seminars / Clinical Postings |
|---------|---------|---------------------|--|
| 01      | Anatomy | 325 hrs.            | 330hrs.  |

| Theory (hrs)      | Non-lecture (hrs) |                        |
|-------------------|-------------------|------------------------|
| 325               | Practical         | Non-lecture activities |
|                   | 250               | 80                     |
| Total – 655 hours |                   |                        |

##### a. TEACHING HOURS (THEORY)

|         |
|---------|
| Paper-I |
|---------|

| Sl. No | List of Topics         | Term | Teaching Hours |
|--------|------------------------|------|----------------|
| 1      | General Anatomy        | I    | 32             |
| 2      | Head, Neck & Face      | II   | 50             |
| 3      | Central Nervous System | II   | 30             |
| 4      | Upper Extremities      | I    | 35             |
| 5      | Embryology             | I    | 20             |

| Paper-II |                   |      |                |
|----------|-------------------|------|----------------|
| Sl. No   | List of Topics    | Term | Teaching Hours |
| 1        | Thorax            | II   | 28             |
| 2        | Abdomen & Pelvis  | III  | 70             |
| 3        | Lower Extremities | III  | 40             |
| 4        | Histology         | I    | 20             |

**b. TEACHING HOURS (PRACTICAL)**

| Sl. No | List of Topics         | Term | Teaching Hours |
|--------|------------------------|------|----------------|
| 1      | Head, Neck & Face      | II   | 56             |
| 2      | Central Nervous System | II   | 16             |
| 3      | Upper Extremities      | I    | 34             |
| 4      | Thorax                 | II   | 30             |
| 5      | Abdomen & Pelvis       | III  | 50             |
| 6      | Lower Extremities      | III  | 40             |
| 7      | Histology              | I    | 24             |

**5. COURSE CONTENT: Syllabus Planning****a. Theory:**

- a. Syllabus should start with revision of some of important topics of BIOLOGY (To connect Biology to Medical Science), origin of Earth and Environment, Origin of LIFE-Evolution of Human Lives.
- b. The complete course of Human Anatomy should be subdivided in number of modules according to topics/regions/systems.
- c. Syllabus of other subjects of same course should be planned out where the maximum integration (Vertical & Horizontal) of topics is possible.
- d. Theory/Practical/Tutorial/Case based learning should be arranged in parallel.
- e. Each module should be planned according to the need of system-Co-relation with Homoeopathy & time dimension (number of hours).
- f. At the end of each module knowledge should be assessed by arranging joint seminars (application of classroom knowledge to practical understanding).

**g.** The curriculum includes the following;

1. Anatomy Act.
2. Body donation procedure and its legal aspects.
3. Develop respect to the human cadaver, empathy towards diseased and sense of gratification for the voluntary body donors and their families.
4. Anatomy and Ethics.

**b. Practical**

- a.** Dissection of whole Human Body, Demonstration of dissected parts and small group discussions.
- b.** Identification of histological slides, related to tissue & organs.
- c.** Students shall maintain Practical/Dissection & Histology record.

**THEORY**

| Sl. No.   | Topics   | No. of hours | Term     |
|-----------|--|--------------|----------|
| <b>1.</b> | <b>GENERAL ANATOMY</b>   |              | <b>I</b> |
|           | 1. Modern concepts of cell and its components; cell division, types with their significance  | 2            |          |
|           | 2. Basic tissues   | 2            |          |
|           | 3. Genetics <ol style="list-style-type: none"><li>i. DNA &amp; RNA</li><li>ii. Chromosomes</li><li>iii. Genes</li><li>iv. Inheritances</li></ol> | 6            |          |

| Sl. No.   | Topics   | No. of hours  | Term     |
|-----------|--|---|----------|
|           | v. Genetic basis of diseases and Integration with homoeopathic concept of miasmatic influence  |   |          |
|           | 4. Basics of General Anatomy-<br>i. Definition and subdivisions of Anatomy<br>ii. History of Anatomy<br>iii. Anatomical terms of position & movement<br>iv. Skin, superficial and deep fasciae<br>v. Muscles<br>vi. Bones<br>vii. Joints<br>viii. Blood vessels<br>ix. Lymphatic system<br>x. Nerves<br>xi. Glands: types and classification | 1<br>1<br>2<br>2<br>2<br>2<br>2<br>2<br>2<br>2<br>2 |          |
|           | 5. Revision  | 2   |          |
|           | <b>Total Hours</b>   | <b>32</b>   |          |
|           |  |   |          |
| <b>2.</b> | <b>DEVELOPMENTAL ANATOMY (EMBRYOLOGY)</b>  |   | <b>I</b> |
|           | 1. Introduction<br>2. Spermatogenesis<br>3. Oogenesis<br>4. Fertilization<br>5. Cleavage and implantation<br>6. Bilaminar germ disc formation<br>7. Gastrulation: Germ layers & Derivatives  | 1<br>1<br>1<br>1<br>2<br>2<br>3<br>1                |          |

| Sl. No.   | Topics   | No. of hours | Term     |
|-----------|--|--------------|----------|
|           | 8. Intraembryonic mesoderm derivatives: Somites          | 1            |          |
|           | 9. Ossification  | 1            |          |
|           | 10. Notochord  | 1            |          |
|           | 11. Folding of the embryonic: formation of primitive gut | 2            |          |
|           | 12. Placenta   | 1            |          |
|           | 13. Revision   | 2            |          |
|           | <b>Total Hours</b>                                       | <b>20</b>    |          |
| <b>3.</b> | <b>HISTOLOGY (General)</b>                               |              | <b>I</b> |
|           | 1. Introduction  | 1            |          |
|           | 2. Epithelial tissue                                     | 2            |          |
|           | 3. Connective tissue                                     | 2            |          |
|           | 4. Cartilage   | 1            |          |
|           | 5. Bone  | 1            |          |
|           | 6. Muscle  | 2            |          |
|           | 7. Nervous tissue  | 1            |          |
|           | 8. Skin  | 2            |          |
|           | 9. Lymphoid organs                                       | 2            |          |
|           | 10. Blood vessels  | 2            |          |

| Sl. No.   | Topics  | No. of hours | Term     |
|-----------|---|--------------|----------|
|           | 11. Glands  | 2            |          |
|           | 12. Revision  | 2            |          |
|           | <b>Total Hours</b>  | <b>20</b>    |          |
| <b>4.</b> | <b>UPPER EXTREMITY</b>  |              | <b>I</b> |
|           | 1. Introduction   | 1            |          |
|           | 2. Pectoral region and axilla   | 2            |          |
|           | 3. Mammary Gland  | 2            |          |
|           | 4. Brachial plexus  | 2            |          |
|           | 5. Axillary artery  | 1            |          |
|           | 6. Back and Intermuscular spaces around scapula   | 2            |          |
|           | 7. Shoulder Joint   | 2            |          |
|           | 8. Musculocutaneous and axillary nerves   | 1            |          |
|           | 9. Arm and cubital fossa; brachial artery   | 2            |          |
|           | 10. Fore arm: Muscles, nerves and blood vessels<br>(Superficial and Deep Flexors and Extensors) | 4            |          |
|           | 11. Radial artery   | 1            |          |
|           | 12. Ulnar artery  | 1            |          |

| Sl. No.   | Topics   | No. of hours | Term       |
|-----------|--|--------------|------------|
|           | 13. Median nerve                                   | 2            |            |
|           | 14. Ulnar nerve                                    | 1            |            |
|           | 15. Radial nerve                                   | 2            |            |
|           | 16. Elbow joint and radio-ulnar articulations      | 2            |            |
|           | 17. Wrist joint                                    | 1            |            |
|           | 18. Flexor and extensor retinacula                 | 1            |            |
|           | 19. Palmar aponeurosis and spaces in palmar spaces | 2            |            |
|           | 20. Venous drainage of upper extremity             | 1            |            |
|           | 21. Revision                                       | 2            |            |
|           | <b>Total Hours</b>                                 | <b>35</b>    |            |
| <b>5.</b> | <b>LOWER EXTREMITY</b>                             |              | <b>III</b> |
|           | 1. Introduction                                    | 1            |            |
|           | 2. Lumbar plexus and femoral nerve                 | 2            |            |
|           | 3. Front of thigh                                  | 2            |            |
|           | 4. Femoral Triangle and Femoral artery             | 2            |            |
|           | 5. Median compartment of thigh and obturator nerve | 2            |            |

| Sl. No.   | Topics   | No. of hours | Term      |
|-----------|--|--------------|-----------|
|           | 6. Gluteal region  | 2            |           |
|           | 7. Sacral plexus and sciatic nerve, tibial and common peroneal nerves                    | 4            |           |
|           | 8. Back of the thigh Popliteal fossa   | 2            |           |
|           | 9. Hip joint   | 2            |           |
|           | 10. Front of the leg and dorsum of the foot: Anterior tibial artery, deep peroneal nerve | 4            |           |
|           | 11. Back of the leg: Tibial nerve and posterior tibial artery                            | 3            |           |
|           | 12. Side of the leg: Superficial peroneal nerve  | 2            |           |
|           | 13. Retinacula around the ankle  | 1            |           |
|           | 14. Sole of foot   | 2            |           |
|           | 15. Knee Joint   | 2            |           |
|           | 16. Ankle joint  | 1            |           |
|           | 17. Arches of foot   | 2            |           |
|           | 18. Venous drainage of lower extremity   | 2            |           |
|           | 19. Revision   | 2            |           |
|           | <b>Total Hours</b>   | <b>40</b>    |           |
| <b>6.</b> | <b>THORAX</b>  |              | <b>II</b> |

| Sl. No. | Topics  | No. of hours | Term |
|---------|---|--------------|------|
|         | 1. Introduction   | 1            |      |
|         | 2. Trachea  | 1            |      |
|         | 3. Pleura   | 1            |      |
|         | 4. Lungs  | 3            |      |
|         | 5. Mediastinum  | 2            |      |
|         | 6. Pericardium and Heart  | 4            |      |
|         | 7. Blood supply of heart  | 2            |      |
|         | 8. Superior mediastinum: Arch of aorta                            | 1            |      |
|         | 9. Superior mediastinum: Superior Vena cava                       | 1            |      |
|         | 10. Inferior Vena Cava  | 1            |      |
|         | 11. Posterior mediastinum: Azygous vein & Thoracic duct           | 2            |      |
|         | 12. Posterior mediastinum: Oesophagus & Descending thoracic aorta | 2            |      |
|         | 13. Diaphragm   | 1            |      |
|         | 14. Systemic embryology: Development of Heart and lung            | 3            |      |
|         | 15. Systemic histology: Trachea and Lung                          | 1            |      |
|         | 16. Revision  | 2            |      |
|         | <b>Total Hours</b>  | <b>28</b>    |      |

| Sl. No.   | Topics   | No. of hours | Term       |
|-----------|--|--------------|------------|
| <b>7.</b> | <b>ABDOMEN, PELVIS &amp; PERINEUM</b>              |              | <b>III</b> |
|           | 1. Introduction                                    | 1            |            |
|           | 2. Anterior Abdominal wall                         | 2            |            |
|           | 3. Peritoneum                                      | 2            |            |
|           | 4. Stomach   | 2            |            |
|           | 5. Liver   | 2            |            |
|           | 6. Gall bladder and Extrahepatic biliary apparatus | 2            |            |
|           | 7. Spleen  | 1            |            |
|           | 8. Duodenum  | 1            |            |
|           | 9. Pancreas  | 2            |            |
|           | 10. Jejunum and Ileum, Superior mesenteric artery  | 2            |            |
|           | 11. Caecum & appendix                              | 2            |            |
|           | 12. Large intestine                                | 2            |            |
|           | 13. Portal venous system                           | 2            |            |
|           | 14. Kidney   | 2            |            |
|           | 15. Supra renal glands                             | 1            |            |

| Sl. No. | Topics  | No. of hours | Term |
|---------|---|--------------|------|
|         | 16. Abdominal aorta                                       | 1            |      |
|         | 17. Posterior abdominal wall                              | 1            |      |
|         | 18. Urinary bladder                                       | 2            |      |
|         | 19. Ureter  | 1            |      |
|         | 20. Prostate gland  | 2            |      |
|         | 21. Ovary   | 1            |      |
|         | 22. Uterus  | 2            |      |
|         | 23. Fallopian tube  | 1            |      |
|         | 24. Scrotum and testis                                    | 2            |      |
|         | 25. Vas deferens  | 1            |      |
|         | 26. Rectum  | 1            |      |
|         | 27. Anal canal  | 1            |      |
|         | 28. Walls of pelvis including pelvic diaphragm            | 2            |      |
|         | 29. Perineum: superficial and deep perineal pouches       | 3            |      |
|         | 30. Ischiorectal fossa                                    | 1            |      |
|         | 31. Systemic embryology: Development of digestive system  | 4            |      |
|         | 32. Systemic embryology: Development of urogenital organs | 2            |      |

| Sl. No.   | Topics   | No. of hours | Term      |
|-----------|--|--------------|-----------|
|           | 33. Systemic histology: Digestive system                     | 4            |           |
|           | 34. Systemic histology: Urinary system & supra renal gland   | 2            |           |
|           | 35. Systemic histology: Male reproductive system             | 2            |           |
|           | 36. Systemic histology: Female reproductive system           | 2            |           |
|           | 37. Revision   | 6            |           |
|           | <b>Total Hours</b>   | <b>70</b>    |           |
| <b>8.</b> | <b>HEAD, NECK &amp; FACE</b>                                 |              | <b>II</b> |
|           | 1. Introduction  | 1            |           |
|           | 2. Scalp   | 2            |           |
|           | 3. Face: muscles, nerves and blood vessels                   | 2            |           |
|           | 4. Lachrymal apparatus                                       | 1            |           |
|           | 5. Side of the neck: Posterior triangle                      | 1            |           |
|           | 6. Front of the neck: Anterior triangle and its subdivisions | 3            |           |
|           | 7. Deep cervical fascia                                      | 1            |           |
|           | 8. Back of the neck: Suboccipital triangle                   | 1            |           |
|           | 9. Contents of vertebral canal                               | 1            |           |

| Sl. No. | Topics   | No. of hours | Term |
|---------|--|--------------|------|
|         | 10. Parotid gland  | 1            |      |
|         | 11. Submandibular gland  | 1            |      |
|         | 12. Muscles of mastication   | 1            |      |
|         | 13. Temporomandibular joint  | 1            |      |
|         | 14. Thyroid gland  | 2            |      |
|         | 15. Cranial cavity: Dura mater, Dural venous sinuses & Pituitary gland | 3            |      |
|         | 16. Contents of the orbit  | 1            |      |
|         | 17. Extraocular muscles  | 1            |      |
|         | 18. Oral cavity  | 1            |      |
|         | 19. Soft palate and palatine tonsil                                    | 1            |      |
|         | 20. Tongue   | 1            |      |
|         | 21. Pharynx  | 2            |      |
|         | 22. Larynx   | 2            |      |
|         | 23. Nose and paranasal air sinuses                                     | 2            |      |
|         | 24. Ear: EAC & middle ear, inner ear                                   | 2            |      |
|         | 25. Eustachian tube  | 1            |      |
|         | 26. Eyeball  | 2            |      |

| Sl. No.   | Topics  | No. of hours  | Term      |
|-----------|---|---------------|-----------|
|           | 27. Common & Internal carotid artery                              | 1             |           |
|           | 28. External carotid artery                                       | 2             |           |
|           | 29. Vertebral artery  | 1             |           |
|           | 30. Internal Jugular vein   | 1             |           |
|           | 31. Systemic histology: Thyroid gland, Pituitary gland and Tongue | 3             |           |
|           | 32. Systemic embryology: Pharyngeal arches: derivatives           | 1             |           |
|           | 33. Revision  | 3             |           |
|           | <b>Total Hours</b>  | <b>50 hrs</b> |           |
| <b>9.</b> | <b>CENTRAL NERVOUS SYSTEM: BRAIN</b>                              |               | <b>II</b> |
|           | 1. Introduction   | 1             |           |
|           | 2. Meninges & CSF   | 1             |           |
|           | 3. Spinal cord  | 1             |           |
|           | 4. Medulla oblongata  | 1             |           |
|           | 5. Pons   | 1             |           |
|           | 6. Cerebellum   | 1             |           |
|           | 7. Fourth ventricle   | 1             |           |

| Sl. No. | Topics   | No. of hours | Term |
|---------|--|--------------|------|
|         | 8. Mid-brain   | 1            |      |
|         | 9. Diencephalon: Thalamus & Hypothalamus                         | 2            |      |
|         | 10. Third Ventricle  | 1            |      |
|         | 11. Lateral Ventricle  | 1            |      |
|         | 12. Cerebrum: external features                                  | 2            |      |
|         | 13. Functional areas of cerebral cortex                          | 1            |      |
|         | 14. Basal ganglia  | 1            |      |
|         | 15. White matter of cerebrum: Corpus callosum & Internal capsule | 2            |      |
|         | 16. Blood supply of brain  | 2            |      |
|         | 17. Cranial nerves   | 6            |      |
|         | 18. Systemic embryology: Development of Brain                    | 2            |      |
|         | 19. Revision   | 2            |      |
|         | <b>Total Hours</b>   | <b>30</b>    |      |

**Total – 325 hrs**

**PRACTICAL**

| Sl. No. | Topics   | No. of hours | Term |
|---------|--|--------------|------|
| 1.      | GENERAL HISTOLOGY  |              | I    |
|         | 1. Epithelial tissue: Simple & Stratified                        | 4            |      |
|         | 2. Connective tissue: Loose/Areolar & Adipose                    | 2            |      |
|         | 3. Connective tissue: Cartilages                                 | 2            |      |
|         | 4. Connective tissue: Compact bone (L.S, T.S) and Spongy bone    | 2            |      |
|         | 5. Muscle tissue: Skeletal (L.S, T.S), Smooth and Cardiac        | 2            |      |
|         | 6. Nervous tissue: Peripheral nerve (T.S) & Nerve fibre (L.S)    | 2            |      |
|         | 7. Skin: Thick & Thin  | 2            |      |
|         | 8. Lymphoid organs: Lymph node, Spleen, Thymus & Tonsil          | 4            |      |
|         | 9. Blood vessels: Large artery, Medium sized artery & Large vein | 2            |      |
|         | 10. Glands: Serous, Mucous & Mixed                               | 2            |      |
|         | Total Hours  | 24           |      |
| 2.      | UPPER EXTREMITY  |              | I    |
|         | 1. Introduction  | 2            |      |
|         | Osteology  |              |      |
|         | 2. Clavicle  | 2            |      |
|         | 3. Scapula   | 2            |      |

| Sl. No. | Topics   | No. of hours | Term |
|---------|--|--------------|------|
|         | 4. Humerus   | 2            |      |
|         | 5. Radius  | 2            |      |
|         | 6. Ulna  | 2            |      |
|         | 7. Articulated hand                                | 2            |      |
|         | 8. Surface Markings in upper extremity             | 2            |      |
|         | Dissection   |              |      |
|         | 9. Pectoral region                                 | 2            |      |
|         | 10. Axilla   | 2            |      |
|         | 11. Back & Shoulder                                | 2            |      |
|         | 12. Arm: Front & Cubital fossa and Back of the arm | 2            |      |
|         | 13. Front of Forearm & palm of hand                | 4            |      |
|         | 14. Back of Forearm & Dorsum of Hand               | 2            |      |
|         | 15. Joints of upper extremity                      | 2            |      |
|         | 16. Radiology of upper extremity                   | 2            |      |
|         | Total Hours  |              |      |
| 3.      | HEAD, NECK & FACE                                  | II           |      |
|         | 1. Introduction                                    | 2            |      |

| Sl. No. | Topics   | No. of hours | Term |
|---------|--|--------------|------|
|         | <b>Osteology</b>                                 |              |      |
|         | 2. Skull   | 6            |      |
|         | 3. Mandible                                      | 2            |      |
|         | 4. Hyoid bone                                    | 2            |      |
|         | 5. Cervical vertebrae: Typical & Atypical        | 2            |      |
|         | 6. Surface Markings in head, neck & face.        | 2            |      |
|         | <b>Dissection</b>                                |              |      |
|         | 7. Scalp   | 2            |      |
|         | 8. Face  | 2            |      |
|         | 9. Posterior triangle of neck                    | 2            |      |
|         | 10. Anterior triangle of neck                    | 2            |      |
|         | 11. Back of neck                                 | 2            |      |
|         | 12. Cranial cavity & Contents of vertebral canal | 4            |      |
|         | 13. Deep dissection of neck                      | 2            |      |
|         | 14. Orbit & Eyeball                              | 2            |      |
|         | 15. Ear  | 2            |      |
|         | 16. Parotid region                               | 2            |      |

| Sl. No. | Topics  | No. of hours | Term |
|---------|---|--------------|------|
|         | 17. Temporal & infratemporal region             | 2            |      |
|         | 18. Sub mandibular region                       | 2            |      |
|         | 19. Mouth, Tongue & Pharynx                     | 2            |      |
|         | 20. Nose & Larynx                               | 2            |      |
|         | 21. Temporo-Mandibular joint & joints of Neck   | 2            |      |
|         | 22. Radiological anatomy of Head, Neck and Face | 2            |      |
|         | Systemic Histology-                             |              |      |
|         | 23. Thyroid gland (including parathyroid)       | 2            |      |
|         | 24. Pituitary gland                             | 2            |      |
|         | 25. Revision                                    | 2            |      |
|         | Total Hours                                     |              |      |
| 4.      | CENTRAL NERVOUS SYSTEM                          |              | II   |
|         | 1. Introduction                                 | 2            |      |
|         |   |              |      |
|         | Demonstration                                   |              |      |
|         | 2. Parts of the brain                           | 4            |      |
|         | 3. Spinal cord                                  | 2            |      |

| Sl. No. | Topics  | No. of hours | Term |
|---------|---|--------------|------|
|         | 4. Ventricles (model)                                   | 2            |      |
|         | 5. Radiology of brain                                   | 2            |      |
|         | Systemic Histology                                      |              |      |
|         | 6. Nervous tissue: Cerebrum & Cerebellum                | 2            |      |
|         | 7. Revision   | 2            |      |
|         | Total Hours   | 16           |      |
| 5.      | THORAX  |              | II   |
|         | 1. Introduction   | 2            |      |
|         | Osteology   |              |      |
|         | 2. Sternum. Ribs: Typical & Atypical                    | 2            |      |
|         | 3. Thoracic vertebrae: Typical & Atypical               | 2            |      |
|         | Surface Marking   | 4            |      |
|         | Dissection  |              |      |
|         | 4. Anterior Thoracic wall, Intercostal space & contents | 2            |      |
|         | 5. Pleura & Lungs                                       | 4            |      |
|         | 6. Contents of superior mediastinum & Pericardium       | 2            |      |
|         | 7. Heart: External features                             | 2            |      |

| Sl. No. | Topics                                    | No. of hours | Term |
|---------|---|--------------|------|
|         | 8. Interior of Heart with valves of heart | 2            |      |
|         | 9. Contents of posterior Mediastinum      | 2            |      |
|         | 10. Radiological anatomy                  | 2            |      |
|         | Systemic Histology                        |              |      |
|         | 11. Trachea & Lung                        | 2            |      |
|         | 12. Revision                              | 2            |      |
|         | Total Hours                               | 30           |      |
| 6.      | LOWER LIMB                                |              | III  |
|         | 1. Introduction                           | 2            |      |
|         | Osteology                                 |              |      |
|         | 2. Hip Bone                               | 2            |      |
|         | 3. Femur & Patella                        | 2            |      |
|         | 4. Tibia                                  | 2            |      |
|         | 5. Fibula                                 | 2            |      |
|         | 6. Articulated Foot                       | 2            |      |
|         | 7. Surface Marking                        | 2            |      |
|         | Dissection                                |              |      |

| Sl. No.   | Topics                                 | No. of hours | Term       |
|-----------|--|--------------|------------|
|           | 8. Front of thigh                      | 4            |            |
|           | 9. Medial side of thigh                | 2            |            |
|           | 10. Gluteal region                     | 2            |            |
|           | 11. Back of thigh & Popliteal fossa    | 2            |            |
|           | 12. Front of Leg & Dorsum of Foot      | 2            |            |
|           | 13. Leg: Medial, Lateral & Back of Leg | 4            |            |
|           | 14. Sole of Foot                       | 4            |            |
|           | 15. Joints of the lower extremity      | 2            |            |
|           | 16. Radiology lower extremity          | 2            |            |
|           | 17. Revision                           | 2            |            |
|           | <b>Total Hours</b>                     | <b>40</b>    |            |
| <b>7.</b> | <b>ABDOMEN &amp; PELVIS</b>            |              | <b>III</b> |
|           | 1. Introduction                        | 2            |            |
|           | 2. <b>Osteology</b>                    |              |            |
|           | 3. Lumbar Vertebrae                    | 2            |            |
|           | 4. Sacrum and joints                   | 2            |            |
|           | 5. Articulated Pelvis: Male & female   | 2            |            |

| Sl. No. | Topics  | No. of hours | Term |
|---------|---|--------------|------|
|         | 6. <b>Surface Marking</b>   | 4            |      |
|         | <b>Dissection</b>   |              |      |
|         | 7. Anterior abdominal wall  | 2            |      |
|         | 8. External genitalia of Male   | 2            |      |
|         | 9. Abdominal cavity: Positions & Relations of viscera, Peritoneum, Greater & Lesser sac | 2            |      |
|         | 10. Stomach & Spleen  | 2            |      |
|         | 11. Small intestine (Jejunum & Ileum) & Large intestine                                 | 2            |      |
|         | 12. Duodenum & Pancreas   | 2            |      |
|         | 13. Liver, Gall bladder & blood vessels of Digestive system                             | 2            |      |
|         | 14. Kidney & Suprarenal gland   | 2            |      |
|         | 15. Posterior Abdominal wall & Diaphragm  | 2            |      |
|         | 16. Walls of the pelvis & Pelvic cavity : position & relations of viscera, Perineum     | 2            |      |
|         | 17. Urinary bladder, Urethra & Prostate   | 2            |      |
|         | 18. Ovary, Uterus, Fallopian tubes, Vagina  | 2            |      |
|         | 19. Sigmoid colon, Rectum & Anal canal  | 2            |      |

| Sl. No.                      | Topics  | No. of hours     | Term |
|------------------------------|---|------------------|------|
|                              | 20. Radiological anatomy                              | 2                |      |
|                              | <b>Systemic Histology</b>                             |                  |      |
|                              | 21. Digestive system: Basic structure of GIT          | 2                |      |
|                              | 22. Digestive system: Liver & Gall bladder, Pancreas  | 2                |      |
|                              | 23. Urinary system: Kidney, Ureter & Suprarenal gland | 2                |      |
|                              | 24. Male Reproductive system: Testis & Prostate       | 2                |      |
|                              | 25. Female Reproductive system: Ovary & Uterus        | 2                |      |
|                              | <b>Total Hours</b>                                    | <b>50</b>        |      |
| <b>Total Practical hours</b> |   | <b>250 Hours</b> |      |

#### Non-Lecture activities

| Sl. No | Non-Lecture Teaching Learning methods | Time Allotted per Activity (in Hours) |
|--------|---------------------------------------|---------------------------------------|
| 1.     | Seminars/ Workshops                   | 10                                    |
| 2.     | Group Discussions                     | 10                                    |
| 3.     | Problem based learning                | 10                                    |

|              |                                     |            |
|--------------|-------------------------------------|------------|
| 4.           | Integrated Teaching                 | 15         |
| 5.           | Case Based Learning                 | 10         |
| 6.           | Self-directed Learning              | 15         |
| 7.           | Tutorials, Assignments and projects | 10         |
| Sub total    |                                     | 80         |
| 8.           | Practical                           | 250        |
| <b>Total</b> |                                     | <b>330</b> |

#### Description of Non-Lecture Activities

| Sl. No | Non-Lecture Teaching Learning methods | Time Allotted per Activity (in Hours) | Topics   |
|--------|---------------------------------------|---------------------------------------|--|
| 1.     | Seminars/ Workshops                   | 10                                    | Seminars: Guest Seminars, Student Seminars of Fast Learners can be conducted on any topic of Anatomy. E.g.: Shoulder joint, Liver etc.<br><br>Workshop: Workshop can be arranged on important topics of Anatomy. E.g.: Abdomen, Thorax, CNS etc. |
| 2.     | Group Discussions                     | 10                                    | Group discussions can be conducted during practical hours on any topic of Practical and dissection. E.g.: Heart, Lungs, actions of joints etc.   |
| 3.     | Problem based learning                | 10                                    | Problem based learning can be conducted on any applied anatomy topic. E.g.: Bell's palsy, Frozen shoulder, Varicose veins etc.   |
| 4.     | Integrated Teaching                   | 15                                    | <b>A] Horizontal Integration</b>   |

|    |                     |    |   |
|----|---------------------|----|---|
|    |                     |    | <p>Physiology: Any topic related to Physiology can be conducted. E.g.:<br/>Anatomy: Physiology Seminar on Respiratory System.</p> <p>Homoeopathic Subjects: Any topic related to Homoeopathic Materia Medica, Repertory, Organon of Medicine. E.g.:</p> <p>a) Integrated lecture with HMM - Homoeopathic drugs related to organs of Abdomen.</p> <p>b) Integrated lecture with Repertory – Rubrics related to structures of Thorax.</p> <p>c) Integrated lecture with Organon –Miasmatic influence on heredity.</p> <p>d) Integrated lecture with Homoeopathic Pharmacy - Action of Homoeopathic drugs on cellular level.</p> <p><b>B] Vertical Integration</b></p> <p>Gynecology – E.g.: Any topic related on female reproductive System.</p> <p>Surgery – E.g.: Integrated lecture on radiology.</p> <p>Medicine – E.g.: Embryological basis of major congenital anomalies of heart</p> |
| 5. | Case Based Learning | 10 | <p>Case Based Learning can be conducted on any clinical topic of anatomy by presenting a case scenario with the help of Simulation or Audiovisual aid in the classroom. E.g.: A case of Bell's Palsy for the topic Facial Nerve, A case of Wrist drop for the topic Radial Nerve etc.</p>   |

|    |                                  |    |  |
|----|----------------------------------|----|--|
| 6. | Self-Directed Learning           | 15 | Self-Directed Learning can be conducted for any topic of Anatomy. E.g.: Functional areas of cerebrum, Actions of Facial muscles. |
| 7. | Tutorials, Assignments, Projects | 10 | Tutorials, Assignments, projects can be conducted on any topic of anatomy at the end of the topic.                               |

## 6. TEACHING LEARNING METHODS

### General Instructions

- (a) Instructions in anatomy should be so planned as to present a general working knowledge of the structure of the human body both at micro and macro level and should correlate with function. Topics/syllabus should be planned out in parallel with other subjects for better understanding & to achieve integration.
- (b) The amount of detail which a student is required to memorise should be reduced to the minimum but should connect to syllabus of other subjects and applied anatomy.
- (c) Major emphasis should be laid on functional anatomy of the living subject rather than on the static structures of the cadaver and on general anatomical positions and broad relations of the viscera, muscles, blood vessels, nerves and lymphatics and study of the cadaver is the only means to achieve this.
- (d) Students should know the basic applied anatomy & should not be burdened with minute anatomical details which have no clinical significance.
- (e) Only such details which have professional or general educational value for the Homoeopathic medical students need to be focused.
- (f) Normal radiological anatomy may also form part of practical or clinical training and the structure of the body should be presented linking functional aspects.
- (g) A good part of theoretical lectures on anatomy can be transferred to tutorial classes with the demonstrations/ Projection / Dissection.
- (h) Case based learning should be conducted for the students on various clinical conditions with the help of case scenario, simulation or Audiovisual aids as a Non-Lecture activity.
- (i) Seminars and group discussions to be arranged periodically with view of presenting these subjects in an integrated manner.

- (j) More stress on demonstrations and tutorials should be given. Emphasis should be laid on the general anatomical positions and broad relations of the viscera, muscles, blood vessels, nerves and lymphatics.
- (k) There should be joint seminars with the departments of Physiology and Biochemistry, Repertory, HMM, Philosophy and Pharmacy which should be organized wherever necessary as per the topic.
- (l) There should be a close correlation in the teaching of gross Anatomy, Histology, Embryology and Genetics and the teaching of Anatomy, Physiology including Biochemistry along with Homoeopathic subjects shall be integrated.

Though dissection of the entire body is essential for the preparation of the student for his clinical studies, the burden of dissection can be reduced and much saving of time can be affected with considerable reduction of the number of topographical details while following the above points.

The purpose of dissection is to give the student an understanding of the body-Structure from Macro to Micro correlate to its function- Functional anatomy to integrate with Physiology and the dissection should be designed to achieve this goal.

Dissection should be preceded by a course of lectures on the general structure of the organ or the system under discussion and then its function. In this way anatomical and physiological knowledge can be presented to students in an integrated form and the instruction of the whole course of anatomy and physiology made interesting, lively practical or clinical. Syllabus of all the subjects of First BHMS course should be structured to run parallel, horizontally & vertically as far as possible to achieve maximum integration.

Students should be able to identify anatomical specimens and structures displayed in the dissection. Teaching and Demonstration methods should be supported with latest software/Practical/Charts/slides/Working or 3D Diagrams, Audio-Visual/ Multimedia presentation/Simulation to train clinical application.

The Teaching Learning activities in Anatomy requires change in structure & process in order to be more skill based & providing hands on experience.

The Teaching Learning methods with respect to Anatomy may be covered in the following manner:

- a. **Class Room Lectures** – Oral Presentation, Board Work, Power point Presentation. **Tutorials** on the topics covered.
- b. **Assignments** – For Slow Learners

- c. **Practical Class** – Demonstration, Dissection, Surface Marking, Histology, Radiology
- d. **Student Activities** – Working out the Assignments, Projects, PowerPoint presentations as assigned
- e. **Case based Learning & Problem Based Learning (CBL & PBL)** for students to understand the application of knowledge of Anatomy with Clinical subjects.
- f. **DOAP (Demonstration – Observation – Assistance – Performance)** For Clinical Anatomy.

## **7. CONTENT MAPPING (COMPETENCY TABLE)**

- 1. General Anatomy
- 2. Developmental anatomy (Embryology)
- 3. Regional anatomy (Upper and Lower Extremities, Thorax, Abdomen, Pelvis & Perineum, Head, Neck & Face and Brain)
  - 3.1 Each of the region will be studied under the following headings
    - (a) Osteology
    - (b) Syndesmology and Arthrology (Joints)
    - (c) Myology
    - (d) Angiology
    - (e) Neurology
    - (f) Splanchnology (Viscera/Organ)
    - (g) Histology
    - (h) Surface anatomy
    - (i) Applied anatomy
    - (j) Radiographic anatomy
    - (k) Correlation with homoeopathic subjects

**Semester - I**

## 1. Topic: General Anatomy

**Learning Outcomes (LO):** At the end of general anatomy, I-BHMS student must;

1. Describe the structure of a cell, its components and their function.
2. Recall the terminologies used in Anatomy.
3. Classify bones, muscles, joints and nerves
4. Mention the homoeopathic drugs indicated for particular tissue/organ involvement.
5. Practice Ethics related to the learning of Anatomy.

| Sl. No. | Generic Competency | Subject Area   | Specific Competency | Specific learning objectives: At the end of the session student should be able to | Bloom's Domain | Guilbert's level | Must know (MK) /<br>Desire to know (DK) /<br>Nice to know (NK) | Teaching Learning Method/Media | Formative Assessment | Summative Assessment | Summative Assessment | Integration Horizontal (H) / Vertical(V) |
|---------|--------------------|--|---------------------|---|----------------|------------------|--|--------------------------------|----------------------|----------------------|----------------------|--|
|         |                    | Millers: Knows (K) /Knows how (KH) / Shows how (SH) /Does (D) K/KH/ SH/D |                     |   |                |                  |  |                                |                      |                      |                      |  |

|                             |  |                 |   |  |  |           |                              |   |                                 |              |                                  |                                       |
|-----------------------------|--|-----------------|---|--|--|-----------|------------------------------|---|---------------------------------|--------------|----------------------------------|---------------------------------------|
| Hom<br>UG-<br>AN-<br>1.1    | Problem formulation/ Integration of Knowledge/ Information gathering/Practical Skills/Information management/synthesis | General Anatomy | K | Concept of cell as structural and functional unit of the body                  | 1. Define cell<br>2. Name the components of cell<br>3. Mention their functions of cell organelle<br>4. Mention the types of cell division<br>5. explain their significance | Cognitive | Level 1<br>(Remember/recall) | 1. MK<br>2. MK<br>3. MK<br>4. MK<br>5. DK | Lecture                         | MCQ,<br>SAQ. | MCQ,<br>SAQ.<br>Viva<br>Voce     | Physiology<br>(H)                     |
| Hom<br>UG-<br>AN-<br>1.2    |  |                 | K | Understanding of the four basic tissues that make up organs and systems        | 1. Describe the structure and location<br>2. Mention the characteristics<br>3. Function of each of the basic tissues   | Cognitive | Level 1<br>(Remember/recall) | 1. MK<br>2. MK<br>3. MK                   | Lecture<br><br>Group discussion | MCQ,<br>SAQ. | MCQ,<br>SAQ. Viva<br>Voce        | Physiology<br>(H)                     |
| Hom<br>UG-<br>AN-<br>1.3. i |  |                 | K | Understand role of DNA in carrying the genetic code and RNA in gene expression | 1. Describe the structure of DNA and RNA<br>2. List the functions of DNA and RNA   | Cognitive | Level 1<br>(Remember/recall) | 1. DK<br>2. DK                            | Lecture<br><br>Group discussion | MCQ,<br>SAQ. | MCQ,<br>SAQ.<br><br>Viva<br>Voce | Physiology<br>(H)<br><br>Medicine (V) |

|         |                    |              |                        |                     |   |                |                  |  |                                |                      |                      |                      |                                     |
|---------|--------------------|--------------|------------------------|---------------------|---|----------------|------------------|--|--------------------------------|----------------------|----------------------|----------------------|-------------------------------------|
| Sl. No. | Generic Competency | Subject Area | Millers:<br>K/KH/ SH/D | Specific Competency | Specific learning objectives: At the end of the session student should be able to | Bloom's Domain | Guilbert's level | Must know/ Desire to know/<br>Nice to know | Teaching Learning Method/Media | Formative Assessment | Summative Assessment | Summative Assessment | Integration<br>Horizontal/ Vertical |
|---------|--------------------|--------------|------------------------|---------------------|---|----------------|------------------|--|--------------------------------|----------------------|----------------------|----------------------|-------------------------------------|

|                               |  |                 |    |  |   |           |                              |                                  |         |              |                                  |                                       |
|-------------------------------|--|-----------------|----|--|---|-----------|------------------------------|----------------------------------|---------|--------------|----------------------------------|---------------------------------------|
| Hom<br>UG-<br>AN-<br>1.3. ii  | Problem formulation/ Integration of Knowledge/ Information gathering/Practical Skills/Information management/synthesis | General Anatomy | K  | Describe the role of chromosomes in transfer or genetic material & role in cell division | 1. Definition and number<br>2. Karyotyping<br>3. Barr body<br>4. Chromosomal abnormalities                                  | Cognitive | Level 1<br>(Remember/recall) | 1. MK<br>2. DK<br>3. NK<br>4. DK | Lecture | MCQ,<br>SAQ. | MCQ,<br>SAQ.<br><br>Viva<br>Voce | Physiology<br>(H)<br><br>Medicine (V) |
| Hom<br>UG-<br>AN-<br>1.3. iii |  |                 | K  | Explain the concept of Gene as unit of inheritance                                       | 1. Definition<br>2. Functions<br>3. Types and location  | Cognitive | Level 1<br>(Remember/recall) | 1. MK<br>2. MK<br>3. DK          | Lecture | MCQ,<br>SAQ. | MCQ,<br>SAQ.<br><br>Viva<br>Voce | Physiology<br>(H)<br><br>Medicine (V) |
| Hom<br>UG-<br>AN-<br>1.3. iv  |  |                 | KH | Describe the types of inheritance and their role in hereditary diseases                  | 1. Definition<br>2. Define autosomal inheritance<br>3. Define sex linked inheritance<br>4. Define mitochondrial inheritance | Cognitive | Level 2<br>(Remember/recall) | 1. MK<br>2. DK<br>3. DK<br>4. NK | Lecture | MCQ,<br>SAQ. | MCQ,<br>SAQ.<br><br>Viva<br>Voce | Physiology<br>(H)<br><br>Medicine (V) |

| Sl. No.                      | Generic Competency  | Subject Area    | Millers:<br>K/KH/ SH/D | Specific Competency                          | Specific learning<br>objectives: At the end of<br>the session student should<br>be able to  | Bloom's Domain | Guilbert's level                          | Must know/ Desire to<br>know/ Nice to know | Teaching Learning<br>Method/Media | Formative Assessment | Summative Assessment<br>Summative Assessment | Integration<br>Horizontal/ Vertical                      |
|------------------------------|---|-----------------|------------------------|--|---|----------------|---|--|-----------------------------------|----------------------|--|--|
| Hom<br>UG-<br>AN-<br>1.3. v  | Problem formulation/ Integration of Knowledge/ Information<br>gathering/Practical Skills/Information management/synthesis | General Anatomy | KH                     | Describe the<br>genetic basis of<br>diseases | 1. Mention the types of<br>genetic abnormalities<br>2. Describe the genetic<br>basis of Down's<br>syndrome<br>3. Explain miasmatic<br>influence on heredity | Cognitive      | Level 2<br>(underst<br>and/inter<br>pret) | 1. DK<br>2. DK<br>3. NK                    | Lecture                           | MCQ,<br>SAQ.         | MCQ,<br>SAQ.<br><br>Viva<br>Voce             | Physiology<br>(H)<br><br>Medicine (V)<br><br>Organon (H) |
| Hom<br>UG-<br>AN-<br>1.4.i   |   |                 | K                      | Definition and<br>subdivisions of<br>anatomy | 1. Definition of anatomy<br>2. List the subdivisions of<br>anatomy<br>1. Recall the methods of<br>study in each sub<br>division of anatomy                  | Cognitive      | Level 1<br>(Remem<br>ber)                 | 1. MK<br>2. DK<br>3. DK<br>4.              | Lecture                           | MCQ,<br>SAQ.         | MCQ,<br>SAQ.<br><br>Viva<br>Voce             | -  |
| Hom<br>UG-<br>AN-<br>1.4. ii |   |                 | K                      | History of<br>Anatomy                        | 1. Recall the evolution of<br>anatomy as a science<br>2. Enumerate the major<br>contributors and their<br>work  | Cognitive      | Level 1<br>(Remem<br>ber)                 | 1. NK<br>2. NK                             | Lecture                           | MCQ,<br>SAQ.         | MCQ,<br>SAQ.<br><br>Viva<br>Voce             | -  |

| Sl. No.                      | Generic Competency  | Subject Area    | Millers:<br>K/KH/ SH/D | Specific Competency                              | Specific learning<br>objectives: At the end of<br>the session student should<br>be able to  | Bloom's Domain                | Guilbert's level                                      | Must know/ Desire to<br>know/ Nice to know   | Teaching Learning<br>Method/Media               | Formative Assessment | Summative Assessment         | Summative Assessment | Integration<br>Horizontal/ Vertical |
|------------------------------|---|-----------------|------------------------|--|---|-------------------------------|---|--|---|----------------------|------------------------------|----------------------|-------------------------------------|
| Hom<br>UG-<br>AN-<br>1.4.iii | Problem formulation/ Integration of Knowledge/ Information<br>gathering/Practical Skills/Information management/synthesis | General Anatomy | K<br>&<br>KH           | Anatomical<br>Terms of<br>position &<br>movement | 1. Define anatomical terms<br>of position and<br>movement<br>2. Apply the anatomical<br>terms<br>3. Demonstrate the<br>movements  | Cognitive<br>&<br>Psychomotor | Level 1<br>(Remember)<br>&<br>Level 2<br>(understand) | 1. MK<br><br>2. MK<br><br>3. MK              | Lecture<br>Demonstration<br>Group<br>discussion | MCQ,<br>SAQ.         | MCQ,<br>SAQ.<br>Viva<br>Voce | -                    |                                     |
| Hom<br>UG-<br>AN-<br>1.4.iv  |   |                 | K                      | Skin,<br>Superficial and<br>Deep fasciae         | 1. Describe the structure,<br>appendages of skin<br>2. Mention the functions of<br>skin<br>3. Describe superficial fascia<br>and its distribution<br>4. Describe deep fascia and<br>its functions | Cognitive                     | Level 1<br>(Remember)                                 | 1. MK<br><br>2. MK<br><br>3. DK<br><br>4. MK | Lecture   | MCQ,<br>SAQ.         | MCQ,<br>SAQ.<br>Viva<br>Voce | Physiology<br>(H)    |                                     |
| Hom<br>UG-<br>AN-<br>1.4. v  |   |                 | K<br>&<br>KH           | Muscles  | 1. Classify muscles<br>2. Classify skeletal muscles<br>based on fascicular<br>architecture and their<br>blood and nerve supply<br>3. Explain the actions of<br>skeletal muscles                   | Cognitive                     | Level 1<br>(Remember)<br>&<br>Level 2<br>(understand) | 1. MK<br>2. DK<br><br>3. DK                  | Lecture   | MCQ,<br>SAQ.         | MCQ,<br>SAQ.<br>Viva<br>Voce | Physiology<br>(H)    |                                     |

| Sl. No.            | Generic Competency   | Subject Area    | Millers:<br>K/KH/ SH/D | Specific Competency | Specific learning objectives: At the end of the session student should be able to  | Bloom's Domain | Guilbert's level                          | Must know/ Desire to know/ Nice to know   | Teaching Learning Method/Media | Formative Assessment | Summative Assessment<br>Summative Assessment | Integration<br>Horizontal/ Vertical |
|--------------------|--|-----------------|------------------------|---------------------|--|----------------|---|---|--------------------------------|----------------------|--|-------------------------------------|
| Hom UG-AN-14.vi    | Problem formulation/ Integration of Knowledge/ Information gathering/Practical Skills/Information management/synthesis | General Anatomy | K & KH                 | Bones               | 1. Describe the structure and functions of bones<br>2. Classify bones<br>3. Describe the parts of growing long bone<br>4. Explain the blood supply of long bone              | Cognitive      | Level 1 (Remember) & Level 2 (understand) | 1. MK<br>2. MK<br>3. MK<br>4. DK          | Lecture                        | MCQ, SAQ.            | MCQ, SAQ.<br>Viva Voce                       | Physiology (H)                      |
| Hom UG-AN-1.4.vii  |  |                 | K                      | Joints              | 1. Define joints<br>2. Classify joints<br>3. Describe the structure of synovial joint<br>4. Classify synovial joints<br>5. Mention the blood and nerve supply of joints      | Cognitive      | Level 1 (Remember)                        | 1. MK<br>2. MK<br>3. MK<br>4. DK<br>5. DK | Lecture                        | MCQ, SAQ.            | MCQ, SAQ.<br>Viva Voce                       | Physiology (H)                      |
| Hom UG-AN-1.4.viii |  |                 | K                      | Blood vessels       | 1. Describe the types of blood vessels<br>2. Explain anastomosis & arteriovenous anastomosis<br>3. Describe the types of blood circulation<br>4. Describe foetal circulation | Cognitive      | Level 1 (Remember) & Level 2 (understand) | 1. MK<br>2. MK<br>3. MK<br>4. DK          | Lecture                        | MCQ, SAQ.            | MCQ, SAQ.<br>Viva Voce                       | Physiology (H)                      |

| Sl. No.                      | Generic Competency  | Subject Area    | Millers:<br>K/KH/ SH/D | Specific Competency | Specific learning<br>objectives: At the end of<br>the session student should<br>be able to   | Bloom's Domain | Guilbert's level                                      | Must know/ Desire to<br>know/ Nice to know | Teaching Learning<br>Method/Media | Formative Assessment | Summative Assessment<br>Summative Assessment | Integration<br>Horizontal/ Vertical |
|------------------------------|---|-----------------|------------------------|---------------------|--|----------------|---|--|-----------------------------------|----------------------|--|-------------------------------------|
| Hom<br>UG-<br>AN-<br>14. ix  | Problem formulation/ Integration of Knowledge/ Information<br>gathering/Practical Skills/Information management/synthesis | General Anatomy | K                      | Lymphatic<br>system | 1. Define the lymphatic system<br>and mention its functions<br>2. Enumerate the components<br>of lymphatic systems<br>3. Define mucosa associated<br>lymphatic tissue and<br>bronchus associated<br>lymphatic tissue | Cognitive      | Level 1<br>(Remember)                                 | 1. MK<br><br>2. MK<br><br>3. MK            | Lecture                           | MCQ,<br>SAQ.         | MCQ,<br>SAQ.<br>Viva<br>Voce                 | Physiology<br>(H)                   |
| Hom<br>UG-<br>AN-<br>1.4x    |   |                 | K<br>&<br>KH           | Nerves              | 1. Classify nervous system<br>2. Describe neuron & neuroglia<br>3. Describe the formation of<br>typical spinal nerve<br>4. Differentiate sympathetic<br>and parasympathetic<br>nervous systems                       | Cognitive      | Level 1<br>(Remember)<br>&<br>Level 2<br>(understand) | 1. MK<br>2. MK<br>3. MK<br>4. DK           | Lecture                           | MCQ,<br>SAQ.         | MCQ,<br>SAQ.<br>Viva<br>Voce                 | Physiology<br>(H)                   |
| Hom<br>UG-<br>AN-<br>1.4. xi |   |                 | K<br>&<br>KH           | Glands              | 1. Define a gland<br>2. Describe exocrine and<br>endocrine glands<br>3. Classify exocrine glands<br>4. Classify endocrine glands   | Cognitive      | Level 1<br>(Remember)<br>&<br>Level 2<br>(understand) | 1. MK<br>2. MK<br>3. DK<br>4. DK           | Lecture                           | MCQ,<br>SAQ.         | MCQ,<br>SAQ.<br>Viva<br>Voce                 | Physiology<br>(H)                   |

|                          |  |  |   |   |  |           |                                  |    |                        |              |   |   |
|--------------------------|--|--|---|---|--|-----------|----------------------------------|----|------------------------|--------------|---|---|
| Hom<br>UG-<br>AN-<br>1.5 |  |  | K | Cell,<br>Tissues,<br>organs,<br>Organ<br>System | Describe the action of<br>Homoeopathic drugs on<br>cellular level. | Cognitive | Level 1<br>(Remember/<br>recall) | NK | Integrate<br>d lecture | Viva<br>Voce | - | Pharmacy ,<br>Homoeopat<br>hic Materia<br>Medica (H), |
|--------------------------|--|--|---|---|--|-----------|----------------------------------|----|------------------------|--------------|---|---|

## 2. Topic: Developmental Anatomy (Embryology)

**Learning Outcomes (LO):** At the end of embryology, I-BHMS student should be able to;

1. Describe evolution of life on earth and the developmental anatomy and genetics.
2. Explain the structural organization of man from micro to macro and its evolution from embryo.
3. Explain the evolution of different organs and systems from the embryo.
4. Enumerate the homoeopathic drugs indicated for particular genetic or developmental defect.

## Embryology

| Sl. No.                  | Generic Competency  | Subject Area | Millers:<br>K/KH/ SH/D | Specific Competency           | Specific learning<br>objectives: At the end of<br>the session student should<br>be able to  | Bloom's Domain | Guilbert's level                                      | Must know/ Desire to<br>know/ Nice to know | Teaching Learning<br>Method/Media | Formative Assessment | Summative Assessment             | Integration<br>Horizontal/ Vertical                         |
|--------------------------|---|--------------|------------------------|-------------------------------|---|----------------|---|--|-----------------------------------|----------------------|----------------------------------|---|
| Hom<br>UG-<br>AN-<br>2.1 | Problem formulation/ Integration of Knowledge/ Information<br>gathering/Practical Skills/information management/synthesis | Embryology   | K<br>&<br>KH           | Introduction to<br>embryology | 1. Define embryology<br>2. Enumerate the parts of<br>male and female<br>reproductive systems<br>3. Correlate meiosis with<br>gametogenesis<br>4. Describe menstrual cycle | Cognitiv<br>e  | Level 1<br>(Remember)<br>&<br>Level 2<br>(understand) | 1. MK<br>2. MK<br>3. DK<br>4. DK           | Lecture                           | MCQ,<br>SAQ.         | MCQ,<br>SAQ.<br><br>Viva<br>Voce | Physiology<br>(H)<br>Obstetrics<br>and<br>Gynecology<br>(V) |
| Hom<br>UG-<br>AN-<br>2.2 |   |              | K<br>&<br>KH           | Spermatogenesis               | 1. Define spermatogenesis<br>2. Describe the process of<br>spermatogenesis<br>3. Describe spermiogenesis<br>4. Describe the structure of<br>spermatozoon                  | Cognitiv<br>e  | Level 1<br>(Remember)<br>&<br>Level 2<br>(understand) | 1. MK<br>2. MK<br>3. MK<br>4. DK           | Lecture                           | MCQ,<br>SAQ.         | MCQ,<br>SAQ.<br><br>Viva<br>Voce | Physiology<br>(H)   |
| Hom<br>UG-<br>AN-<br>2.3 |   |              | K<br>&<br>KH           | Oogenesis                     | 1. Define Oogenesis<br>2. Describe the process of<br>oogenesis<br>3. Describe formation of<br>graafian follicle<br>4. Compare<br>spermatogenesis and<br>oogenesis         | Cognitiv<br>e  | Level 1<br>(Remember)<br>&<br>Level 2<br>(understand) | 1. MK<br>2. MK<br>3. MK<br>4. DK           | Lecture                           | MCQ,<br>SAQ.         | MCQ,<br>SAQ.<br><br>Viva<br>Voce | Physiology<br>(H)<br>Obstetrics<br>and<br>Gynecology<br>(V) |

| Sl. No.             | Generic Competency   | Subject Area | Millers:<br>K/KH/ SH/D | Specific Competency              | Specific learning objectives: At the end of the session student should be able to   | Bloom's Domain | Guilbert's level                          | Must know/ Desire to know/ Nice to know   | Teaching Learning Method/Media | Formative Assessment | Summative Assessment | Integration Horizontal/ Vertical |
|---------------------|--|--------------|------------------------|----------------------------------|---|----------------|---|---|--------------------------------|----------------------|----------------------|----------------------------------|
| Hom UG-AN-2.4 & 2.5 | Problem formulation/ Integration of Knowledge/ Information gathering/Practical Skills/Information management/synthesis | Embryology   | K & KH                 | Fertilization                    | 1. Define fertilization<br>2. Describe the process of fertilization<br>3. Describe the process of cleavage and formation of blastocyst<br>4. Explain the clinical correlation with IVF                            | Cognitive      | Level 1 (Remember) & Level 2 (understand) | 1. MK<br>2. MK<br>3. MK<br>4. NK          | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. Viva Voce  | Physiology (H)                   |
| Hom UG-AN-2.6       |  |              | K                      | Formation of bilaminar germ disc | 1. Describe the formation of amniotic cavity and yolk sac<br>2. Describe the formation of bilaminar germ disc<br>3. Describe the formation of extraembryonic mesoderm<br>4. Define chorion and amnion             | Cognitive      | Level 1 (Remember) & Level 2 (understand) | 1. MK<br>2. MK<br>3. MK<br>4. DK          | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. Viva Voce  | -                                |
| Hom UG-AN-2.7       |  |              | K                      | Gastrulation                     | 1. Define Gastrulation<br>2. Describe the formation of prochordal plate<br>3. Describe the formation of primitive streak<br>4. Describe the formation of germ layers<br>5. Mention derivatives of each germ layer | Cognitive      | Level 1 (Remember)                        | 1. MK<br>2. MK<br>3. MK<br>4. DK<br>5. DK | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. Viva Voce  | Physiology (H)                   |

| Sl. No.        | Generic Competency  | Subject Area | Millers:<br>K/KH/SH/D | Specific Competency                               | Specific learning objectives: At the end of the session student should be able to  | Bloom's Domain | Guilbert's level   | Must know/ Desire to know/ Nice to know | Teaching Learning Method/Media | Formative Assessment | Summative Assessment | Integration Horizontal/ Vertical |
|----------------|---|--------------|-----------------------|---|--|----------------|--------------------|---|--------------------------------|----------------------|----------------------|----------------------------------|
| Hom UG-AN-2.8  | Problem formulation/ Integration of Knowledge/ Information gathering/ Practical Skills/ Information management/ Synthetic | Embryology   | K                     | Intra embryonic mesoderm and formation of somites | 1. Describe the parts of intra embryonic mesoderm<br>2. Describe the formation of somites and their derivatives<br>3. Define Sclerotome, myotome and dermatome | Cognitive      | Level 1 (Remember) | 1. MK<br>2. MK<br>3. MK                 | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. Viva Voce  | Physiology (H)                   |
| Hom UG-AN-2.9  |   |              | K                     | Ossification                                      | 1. Define ossification<br>2. Mention the types of ossification<br>3. Describe intramembranous ossification<br>4. Describe endochondral ossification            | Cognitive      | Level 1 (Remember) | 1. MK<br>2. MK<br>3. DK<br>4. DK        | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. Viva Voce  | Physiology (H)                   |
| Hom UG-AN-2.10 |   |              | K                     | Notochord   | 1. Describe the formation of notochord<br>2. Mention the function and fate of notochord<br>3. Describe the formation of neural tube                            | Cognitive      | Level 1 (Remember) | 1. MK<br>2. MK<br>3. MK                 | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. Viva Voce  | -                                |

| Sl. No.        | Generic Competency  | Subject Area | Millers:<br>K/KH/SH/D | Specific Competency   | Specific learning objectives: At the end of the session student should be able to  | Bloom's Domain | Guilbert's level          | Must know/ Desire to know/ Nice to know | Teaching Learning Method/Media | Formative Assessment | Summative Assessment | Integration Horizontal/ Vertical             |
|----------------|---|--------------|-----------------------|---|--|----------------|---------------------------|---|--------------------------------|----------------------|----------------------|--|
| Hom UG-AN-2.11 | Problem formulation/ Integration of Knowledge/ Information gathering/ Practical Skills/ Information management/ Synthetic | Embryology   | K                     | Folding of the embryonic disc and formation of primitive gut tube | 1. Explain the sagittal folding of embryo<br>2. Explain the transverse folding of embryo<br>3. Describe the parts of primitive gut tube                          | Cognitive      | Level 1 (Remember)        | 1. MK<br>2. MK<br>3. MK                 | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. Viva Voce  | -  |
| Hom UG-AN-2.12 |   |              | K                     | Placenta  | 1. Define amnion and chorion<br>2. Define decidua<br>3. Describe the formation of placenta<br>4. Mention the functions of placenta                               | Cognitive      | Level 1 (Remember)        | 1. DK<br>2. DK<br>3. MK<br>4. DK        | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. Viva Voce  | -  |
| Hom UG-AN-2.13 |   |              | K                     | Stages of development   | 1. Describe the Development of embryo and layers of suppression.<br>2. Enumerate the homoeopathic drugs indicated for particular genetic or developmental defect | Cognitive      | Level 1 (Remember/recall) | 1. NK                                   | Integrated lecture             | Viva Voce            | -                    | Organon (H), Homoeopathic Materia Medica (H) |

### 3. Topic: General Histology

**Learning Outcomes (LO):** At the end of embryology, I-BHMS student should be able to;

1. Describe microscopic structure of the basic tissues and clinically relevant structures.
2. Correlate the histological features with their functions.
3. Explain the possible changes in cells, tissues and organs due to injury or disease.

| Sl. No.       | Generic Competency   | Subject Area | Millers:<br>K/KH/SH/D | Specific Competency       | Specific learning objectives: At the end of the session student should be able to                                   | Bloom's Domain | Guilbert's level                          | Must know/ Desire to know/ Nice to know | Teaching Learning Method/Media | Formative Assessment | Summative Assessment | Integration Horizontal/ Vertical |
|---------------|--|--------------|-----------------------|---------------------------|---|----------------|---|---|--------------------------------|----------------------|----------------------|----------------------------------|
| Hom UG-AN-3.1 | Problem formulation/ Integration of Knowledge/ Information gathering/Practical Skills/Information management/synthesis | Histology    | K & KH                | Introduction to histology | 1. Define histology<br>2. Describe parts of microscope<br>3. Explain the use of microscope                          | Cognitive      | Level 1 (Remember) & Level 2 (understand) | 1. MK<br>2. MK<br>3. MK                 | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. Viva Voce  | Physiology (H)                   |
| Hom UG-AN-3.2 |  |              | K                     | Epithelial tissue         | 1. Define epithelium<br>2. Mention the characteristics of epithelial tissue<br>3. Classify epithelia                | Cognitive      | Level 1 (Remember)                        | 1. MK<br>2. MK<br>3. MK                 | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. Viva Voce  | Physiology (H)                   |
| Hom UG-AN-3.3 |  |              | K & KH                | Connective tissue         | 1. Define connective tissue<br>2. Mention the characteristics of connective tissue<br>3. Classify connective tissue | Cognitive      | Level 1 (Remember) & Level 2 (understand) | 1. MK<br>2. M<br>3. MK                  | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. Viva Voce  | Physiology (H)                   |

| Sl. No.       | Generic Competency   | Subject Area | Millers:<br>K/KH/SH/D | Specific Competency | Specific learning objectives: At the end of the session student should be able to   | Bloom's Domain | Guilbert's level   | Must know/ Desire to know/ Nice to know | Teaching Learning Method/Media | Formative Assessment | Summative Assessment | Integration Horizontal/ Vertical |
|---------------|--|--------------|-----------------------|---------------------|---|----------------|--------------------|---|--------------------------------|----------------------|----------------------|----------------------------------|
| Hom UG-AN-3.4 | Problem formulation/ Integration of Knowledge/ Information gathering/Practical Skills/Information management/synthesis | Histology    | K                     | Cartilage           | 1. Classify cartilages<br>2. Describe the microscopic structure of hyaline cartilage<br>3. Describe the microscopic structure of fibro cartilage<br>4. Describe the microscopic structure of elastic cartilage            | Cognitive      | Level 1 (Remember) | 1. MK<br>2. MK<br>3. MK<br>4. MK        | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. Viva Voce  | Physiology (H)                   |
| Hom UG-AN-3.5 |  |              | K                     | Bone                | 1. Describe haversian system<br>2. Describe the microscopic structure of L S and T S of compact bone<br>3. Describe the microscopic structure of spongy bone  | Cognitive      | Level 1 (Remember) | 1. MK<br>2. MK<br>3. MK                 | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. Viva Voce  | Physiology (H)                   |
| Hom UG-AN-3.6 |  |              | K                     | Muscle              | 1. Classify muscle tissue<br>2. Describe the microscopic structure of L S and T S of skeletal muscle<br>3. Describe the microscopic structure of smooth muscle<br>4. Describe the microscopic structure of cardiac muscle | Cognitive      | Level 1 (Remember) | 1. MK<br>2. MK<br>3. MK<br>4. MK        | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. Viva Voce  | Physiology (H)                   |

| Sl. No.                  | Generic Competency  | Subject Area | Millers:<br>K/KH/ SH/D | Specific Competency | Specific learning<br>objectives: At the end of<br>the session student should<br>be able to  | Bloom's Domain | Guilbert's level          | Must know/ Desire to<br>know/ Nice to know    | Teaching Learning<br>Method/Media | Formative Assessment | Summative Assessment         | Integration<br>Horizontal/ Vertical |
|--------------------------|---|--------------|------------------------|---------------------|---|----------------|---------------------------|---|-----------------------------------|----------------------|------------------------------|-------------------------------------|
| Hom<br>UG-<br>AN-<br>3.7 | Problem formulation/ Integration of Knowledge/ Information<br>gathering/Practical Skills/Information management/synthesis | Histology    | K                      | Nervous<br>tissue   | 1. Describe nerve<br>2. Describe T S of peripheral nerve<br>3. Describe L S of peripheral nerve   | Cognitive      | Level 1<br>(Remem<br>ber) | 1. MK<br>2. MK<br>3. MK                       | Lecture                           | MCQ,<br>SAQ.         | MCQ,<br>SAQ.<br>Viva<br>Voce | Physiology<br>(H)                   |
| Hom<br>UG-<br>AN-<br>3.8 |   |              | K                      | Skin                | 1. Describe microscopic structure of<br>thin skin<br>2. Describe microscopic structure of<br>thick skin<br>3. Describe appendages of skin   | Cognitive      | Level 1<br>(Remem<br>ber) | 1. MK<br>2. MK<br>3. MK                       | Lecture                           | MCQ,<br>SAQ.         | MCQ,<br>SAQ.<br>Viva<br>Voce | Physiology<br>(H)                   |
| Hom<br>UG-<br>AN-<br>3.9 |   |              | K                      | Lymphoid<br>organs  | 1. Mention lymphoid organs<br>2. Describe the microscopic<br>structure of lymph node,<br>3. Describe the microscopic<br>structure of tonsil<br>4. Describe the microscopic<br>structure of thymus<br>5. Describe the microscopic<br>structure of spleen | Cognitive      | Level 1<br>(Remem<br>ber) | 1. MK<br>2. MK<br>3. MK<br><br>4. MK<br>5. MK | Lecture                           | MCQ,<br>SAQ.         | MCQ,<br>SAQ.<br>Viva<br>Voce | Physiology<br>(H)                   |

| Sl. No.        | Generic Competency   | Subject Area | Millers:<br>K/KH/ SH/D | Specific Competency | Specific learning objectives: At the end of the session student should be able to   | Bloom's Domain | Guilbert's level   | Must know/ Desire to know/ Nice to know | Teaching Learning Method/Media | Formative Assessment | Summative Assessment       | Integration Horizontal/ Vertical |
|----------------|--|--------------|------------------------|---------------------|---|----------------|--------------------|---|--------------------------------|----------------------|----------------------------|----------------------------------|
| Hom UG-AN-3.10 | Problem formulation/ Integration of Knowledge/ Information gathering/Practical Skills/Information management/synthesis | Histology    | K                      | Blood vessels       | 1. Classify blood vessels<br>2. Describe the microscopic structure of large artery<br>3. Describe the histology of medium sized artery<br>4. Describe the microscopic structure of large vein                           | Cognitive      | Level 1 (Remember) | 1. MK<br>2. MK<br>3. MK<br>4. MK        | Lecture                        | MCQ, SAQ.            | MCQ, SAQ.<br><br>Viva Voce | Physiology (H)                   |
| Hom UG-AN-3.11 |  |              | K                      | Glands              | 1. Classify glands based on type of secretion<br>2. Describe the microscopic structure of serous gland<br>3. Describe the microscopic structure of mucous gland<br>4. Describe the microscopic structure of mixed gland | Cognitive      | Level 1 (Remember) | 1. MK<br>2. MK<br>3. MK<br>4. MK        | Lecture                        | MCQ, SAQ.            | MCQ, SAQ.<br><br>Viva Voce | Physiology (H)                   |

#### **4.Topic: Upper Extremities**

**Learning Outcomes (LO):** At the end of Upper Extremities, I-BHMS student should be able to;

1. Describe the anatomy of the bones of the upper extremities, their blood supply and applied anatomy.
2. Describe anatomy of the joints of the upper extremities, their blood supply, action and applied anatomy.
3. Describe the muscles of the upper extremities, their origin, insertion, nerve supply, action and applied anatomy.
4. Explain anatomy of the vessels and nerves of the upper extremities, their course, muscles they supply, relations and applied anatomy.
5. Describe the anatomy of mammary gland with its applied anatomy.
6. Describe the anatomy of axilla.
7. Enumerate homoeopathic drugs and rubrics indicated for particular involvement of bones, muscles, joints, nerves, blood vessels.

| Sr No.                                      | Generic Competency   | Subject Area    | Millers: K/KH/ SH/D | Specific Competency   | Specific learning objectives: At the end of the session student should be able to  | Bloom's Domain | Guilbert's level          | Must know/ Desire to know/ Nice to know | Teaching Learning Method/Media | Formative Assessment | Summative Assessment          | Integration Horizontal/ Vertical                      |
|---|--|-----------------|---------------------|---|--|----------------|---------------------------|---|--------------------------------|----------------------|-------------------------------|---|
| HomUG-AN-4.2, 4.6, 4.9, 4.10, 4.18 and 4.19 | Problem formulation/ Integration of Knowledge/ Information gathering/Practical Skills/ Information management/ synthesis | Upper Extremity | K & KH              | Anatomic al features of Pectoral region and axilla<br>Back and Intermuscular spaces around scapula<br>Arm and cubital fossa<br>Fore arm<br>Flexor and extensor retinacula<br>Palmar aponeurosis and spaces in palmar spaces | 1. Describe the contents of the regions of upper extremity<br>2. Recall the attachments, nerve supply and actions of the muscles in the regions<br>3. Describe the main joint, blood vessels and nerves in the region.<br>4. Identify the surface land marks in the region for surface marking | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. MK<br>4. MK        | Lecture                        | MCQ, SAQ.            | MCQ, SAQ.<br><br>Viva Voce    | Physiology (H)  |
| HomUG-AN-4.4, 4.5 4.9 to 4.12 & 4.20        |  |                 | K                   | Main blood vessels of the upper limb: Axillary artery, brachial artery<br>Radial artery and ulnar artery and superficial veins of upper extremity   | 1. Describe the origin, extent, parts, branches and distribution of main arteries<br>2. Describe superficial and deep palmar arches<br>3. Describe the venous drainage of upper extremity<br>4. Describe their applied anatomy   |                | Level 1 (Remember/recall) | 5. MK<br>1. MK<br>2. MK<br>3. MK        | Lecture                        | MCQ, SAQ.            | MCQ, SAQ.<br>LAQ<br>Viva Voce | Physiology (H)  |
| HomUG-AN-4.8, 4.10, 4.13 to 4.15            |  |                 | K                   | Describe the Anatomy of nerves of Upper extremity<br>Median nerve, Ulnar nerve, Radial nerve, Musculocutaneous nerve and Axillary nerve   | 1. Describe the formation, course and relations of main nerves of the upper extremity<br>2. Mention their branches and their distribution<br>3. Describe the applied anatomy   | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. DK                 | Lecture                        | MCQ, SAQ.            | MCQ, SAQ.<br>LAQ<br>Viva Voce | Physiology (H)<br><br>Medicine (V)<br><br>Surgery (V) |

| Sl. No.      | Generic Competency   | Subject Area    | Millers:<br>K/KH/ SH/D | Specific Competency                            | Specific learning objectives: At the end of the session student should be able to  | Bloom's Domain | Guilbert's level           | Must know/ Desire to know/ Nice to know   | Teaching Learning Method/Media | Formative Assessment | Summative Assessment     | Integration Horizontal/ Vertical |
|--------------|--|-----------------|------------------------|--|--|----------------|----------------------------|---|--------------------------------|----------------------|--------------------------|----------------------------------|
| HomUG-AN-4.4 | Problem formulation/ Integration of Knowledge/ Information gathering/Practical | Upper Extremity | K                      | Describe the anatomy of Brachial plexus        | <ol style="list-style-type: none"> <li>1. Define nerve plexus</li> <li>2. Enumerate the root value of Brachial plexus</li> <li>3. Mention the stages of formation of Brachial plexus</li> <li>4. Name the branches of Brachial plexus</li> <li>5. Enlist the deformities due to injuries to Brachial plexus</li> </ol> | Cognitive      | Level 1 (Remember/ recall) | <ol style="list-style-type: none"> <li>1. MK</li> <li>2. MK</li> <li>3. MK</li> <li>4. MK</li> <li>5. DK</li> </ol> | Lecture                        | MCQ, SAQ.            | MCQ, SAQ, LAQ, Viva Voce | Physiology H)                    |
| HomUG-AN-4.3 |  |                 | K                      | Describe the anatomy of Breast (Mammary gland) | <ol style="list-style-type: none"> <li>1. Define location &amp; extent of breast</li> <li>2. Describe structure of breast</li> <li>3. Describe the relations, blood supply and nerve supply</li> <li>4. Explain the lymphatic drainage of breast</li> <li>5. Describe applied anatomy of breast</li> </ol>             | Cognitive      | Level 1 (Remember/ recall) | <ol style="list-style-type: none"> <li>1. MK</li> <li>2. MK</li> <li>3. MK</li> <li>4. MK</li> <li>5. DK</li> </ol> | Lecture                        | MCQ, SAQ.            | MCQ, SAQ, LAQ, Viva Voce | Surgery (V)                      |

|                          |  |  |   |   |  |           |                           |                                  |                    |           |                         |   |
|--------------------------|--|--|---|---|--|-----------|---------------------------|----------------------------------|--------------------|-----------|-------------------------|---|
| HomUG-AN-4.7, 4.16 &4.17 |  |  | K | Describe the Anatomy of joints of Upper extremity Shoulder, Elbow, Radio-ulnar and wrist joints | 1. Enumerate the joints of upper extremity<br>2. Describe the articulating surfaces, ligaments, blood and nerve supply of joints of upper extremity<br>3. Describe the movements of joints upper extremity<br>4. Describe the applied anatomy of joints of upper extremity | Cognitive | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. MK<br>4. DK | Lecture            | MCQ, SAQ. | MCQ, SAQ. LAQ Viva Voce | Surgery (V)                                     |
| HomUG-AN-4.18            |  |  | K | Structures of upper extremity   | 1. Enumerate the homoeopathic drugs related to structures of upper extremity.<br>2. Enumerate the rubrics related to structures of upper extremity.  | Cognitive | Level 1 (Remember/recall) | NK                               | Integrated Lecture | Viva voce |                         | Homoeopathic Materia Medica (H), Repertory (H). |

## 5. Topic: Lower Extremity

**Learning Outcomes (LO):** At the end of Lower Extremities, I-BHMS student should be able to;

1. Describe the anatomy of the bones of the lower extremities, their blood supply, and applied anatomy.
2. Describe the anatomy of the joints of the lower extremities, their blood supply, action and applied anatomy.
3. Describe the anatomy of the muscles of the lower extremities, their origin, insertion, nerve supply, action and applied anatomy.
4. Describe the anatomy of the vessels and nerves of the lower extremities, their course, muscles they supply, relations and applied anatomy.
5. Enumerate the homoeopathic drugs indicated for particular involvement of bones, muscles, joints, nerves, blood vessels.

| Sr. No                                      | Generic Competency   | Subject Area    | Millers:<br>K/KH/SH/D | Specific Competency   | Specific learning objectives:<br>At the end of the session student should be able to   | Bloom's Domain | Guilbert's level          | Must know/ Desire to know/ Nice to know  | Teaching Learning Method/Media | Formative Assessment | Summative Assessment       | Integration Horizontal/ Vertical              |
|---|--|-----------------|-----------------------|---|--|----------------|---------------------------|--|--------------------------------|----------------------|----------------------------|---|
| HomUG-AN-5.3 to 5.6, 5.8, 5.10 To 5.14      | Problem formulation/ Integration of Knowledge/ Information gathering/Practical Skills/ Information management/ synthesis | Lower Extremity | K & KH                | Front of the thigh, Femoral triangle, Medial side of thigh, Gluteal region, Back of the thigh and popliteal fossa, Front of the thigh and dorsum of the foot, Back & side of the leg, retinacula and sole of the foot | <ol style="list-style-type: none"> <li>Describe Contents of the regions of lower extremity</li> <li>Recall the attachments, nerve supply and actions of the muscles in the regions</li> <li>Describe the main joint, blood vessels and nerves in the region.</li> <li>Identify the surface land marks in the region for surface marking</li> </ol> | Cognitive      | Level 1 (Remember/recall) | <ol style="list-style-type: none"> <li>MK</li> <li>MK</li> <li>MK</li> <li>MK</li> </ol> | Lecture                        | MCQ, SAQ.            | MCQ, SAQ.<br><br>Viva Voce | Physiology (H)                                |
| HomUG-AN-5.4, 5.8 5.10 to 5.11, 5.14 & 5.18 |  |                 | K                     | Main blood vessels of the upper extremity: Femoral artery, Popliteal artery, Anterior tibial & Posterior tibial and Dorsalis pedis artery   | <ol style="list-style-type: none"> <li>Describe the origin, extent, parts, branches and distribution of main arteries</li> <li>Describe superficial and deep plantar arches</li> <li>Describe the venous drainage of lower extremity</li> <li>Describe their applied anatomy</li> </ol>  |                | Level 1 (Remember/recall) | <ol style="list-style-type: none"> <li>MK</li> <li>MK</li> <li>MK</li> <li>MK</li> </ol> | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. LAQ Viva Voce    | Physiology (H)                                |
| HomUG-AN-5.2, 5.5, 5.7, 5.10 to 5.12, 5.14  |  |                 | K                     | Describe morphology nerves of lower extremity Femoral, obturator, Sciatic, common peroneal and Tibial nerves  | <ol style="list-style-type: none"> <li>Describe the formation, course and relations of main nerves of the lower extremity</li> <li>Mention their branches and their distribution</li> <li>Describe the applied anatomy</li> </ol>  | Cognitive      | Level 1 (Remember/recall) | <ol style="list-style-type: none"> <li>MK</li> <li>MK</li> <li>DK</li> </ol>             | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. LAQ Viva Voce    | Physiology (H)<br>Medicine (V)<br>Surgery (V) |

| Sl. No.                    | Generic Competency   | Subject Area    | Millers:<br>K/KH/ SH/D | Specific Competency  | Specific learning objectives: At the end of the session student should be able to  | Bloom's Domain | Guilbert's level           | Must know/ Desire to know/ Nice to know   | Teaching Learning Method/Media | Formative Assessment | Summative Assessment    | Integration Horizontal/ Vertical                |
|----------------------------|--|-----------------|------------------------|--|--|----------------|----------------------------|---|--------------------------------|----------------------|-------------------------|---|
| Hom UG-AN- 5.2 & 5.7       | Problem formulation/ Integration of Knowledge/ Information gathering/Practical Skills/ Information management/ synthesis | Lower Extremity | K                      | Describe the anatomy of Lumbar & Sacral plexuses   | 1. Define nerve plexus<br>2. Enumerate the root value of the plexuses<br>3. Describe the formation of the plexuses<br>4. Name the branches of sacral and lumbar plexus<br>5. Enlist the deformities due to injuries to lumbar & sacral plexuses  | Cognitive      | Level 1 (Remember/ recall) | 1. MK<br>2. MK<br>3. MK<br>4. MK<br>5. DK | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. LAQ Viva Voce | Physiology H)                                   |
| HomUG-AN-5.9, 5.15 to 5.17 |  |                 | K                      | Describe the Anatomy of joints of Lower extremity Hip, Knee and Ankle Arches of the foot | 1. Describe the articulating surfaces, ligaments, blood and nerve supply of joints of lower extremity<br>2. Describe the movements of joints lower extremity<br>3. Describe the applied anatomy of joints of lower extremity<br>4. Describe the formation of arches of foot<br>5. Describe the applied anatomy | Cognitive      | Level 1 (Remember/ recall) | 1. MK<br>2. MK<br>3. MK<br>4. DK          | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. LAQ Viva Voce | Surgery (V)                                     |
| Hom UG-AN- 5.18            |  |                 | K                      | Structures of lower extremity  | 1. Enumerate the homoeopathic drugs related to structures of lower extremity.<br>2. Enumerate the rubrics related to structures of lower extremity.  | Cognitive      | Level 1 (Remember/ recall) | NK  | Integrated Lecture             | Viva voce            |                         | Homoeopathic Materia Medica (H), Repertory (H). |

## 6. Topic: Thorax

**Learning Outcomes (LO):** At the end of Thorax, I-BHMS student should be able to;

1. Describe the parts of Respiratory and Cardiovascular system with their applied anatomy.
2. Enumerate the homoeopathic drugs and rubrics related to thorax.

| Sl. No.             | Generic Competency   | Subject Area | Millers: Knows (K) / Knows how (KH) / Shows how (SH) / Does (D) K/KH/ SH/D | Specific Competency    | Specific learning objectives: At the end of the session student should be able to   | Bloom's Domain | Guilbert's level          | Must know (MK) / Desire to know (DK) / Nice to know (NK)  | Teaching Learning Method/Media | Formative Assessment | Summative Assessment    | Integration Horizontal (H) / Vertical (V) |
|---------------------|--|--------------|--|------------------------|---|----------------|---------------------------|---|--------------------------------|----------------------|-------------------------|---|
| Hom UG-AN-6.1 & 6.2 | Problem formulation/ Integration of Information Knowledge/ | Thorax       | K  | Introduction & Trachea | <ol style="list-style-type: none"> <li>1. Describe the Boundaries and content of thoracic cage</li> <li>2. Describe the morphology of trachea</li> <li>3. Mention the Blood supply and nerve supply</li> <li>4. Describe the applied anatomy</li> </ol> | Cognitive      | Level 1 (Remember/recall) | <ol style="list-style-type: none"> <li>1. MK</li> <li>2. DK</li> <li>3. DK</li> <li>4. DK</li> </ol>                | Lecture<br>Group discussion    | MCQ, SAQ.            | MCQ, SAQ. Viva Voce     | Physiology (H)                            |
| Hom UG-AN-6.3       |  |              | K  | Pleura                 | <ol style="list-style-type: none"> <li>1. Define pleura</li> <li>2. Mention the layers</li> <li>3. Describe the parts of parietal pleura</li> <li>4. Mention its blood and nerve supply</li> <li>5. Describe its applied anatomy</li> </ol>             | Cognitive      | Level 1 (Remember/recall) | <ol style="list-style-type: none"> <li>1. MK</li> <li>2. MK</li> <li>3. MK</li> <li>4. DK</li> <li>5. DK</li> </ol> | Lecture<br>Group discussion    | MCQ, SAQ.            | MCQ, SAQ. LAQ Viva Voce | Physiology (H)<br>Medicine (V)            |

|                          |  |  |   |       |  |           |                              |  |                                 |           |                           |                                    |
|--------------------------|--|--|---|-------|--|-----------|------------------------------|--|---------------------------------|-----------|---------------------------|------------------------------------|
| Hom<br>UG-<br>AN-<br>6.4 |  |  | K | Lungs | <ol style="list-style-type: none"> <li>1. Describe the external features of the lung</li> <li>2. Compare the features of right and left lungs</li> <li>3. State the blood supply and nerve supply</li> <li>4. Explain the broncho-pulmonary segments and their applied aspect</li> </ol> | Cognitive | Level 1<br>(Remember/recall) | <ol style="list-style-type: none"> <li>1. MK</li> <li>2. DK</li> <li>3. DK</li> <li>4. MK</li> </ol> | Lecture<br><br>Group discussion | MCQ, SAQ. | MCQ, SAQ, LAQ, Viva, Voce | Physiology (H)<br><br>Medicine (V) |
|--------------------------|--|--|---|-------|--|-----------|------------------------------|--|---------------------------------|-----------|---------------------------|------------------------------------|

| Sl. No.       | Generic Competency   | Subject Area | Millers: Knows (K) /Knows how (KH) / Shows how (SH) /Does (D) K/KH/ SH/D | Specific Competency   | Specific learning objectives: At the end of the session student should be able to   | Bloom's Domain | Guilbert s level          | Must know (MK) / Desire to know (DK) / Nice to know (NK) | Teaching Learning Method/Media | Formative Assessment | Summative Assessment     | Integration Horizontal (H) I/ Vertical(V) |
|---------------|--|--------------|--|-----------------------|---|----------------|---------------------------|--|--------------------------------|----------------------|--------------------------|---|
| Hom UG-AN-6.5 | Problem formulation/ Integration of Knowledge/ Information gathering/Practical Skills/Information management/synthesis | Thorax       | K  | Mediastinum           | 1. Define mediastinum<br>2. Describe the boundaries of mediastinum<br>3. Mention the contents of each mediastinum<br>4. Describe its applied aspect   | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. MK<br>4. DK                         | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. LAQ Viva Voce  | Physiology (H)                            |
| Hom UG-AN-6.6 |  |              | K  | Pericardium and Heart | 4. Describe the morphology of the pericardium<br>5. Describe the external features of the heart<br>6. Describe the internal features of the chambers of heart<br>7. Describe the applied anatomy                                | Cognitive      | Level 1 (Remember/recall) | 4. MK<br>5. MK<br>6. MK                                  | Lecture<br>Group discussion    | MCQ, SAQ.            | MCQ, SAQ Viva Voce       | Physiology (H)                            |
| Hom UG-AN-6.7 |  |              | K  | Blood supply of heart | 1. Mention the arteries and veins supplying the heart<br>2. Describe the course and distribution of right and left coronary arteries<br>3. Describe the course and drainage of coronary sinus<br>4. Describe the applied aspect | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. MK<br>4. MK                         | Lecture<br>Group discussion    | MCQ, SAQ.            | MCQ, SAQ. LAQ. Viva Voce | Physiology (H)<br>Medicine (V)            |

| Sl. No.        | Generic Competency  | Subject Area | Millers: Knows (K) /Knows how (KH) / Shows how (SH) /Does (D) K/KH/ SH/D | Specific Competency                                 | Specific learning objectives: At the end of the session student should be able to  | Bloom's Domain | Guilbert s level          | Must know (MK) / Desire to know (DK) / Nice to know (NK) | Teaching Learning Method/Media | Formative Assessment | Summative Assessment | Integration Horizontal (H) I/ Vertical(V) |
|----------------|---|--------------|--|---|--|----------------|---------------------------|--|--------------------------------|----------------------|----------------------|---|
| Hom UG-AN-6.8  | Problem formulation/ Integration of Knowledge/ Skills/Information gathering/Practical Information | Thorax       | K  | Superior mediastinum: Arch of aorta                 | 1. Describe the extent, course, convexities of arch of aorta<br>2. Mention the relations<br>3. Name the branches<br>4. Describe the applied aspect   | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. MK<br>4. MK                         | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. Viva Voce  | Physiology (H)                            |
| Hom UG-AN-6.9  |   |              | K  | Superior mediastinum: Superior Vena cava            | 1. Describe the formation of SVC<br>2. Describe its course and relations<br>3. Name the tributaries<br>4. Describe it applied anatomy  | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. MK<br>4. MK                         | Lecture<br>Group discussion    | MCQ, SAQ.            | MCQ, SAQ. Viva Voce  | Physiology (H)<br>Surgery (V)             |
| Hom UG-AN-6.10 |   |              | K  | Posterior mediastinum: Azygous vein & Thoracic duct | 1. Describe the origin, course and tributaries of azygos vein<br>2. Mention the relations<br>3. Describe the origin, course and tributaries of thoracic duct<br>4. Mention the relations of thoracic duct<br>5. Describe their applied anatomy | Cognitive      | Level 1 (Remember/recall) | 1. DK<br>2. DK<br>3. DK<br>4. DK<br>5. DK                | Lecture<br>Group discussion    | MCQ, SAQ.            | MCQ, SAQ. Viva Voce  | Physiology (H)<br>Medicine (V)            |

| Sl. No.        | Generic Competency   | Subject Area | Millers: Knows (K) /Knows how (KH) / Shows how (SH) /Does (D) | Specific Competency   | Specific learning objectives: At the end of the session student should be able to   | Bloom's Domain | Guilbert s level          | Must know (MK) / Desire to know (DK) / Nice to know (NK)   | Teaching Learning Method/Media | Formative Assessment | Summative Assessment | Integration Horizontal (H) / Vertical(V) |
|----------------|--|--------------|---|---|---|----------------|---------------------------|--|--------------------------------|----------------------|----------------------|--|
| Hom UG-AN-6.11 | Problem formulation/ Integration of Knowledge/ Information gathering/Practical Skills/Information management/synthesis | Thorax       | K   | Posterior mediastinum: Oesophagus & Descending thoracic aorta | <ol style="list-style-type: none"> <li>Describe the morphology and relations of the oesophagus</li> <li>Mention constrictions in its course</li> <li>Mention the blood supply and nerve supply</li> <li>Describe the extent, branches and relations of descending thoracic aorta</li> <li>Describe the applied anatomy</li> </ol> | Cognitive      | Level 1 (Remember/recall) | <ol style="list-style-type: none"> <li>MK</li> <li>MK</li> <li>MK</li> <li>MK</li> <li>DK</li> </ol> | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. Viva Voce  | Physiology (H)                           |
| Hom UG-AN-6.12 |  |              | K   | Diaphragm   | <ol style="list-style-type: none"> <li>Describe the attachments, nerve supply and actions of diaphragm</li> <li>Mention the major openings in the diaphragm and structures passing through it.</li> <li>Describe the nerve and blood supply</li> <li>Describe its applied anatomy</li> </ol>                                      | Cognitive      | Level 1 (Remember/recall) | <ol style="list-style-type: none"> <li>MK</li> <li>MK</li> <li>MK</li> <li>DK</li> <li>DK</li> </ol> | Lecture<br>Group discussion    | MCQ, SAQ.            | MCQ, SAQ. Viva Voce  | Physiology (H)                           |

|                           |  |                     |  |  |   |                       |                              |   |                                       |                             |                               |  |
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| Hom<br>UG-<br>AN-<br>6.13 |  |                     | K  | Systemic<br>embryology:<br>Development<br>of Heart and<br>lung | <ol style="list-style-type: none"> <li>Describe the formation of primitive heart tube</li> <li>Describe the formation of the atria and ventricles of the heart</li> <li>Explain the embryological basis of major congenital anomalies of heart</li> <li>Describe formation of lung</li> </ol> | Cognitive             | Level 1<br>(Remember/recall) | 6. DK<br>7. DK  | Lecture<br><br>Group discussion       | MCQ,<br>SAQ.                | MCQ,<br>SAQ.<br><br>Viva Voce | Physiology<br>(H)<br><br>Medicine (V)            |
| <b>Sl. No.</b>            | <b>Generic Competency</b>  | <b>Subject Area</b> | <b>Millers: Knows (K) /Knows how (KH) / Shows how (SH) /Does (D)</b> | <b>Specific Competency</b>                                     | <b>Specific learning objectives: At the end of the session student should be able to</b>  | <b>Bloom's Domain</b> | <b>Guilbert s level</b>      | <b>Must know (MK) / Desire to know (DK) / Nice to know (NK)</b> | <b>Teaching Learning Method/Media</b> | <b>Formative Assessment</b> | <b>Summative Assessment</b>   | <b>Integration Horizontal (H) I/ Vertical(V)</b> |
| Hom<br>UG-<br>AN-<br>6.14 | Problem formulation/ Integration of Knowledge/ Information gathering/Practical | Thorax              | K  | Systemic histology: Trachea and Lung                           | <ol style="list-style-type: none"> <li>Describe the microscopic structure of trachea and lung</li> <li>Correlate with their functions</li> <li>Explain the applied aspect and correlate with histopathology</li> </ol>  | Cognitive             | Level 1<br>(Remember/recall) | 1. MK<br>2. MK<br>3. MK   | Lecture                               | MCQ,<br>SAQ.                | MCQ,<br>SAQ.<br><br>Viva Voce | Physiology<br>(H)<br>Pathology<br>(V)            |

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| Hom<br>UG-<br>AN-<br>6.15 |  |  | K | Structures of<br>Thorax. | 1. Enumerate the homoeopathic<br>drugs related to thorax.<br>2. Enumerate the rubrics related to<br>thorax. | Cognitive | Level 1<br>(Remem<br>ber/<br>recall) | NK | Integrated<br>lecture | Viva<br>Voce | - | Homoeopat<br>hic Materia<br>Medica (H),<br>Repertory.<br>(H) |
|---------------------------|--|--|---|--------------------------|---|-----------|--------------------------------------|----|-----------------------|--------------|---|--|

## 7.Topic: Abdomen

**Learning Outcomes (LO):** At the end of Abdomen, I-BHMS student should be able to;

1. Describe the anatomy of the abdomen and pelvic organs with their applied anatomy.
2. Enumerate the homoeopathic drugs and rubrics indicated for involvement of the abdominal and pelvic organs.

| Sl. No.       | Generic Competency   | Subject Area               | Millers:<br>K/KH/ SH/D | Specific Competency     | Specific learning objectives: At the end of the session student should be able to   | Bloom's Domain | Guilbert's level                          | Must know/ Desire to know/ Nice to know  | Teaching Learning Method/Media | Formative Assessment | Summative Assessment | Integration Horizontal/ Vertical |
|---------------|--|----------------------------|------------------------|-------------------------|---|----------------|---|--|--------------------------------|----------------------|----------------------|----------------------------------|
| Hom UG-AN-7.1 | Problem formulation/ Integration of Knowledge/ Information gathering/Practical Skills/Information management/synthesis | Abdomen, Pelvis & Perineum | K                      | Introduction            | <ol style="list-style-type: none"> <li>1. Describe the regions of abdominal cavity</li> <li>2. Name the contents of abdominal cavity and pelvic cavity</li> <li>3. Describe perineum</li> </ol>   | Cognitive      | Level 1 (Remember)                        | <ol style="list-style-type: none"> <li>1. MK</li> <li>2. MK</li> <li>3. DK</li> </ol>                | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. Viva Voce  | Physiology (H)                   |
| Hom UG-AN-7.2 |  |                            | K & KH                 | Anterior abdominal wall | <ol style="list-style-type: none"> <li>1. Describe the muscles of anterior abdominal wall and their actions</li> <li>2. Describe the boundaries and contents of inguinal canal</li> <li>3. Explain the applied anatomy of inguinal canal</li> </ol> | Cognitive      | Level 1 (Remember) & Level 2 (understand) | <ol style="list-style-type: none"> <li>1. MK</li> <li>2. MK</li> <li>3. DK</li> <li>4. DK</li> </ol> | Lecture                        | MCQ, SAQ.            | MCQ, SAQ Viva Voce   | Surgery (V)                      |

|                          |  |  |              |            |  |           |   |   |         |           |                          |             |
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| Hom<br>UG-<br>AN-<br>7.3 |  |  | K<br>&<br>KH | Peritoneum | <ol style="list-style-type: none"> <li>1. Define peritoneum</li> <li>2. Describe greater sac, lesser sac and epiploic foramen</li> <li>3. Describe the folds of peritoneum</li> <li>4. Describe recto-uterine pouch and hepatorenal pouch</li> <li>5. Define mesoappendix, transverse mesocolon and sigmoid mesocolon</li> </ol> | Cognitive | Level 1<br>(Remember)<br>&<br>Level 2<br>(understand) | <ol style="list-style-type: none"> <li>1. MK</li> <li>2. MK</li> <li>3. MK</li> <li>4. MK</li> <li>5. DK</li> </ol> | Lecture | MCQ, SAQ. | MCQ, SAQ<br>Viva<br>Voce | Surgery (V) |
|--------------------------|--|--|--------------|------------|--|-----------|---|---|---------|-----------|--------------------------|-------------|

| Sl. No.                  | Generic Competency  | Subject Area                  | Millers:<br>K/KH/ SH/D | Specific Competency | Specific learning objectives: At the end of the session student should be able to  | Bloom's Domain | Guilbert's level                                      | Must know/ Desire to know/ Nice to know   | Teaching Learning Method/Media | Formative Assessment | Summative Assessment            | Integration Horizontal/ Vertical |
|--------------------------|---|-------------------------------|------------------------|---------------------|--|----------------|---|---|--------------------------------|----------------------|---------------------------------|----------------------------------|
| Hom<br>UG-<br>AN-<br>7.4 | Problem formulation/<br>Integration of<br>Knowledge/<br>Information | Abdomen, Pelvis &<br>Perineum |                        | Stomach             | <ol style="list-style-type: none"> <li>1. Describe the morphology of stomach</li> <li>2. Describe the relations of stomach</li> <li>3. Describe the interior of stomach</li> <li>4. Describe the blood and nerve supply of stomach</li> <li>5. Explain the applied anatomy of stomach</li> </ol> | Cognitive      | Level 1<br>(Remember)<br>&<br>Level 2<br>(understand) | <ol style="list-style-type: none"> <li>1. MK</li> <li>2. MK</li> <li>3. MK</li> <li>4. MK</li> <li>5. DK</li> </ol> | Lecture                        | MCQ, SAQ.            | MCQ, SAQ<br>LAQ<br>Viva<br>Voce | Physiology (H)<br>Surgery (V)    |

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| rHom<br>UG-<br>AN-<br>7.5 |  |  | K<br>&<br>KH | Liver                                    | 1. Describe the morphology of liver<br>2. Describe the ligaments of liver<br>3. through porta hepatis<br>4. Describe the blood and nerve supply of liver<br>5. Explain the applied anatomy of liver   | Cognitive | Level 1<br>(Remem<br>ber)<br>&<br>Level 2<br>(underst<br>and) | 1. MK<br>2. MK<br>3. MK<br>4. DK<br>5. DK | Lecture | MCQ,<br>SAQ. | MCQ,<br>SAQ<br>LAQ<br>Viva<br>Voce | Physiology<br>(H)<br>Surgery (V) |
| Hom<br>UG-<br>AN-<br>7.6  |  |  | K<br>&<br>KH | Extra<br>hepatic<br>biliary<br>apparatus | 1. Mention the parts of extra hepatic biliary apparatus<br>2. Describe the morphology of gall bladder and its interior<br>3. Describe the blood and nerve supply of gall bladder<br>4. Describe the formation of bile duct<br>5. Describe the applied anatomy | Cognitive | Level 1<br>(Remem<br>ber)<br>&<br>Level 2<br>(underst<br>and) | 1. MK<br>2. MK<br>3. MK<br>4. DK<br>5. MK | Lecture | MCQ,<br>SAQ. | MCQ,<br>SAQ<br>Viva<br>Voce        | Physiology<br>(H)<br>Surgery (V) |

| Sl. No.       | Generic Competency                            | Subject Area               | Millers:<br>K/KH / SH/D | Specific Competency | Specific learning objectives: At the end of the session student should be able to  | Bloom's Domain | Guilbert's level                          | Must know/ Desire to know/ Nice to know | Teaching Learning Method/Media | Formative Assessment | Summative Assessment | Integration Horizontal/ Vertical |
|---------------|---|----------------------------|-------------------------|---------------------|--|----------------|---|---|--------------------------------|----------------------|----------------------|----------------------------------|
| Hom UG-AN-7.7 | Problem formulation/ Integration of Knowledge | Abdomen, Pelvis & Perineum | K & KH                  | Spleen              | 1. Describe the morphology of spleen<br>2. Describe the ligaments of spleen<br>3. Describe the functions of spleen and its applied anatomy | Cognitive      | Level 1 (Remember) & Level 2 (understand) | 1. MK<br>2. NK<br>3. DK<br>4. DK        | Lecture                        | MCQ, SAQ.            | MCQ, SAQ, Viva Voce  | Physiology (H) Surgery (V)       |

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| Hom<br>UG-<br>AN-<br>7.8 |  |  | K<br>&<br>KH | Duodenum | 1. Describe the morphology of duodenum<br>2. Describe interior of duodenum<br>3. Describe the blood and nerve supply of duodenum<br>4. Describe the applied anatomy | Cognitive | Level 1<br>(Remember)<br>&<br>Level 2<br>(understand) | 1. MK<br>2. NK<br>3. DK<br>4. DK | Lecture | MCQ,<br>SAQ. | MCQ,<br>SAQ<br>LAQ<br>Viva<br>Voce | Physiology<br>(H)<br>Surgery (V) |
| Hom<br>UG-<br>AN-<br>7.9 |  |  | K<br>&<br>KH | Pancreas | 1. Describe the morphology of pancreas<br>2. Describe duct system of pancreas<br>3. Describe the blood and nerve supply and applied anatomy                         | Cognitive | Level 1<br>(Remember)<br>&<br>Level 2<br>(understand) | 1. MK<br>2. NK<br>3. DK          | Lecture | MCQ,<br>SAQ. | MCQ,<br>SAQ<br>LAQ<br>Viva<br>Voce | Physiology<br>(H)<br>Surgery (V) |

| Sl. No.                   | Generic Competency                               | Subject Area                        | Millers:<br>K/KH/SH/D | Specific Competency                                 | Specific learning<br>objectives: At the end of<br>the session student should<br>be able to   | Bloom's Domain | Guilbert's level                                      | Must know/ Desire to<br>know/ Nice to know | Teaching Learning<br>Method/Media | Formative Assessment | Summative Assessment        | Integration<br>Horizontal/ Vertical |
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| Hom<br>UG-<br>AN-<br>7.10 | Problem<br>formulation/<br><i>Integration of</i> | Abdomen, Pelvis &<br><i>Anatomy</i> | K<br>&<br>KH          | Jejunum, Ileum and<br>Superior mesenteric<br>artery | 1. Mention the characteristics of small intestine<br>2. State the differences between jejunum and ileum<br>3. Describe the origin, branches and distribution of superior mesenteric artery | Cognitive      | Level 1<br>(Remember)<br>&<br>Level 2<br>(understand) | 1. MK<br>2. NK<br>3. DK                    | Lecture                           | MCQ,<br>SAQ.         | MCQ,<br>SAQ<br>Viva<br>Voce | Physiology<br>(H)<br>Surgery (V)    |

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| Hom<br>UG-<br>AN-<br>7.11 |  |  | K<br>&<br>KH | Caecum and<br>appendix | 1. Mention the morphology of<br>caecum and vermiform<br>appendix<br>2. Describe their relations, blood<br>and nerve supply<br>3. Describe the applied anatomy   | Cognitive | Level 1<br>(Remember)<br>&<br>Level 2<br>(understand) | 1. MK<br>2. NK<br>3. DK | Lecture | MCQ,<br>SAQ. | MCQ,<br>SAQ<br>Viva<br>Voce | Surgery (V) |
| Hom<br>UG-<br>AN-<br>7.12 |  |  | K<br>&<br>KH | Large intestine        | 1. Mention the parts of large<br>intestine<br>2. Mention the characteristics of<br>large intestine<br>3. Mention the differences<br>between large and small<br>intestines<br>Describe the applied anatomy | Cognitive | Level 1<br>(Remember)<br>&<br>Level 2<br>(understand) | 1. MK<br>2. DK<br>3. DK | Lecture | MCQ,<br>SAQ. | MCQ,<br>SAQ<br>Viva<br>Voce | Surgery (V) |

| Sl. No.                   | Generic Competency                                      | Subject Area                  | Millers:<br>K/KH/ SH/D | Specific Competency        | Specific learning<br>objectives: At the end<br>of the session student<br>should be able to  | Bloom's Domain | Guilbert's level  | Must know/ Desire to<br>know/ Nice to know | Teaching Learning<br>Method/Media | Formative Assessment | Summative Assessment                   | Integration<br>Horizontal/ Vertical |
|---------------------------|---|-------------------------------|------------------------|----------------------------|---|----------------|---|--|-----------------------------------|----------------------|--|-------------------------------------|
| Hom<br>UG-<br>AN-<br>7.13 | Problem<br>formulation/<br>Integration of<br>Knowledge/ | Abdomen, Pelvis &<br>Perineum | K<br>&<br>KH           | Portal<br>venous<br>system | 1. Define portal vein<br>2. Describe its formation,<br>course and relations<br>3. Mention the tributaries<br>4. Mention the sites of<br>portacaval anastomosis and<br>its applied anatomy | Cognitive      | Level 1<br>(Remem<br>ber)<br>&<br>Level 2<br>(underst<br>and) | 1. MK<br>2. MK<br>3. DK<br>4. DK           | Lecture                           | MCQ,<br>SAQ.         | MCQ,<br>SAQ<br>LAQ<br><br>Viva<br>Voce | Surgery (V)                         |

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| Hom<br>UG-<br>AN-<br>7.14 |  |  | K<br>&<br>KH | Kidney             | 1. Describe the morphology of kidney<br>2. Mention the relations of the kidneys<br>3. Describe the structure of kidney in coronal section<br>4. Describe the blood supply of kidneys<br>5. Explain the applied anatomy | Cognitive | Level 1<br>(Remember)<br>&<br>Level 2<br>(understand) | 1. MK<br>2. MK<br>3. DK<br>4. DK<br>5. DK | Lecture | MCQ, SAQ. | MCQ, SAQ, LAQ<br><br>Viva Voce | Physiology (H)<br>Surgery (V) |
| Hom<br>UG-<br>AN-<br>7.15 |  |  | K<br>&<br>KH | Supra renal glands | 1. Describe the morphology of supra renal glands<br>2. Mention their relations<br>3. Mention the functions<br>4. Describe the blood supply of supra renal glands<br>5. Explain the applied anatomy                     | Cognitive | Level 1<br>(Remember)<br>&<br>Level 2<br>(understand) | 1. MK<br>2. DK<br>3. DK<br>4. DK<br>5. DK | Lecture | MCQ, SAQ. | MCQ, SAQ<br><br>Viva Voce      | Physiology (H)<br>Surgery (V) |

| Sl. No. | Generic Competency | Subject Area | Millers:<br>K/KH/ SH/D | Specific Competency | Specific learning objectives:<br>At the end of the session student should be able to | Bloom's Domain | Guilbert's level | Must know/<br>Desire to know/ Nice to know | Teaching Learning Method/Media | Formative Assessment | Summative Assessment | Integration Horizontal/ Vertical |
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| Hom<br>UG-<br>AN-<br>7.16 | Problem formulation/ Integration of Knowledge/ Information gathering/Practical Skills/Information management/synthesis | Abdomen, Pelvis & Perineum | K<br>&<br>KH | Abdominal<br>aorta                                       | 1. Describe the origin and extent of abdominal aorta<br>2. Mention the relations<br>3. Name the branches<br>4. Describe the course and distribution of coeliac trunk<br>5. Describe the course and distribution of coeliac trunk | Cognitive | Level 1<br>(Remember)<br>&<br>Level 2<br>(understand) | 1. MK<br>2. DK<br>3. MK<br>4. DK<br>5. DK | Lecture | MCQ,<br>SAQ. | MCQ,<br>SAQ<br>LAQ<br>Viva<br>Voce | Surgery (V) |
| Hom<br>UG-<br>AN-<br>7.17 |  |                            | K<br>&<br>KH | Posterior<br>abdominal wall<br>and Inferior<br>vena cava | 1. Name the structures in the posterior abdominal wall<br>2. Describe the origin, course relations and tributaries of inferior vena cava<br>3. Describe the applied anatomy  | Cognitive | Level 1<br>(Remember)<br>&<br>Level 2<br>(understand) | 1. DK<br>2. MK<br>3. DK                   | Lecture | MCQ,<br>SAQ. | MCQ,<br>SAQ<br>Viva<br>Voce        | Surgery (V) |
| Hom<br>UG-<br>AN-<br>7.18 |  |                            | K<br>&<br>KH | Urinary bladder  | 1. Describe the morphology of urinary bladder<br>2. Describe the relations of urinary bladder<br>3. Describe the ligaments of urinary bladder<br>4. Describe the applied anatomy   | Cognitive | Level 1<br>(Remember)<br>&<br>Level 2<br>(understand) | 1. MK<br>2. MK<br>3. DK<br>DK             | Lecture | MCQ,<br>SAQ. | MCQ,<br>SAQ<br>LAQ<br>Viva<br>Voce | Surgery (V) |

| Sl. No.        | Generic Competency   | Subject Area               | Millers:<br>K/KH/ SH/D | Specific Competency | Specific learning objectives: At the end of the session student should be able to   | Bloom's Domain | Guilbert's level                          | Must know/ Desire to know/ Nice to know   | Teaching Learning Method/Media | Formative Assessment | Summative Assessment      | Integration Horizontal/ Vertical                |
|----------------|--|----------------------------|------------------------|---------------------|---|----------------|---|---|--------------------------------|----------------------|---------------------------|---|
| Hom UG-AN-7.19 | Problem formulation/ Integration of Knowledge/ Information gathering/Practical Skills/Information management/synthesis | Abdomen, Pelvis & Perineum | K & KH                 | Ureter              | 1. Describe the extent and parts of ureter<br>2. Describe the course and relations<br>3. Describe the applied anatomy   | Cognitive      | Level 1 (Remember) & Level 2 (understand) | 1. MK<br>2. MK<br>3. DK                   | Lecture                        | MCQ, SAQ.            | MCQ, SAQ<br><br>Viva Voce | Surgery (V)                                     |
| Hom UG-AN-7.20 |  |                            | K & KH                 | Prostate gland      | 1. Describe the morphology of prostate gland<br>2. Describe the relations of prostate gland<br>3. Describe the applied anatomy  | Cognitive      | Level 1 (Remember) & Level 2 (understand) | 1. MK<br>2. MK<br>3. DK                   | Lecture                        | MCQ, SAQ.            | MCQ, SAQ<br><br>Viva Voce | Surgery (V)                                     |
| Hom UG-AN-7.21 |  |                            | K & KH                 | Ovary               | 1. Describe the morphology of ovary<br>2. Describe the relations of ovary<br>3. Name the ligaments of ovary<br>4. Mention the blood supply of ovary<br>4. Describe the applied anatomy of ovary | Cognitive      | Level 1 (Remember) & Level 2 (understand) | 1. MK<br>2. MK<br>3. NK<br>4. DK<br>4. DK | Lecture                        | MCQ, SAQ.            | MCQ, SAQ<br><br>Viva Voce | Physiology (H)<br>Obstetrics and Gynecology (V) |

| Sl. No.        | Generic Competency   | Subject Area               | Millers: K/KH/ SH/D | Specific Competency | Specific learning objectives: At the end of the session student should be able to   | Bloom's Domain | Guilbert's level                          | Must know/ Desire to know/ Nice to know   | Teaching Learning Method/Media | Formative Assessment | Summative Assessment           | Integration Horizontal/ Vertical                |
|----------------|--|----------------------------|---------------------|---------------------|---|----------------|---|---|--------------------------------|----------------------|--------------------------------|---|
| Hom UG-AN-7.22 | Problem formulation/ Integration of Knowledge/ Information gathering/Practical | Abdomen, Pelvis & Perineum | K & KH              | Uterus              | 1. Describe the morphology of uterus<br>2. Describe the relations of Uterus<br>3. Name the ligaments and supports of uterus<br>4. Mention the blood supply of uterus<br>5. Describe the applied anatomy of uterus | Cognitive      | Level 1 (Remember) & Level 2 (understand) | 1. MK<br>2. MK<br>3. NK<br>4. DK<br>5. DK | Lecture                        | MCQ, SAQ.            | MCQ, SAQ, LAQ<br><br>Viva Voce | Physiology (H)<br>Obstetrics and Gynecology (V) |
| Hom UG-AN-7.23 |  |                            | K & KH              | Fallopian tube      | 1. Describe the morphology of fallopian tube<br>2. Describe the relations of fallopian tube<br>3. Describe the applied anatomy of fallopian tube  | Cognitive      | Level 1 (Remember) & Level 2 (understand) | 1. MK<br>2. MK<br>3. DK                   | Lecture                        | MCQ, SAQ.            | MCQ, SAQ<br><br>Viva Voce      | Physiology (H)<br>Obstetrics and Gynecology (V) |
| Hom UG-AN-7.24 |  |                            | K & KH              | Scrotum and Testis  | 1. Describe the morphology of scrotum<br>2. Mention its blood and nerve supply<br>3. Describe the morphology of testis<br>4. Describe the applied anatomy of testis   | Cognitive      | Level 1 (Remember) & Level 2 (understand) | 1. MK<br>2. DK<br>3. MK<br>4. DK          | Lecture                        | MCQ, SAQ.            | MCQ, SAQ, LAQ<br><br>Viva Voce | Physiology (H)<br>Surgery (V)                   |

| Sl. No.        | Generic Competency   | Subject Area               | Millers: K/KH/ SH/D | Specific Competency | Specific learning objectives: At the end of the session student should be able to  | Bloom's Domain | Guilbert's level                          | Must know/ Desire to know/ Nice to know | Teaching Learning Method/Media | Formative Assessment | Summative Assessment           | Integration Horizontal/ Vertical |
|----------------|--|----------------------------|---------------------|---------------------|--|----------------|---|---|--------------------------------|----------------------|--------------------------------|----------------------------------|
| Hom UG-AN-7.25 | Problem formulation/ Integration of Knowledge/ Information gathering/Practical Skills/Information management/synthesis | Abdomen, Pelvis & Perineum | K & KH              | Vas deferens        | 1. Mention the extent of ductus deferens, its course and relations<br>2. Mention its blood and nerve supply<br>3. Describe the applied anatomy of vas deferens | Cognitive      | Level 1 (Remember) & Level 2 (understand) | 1. MK<br>2. DK<br>3. MK                 | Lecture                        | MCQ, SAQ.            | MCQ, SAQ, LAQ<br><br>Viva Voce | Surgery (V)                      |
| Hom UG-AN-7.26 |  |                            | K & KH              | Rectum              | 1. Describe the morphology of rectum and its relations<br>2. Mention its blood and nerve supply<br>3. Describe the applied anatomy of rectum                   | Cognitive      | Level 1 (Remember) & Level 2 (understand) | 1. MK<br>2. MK<br>3. MK<br>4. DK        | Lecture                        | MCQ, SAQ.            | MCQ, SAQ, LAQ<br><br>Viva Voce | Surgery (V)                      |
| Hom UG-AN-7.27 |  |                            | K & KH              | Anal canal          | 1. Describe the morphology of anal canal and its relations<br>2. Mention its blood and nerve supply<br>3. Describe the applied anatomy of anal canal           | Cognitive      | Level 1 (Remember) & Level 2 (understand) | 5. MK<br>6. MK<br>7. MK<br>8. DK        | Lecture                        | MCQ, SAQ.            | MCQ, SAQ, LAQ<br><br>Viva Voce | Surgery (V)                      |

| Sl. No.        | Generic Competency   | Subject Area               | Millers: K/KH/ SH/D | Specific Competency                             | Specific learning objectives: At the end of the session student should be able to  | Bloom's Domain | Guilbert's level                          | Must know/ Desire to know/ Nice to know | Teaching Learning Method/Media | Formative Assessment | Summative Assessment      | Integration Horizontal/ Vertical |
|----------------|--|----------------------------|---------------------|---|--|----------------|---|---|--------------------------------|----------------------|---------------------------|----------------------------------|
| Hom UG-AN-7.28 | Problem formulation/ Integration of Knowledge/ Information gathering/Practical Skills/Information management/synthesis | Abdomen, Pelvis & Perineum | K & KH              | Wall of pelvis including pelvic diaphragm       | 1. Describe the structures that form the walls and pelvic diaphragm<br>2. Describe the main blood vessels and nerves pelvis and perineum<br>3. Describe their applied aspect | Cognitive      | Level 1 (Remember) & Level 2 (understand) | 1. MK<br>2. DK<br>3. DK                 | Lecture                        | MCQ, SAQ.            | MCQ, SAQ<br><br>Viva Voce | Surgery (V)                      |
| Hom UG-AN-7.29 |  |                            | K & KH              | Perineum: superficial and deep perineal pouches | 1. Define perineum and mention its sub divisions<br>2. Describe the boundaries and contents of superficial and deep perineal pouches<br>3. Describe the applied anatomy      | Cognitive      | Level 1 (Remember) & Level 2 (understand) | 1. MK<br>2. MK<br>3. DK                 | Lecture                        | MCQ, SAQ.            | MCQ, SAQ<br><br>Viva Voce | Surgery (V)                      |
| Hom UG-AN-7.30 |  |                            | K & KH              | Ischiorectal fossa                              | 1. Describe the morphology of ischiorectal fossa<br>2. Mention the contents<br>3. Describe the applied anatomy of anal canal   | Cognitive      | Level 1 (Remember) & Level 2 (understand) | 1. MK<br>2. MK<br>3. MK                 | Lecture                        | MCQ, SAQ.            | MCQ, SAQ<br><br>Viva Voce | Surgery (V)                      |

| Sl. No.                | Generic Competency   | Subject Area               | Millers: K/KH/ SH/D | Specific Competency   | Specific learning objectives: At the end of the session student should be able to  | Bloom's Domain | Guilbert's level                          | Must know/ Desire to know/ Nice to know | Teaching Learning Method/Media | Formative Assessment | Summative Assessment      | Integration Horizontal/ Vertical |
|------------------------|--|----------------------------|---------------------|---|--|----------------|---|---|--------------------------------|----------------------|---------------------------|----------------------------------|
| Hom UG-AN-7.31 & 7.32  | Problem formulation/ Integration of Knowledge/ Information gathering/Practical Skills/Information management/synthesis | Abdomen, Pelvis & Perineum | K & KH              | Systemic embryology: Development of Digestive system and Urogenital system                                  | 1. Explain the process of formation of primitive and development of digestive system including liver and pancreas<br>2. Explain the process of development of kidney, urinary bladder and ureter<br>3. Explain the process of formation of male and female gonads and reproductive organs. | Cognitive      | Level 1 (Remember) & Level 2 (understand) | 1. DK<br>2. DK<br>3. DK                 | Lecture                        | MCQ, SAQ.            | MCQ, SAQ<br><br>Viva Voce | Surgery (V)                      |
| Hom UG-AN-7.33 to 7.36 |  |                            | K & KH              | Systemic histology: Microscopic structure of Digestive, urinary, reproductive systems and Supra renal gland | 1. Describe the microscopic structure of digestive, urinary, reproductive systems and supra renal gland<br>2. Correlate with their functions<br>3. Explain the applied aspect and correlate with histopathology  | Cognitive      | Level 1 (Remember) & Level 2 (understand) | 1. MK<br>2. MK<br>3. DK                 | Lecture                        | MCQ, SAQ.            | MCQ, SAQ<br><br>Viva Voce | Surgery (V)                      |

|                           |  |  |   |                                       |   |           |                                  |    |                        |              |   |  |
|---------------------------|--|--|---|---------------------------------------|---|-----------|----------------------------------|----|------------------------|--------------|---|--|
| Hom<br>UG-<br>AN-<br>7.37 |  |  | K | Structures<br>of Abdomen<br>& Pelvis. | 1.Enumerate the<br>homoeopathic drugs<br>related to Structures of<br>Abdomen & Pelvis.<br>2. Enumerate the rubrics<br>related to Structures of<br>Abdomen & Pelvis. | Cognitive | Level 1<br>(Remember/<br>recall) | NK | Integrate<br>d lecture | Viva<br>Voce | - | Homoeopat<br>hic Materia<br>Medica (H),<br>Repertory.<br>(H) |
|---------------------------|--|--|---|---------------------------------------|---|-----------|----------------------------------|----|------------------------|--------------|---|--|

### 8.Topic: Head Neck Face & Special Senses

**Learning Outcomes (LO):** At the end of Head Neck & Face, I-BHMS student should be able to;

1. Describe the anatomy of the bones of the Head Neck & Face, their blood supply, and applied anatomy.
2. Describe the anatomy of the joints of the Head Neck & Face, their blood supply, action and applied anatomy.
3. Explain the anatomy of the muscles of the Head Neck & Face, their origin, insertion, nerve supply, action and applied anatomy.
4. Describe the anatomy of the vessels and nerves of the Head Neck & Face, their course, muscles they supply, relations and applied anatomy.
5. Describe the triangles of the Neck with its applied anatomy.
6. Identify a particular bone of Head Neck & Face on X-Ray.
7. Describe the structure of the special senses organs with its applied anatomy.
8. Enumerate the homoeopathic drugs and rubrics related to structures of HNF.

| Sl. No.               | Generic Competency   | Subject Area        | Millers: Knows (K) /Knows how (KH) / Shows how (SH) /Does (D) | Specific Competency                    | Specific learning objectives: At the end of the session student should be able to   | Bloom's Domain | Guilbert s level          | Must know (MK) / Desire to know (DK) / Nice to know (NK) | Teaching Learning Method/Media | Formative Assessment | Summative Assessment    | Integration Horizontal (H) I/ Vertical(V) |
|-----------------------|--|---------------------|---|--|---|----------------|---------------------------|--|--------------------------------|----------------------|-------------------------|---|
| Hom UG-AN-8.1 and 8.2 | Problem formulation/ Integration of Information Knowledge/ | Head, Neck and Face | K   | Introduction & Scalp                   | 1. Mention the main areas of the head and neck region<br>2. Describe the layers of the scalp<br>3. Enumerate the blood and nerves supplying the scalp<br>4. Describe the applied anatomy of scalp | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. MK<br>4. MK                         | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. LAQ Viva Voce | Surgery (V)                               |
| Hom UG-AN-8.3         |  |                     | K   | Face – Muscle, Nerve and Blood vessels | 1. Name the muscles of facial expression<br>2. Mention the blood and nerve supply of face<br>3. Explain related applied anatomy   | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. MK                                  | Lecture<br>Group discussion    | MCQ, SAQ.            | MCQ, SAQ Viva Voce      | Surgery (V)                               |

| Sl. No.       | Generic Competency   | Subject Area        | Millers: Knows (K) /Knows how (KH) / Shows how (SH) /Does (D) K/KH/ SH/D | Specific Competency                     | Specific learning objectives: At the end of the session student should be able to   | Bloom's Domain | Guilbert s level          | Must know (MK) / Desire to know (DK) / Nice to know (NK) | Teaching Learning Method/Media | Formative Assessment | Summative Assessment       | Integration Horizontal (H) I/ Vertical(V) |
|---------------|--|---------------------|--|---|---|----------------|---------------------------|--|--------------------------------|----------------------|----------------------------|---|
| Hom UG-AN-8.4 | Problem formulation/ Integration of Knowledge/ Information gathering/Practical Skills/Information management/synthesis | Head, Neck and Face | K  | Lachrymal apparatus                     | 1. Mention the components of lachrymal apparatus<br>2. Describe the location and function of each of the components of lachrymal apparatus<br>3. Describe their applied anatomy   | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. DK                                  | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. Viva Voce        | Surgery (V)                               |
| Hom UG-AN-8.5 |  |                     | K  | Side of the neck: Posterior triangle    | 1. Define triangles of neck<br>2. Describe the boundaries and contents of posterior triangle<br>3. Describe applied aspect  | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK   | Lecture<br>Group discussion    | MCQ, SAQ.            | MCQ, SAQ. LAQ<br>Viva Voce | Surgery (V)                               |
| Hom UG-AN-8.6 |  |                     | K  | Front of the neck and Anterior triangle | 1. Describe the sub divisions of anterior triangle<br>2. Describe the boundaries and contents of carotid triangle and digastric triangle<br>3. Describe the principal neurovascular bundle of the neck<br>4. Describe the applied anatomy | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. Dk<br>4. DK                         | Lecture<br>Group discussion    | MCQ, SAQ.            | MCQ, SAQ. Viva Voce        | Surgery (V)                               |

| Sl. No.       | Generic Competency  | Subject Area        | Millers: Knows (K) /Knows how (KH) / Shows how (SH) /Does (D) K/KH/ SH/D | Specific Competency                     | Specific learning objectives: At the end of the session student should be able to  | Bloom's Domain | Guilbert s level          | Must know (MK) / Desire to know (DK) / Nice to know (NK) | Teaching Learning Method/Media | Formative Assessment | Summative Assessment | Integration Horizontal (H) I/ Vertical(V) |
|---------------|---|---------------------|--|---|--|----------------|---------------------------|--|--------------------------------|----------------------|----------------------|---|
| Hom UG-AN-8.7 | Knowledge/ Skills/Information<br><br>Integration of Practical<br><br>Problem formulation/ gathering/Practical Information | Head, Neck and Face | K  | Deep Cervical fascia                    | 1. Describe the parts of deep cervical fascia<br>2. Describe the attachments and modifications<br>3. Explain applied anatomy   | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. DK                                  | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. Viva Voce  | Surgery (V)                               |
| Hom UG-AN-8.8 |   |                     | K  | Back of the neck: suboccipital triangle | 1. Describe the features of the back of the neck<br>2. Describe the boundaries and contents of occipital triangle  | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. DK   | Lecture<br>Group discussion    | MCQ, SAQ.            | MCQ, SAQ. Viva Voce  | Surgery (V)                               |
| Hom UG-AN-8.9 |   |                     | K  | Content of the Vertebral Canal          | 1. List the contents of the vertebral canal<br>2. Describe the meninges of the spinal cord<br>3. Describe the internal vertebral plexus of veins and their applied anatomy | Cognitive      | Level 1 (Remember/recall) | 1. DK<br>2. DK<br>3. DK                                  | Lecture<br>Group discussion    | MCQ, SAQ.            | MCQ, SAQ. Viva Voce  | Surgery (V)                               |

| Sl. No.        | Generic Competency  | Subject Area        | Millers: Knows (K) /Knows how (KH) / Shows how (SH) /Does (D) K/KH/ SH/D | Specific Competency    | Specific learning objectives: At the end of the session student should be able to  | Bloom's Domain | Guilbert s level          | Must know (MK) / Desire to know (DK) / Nice to know (NK) | Teaching Learning Method/Media | Formative Assessment | Summative Assessment     | Integration Horizontal (H) I/ Vertical(V) |
|----------------|---|---------------------|--|------------------------|--|----------------|---------------------------|--|--------------------------------|----------------------|--------------------------|---|
| Hom UG-AN-8.10 | Problem formulation/ Integration of Knowledge/ Skills/Information gathering/Practical | Head, Neck and Face | K  | Parotid Gland          | 1. Describe the surfaces, border and relations of parotid gland<br>2. Mention the blood and nerve supply of the parotid gland<br>3. List the structures inside the parotid gland and parotid duct<br>4. Describe the clinical aspect | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. DK<br>4. DK                         | Lecture                        | MCQ, SAQ.            | MCQ, SAQ, LAQ, Viva Voce | Surgery (V)                               |
| Hom UG-AN-8.11 |   |                     | K  | Submandibular gland    | 1. Describe the morphology of submandibular gland<br>2. Mention its blood and nerve supply<br>3. Describe the applied aspect   | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. MK                                  | Lecture<br>Group discussion    | MCQ, SAQ.            | MCQ, SAQ, Viva Voce      | Surgery (V)                               |
| Hom UG-AN-8.12 |   |                     | K  | Muscles of Mastication | 1. Name the muscles of mastication<br>2. Describe their attachments, nerve supply and actions<br>3. Describe related applied anatomy   | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. DK                                  | Lecture<br>Group discussion    | MCQ, SAQ.            | MCQ, SAQ, Viva Voce      | Surgery (V)                               |

| Sl. No.        | Generic Competency   | Subject Area        | Millers: Knows (K) /Knows how (KH) / Shows how (SH) /Does (D) K/KH/ SH/D | Specific Competency  | Specific learning objectives: At the end of the session student should be able to   | Bloom's Domain | Guilbert s level          | Must know (MK) / Desire to know (DK) / Nice to know (NK) | Teaching Learning Method/Media | Formative Assessment | Summative Assessment    | Integration Horizontal (H) I/ Vertical(V) |
|----------------|--|---------------------|--|--|---|----------------|---------------------------|--|--------------------------------|----------------------|-------------------------|---|
| Hom UG-AN-8.13 | Problem formulation/ Integration of Knowledge/ Information gathering/Practical Skills/Information management/synthesis | Head, Neck and Face | K  | Temporo-Mandibular Joint   | 1. Describe the articulation of TM joint<br>2. Enumerate the ligaments of the joint<br>3. Describe the relations<br>4. Explain the movements of the joint<br>5. Describe its applied anatomy  | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. MK<br>4. MK<br>5. DK                | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. Viva Voce     | Surgery (V)                               |
| Hom UG-AN-8.14 |  |                     | K  | Thyroid Gland  | 1. Describe the location, external features and relations<br>2. Describe the blood and nerve supply<br>3. Describe its development<br>4. Explain the applied anatomy  | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. MK<br>4. DK                         | Lecture<br>Group discussion    | MCQ, SAQ.            | MCQ, SAQ. LAQ Viva Voce | Surgery (V)                               |
| Hom UG-AN-8.15 |  |                     | K  | Cranial cavity: Dura mater, Dural venous sinuses & Pituitary gland | 1. Describe the contents of cranial cavity<br>2. Describe morphology of pituitary gland and its clinical importance<br>3. Describe the folds of dura mater<br>4. Classify dural venous sinuses<br>5. Explain anatomy and clinical importance of cavernous sinus | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. MK<br>4. MK<br>5. MK                | Lecture<br>Group discussion    | MCQ, SAQ.            | MCQ, SAQ. Viva Voce     | Surgery (V)                               |

| Sl. No.        | Generic Competency  | Subject Area        | Millers: Knows (K) / Knows how (KH) / Shows how (SH) / Does (D) | Specific Competency   | Specific learning objectives: At the end of the session student should be able to   | Bloom's Domain | Guilbert's level          | Must know (MK) / Desire to know (DK) / Nice to know (NK) | Teaching Learning Method/Media | Formative Assessment | Summative Assessment | Integration Horizontal (H) / Vertical (V) |
|----------------|---|---------------------|---|-----------------------|---|----------------|---------------------------|--|--------------------------------|----------------------|----------------------|---|
| Hom UG-AN-8.16 | Problem formulation/ Integration of Knowledge/ Skills/Information gathering/Practical Information | Head, Neck and Face | K   | Contents of the Orbit | 1. Name the contents of orbit<br>2. Describe the fasciae around eye ball<br>3. Describe the course and distribution of ophthalmic nerve<br>4. Describe blood vessels in the orbit<br>5. Describe the connections and distribution of ciliary ganglion | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. MK<br>4. MK<br>5. DK                | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. Viva Voce  | Surgery (V) Medicine (V)                  |
| Hom UG-AN-8.17 |   |                     | K   | Extra Ocular Muscles  | 1. Name the extra ocular muscles<br>2. Describe their attachments, nerve supply and actions<br>3. Discuss the clinical anatomy  | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. MK                                  | Lecture<br>Group discussion    | MCQ, SAQ.            | MCQ, SAQ. Viva Voce  | Physiology (H)                            |
| Hom UG-AN-8.18 |   |                     | K   | Oral cavity           | 1. Describe the parts and structure of tooth<br>2. Explain blood and nerve supply of tooth<br>3. Describe applied anatomy   | Cognitive      | Level 1 (Remember/recall) | 1. DK<br>2. DK<br>3. DK                                  | Lecture<br>Group discussion    | MCQ, SAQ.            | MCQ, SAQ. Viva Voce  | Physiology (H) Medicine (V)               |

| Sl. No.        | Generic Competency  | Subject Area        | Millers: Knows (K) /Knows how (KH) / Shows how (SH) /Does (D) K/KH/ SH/D | Specific Competency             | Specific learning objectives: At the end of the session student should be able to   | Bloom's Domain | Guilbert s level          | Must know (MK) / Desire to know (DK) / Nice to know (NK) | Teaching Learning Method/Media | Formative Assessment | Summative Assessment    | Integration Horizontal (H) I/ Vertical(V) |
|----------------|---|---------------------|--|---------------------------------|---|----------------|---------------------------|--|--------------------------------|----------------------|-------------------------|---|
| Hom UG-AN-8.19 | Knowledge/ Skills/Information<br><br>Integration of<br>Practical<br>formulation/<br>Information | Head, Neck and Face | K  | Soft palate and palatine tonsil | 1. Describe the structure, muscles, blood and nerve supply of soft palate<br>2. Define Waldeyer's lymphatic ring<br>3. Describe the features, blood and nerve supply of palatine tonsil<br>4. Describe the applied anatomy of palatine tonsil | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. NK<br>3. MK<br>4. MK                         | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. Viva Voce     | Surgery (H)                               |
| Hom UG-AN-8.20 |   |                     | K  | Tongue                          | 1. Describe the parts, features of the tongue<br>2. Describe the blood and nerve supply of tongue<br>3. Describe applied anatomy of tongue  | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. MK<br>4. DK                         | Lecture Group discussion       | MCQ, SAQ.            | MCQ, SAQ. Viva Voce     | Physiology (H)                            |
| Hom UG-AN-8.21 |   |                     | K  | Pharynx                         | 1. Describe the parts of the pharynx and their features<br>2. Describe the constrictors of pharynx<br>3. Describe the blood and nerve supply<br>4. Describe its applied anatomy   | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. MK<br>4. DK                         | Lecture Group discussion       | MCQ, SAQ.            | MCQ, SAQ. LAQ Viva Voce | Physiology (H) Medicine (V)               |

| Sl. No.        | Generic Competency   | Subject Area        | Millers: Knows (K) /Knows how (KH) / Shows how (SH) /Does (D) K/KH/ SH/D | Specific Competency             | Specific learning objectives: At the end of the session student should be able to   | Bloom's Domain | Guilbert s level          | Must know (MK) / Desire to know (DK) / Nice to know (NK) | Teaching Learning Method/Media | Formative Assessment | Summative Assessment    | Integration Horizontal (H) I/ Vertical(V) |
|----------------|--|---------------------|--|---------------------------------|---|----------------|---------------------------|--|--------------------------------|----------------------|-------------------------|---|
| Hom UG-AN-8.22 | Knowledge/ Skills/Information<br>Integration of Skills/Information<br>Problem formulation/ gathering/Practical Information | Head, Neck and Face | K  | Larynx                          | 1. Describe the cartilages of larynx<br>2. Describe the interior of larynx<br>3. Describe its blood and nerve supply<br>4. Explain its applied anatomy  | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. MK<br>4. DK                         | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. LAQ Viva Voce | Physiology (H)                            |
| Hom UG-AN-8.23 |  |                     | K  | Nose and paranasal air cavities | 1. Describe the features, blood and nerve supply of nasal septum and lateral wall of the nose<br>2. Describe the features, blood and nerve supply of paranasal air sinuses<br>3. Describe its applied anatomy | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. MK                                  | Lecture<br>Group discussion    | MCQ, SAQ.            | MCQ, SAQ. Viva Voce     | Physiology (H)<br>Surgery (V)             |
| Hom UG-AN-8.24 |  |                     | K  | Ear: middle ear cavity          | 1. Mention the parts of the ear<br>2. Describe the parts, boundaries and contents of middle ear cavity<br>3. Describe features of ear ossicles<br>4. Describe the applied anatomy of middle ear cavity        | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. DK<br>4. DK                         | Lecture<br>Group discussion    | MCQ, SAQ.            | MCQ, SAQ. LAQ Viva Voce | Surgery (V)<br>Surgery (V)                |

| Sl. No.        | Generic Competency  | Subject Area        | Millers: Knows (K) /Knows how (KH) / Shows how (SH) /Does (D) K/KH/ SH/D | Specific Competency              | Specific learning objectives: At the end of the session student should be able to  | Bloom's Domain | Guilbert s level          | Must know (MK) / Desire to know (DK) / Nice to know (NK) | Teaching Learning Method/Media | Formative Assessment | Summative Assessment | Integration Horizontal (H) I/ Vertical(V) |
|----------------|---|---------------------|--|----------------------------------|--|----------------|---------------------------|--|--------------------------------|----------------------|----------------------|---|
| Hom UG-AN-8.25 | Problem formulation/ Integration of Knowledge/ Information gathering/Practical Skills/Information | Head, Neck and Face | K  | Eustachian tube                  | 1. Describe the parts of the auditory tube<br>2. Describe its relations<br>3. Mention the blood and nerve supply<br>4. Describe its clinical anatomy                         | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. DK<br>4. DK                         | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. Viva Voce  | Surgery (V)                               |
| Hom UG-AN-8.26 |   |                     | K  | Eyeball                          | 1. Describe the structure and location<br>2. Mention the characteristics<br>3. Function of each of the basic tissues   | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. MK                                  | Lecture<br>Group discussion    | MCQ, SAQ.            | MCQ, SAQ. Viva Voce  | Physiology (H)                            |
| Hom UG-AN-8.27 |   |                     | K  | Common & Internal carotid artery | 1. Describe the origin, course relations and branches of CCA<br>2. Describe the origin, parts, course relations and distribution of ICA<br>3. Describe their applied anatomy | Cognitive      | Level 1 (Remember/recall) | 1. DK<br>2. DK<br>3. DK                                  | Lecture<br>Group discussion    | MCQ, SAQ.            | MCQ, SAQ. Viva Voce  | Surgery (V)                               |

| Sl. No.        | Generic Competency  | Subject Area        | Millers: Knows (K) /Knows how (KH) / Shows how (SH) /Does (D) K/KH/ SH/D | Specific Competency                          | Specific learning objectives: At the end of the session student should be able to  | Bloom's Domain | Guilbert s level          | Must know (MK) / Desire to know (DK) / Nice to know (NK) | Teaching Learning Method/Media | Formative Assessment | Summative Assessment    | Integration Horizontal (H) I/ Vertical(V) |
|----------------|---|---------------------|--|--|--|----------------|---------------------------|--|--------------------------------|----------------------|-------------------------|---|
| Hom UG-AN-8.28 | Problem formulation/ Integration of Knowledge/ Information gathering/ Practical Skills/Information management/synthesis | Head, Neck and Face | K  | External carotid artery                      | 1. Describe the origin, parts, course relations and distribution of ECA<br>2. Describe the course, relations and distribution of facial, lingual, maxillary and superficial temporal arteries<br>3. Describe their applied anatomy | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. DK                                  | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. LAQ Viva Voce | Physiology (H)                            |
| Hom UG-AN-8.29 |   |                     | K  | Vertebral artery and middle meningeal artery | 1. Describe the parts, course, relations and branches of vertebral artery<br>2. Describe the parts, course, relations and branches of middle meningeal artery<br>3. Describe its applied anatomy                                   | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. DK                                  | Lecture<br>Group discussion    | MCQ, SAQ.            | MCQ, SAQ. Viva Voce     | Physiology (H)                            |
| Hom UG-AN-8.30 |   |                     | K  | Internal Jugular vein                        | 1. Describe the formation of IVC<br>2. Describe the course and relations of IVC<br>3. Name the tributaries<br>4. Describe the applied anatomy  | Cognitive      | Level 1 (Remember/recall) | 1. DK<br>2. DK<br>3. DK<br>4. DK                         | Lecture<br>Group discussion    | MCQ, SAQ.            | MCQ, SAQ. Viva Voce     | Physiology (H)<br>Medicine (V)            |

| Sl. No.        | Generic Competency   | Subject Area        | Millers: Knows (K) /Knows how (KH) / Shows how (SH) /Does (D) K/KH/ SH/D | Specific Competency   | Specific learning objectives: At the end of the session student should be able to  | Bloom's Domain | Guilbert s level          | Must know (MK) / Desire to know (DK) / Nice to know (NK) | Teaching Learning Method/Media | Formative Assessment | Summative Assessment | Integration Horizontal (H) I/ Vertical(V)      |
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| Hom UG-AN-8.31 | Problem formulation/ Integration of Information Knowledge/ | Head, Neck and Face | K  | Systemic histology: Thyroid gland, Pituitary gland and Tongue | 1. Describe the microscopic structure of thyroid gland, pituitary gland and tongue<br>2. Correlate with their functions<br>3. Explain the applied aspect and correlate with histopathology | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. MK                                  | Lecture                        | MCQ, SAQ.            | MCQ, SAQ. Viva Voce  | Pathology (V)                                  |
| Hom UG-AN-8.32 |  |                     | K  | Systemic embryology: Pharyngeal arches: derivatives           | 1. Describe the formation of pharyngeal arches<br>2. Name the derivatives of pharyngeal arches<br>3. Describe the formation of tongue and thyroid gland                                    | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. MK                                  | Lecture<br>Group discussion    | MCQ, SAQ.            | MCQ, SAQ, Viva Voce  | Physiology (H)                                 |
| Hom UG-AN-8.33 |  |                     | K  | Structures of HNF   | 1. Enumerate the homoeopathic drugs related to the structures of HNF<br>2. Enumerate the rubrics related to the structures of HNF.   | Cognitive      | Level 1 (Remember/recall) | NK   | Integrated Lecture             | Viva voce            | -                    | Homoeopathic Materia Medica (H), Repertory (H) |

## **9.Topic- Brain- CNS System**

**Learning Outcomes (LO):** At the end of CNS, I-BHMS student should be able to;

- 1.** Describe the structure of Brain and CNS with their applied anatomy.
- 2.** Classify nervous system and identify the parts of the brain and their features and internal structure.
- 3.** Describe the origin and course of cranial nerves.
- 4.** Enumerate the homoeopathic drugs and rubrics related to the structures of CNS.

| Sl. No.       | Generic Competency   | Subject Area                  | Millers: Knows (K) /Knows how (KH) / Shows how (SH) /Does (D) K/KH/ SH/D | Specific Competency | Specific learning objectives: At the end of the session student should be able to  | Bloom's Domain | Guilbert s level          | Must know (MK) / Desire to know (DK) / Nice to know (NK) | Teaching Learning Method/Media | Formative Assessment | Summative Assessment     | Integration Horizontal (H) I/ Vertical(V) |
|---------------|--|-------------------------------|--|---------------------|--|----------------|---------------------------|--|--------------------------------|----------------------|--------------------------|---|
| Hom UG-AN-9.1 | Problem formulation/ Integration of Knowledge/ Information | CENTRAL NERVOUS SYSTEM: BRAIN | K  | Introduction        | 1. Describe the parts of the nervous system<br>2. Mention the parts of the brain<br>3. Describe the structure of neuron and neuroglia<br>4. Describe the applied anatomy                     | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. MK<br>4. DK                         | Lecture                        | MCQ, SAQ.            | MCQ, SAQ, LAQ, Viva Voce | Physiology (H)                            |
| Hom UG-AN-9.2 |  |                               | K  | Meninges & CSF      | 1. Describe the layers of meninges<br>2. Define Cisterns<br>3. Describe the ventricles<br>4. Describe the formation, circulation and functions of the CSF<br>5. Describe the applied anatomy | Cognitive      | Level 1 (Remember/recall) | 1. MK<br>2. MK<br>3. MK<br>4. DK<br>5. DK                | Lecture<br>Group discussion    | MCQ, SAQ.            | MCQ, SAQ, Viva Voce      | Physiology (H)<br>Medicine (V)            |

|                          |  |  |   |             |  |           |                              |  |                                 |           |                            |                                    |
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| Hom<br>UG-<br>AN-<br>9.3 |  |  | K | Spinal cord | <ol style="list-style-type: none"> <li>Describe the morphology of spinal cord</li> <li>Describe the structure in T.S</li> <li>Mention the main contents of gray and white matter of SC</li> <li>Mention the blood supply of spinal cord</li> <li>Describe the applied anatomy</li> </ol> | Cognitive | Level 1<br>(Remember/recall) | <ol style="list-style-type: none"> <li>DK</li> <li>DK</li> <li>DK</li> <li>DK</li> <li>DK</li> </ol> | Lecture<br><br>Group discussion | MCQ, SAQ. | MCQ, SAQ.<br><br>Viva Voce | Physiology (H)<br><br>Medicine (V) |
|--------------------------|--|--|---|-------------|--|-----------|------------------------------|--|---------------------------------|-----------|----------------------------|------------------------------------|

| Sl. No.                  | Generic Competency   | Subject Area            | Millers: Knows (K) / Knows how (KH) / Shows how (SH) / Does (D) K/KH/ SH/D | Specific Competency | Specific learning objectives: At the end of the session student should be able to  | Bloom's Domain | Guilbert s level             | Must know (MK) / Desire to know (DK) / Nice to know (NK)                                 | Teaching Learning Method/Media  | Formative Assessment | Summative Assessment       | Integration Horizontal (H) / Vertical(V) |
|--------------------------|--|-------------------------|--|---------------------|--|----------------|------------------------------|--|---------------------------------|----------------------|----------------------------|--|
| Hom<br>UG-<br>AN-<br>9.4 | Problem formulation/ Integration of Knowledge/ Information | CENTRAL NERVOUS SYSTEM: | K  | Medulla oblongata   | <ol style="list-style-type: none"> <li>Describe the external features</li> <li>Describe the internal structures in the transverse sections</li> <li>Describe the blood supply</li> <li>Describe the applied anatomy</li> </ol> | Cognitive      | Level 1<br>(Remember/recall) | <ol style="list-style-type: none"> <li>MK</li> <li>DK</li> <li>DK</li> <li>MK</li> </ol> | Lecture                         | MCQ, SAQ.            | MCQ, SAQ.<br><br>Viva Voce | Physiology (H)<br><br>Medicine (V)       |
| Hom<br>UG-<br>AN-<br>9.5 |  |                         | K  | Pons                | <ol style="list-style-type: none"> <li>Describe the external features</li> <li>Describe the structures in the transverse section</li> <li>Describe the blood supply</li> <li>Describe the applied anatomy</li> </ol>           | Cognitive      | Level 1<br>(Remember/recall) | <ol style="list-style-type: none"> <li>MK</li> <li>MK</li> <li>DK</li> <li>DK</li> </ol> | Lecture<br><br>Group discussion | MCQ, SAQ.            | MCQ, SAQ. Viva Voce        | Physiology (H)<br><br>Medicine (V)       |

|                          |  |  |   |            |   |           |                                      |  |                                    |              |                                     |                                       |
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| Hom<br>UG-<br>AN-<br>9.6 |  |  | K | Cerebellum | <ol style="list-style-type: none"> <li>Describe the location and external features</li> <li>Describe the division and connections of cerebellum</li> <li>Enumerate cerebellar peduncles</li> <li>Name intra cerebellar nuclei</li> <li>Describe the blood supply</li> <li>Describe the applied anatomy</li> </ol> | Cognitive | Level 1<br>(Remem<br>ber/<br>recall) | <ol style="list-style-type: none"> <li>MK</li> <li>MK</li> <li>DK</li> <li>DK</li> <li>DK</li> <li>DK</li> </ol> | Lecture<br><br>Group<br>discussion | MCQ,<br>SAQ. | MCQ,<br>SAQ.<br>LAQ<br>Viva<br>Voce | Physiology<br>(H)<br><br>Medicine (V) |
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| Sl. No.                  | Generic Competency   | Subject Area            | Millers: Knows (K) /Knows how (KH) / Shows how (SH) /Does (D) K/KH/ SH/D | Specific Competency | Specific learning objectives: At the end of the session student should be able to   | Bloom's Domain | Guilbert s level                     | Must know (MK) / Desire to know (DK) / Nice to know (NK)                                 | Teaching Learning Method/Media     | Formative Assessment | Summative Assessment         | Integration Horizontal (H) I/ Vertical(V) |
|--------------------------|--|-------------------------|--|---------------------|---|----------------|--------------------------------------|--|------------------------------------|----------------------|------------------------------|---|
| Hom<br>UG-<br>AN-<br>9.7 | Problem formulation/ Integration of Knowledge/ Information | CENTRAL NERVOUS SYSTEM: | K  | Fourth ventricle    | <ol style="list-style-type: none"> <li>Describe the boundaries of the ventricle</li> <li>Explain the features</li> <li>Mention the structures in the floor of IV Ventricle</li> <li>Describe the applied anatomy</li> </ol> | Cognitive      | Level 1<br>(Remem<br>ber/<br>recall) | <ol style="list-style-type: none"> <li>MK</li> <li>MK</li> <li>MK</li> <li>DK</li> </ol> | Lecture                            | MCQ,<br>SAQ.         | MCQ,<br>SAQ.<br>Viva<br>Voce | Physiology<br>(H)<br><br>Medicine (V)     |
| Hom<br>UG-<br>AN-<br>9.8 |  |                         | K  | Mid-brain           | <ol style="list-style-type: none"> <li>Describe the external features</li> <li>Describe the structures in the transverse section</li> <li>Describe the blood supply</li> <li>Describe the applied anatomy</li> </ol>        | Cognitive      | Level 1<br>(Remem<br>ber/<br>recall) | <ol style="list-style-type: none"> <li>MK</li> <li>MK</li> <li>DK</li> <li>DK</li> </ol> | Lecture<br><br>Group<br>discussion | MCQ,<br>SAQ.         | MCQ,<br>SAQ.Viva<br>Voce     | Physiology<br>(H)<br><br>Medicine (V)     |

|                          |  |  |   |   |   |           |                                      |  |                                    |              |                                  |                                       |
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| Hom<br>UG-<br>AN-<br>9.9 |  |  | K | Diencephalon:<br>Thalamus &<br>Hypothalamus | <ol style="list-style-type: none"> <li>1. Name the parts of diencephalon</li> <li>2. Describe the nuclei of thalamus and its functions</li> <li>3. Describe the nuclei and functions of hypothalamus</li> <li>4. Explain clinical significance</li> </ol> | Cognitive | Level 1<br>(Remem<br>ber/<br>recall) | <ol style="list-style-type: none"> <li>1. DK</li> <li>2. DK</li> <li>3. DK</li> <li>4. DK</li> </ol> | Lecture<br><br>Group<br>discussion | MCQ,<br>SAQ. | MCQ,<br>SAQ.<br><br>Viva<br>Voce | Physiology<br>(H)<br><br>Medicine (V) |
|--------------------------|--|--|---|---|---|-----------|--------------------------------------|--|------------------------------------|--------------|----------------------------------|---------------------------------------|

| Sl. No.                   | Generic Competency  | Subject Area            | Millers: Knows (K) /Knows how (KH) / Shows how (SH) /Does (D) K/KH/ SH/D | Specific Competency | Specific learning objectives: At the end of the session student should be able to   | Bloom's Domain | Guilbert s level                     | Must know (MK) / Desire to know (DK) / Nice to know (NK)   | Teaching Learning Method/Media     | Formative Assessment | Summative Assessment             | Integration Horizontal (H) I/ Vertical(V) |
|---------------------------|---|-------------------------|--|---------------------|---|----------------|--------------------------------------|--|------------------------------------|----------------------|----------------------------------|---|
| Hom<br>UG-<br>AN-<br>9.10 | formulation/<br>of Knowledge/<br><br>Problem<br>Integration | CENTRAL NERVOUS SYSTEM: | K  | Third Ventricle     | <ol style="list-style-type: none"> <li>1. Describe the boundaries of the ventricle</li> <li>2. Explain the features</li> <li>3. Name the structures in the floor of III Ventricle</li> <li>4. Describe the applied anatomy</li> </ol> | Cognitive      | Level 1<br>(Remem<br>ber/<br>recall) | <ol style="list-style-type: none"> <li>1. MK</li> <li>2. MK</li> <li>3. MK</li> <li>4. DK</li> </ol> | Lecture                            | MCQ,<br>SAQ.         | MCQ,<br>SAQ.<br><br>Viva<br>Voce | Physiology<br>(H)<br><br>Medicine (V)     |
| Hom<br>UG-<br>AN-<br>9.11 |   |                         | K  | Lateral Ventricle   | <ol style="list-style-type: none"> <li>1. Describe the boundaries of the ventricle</li> <li>2. Explain the features</li> <li>3. Describe the applied anatomy</li> </ol>   | Cognitive      | Level 1<br>(Remem<br>ber/<br>recall) | <ol style="list-style-type: none"> <li>1. MK</li> <li>2. MK</li> <li>3. MK</li> </ol>                | Lecture<br><br>Group<br>discussion | MCQ,<br>SAQ.         | MCQ,<br>SAQ. Viva<br>Voce        | Physiology<br>(H)                         |

|                           |  |  |   |                                   |  |           |                                      |                         |                                    |              |                                  |                                       |
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| Hom<br>UG-<br>AN-<br>9.12 |  |  | K | Cerebrum:<br>external<br>features | 1. Describe the external features<br>2. Name major sulci and Gyri<br>3. Describe the applied anatomy | Cognitive | Level 1<br>(Remem<br>ber/<br>recall) | 1. DK<br>2. DK<br>3. DK | Lecture<br><br>Group<br>discussion | MCQ,<br>SAQ. | MCQ,<br>SAQ.<br><br>Viva<br>Voce | Physiology<br>(H)<br><br>Medicine (V) |
|---------------------------|--|--|---|-----------------------------------|--|-----------|--------------------------------------|-------------------------|------------------------------------|--------------|----------------------------------|---------------------------------------|

| Sl. No.                   | Generic Competency                           | Subject Area            | Millers: Knows (K) /Knows how (KH) / Shows how (SH) /Does (D) K/KH/ SH/D | Specific Competency                 | Specific learning objectives: At the end of the session student should be able to                           | Bloom's Domain | Guilbert s level                     | Must know (MK) / Desire to know (DK) / Nice to know (NK) | Teaching Learning Method/Media     | Formative Assessment | Summative Assessment         | Integration Horizontal (H) / Vertical(V) |
|---------------------------|--|-------------------------|--|-------------------------------------|---|----------------|--------------------------------------|--|------------------------------------|----------------------|------------------------------|--|
| Hom<br>UG-<br>AN-<br>9.13 | formulation/<br>of Knowledge/<br>Integration | CENTRAL NERVOUS SYSTEM: | K  | Functional areas of cerebral cortex | 1. Mention the functional area and their importance<br>2. Describe the applied anatomy                      | Cognitive      | Level 1<br>(Remem<br>ber/<br>recall) | 1. MK<br>2. DK   | Lecture                            | MCQ,<br>SAQ.         | MCQ,<br>SAQ.<br>Viva<br>Voce | Physiology<br>(H)<br><br>Medicine (V)    |
| Hom<br>UG-<br>AN-<br>9.14 |  |                         | K  | Basal ganglia                       | 1. Name the basal ganglia<br>2. Describe their location and blood supply<br>3. Describe the applied anatomy | Cognitive      | Level 1<br>(Remem<br>ber/<br>recall) | 1. MK<br>2. MK<br>3. DK                                  | Lecture<br><br>Group<br>discussion | MCQ,<br>SAQ.         | MCQ,<br>SAQ. Viva<br>Voce    | Physiology<br>(H)<br><br>Medicine (V)    |

|                           |  |  |   |   |  |           |                              |                |                                 |              |                               |                                    |
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| Hom<br>UG-<br>AN-<br>9.15 |  |  | K | White matter of cerebrum:<br>Corpus callosum & Internal capsule | <ol style="list-style-type: none"> <li>1. Classify white matter of cerebrum</li> <li>2. Describe the parts of corpus callosum</li> <li>3. Describe the parts and composition of internal capsule</li> <li>4. Mention the blood supply of internal capsule</li> </ol> | Cognitive | Level 1<br>(Remember/recall) | 4. DK<br>5. DK | Lecture<br><br>Group discussion | MCQ,<br>SAQ. | MCQ,<br>SAQ.<br><br>Viva Voce | Physiology (H)<br><br>Medicine (V) |
|---------------------------|--|--|---|---|--|-----------|------------------------------|----------------|---------------------------------|--------------|-------------------------------|------------------------------------|

| Sl. No.                   | Generic Competency            | Subject Area            | Millers: Knows (K) / Knows how (KH) / Shows how (SH) / Does (D) K/KH/SH/D | Specific Competency   | Specific learning objectives: At the end of the session student should be able to  | Bloom's Domain | Guilbert's level             | Must know (MK) / Desire to know (DK) / Nice to know (NK) | Teaching Learning Method/Media  | Formative Assessment | Summative Assessment          | Integration Horizontal (H) / Vertical (V) |
|---------------------------|-------------------------------|-------------------------|---|-----------------------|--|----------------|------------------------------|--|---------------------------------|----------------------|-------------------------------|---|
| Hom<br>UG-<br>AN-<br>9.16 | formulation/<br>of Knowledge/ | CENTRAL NERVOUS SYSTEM: | K   | Blood supply of brain | <ol style="list-style-type: none"> <li>1. Mention the blood supply to the brain</li> <li>2. Explain the formation, branches and distribution of circle of Willis</li> <li>3. Describe the applied anatomy</li> </ol> | Cognitive      | Level 1<br>(Remember/recall) | 1. MK<br>2. MK<br>3. DK                                  | Lecture                         | MCQ,<br>SAQ.         | MCQ,<br>SAQ.<br><br>Viva Voce | Physiology (H)<br><br>Medicine (V)        |
| Hom<br>UG-<br>AN-<br>9.17 | Problem<br>Integration        |                         | K   | Cranial nerves        | <ol style="list-style-type: none"> <li>1. Describe the origin, course, branches and distribution of major cranial nerves</li> <li>2. Describe applied anatomy</li> </ol>   | Cognitive      | Level 1<br>(Remember/recall) | 1. MK<br>2. MK<br>3. MK                                  | Lecture<br><br>Group discussion | MCQ,<br>SAQ.         | MCQ,<br>SAQ. Viva Voce        | Physiology (H)<br><br>Medicine (V)        |

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| Hom<br>UG-<br>AN-<br>9.18 |  |  | K | Systemic<br>embryology:<br>Development<br>of Brain | 1. Describe the formation and fate of neural tube<br>2. List the derivatives of neural crest<br>3. Describe the formation of eye ball<br>4. Describe the formation of pituitary gland | Cognitive | Level 1<br>(Remember/recall) | 1. DK<br>2. DK<br>3. Dk<br>4. DK | Lecture<br><br>Group discussion | MCQ, SAQ. | MCQ, SAQ.<br><br>Viva Voce | Physiology (H)<br><br>Medicine (V)             |
| Hom<br>UG-<br>AN-<br>9.19 |  |  | K | Structures of CNS                                  | 1. Enumerate the homoeopathic drugs related to the structures of CNS.<br><br>2. Enumerate the rubrics related to the structures of CNS.   | Cognitive | Level 1<br>(Remember/recall) | NK                               | Integrated Lecture              | Viva voce | -                          | Homoeopathic Materia Medica (H), Repertory (H) |

### PRACTICAL:

#### Topic – Histology

**Learning Outcome-** At the end of Histology, I-BHMS student should be able to;

1. Describe a particular organ and tissue through its histological features.

| Sl. No.  | Generic Competency  | Subject Area | Millers: Knows (K) / Knows How (KH) / Shows How (SH) / Does (D) | Specific Competency  | Specific learning Objectives: At the end of the session student should be able to   | Bloom's Domain           | Guilbert's level               | Must know/ Desire to know/ Nice to know | Teaching Learning Method/ Media | Formative Assessment                | Summative Assessment              | Integration Horizontal/ Vertical |
|--|---|--------------|---|--|---|--------------------------|--------------------------------|---|---------------------------------|-------------------------------------|-----------------------------------|----------------------------------|
| Hom<br>UG-<br>AN-<br>1.1-<br>1.10<br>3.23<br>3.24<br>4.6<br>5.11<br>7.24<br>to<br>7.29 | Problem formulation/ Integration of Knowledge/ Information gathering/ Practical Skills/ Information management/ synthesis | Histology    | K   | Histological & functional Correlation basic tissues and organs of the body | 1. Identify the tissue/organ under microscope<br>2. Draw & label a schematic diagram to indicate the microscopic structure<br>3. Discuss Its characteristic features<br>4. Correlate the microscopic structure with its normal function | Cognitive<br>Psychomotor | Level 1<br>(Remember / Recall) | 1. MK<br>2. MK<br>3. MK<br>4. DK        | DOPS session                    | Spotting/OSPE/Practical Performance | Practical performance / Checklist | Physiology (H) Pathology (V)     |

## Upper Extremities

**Learning Outcomes (LO):** At the end of Upper Extremity, I-BHMS student should be able to;

1. Describe the anatomy of the bones of the upper extremity, their blood supply, and applied anatomy.
2. Describe the anatomy of the joints of the upper extremity, their blood supply, action and applied anatomy.
3. Describe the anatomy of the muscles of the upper extremity, their origin, insertion, nerve supply, action and applied anatomy.

4. Describe the anatomy of the vessels and nerves of the upper extremity, their course, muscles they supply, relation and applied anatomy.
5. Identify a particular bone and joint of upper extremity on X-Ray.
6. Trace the course of the vessels and nerves of the upper extremity on the cadaver.

| Sl. No.               | Generic Competency  | Subject Area    | Millers: Knows (K) / Knows How (KH) / Shows How (SH) | Specific Competency          | Specific learning Objectives: At the end of the session student should be able to  | Bloom's Domain           | Guilbert's level            | Must know/ Desire to know/ Nice to know  | Teaching Learning Method/ Media | Formative Assessment                | Summative Assessment  | Integration Horizontal/ Vertical |
|-----------------------|---|-----------------|--|------------------------------|--|--------------------------|-----------------------------|--|---------------------------------|-------------------------------------|-----------------------|----------------------------------|
| Hom UG-AN-2.1 to 2.7  | Problem formulation/ Integration of Knowledge/ Information gathering/ Practical Skills/ Information management/ synthesis | Upper Extremity | K  | Osteology of upper extremity | <ol style="list-style-type: none"> <li>Describe the laterality and general features of the bone</li> <li>Describe the major attachments</li> <li>Describe ossification</li> <li>Describe the applied anatomy</li> <li>Draw the surface marking of the major structures in the regions using surface landmarks</li> </ol> | Cognitive                | Level 1 (Remember / Recall) | <ol style="list-style-type: none"> <li>MK</li> <li>MK</li> <li>NK</li> <li>DK</li> </ol> | Demonstration                   | Spotting/OSPE/Practical Performance | Practical/ Check list | Surgery (V)                      |
| Hom UG-AN-2.8 to 2.14 |   |                 | K  | Dissection/ Demonstration    | <ol style="list-style-type: none"> <li>Describe the important surface land marks in the region</li> <li>Identify major muscles, blood vessels and nerves including fascial structures of clinical importance</li> <li>Identify articular surfaces of major joints</li> </ol>   | Cognitive<br>Psychomotor | Level 1 (Remember / Recall) | <ol style="list-style-type: none"> <li>MK</li> <li>MK</li> <li>NK</li> <li>DK</li> </ol> |                                 |                                     |                       |                                  |

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|                           |  |  |   |   | 4. Correlate features and normal functioning of joints  |           |                                |       |  |  |  |  |
| Hom<br>UG-<br>AN-<br>2.15 |  |  | K | Radiological anatomy of upper extremity | 1. Describe the normal appearance and relationship of bones and joints in a normal radiograph (X-ray) of the region | Cognitive | Level 1<br>(Remember / Recall) | 1. MK |  |  |  |  |

### Topic: Head Neck Face

**Learning Outcomes (LO):** At the end of Head Neck & Face, I-BHMS student should be able to;

1. Describe the anatomy of the bones of the Head Neck & Face, their blood supply and applied anatomy.
2. Describe the anatomy of the joints of the Head Neck & Face, their blood supply, action and applied anatomy.
3. Describe the anatomy of the muscles of the Head Neck & Face, their origin, insertion, nerve supply, action and applied anatomy.
4. Describe the anatomy of the vessels and nerves of the Head Neck & Face, their course, muscles they supply, relation and applied anatomy.
5. Identify individual bones of Head Neck & Face on X-Ray.
6. Demonstrate the projection of structures of Head, Neck & Face on the cadaver.

| Sl. No.               | Generic Competency  | Subject Area    | Millers: Knows (K) / Knows How (KH) / Shows How (SH) / Does (D) | Specific Competency                       | Specific learning Objectives: At the end of the session student should be able to  | Bloom's Domain           | Guilbert's level            | Must know/ Desire to know/ Nice to know | Teaching Learning Method/ Media | Formative Assessment                | Summative Assessment  | Integration Horizontal/ Vertical |
|-----------------------|---|-----------------|---|---|--|--------------------------|-----------------------------|---|---------------------------------|-------------------------------------|-----------------------|----------------------------------|
| Hom UG-AN-3.1 to 3.6  | Problem formulation/ Integration of Knowledge/ Information gathering/ Practical Skills/ Information management/ synthesis | Upper Extremity | K   | Osteology of Head, Neck & Face            | 1. Describe the general features of the skull, hyoid bone, cervical vertebrae & mandible<br>2. Describe the major attachments on mandible<br>3. Mention clinically significant ossification features<br>4. Draw the surface marking of the major structures in the regions using surface landmarks | Cognitive                | Level 1 (Remember / Recall) | 1. MK<br>2. MK<br>3. NK<br>4. DK        | Demonstration                   | Spotting/OSPE/Practical Performance | Practical/ Check list | Surgery (V)                      |
| Hom UG-AN-3.7 to 3.21 |   |                 | K   | Dissection/ Demonstration                 | 1. Describe the important surface land marks in the region<br>2. Identify major viscera, muscles, blood vessels and nerves including fascial structures of clinical importance<br>3. Identify articular surfaces of major joints<br>4. Correlate features and normal functioning of joints         | Cognitive<br>Psychomotor | Level 1 (Remember / Recall) | 1. MK<br>2. MK<br>3. NK<br>4. DK        |                                 |                                     |                       |                                  |
| Hom UG-AN-3.22        |   |                 | K   | Radiological anatomy of Head, Neck & Face | 1. Describe the normal appearance and relationship of bones and joints in a normal   | Cognitive                | Level 1 (Remember / Recall) | 1. MK                                   |                                 |                                     |                       |                                  |

|  |  |  |  |  |                                  |  |  |  |  |  |  |  |
|--|--|--|--|--|----------------------------------|--|--|--|--|--|--|--|
|  |  |  |  |  | radiograph (X-ray) of the region |  |  |  |  |  |  |  |
|--|--|--|--|--|----------------------------------|--|--|--|--|--|--|--|

## Topic- Brain- CNS System

**Learning Outcomes (LO):** At the end of CNS, I-BHMS student should be able to;

1. Describe the anatomy of the Brain and its applied anatomy.
2. Classify CNS and describe the parts of brain.

| Sl. No.     | Generic Competency   | Subject Area           | Millers: Knows (K) / Knows How (KH) / Shows How (SH) / Does (D) | Specific Competency                               | Specific learning Objectives: At the end of the session student should be able to  | Bloom's Domain        | Guilbert's level            | Must know / Desire to know / Nice to know   | Teaching Learning Method/ Media | Formative Assessment                | Summative Assessment              | Integration Horizontal/ Vertical |
|-------------|--|------------------------|---|---|--|-----------------------|-----------------------------|---|---------------------------------|-------------------------------------|-----------------------------------|----------------------------------|
| 4. 1 to 4.5 | Problem formulation/ Integration of Knowledge/ Information gathering/Practical Skills/ Information management/ synthesis | Central Nervous System | K   | Describe normal features of brain and spinal cord | <ol style="list-style-type: none"> <li>1. Identify parts of brain on a specimen/model</li> <li>2. Describe normal location and relationship of brain and spinal cord</li> <li>3. Describe its applied anatomy</li> </ol> | Cognitive Psychomotor | Level 1 (Remember / Recall) | <ol style="list-style-type: none"> <li>1. MK</li> <li>2. MK</li> <li>3. DK</li> </ol> | DOAP session                    | Spotting/OSPE/Practical Performance | Practical performance / Checklist | Physiology (H) Pathology (V)     |

## Topic: Thorax

**Learning Outcomes (LO):** At the end of Thorax, I-BHMS student should be able to;

1. Describe the anatomy of the Respiratory and Cardiovascular system with their applied anatomy.
2. Identify the organs of the Respiratory and Cardiovascular system.
3. Explain features of X-ray thorax.
4. Demonstrate surface projection of thoracic organs.

| Sl. No. | Generic Competency | Subject Area | Millers: Knows (K) / Knows How (KH) / Shows How (SH) / Does (D) | Specific Competency | Specific learning Objectives:<br>At the end of the session student should be able to | Bloom's Domain | Guilbert's level | Must know/ Desire to know/ Nice to know | Teaching Learning Method/ Media | Formative Assessment | Summative Assessment | Integration Horizontal/ Vertical |
|---------|--------------------|--------------|---|---------------------|--|----------------|------------------|---|---------------------------------|----------------------|----------------------|----------------------------------|
|---------|--------------------|--------------|---|---------------------|--|----------------|------------------|---|---------------------------------|----------------------|----------------------|----------------------------------|

|                                       |  |                 |   |                                |  |                              |                                |                                  |               |                                     |                       |             |
|---------------------------------------|--|-----------------|---|--------------------------------|--|------------------------------|--------------------------------|----------------------------------|---------------|-------------------------------------|-----------------------|-------------|
| Hom<br>UG-<br>AN-<br>5.1<br>to<br>5.3 | Problem formulation/ Integration of Knowledge/ Information gathering/Practical Skills/ Information management/ synthesis | Upper Extremity | K | Osteology of Thorax            | 1. Describe the general features of the sternum, ribs and thoracic vertebrae<br>2. Describe the major attachments on mandible<br>3. Mention clinically significant ossification features<br>4. Draw the surface marking of the major structures in the regions using surface landmarks | Cognitive<br><br>Psychomotor | Level 1<br>(Remember / Recall) | 1. MK<br>2. MK<br>3. NK<br>4. DK | Demonstration | Spotting/OSPE/Practical Performance | Practical/ Check list | Surgery (V) |
| Hom<br>UG-<br>AN-<br>5.4<br>to<br>5.9 |  |                 | K | Dissection/ Demonstration      | 1. Describe the important surface land marks in the region<br>2. Describe the morphology of lung and its relations.<br>3. Describe the external features of heart and interior of its chambers<br>4. Identify major contents of superior and posterior mediastina                      | Cognitive<br><br>Psychomotor | Level 1<br>(Remember / Recall) | 1. MK<br>2. MK<br>3. NK<br>4. DK |               |                                     |                       |             |
| Hom<br>UG-<br>AN-<br>5.10             |  |                 | K | Radiological anatomy of Thorax | 1. Interpret normal chest radiograph in conventional P-A view  | Cognitive                    | Level 1<br>(Remember / Recall) | 1. MK                            |               |                                     |                       |             |

### Topic: Lower Extremities

**Learning Outcomes (LO):** At the end of Lower Extremity, I-BHMS student should be able to;

1. Describe the anatomy of the bones of the Lower extremity, their blood supply and applied anatomy.
2. Describe the anatomy of the joints of the Lower extremity, their blood supply, action and applied anatomy.
3. Describe the anatomy of the muscles of the Lower extremity, their origin, insertion, nerve supply, action and applied anatomy.

4. Describe the anatomy of the vessels and nerves of the Lower extremity, their course, muscles they supply, relations and applied anatomy.
5. Identify a particular bone and joint of Lower extremity on X-Ray.
6. Trace the course of the vessels and nerves of the Lower extremity on the cadaver.

| Sl. No.               | Generic Competency   | Subject Area    | Millers: Knows (K) / Knows How (KH) / Shows How (SH) / Does (D) | Specific Competency          | Specific learning Objectives:<br>At the end of the session student should be able to   | Bloom's Domain               | Guilbert's level               | Must know/<br>Desire to know/<br>Nice to know  | Teaching Learning Method/ Media | Formative Assessment                | Summative Assessment  | Integration Horizontal/ Vertical |
|-----------------------|--|-----------------|---|------------------------------|--|------------------------------|--------------------------------|--|---------------------------------|-------------------------------------|-----------------------|----------------------------------|
| Hom UG-AN-6.1 to 6.7  | Problem formulation/ Integration of Knowledge/ Information gathering/Practical Skills/ Information management/ synthesis | Upper Extremity | K   | Osteology of lower extremity | <ol style="list-style-type: none"> <li>Describe the laterality and general features of the bones of the region</li> <li>Describe the major attachments</li> <li>Mention clinically important ossification features</li> <li>Draw the surface marking of the major structures in the regions using surface landmarks</li> </ol> | Cognitive<br><br>Psychomotor | Level 1<br>(Remember / Recall) | <ol style="list-style-type: none"> <li>MK</li> <li>MK</li> <li>NK</li> <li>DK</li> </ol> | Demonstration                   | Spotting/OSPE/Practical Performance | Practical/ Check list | Surgery (V)                      |
| Hom UG-AN-6.8 to 6.15 |  |                 | K   | Dissection/ Demonstration    | <ol style="list-style-type: none"> <li>Describe the important surface land marks in the region</li> <li>Identify major muscles, blood vessels and nerves including fascial structures of clinical importance</li> <li>Identify articular surfaces of major joints</li> </ol>   | Cognitive<br><br>Psychomotor | Level 1<br>(Remember / Recall) | <ol style="list-style-type: none"> <li>MK</li> <li>MK</li> <li>NK</li> <li>DK</li> </ol> |                                 |                                     |                       |                                  |

|                           |  |  |   |   |   |           |                             |       |  |  |  |  |
|---------------------------|--|--|---|---|---|-----------|-----------------------------|-------|--|--|--|--|
|                           |  |  |   |   | 4. Correlate features and normal functioning of joints  |           |                             |       |  |  |  |  |
| Hom<br>UG-<br>AN-<br>6.16 |  |  | K | Radiological anatomy of Lower extremity | 2. Describe the normal appearance and relationship of bones and joints in a normal radiograph (X-ray) of the region | Cognitive | Level 1 (Remember / Recall) | 1. MK |  |  |  |  |

### Topic: Abdomen

**Learning Outcomes (LO):** At the end of Abdomen, I-BHMS student should be able to;

1. Describe the anatomy of the Abdominal and pelvic organs with their applied anatomy.
2. Identify the abdominal and pelvic organs in dissection.
3. Explain features of plain X-ray abdomen and pelvis.
4. Demonstrate surface projection of Abdominal and pelvic organs.

| Sl. No. | Generic Competency | Subject Area | Millers: Knows (K) / Knows How (KH) / Shows How (SH) / Does (D) | Specific Competency | Specific learning Objectives: At the end of the session student should be able to | Bloom's Domain | Guilbert's level | Must know / Desire to know / Nice to know | Teaching Learning Method/ Media | Formative Assessment | Summative Assessment | Integration Horizontal/ Vertical |
|---------|--------------------|--------------|---|---------------------|---|----------------|------------------|---|---------------------------------|----------------------|----------------------|----------------------------------|
|---------|--------------------|--------------|---|---------------------|---|----------------|------------------|---|---------------------------------|----------------------|----------------------|----------------------------------|

|  |  |                 |   |  |  |                              |                                |  |               |                                     |                       |             |
|--|--|-----------------|---|--|--|------------------------------|--------------------------------|--|---------------|-------------------------------------|-----------------------|-------------|
| Hom<br>UG-<br>AN-<br>7.1<br>to<br>7.6  | Problem formulation/ Integration of Knowledge/ Information gathering/Practical Skills/ Information management/ synthesis | Upper Extremity | K | Osteology of Abdomen & Pelvis            | <ol style="list-style-type: none"> <li>Describe the general features of the lumbar vertebra, Sacrum &amp; Pelvis</li> <li>Describe the major attachments on sacrum</li> <li>Mention clinically significant ossification features</li> <li>Draw the surface marking of the major structures in the regions using surface landmarks</li> </ol> | Cognitive<br><br>Psychomotor | Level 1<br>(Remember / Recall) | <ol style="list-style-type: none"> <li>MK</li> <li>MK</li> <li>NK</li> <li>DK</li> </ol> | Demonstration | Spotting/OSPE/Practical Performance | Practical/ Check list | Surgery (V) |
| Hom<br>UG-<br>AN-<br>7.7<br>to<br>7.22 |  |                 | K | Dissection/ Demonstration                | <ol style="list-style-type: none"> <li>Describe the important surface land marks in the region</li> <li>Identify the abdominal viscera and describe major surface &amp; internal features</li> <li>Identify pelvic viscera and describe their features and relations</li> </ol>  | Cognitive<br><br>Psychomotor | Level 1<br>(Remember / Recall) | <ol style="list-style-type: none"> <li>MK</li> <li>MK</li> <li>NK</li> <li>DK</li> </ol> |               |                                     |                       |             |
| Hom<br>UG-<br>AN-<br>7.23              |  |                 | K | Radiological anatomy of Abdomen & Pelvis | <ol style="list-style-type: none"> <li>Interpret a normal radiograph (X-ray) of the abdomen and pelvis in different commonly used views</li> </ol>   | Cognitive                    | Level 1<br>(Remember / Recall) | 1. MK  |               |                                     |                       |             |

### 8. Practical Topics (Non-Lecture Activities)

| Sl. No    | Non-Lecture Teaching Learning methods | Time Allotted per Activity (in Hours) |
|-----------|---------------------------------------|---------------------------------------|
| 9.        | Seminars/ Workshops                   | 10                                    |
| 10.       | Group Discussions                     | 10                                    |
| 11.       | Problem based learning                | 10                                    |
| 12.       | Integrated Teaching                   | 15                                    |
| 13.       | Case Based Learning                   | 10                                    |
| 14.       | Self-Directed Learning                | 15                                    |
| 15.       | Tutorials, Assignments & projects     | 10                                    |
| Sub total |                                       | 80                                    |
| 16.       | Practical                             | 250                                   |
| Total     |                                       | 330                                   |

## 9. ASSESSMENT

### Assessment Summary - Number of papers and Mark Distribution

| Sl. No. | Course Code | Papers | Theory | Practical | Viva Voce | Internal Assessment- Practical | Electives Grade Obtained |  | Grand Total |
|---------|-------------|--------|--------|-----------|-----------|--------------------------------|--------------------------|--|-------------|
| 1.      | Hom UG-AN   | 2      | 200    | 100       | 80        | 20                             |                          |  | 400         |

### Scheme of Assessment (formative and Summative)

| Sl. No | Professional Course     | 1 <sup>st</sup> term (1-6 Months)  | 2 <sup>nd</sup> Term (7-12 Months)  | 3 <sup>rd</sup> Term (13-18 Months)         |                        |
|--------|-------------------------|--|---|---|------------------------|
| 1.     | First Professional BHMS | 1 <sup>st</sup> PA + 1 <sup>ST</sup> TT  | 2 <sup>nd</sup> PA+2 <sup>ND</sup> TT   | 3 <sup>rd</sup> PA                          | UE                     |
|        |                         | 1 <sup>st</sup> PA – 4 <sup>th</sup> month<br>1 <sup>st</sup> TT – 6 <sup>th</sup> month | 2 <sup>nd</sup> PA – 9 <sup>th</sup> month<br>2 <sup>nd</sup> TT – 12 <sup>th</sup> month | 3 <sup>rd</sup> PA - 14 <sup>th</sup> month | 17 <sup>th</sup> month |

PA: Periodical Assessment; TT: Term Test; UE: University Examinations

### Evaluation Methods for Assessment

| Sl. No | Evaluation Criteria   |
|--------|---|
| 1.     | Theory, Practical, Viva voce Performance  |
| 2.     | Theory: MCQs, SAQs and LAQs (MEQ - Modified Essay Questions/Structured Questions) |

#### I. Theory Question Paper Layout

|   |     |          |
|---|-----|----------|
| <b>Paper-1 (100 marks)</b><br>General Anatomy, Head, face and neck, Central nervous System, Upper extremities and Embryology. |     |          |
| 1.  | MCQ | 10 marks |
| 2.  | SAQ | 40 marks |

|   |            |                 |
|---|------------|-----------------|
| <b>3.</b>   | <b>LAQ</b> | <b>50 marks</b> |
| <b>Paper-2 (100 marks)</b><br>Thorax, Abdomen, Pelvis, Lower extremities and Histology (micro anatomy). |            |                 |
| <b>1.</b>   | <b>MCQ</b> | <b>10 marks</b> |
| <b>2.</b>   | <b>SAQ</b> | <b>40 marks</b> |
| <b>3.</b>   | <b>LAQ</b> | <b>50 marks</b> |

# I. Distribution of marks (Theory)

| Paper-I |                        |      |                        |  |                  |                   |
|---------|------------------------|------|------------------------|--|------------------|-------------------|
| Sl. No  | A                      | B    | C                      | D  |                  |                   |
|         | List of Topics         | Term | Marks                  | Type of Questions and marks allotted<br>"Yes" can be asked.<br>"No" should not be asked. |                  |                   |
|         |                        |      |                        | MCQ<br>(1 Mark)  | SAQ<br>(5 Marks) | LAQ<br>(10 Marks) |
| 1.      | General Anatomy        | I    | Refer<br>Next<br>Table | Yes  | Yes              | No                |
| 2.      | Head, Neck & Face      | II   |                        | Yes  | Yes              | Yes               |
| 3.      | Central Nervous System | II   |                        | Yes  | Yes              | Yes               |
| 4.      | Upper Extremities      | I    |                        | Yes  | Yes              | Yes               |
| 5.      | Embryology             | I    |                        | Yes  | Yes              | No                |

| Paper-II |                            |      |                        |  |                  |                   |
|----------|----------------------------|------|------------------------|--|------------------|-------------------|
| Sl. No   | A                          | B    | C                      | D  |                  |                   |
|          | List of Topics             | Term | Marks                  | Type of Questions and marks allotted<br>"Yes" can be asked.<br>"No" should not be asked. |                  |                   |
|          |                            |      |                        | MCQ<br>(1 Mark)  | SAQ<br>(5 Marks) | LAQ<br>(10 Marks) |
| 1.       | Thorax                     | II   | Refer<br>Next<br>Table | Yes  | Yes              | Yes               |
| 2.       | Abdomen, Pelvis & Perineum | III  |                        | Yes  | Yes              | Yes               |
| 3.       | Lower Extremities          | III  |                        | Yes  | Yes              | Yes               |
| 4.       | Histology                  | I    |                        | Yes  | Yes              | No                |

## Theme table

### Paper-I

| Theme* | Topics                 | Term | Marks | MCQ's | SAQ's | LAQ's |
|--------|------------------------|------|-------|-------|-------|-------|
| A      | General Anatomy        | I    | 12    | Yes   | Yes   | No    |
| B      | Upper Extremities      | I    | 27    | Yes   | Yes   | Yes   |
| C      | Embryology             | I    | 12    | Yes   | Yes   | No    |
| D      | Head, Neck and Face    | II   | 32    | Yes   | Yes   | Yes   |
| E      | Central nervous System | II   | 17    | Yes   | Yes   | Yes   |

### Paper-II

| Theme* | Topics                     | Term | Marks | MCQ's | SAQ's | LAQ's |
|--------|----------------------------|------|-------|-------|-------|-------|
| A      | Lower Extremities          | III  | 27    | Yes   | Yes   | Yes   |
| B      | Thorax                     | II   | 28    | Yes   | Yes   | Yes   |
| C      | Abdomen, Pelvis & Perineum | III  | 37    | Yes   | Yes   | Yes   |
| D      | Histology                  | I    | 8     | Yes   | Yes   | No    |

## Question paper Blue Print

### Paper-I

| A<br>Question Serial Number | B<br>Type of Question                                  | Question Paper Format<br>(Refer table 4 F II Theme table for themes)   |
|-----------------------------|--|--|
| Q1                          | Multiple choice Questions<br>(MCQ)<br><br>10 Questions | <ol style="list-style-type: none"> <li>1. Theme A</li> <li>2. Theme A</li> <li>3. Theme B</li> <li>4. Theme B</li> <li>5. Theme C</li> <li>6. Theme C</li> </ol> |

|    |   |   |
|----|---|---|
|    | <p>1 mark each</p> <p>All compulsory</p> <p>Must know part: 7 MCQ</p> <p>Desirable to know: 2 MCQ.</p> <p>Nice to know: 1 MCQ</p>   | <p>7. Theme D</p> <p>8. Theme D</p> <p>9. Theme E</p> <p>10. Theme E</p>  |
| Q2 | <p>Short answer Questions<br/>(SAQ)</p> <p>eight Questions</p> <p>5 Marks Each</p> <p>All compulsory</p> <p>Must know part: 6 SAQ</p> <p>Desirable to know: 2 SAQ</p>                                   | <p>1. Theme A</p> <p>2. Theme A</p> <p>3. Theme B</p> <p>4. Theme C</p> <p>5. Theme C</p> <p>6. Theme D</p> <p>7. Theme D</p> <p>8. Theme E</p> |
| Q3 | <p>Long answer Questions<br/>(LAQ)</p> <p>Five Questions</p> <p>10 marks each</p> <p>All compulsory</p> <p>All questions on must know</p> <p>No Questions on Nice to know<br/>and Desirable to know</p> | <p>1. Theme B</p> <p>2. Theme B</p> <p>3. Theme D</p> <p>4. Theme D</p> <p>5. Theme E</p>   |

**Paper-II**

| <b>A</b><br><br><b>Question Number</b> | <b>B</b><br><br><b>Type of Question</b>  | <b>Question Paper Format</b><br><br><b>(Refer table II Theme table for themes)</b>  |
|--|--|---|
| Q1                                     | Multiple choice Questions<br>(MCQ)<br><br>10 Questions<br><br>1 mark each<br><br>All compulsory<br><br>Must know part: 7 MCQ<br><br>Desirable to know: 2 MCQ.<br><br>Nice to know: 1 MCQ       | <ol style="list-style-type: none"> <li>1. Theme A</li> <li>2. Theme A</li> <li>3. Theme B</li> <li>4. Theme B</li> <li>5. Theme B</li> <li>6. Theme C</li> <li>7. Theme C</li> <li>8. Theme D</li> <li>9. Theme D</li> <li>10. Theme D</li> </ol> |
| Q2                                     | Short answer Questions<br>(SAQ)<br><br>eight Questions<br><br>5 Marks Each<br><br>All compulsory<br><br>Must know part: 7 SAQ<br><br>Desirable to know: 2 SAQ<br><br>Nice to know: 1 SAQ       | <ol style="list-style-type: none"> <li>1. Theme A</li> <li>2. Theme A</li> <li>3. Theme A</li> <li>4. Theme B</li> <li>5. Theme C</li> <li>6. Theme C</li> <li>7. Theme C</li> <li>8. Theme D</li> </ol>  |
| Q3                                     | Long answer Questions<br>(LAQ)<br><br>five Questions<br><br>10 marks each<br><br>All compulsory<br><br>All questions on must know<br><br>No Questions on Nice to know<br>and Desirable to know | <ol style="list-style-type: none"> <li>1. Theme A</li> <li>2. Theme B</li> <li>3. Theme B</li> <li>4. Theme C</li> <li>5. Theme C</li> </ol>  |

**II. Scheme of Practical and Viva voce Examination and distribution of marks**  
**(Practical 100 marks – Viva voce 80 marks + Internal assessment 20 marks: Total 200 marks)**

| <b>Scheme of Practical Examination</b>   |                 |
|--|-----------------|
| <p><b>1. Spotters: 4</b> (5 marks each)</p> <p>A. Histology Slide – 2 (5 marks each)</p> <p>a) Identification – 1 mark</p> <p>b) Draw and label – 2 marks</p> <p>c) Two identification features – 2 marks</p> <p>B. Radiology – 2 X-RAYS (5 marks each)</p> <p>a) Identification of X-Ray and its view – 1 mark</p> <p>b) Identification of features – 4 marks</p> | <b>20 marks</b> |
| 2. Osteology - Bones of Upper Extremity, Lower Extremity, Skull, Ribs and Vertebrae.   | <b>20 marks</b> |
| 3.Viscera - Organs from Thorax, Abdomen and CNS.   | <b>20 marks</b> |
| 4. Knowledge of dissected parts - Dissected Specimens of Upper and Lower Extremities.  | <b>20 marks</b> |
| <b>2. Surface marking</b>  | <b>10 marks</b> |
| <b>3. Journal</b> – Practical record of Anatomy including Histology and dissection card.   | <b>10 marks</b> |

|              |                  |
|--------------|------------------|
| <b>Total</b> | <b>100 Marks</b> |
|--------------|------------------|

|   |                  |
|---|------------------|
| <b>Viva voce Max. Marks - 80 + Internal assessment marks – 20</b> |                  |
| <b>Total marks</b>  | <b>100 marks</b> |

### 9B - Scheme of Assessment (formative and Summative)

| Sr. No | Professional Course     | 1 <sup>st</sup> term (1-6 Months) |                    |                          | 2 <sup>nd</sup> Term (7-12 Months) |                    |                          | 3 <sup>rd</sup> Term (13-18 Months) |    |
|--------|-------------------------|-----------------------------------|--------------------|--------------------------|------------------------------------|--------------------|--------------------------|-------------------------------------|----|
| 1      | First Professional BHMS | 1 <sup>st</sup> PA                | 1 <sup>ST</sup> TT |                          | 2 <sup>nd</sup> PA                 | 2 <sup>ND</sup> TT |                          | 3 <sup>rd</sup> PA                  | UE |
|        |                         | 20 Marks Practical/Viva           | 100 Marks Theory   | 100 Marks Practical/Viva | 20 Marks Practical/Viva            | 100 Marks Theory   | 100 Marks Practical/Viva | 20 Marks Practical/Viva             |    |

For Internal assessment, Only Practical/Viva marks will be considered. Theory marks will not be counted)

### Method of Calculation of Internal Assessment Marks for Final University Examination:

|                                     |                                     |                                     |  |                                      |                                      |   |                                       |
|-------------------------------------|-------------------------------------|-------------------------------------|--|--------------------------------------|--------------------------------------|---|---------------------------------------|
| PA1<br>Practical/Viva<br>(20 Marks) | PA2<br>Practical/Viva<br>(20 Marks) | PA3<br>Practical/Viva<br>(20 Marks) | Periodical<br>Assessment<br>Average<br>$\frac{PA1+PA2+PA3}{3}$ | TT1<br>Practical/Viva<br>(100 Marks) | TT2<br>Practical/Viva<br>(100 Marks) | Terminal Test<br>Average<br>$\frac{TT1+TT2}{200 \times 20}$ | Final<br>Internal<br>Assessment Marks |
| <b>A</b>                            | <b>B</b>                            | <b>C</b>                            | <b>D</b>   | <b>E</b>                             | <b>F</b>                             | <b>G</b>  | <b>D+G/2</b>                          |

PA- Periodical Assessment, TT- Terminal Test, UE- University Examination

### 10. List of recommended books –

#### Standard Books

- Garg K, B.D. Chaurasia's Human Anatomy Regional & Applied, Dissection & Clinical. Upper limb & Thorax. CBS Publishers & Distributors Pvt Ltd, New Delhi.
- Garg K, B.D. Chaurasia's Human Anatomy Regional & Applied, Dissection & Clinical. Lower limb & Abdomen. CBS Publishers & Distributors Pvt Ltd, New Delhi
- Garg K, B.D. Chaurasia's Human Anatomy Regional & Applied, Dissection & Clinical. Head, Neck & Brain. CBS Publishers & Distributors Pvt Ltd, New Delhi
- Singh V. General Anatomy. Elsevier; New Delhi

- Singh V. *Anatomy of Head, Neck & Brain*. Elsevier; New Delhi.
- Singh V. *Anatomy of Upper limb & Thorax*. Elsevier; New Delhi
- Singh V. *Anatomy of Abdomen & Lower limb*. Elsevier; New Delhi
- Singh V. *Anatomy of Clinical embryology*. Elsevier; New Delhi
- Garg K, Indira Bahl, Mohini Kaul. *Textbook of Histology*. Ed. 5. CBS Publishers & Distributors Pvt Ltd, New Delhi
- Halim A. *Surface and Radiological Anatomy*. CBS Publishers & Distributors Pvt Ltd, New Delhi
- Khurana A, Khurana I, Garg K B.D. *Chaurasia's Dream Human Embryology*, CBS Publishers & Distributors Pvt Ltd, New Delhi
- Loukas M, Benninger B, Tubbs R S. *Gray's Clinical Photographic Dissector of Human Body*. Elsevier; Philadelphia
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Subject- Homoeopathic Materia Medica

Subject code: HomUG-HMM-I

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**Principal**  
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# **COMPETENCY BASED DYNAMIC CURRICULUM FOR FIRST BHMS PROFESSIONAL COURSE**

**(Applicable from Batch 2022-2023 onwards for 5 years or until further notification by  
National Commission for Homoeopathy whichever is earlier)**

**(Homoeopathic Materia Medica)**



**HOMOEOPATHY EDUCATION BOARD**

**NATIONAL COMMISSION FOR HOMOEOPATHY**

**MINISTRY OF AYUSH, GOVERNMENT OF INDIA**

**JAWAHAR LAL NEHRU BHARTIYA CHIKITSA AVUM HOMOEOPATHY ANUSANDHAN BHAVAN**

**No.61-65, Institutional Area, opp. 'D' block, Janak Puri, New Delhi-110 058**

**Subject- Homoeopathic Materia Medica**

**Subject code:** HomUG-HMM-I

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## **1. PREAMBLE**

Homoeopathic Materia Medica is the study of the action of drugs on healthy human being as a whole taking into consideration individual susceptibility and its reaction to various circumstances and time. A good prescription by a homoeopath mainly depends upon the case receiving, processing and a sound knowledge of Homoeopathic Materia Medica.

Each drug in Materia Medica not only has its own personality with its mental and physical constitution but also has its own affinity to an area, direction, spread, tissue, organ, system. Study of a drug in context of altered sensation, function and structure covers the pathology caused by it, which is also expressed in the pathogenesis of the drugs. Materia Medica also has symptoms from toxicological and clinical proving. All this knowledge is of utmost importance in order to apply the remedies in various clinical conditions. This can be achieved only by integrating the study of Materia Medica with other parallel subjects taught during the course.

Apart from the source books of Materia Medica there are different types of Materia Medica constructed on different philosophical backgrounds by different authors. Materia Medica also forms the platform of various repertories. Therefore, it becomes very important for a student of homoeopathy to learn the plan and construction of all the basic Materia Medica in order to understand their practical utility in practice.

It is also important to keep in mind that the end point of the teaching of HMM is not to burden the student with information of more number of remedies but to equip with an approach which will help to develop the vision towards self-guided study and apply the knowledge in practice.

This self-directed learning can ultimately lead to a critical approach of studying Materia Medica hence empowering evidence based practice and initiate the process of lifelong learning. Exploring Materia Medica is an endless journey as newer illnesses will keep on emerging and newer drugs or undiscovered facets of existing drugs will be needed to explore for managing these situations.

## **2. PROGRAM OUTCOMES:**

At the end of BHMS program, a student must

1. Develop the competencies essential for primary health care in clinical diagnosis and treatment of diseases through the judicious application of homoeopathic principles
2. Recognize the scope and limitation of homoeopathy and to apply the Homoeopathic Principles for curative, prophylactic, promotive, palliative, and rehabilitative primary health care for the benefit of the individual and community.
3. Discern the relevance of other systems of medical practice for rational use of cross referral and life saving measures, so as to address clinical emergencies
4. Develop capacity for critical thinking and research aptitude as required for evidence based homoeopathic practice.
5. Demonstrate aptitude for lifelong learning and develop competencies as and when conditions of practice demand.
6. Be competent enough to practice homoeopathy as per the medical ethics and professionalism.
7. Develop the necessary communication skills to work as a team member in various healthcare setting and contribute towards the larger goals of national policies such as school health, community health, environmental conservation.
8. Identify and respect the socio-demographic, psychological, cultural, environmental & economic factors that affect health and disease and plan homoeopathic intervention to achieve the sustainable development Goal.

### **3. COURSE OUTCOMES**

At the end of BHMS I course, the students should be able to-

1. Define the homoeopathic Materia Medica.
2. Understand the philosophy of homoeopathic Materia Medica.
3. Describe evolution, sources and construction of different types of Homoeopathic Materia Medica.
4. Enumerate the scope and limitations of Homoeopathic Materia Medica.
5. Evolve the portrait and symptomatology of a particular drug using the knowledge of pharmacy, psychology, anatomy, physiology and Organon of medicine.
6. Observe the symptoms of a particular medicine in a clinical set-up with emphasis on individualizing symptoms.

#### **Learning Objectives**

1. To define the homoeopathic Materia Medica and grasp the basic concept with philosophy of it based on Hahnemannian directions.
2. To discuss different sources and types of homoeopathic Materia Medica.
3. To understand the drug in context of its pharmacological data, constitution, temperament, sphere of action, pathogenesis, both mental and physical generals, particular symptoms, characteristic/ individualising symptoms, general and particular modalities, relationship with other remedies including doctrine of signature.
4. To study and understand the bio-chemic system of medicine.
5. To identify the symptoms of a sick individual corresponding to the symptoms of a particular drug.
6. To develop an insight into scopes and limitations of homoeopathic Materia Medica.

#### 4. TEACHING HOURS

##### Distribution of Teaching Hours:

| Homoeopathic Materia Medica |                          |                              |
|-----------------------------|--------------------------|------------------------------|
| Year                        | Teaching hours- Lectures | Teaching hours- Non-lectures |
| 1 <sup>st</sup> BHMS        | 120                      | 75                           |

##### 4. A. Teaching Hours Theory:

| S. no. | List of Topics                                | Hours |
|--------|---|-------|
| 1.     | Definition and introduction of Materia Medica | 3     |
| 2.     | Types of Homoeopathic Materia Medica          | 3     |
| 3.     | Sources of Homoeopathic Materia Medica        | 4     |
| 4.     | Study of drug picture (term I)                | 32    |
| 5.     | Study of drug picture (term II)               | 33    |
| 6.     | Theory of Bio chemic salts                    | 2     |
| 7.     | Individual bio chemic salts                   | 14    |
| 8.     | Study of drug picture (term III)              | 28    |
| 9.     | Scope and Limitation of HMM                   | 1     |
|        | <b>Total</b>                                  | 120   |

##### 4.B. Teaching Hours Non-lecture:

| Sr. No | A<br>Study Setting | B<br>Term | C<br>Teaching Hours |
|--------|--------------------|-----------|---------------------|
| 1      | OPD/IPD/Classroom  | II & III  | 75                  |

##### Non-Lecture Activities (Practical)-

| Sr. No | Non Lecture Teaching Learning methods | Time Allotted per Activity |
|--------|---------------------------------------|----------------------------|
|--------|---------------------------------------|----------------------------|

|   |                                 | <b>(Hours)</b> |
|---|---------------------------------|----------------|
| 1 | Group Discussions               | 5              |
| 2 | Problem based learning          | 5              |
| 3 | Tutorials                       | 10             |
| 4 | Case Based Learning (live case) | 55             |
|   | <b>Total</b>                    | <b>75</b>      |

## 5. COURSE CONTENTS BHMS I (Theory)

### 1. Introductory Lectures

- Definition and introduction of basic Materia Medica. Contrast between Materia Medica and Homoeopathic Materia Medica.
- Sources, types, construction, scope and limitation of Homoeopathic Materia Medica
- Theory of biochemic system of medicine, its comparison with Homoeopathy and study of **12 biochemic tissue salts** with their physico-chemical reaction.

### 2. Homoeopathic medicines:

|                        |                      |                 |
|------------------------|----------------------|-----------------|
| 1. Aconite             | 18. CalcareaPhos     | 35. Hypericum   |
| 2. Aethusa<br>Cynapium | 19. Calendula        | 36. Ignatia     |
| 3. Allium Cepa         | 20. Carbo Veg        | 37. Ipecac      |
| 4. Aloe Soc            | 21. Chamomilla       | 38. Ledum Pal   |
| 5. Ammonium Carb       | 22. Cina             | 39. Lycopodium  |
| 6. Ammonium Mur        | 23. Cinchona         | 40. Natrum Carb |
| 7. Antim Crude         | 24. Cocculus         | 41. Natrum Mur  |
| 8. Antim Tart          | 25. Coffea Cruda     | 42. Nux Vomica  |
| 9. Apis Mel            | 26. Colchicum        | 43. Podophyllum |
| 10. Arnica Montana     | 27. Colocynth        | 44. Pulsatilla  |
| 11. Ars Alb            | 28. DioscoriaVillosa | 45. Rhus Tox    |
| 12. Arum Triph         | 29. Croton Tig       | 46. Ruta        |
| 13. Baryta Carb        | 30. Drossera         | 47. Silicea     |
| 14. Belladonna         | 31. Dulcamara        | 48. Spongia     |
| 15. Borax              | 32. Euphrasia        | 49. Sulphur     |
| 16. Bryonia Alba       | 33. Gelsemium        | 50. Symphytum   |
| 17. Calc Carb          | 34. HeparSulph       |                 |

### 3. Biochemic tissue salts:

|               |               |               |
|---------------|---------------|---------------|
| 1. Calc Flour | 5. Kali Mur   | 9. Nat Mur*   |
| 2. Calc Phos* | 6. Kali Phos  | 10. Nat Phos  |
| 3. Calc Sulph | 7. Kali Sulph | 11. Nat Sulph |

|             |             |             |
|-------------|-------------|-------------|
| 4. FerrPhos | 8. Mag Phos | 12.Silicea* |
|-------------|-------------|-------------|

*\*Also included in the list of Homoeopathic medicines, hence total no. of medicines shall remain 59 for BHMS I.*

## **Contents for Term I:**

### **I. Introductory Lectures**

- a. Definition and introduction of basic Materia Medica, contrast between Materia Medica and Homoeopathic Materia Medica
- b. Sources, types and construction of Homoeopathic Materia Medica

### **II. Homoeopathic medicines:**

|                   |              |
|-------------------|--------------|
| 1. Arnica montana | 8.Natrum Mur |
| 2.Bryonia         | 9.Rhus tox   |
| 3.Baryta carb     | 10.Ruta      |
| 4.Calc Carb       | 11.Silicea   |
| 5.Calendula       | 12.Sulphur   |
| 6.Hypericum       | 13.Symphytum |
| 7. Ledum pal      |              |

## **Contents for Term II:**

### **I. Homoeopathic medicines:**

|                   |               |
|-------------------|---------------|
| 1. Aconite nap    | 11.Colchicum  |
| 2.Aloes soc       | 12. Colocynth |
| 3. Apis mellifica | 13.Dioscorea  |
| 4. Arsenic Alb    | 14. Dulcamara |
| 5.Belladonna      | 15. Gelsemium |

|             |                     |
|-------------|---------------------|
| 6.Cina      | 16. Ignatia         |
| 7.Chamomila | 17. Lycopodium      |
| 8.Carbo veg | 18. Nux vomica      |
| 9.Cinchona  | 19. Podophyllum     |
| 10.Cocculus | 20. Pulsatilla nig. |

II. Theory of biochemic system of medicine, its comparison with Homoeopathy

III. Study of 5 **biochemic tissue salts** with their physico-chemical reaction:

|                |
|----------------|
| 1. Calc Flour  |
| 2. Calc Phos   |
| 3. Calc Sulph  |
| 4. Natrum Phos |
| 5.Natrum sulph |

### Contents for Term III:

#### I. Homoeopathic medicines:

|                |                 |
|----------------|-----------------|
| 1. Aethusa cyn | 9. Coffea cruda |
| 2. Allium cepa | 10. Croton tig  |
| 3. Ammon Carb  | 11. Drosera     |
| 4. Ammon Mur   | 12. Euphrasia   |
| 5. Antim Crud  | 13.Hephar Sulph |
| 6. Antim Tart  | 14.Ipecacuanha  |
| 7. Arum triph  | 15.Natrum carb  |
| 8. Borax       | 16.Spongia      |

II. Study of 5 **biochemic tissue salts** with their physico-chemical reaction:

|               |
|---------------|
| 1. FerrPhos   |
| 2. Kali Mur   |
| 3. Kali Phos  |
| 4. Kali Sulph |
| 5. Mag Phos   |

### **III. Scope and limitations of Homoeopathic Materia medica**

## 6. TEACHING LEARNING METHODS

| Lectures (Theory)      | Non-lectures (Practical) |
|------------------------|--------------------------|
| Lectures               | Clinical demonstration   |
| Small group discussion | Problem based discussion |
| Integrated lectures    | Case Study               |
| Assignments            |                          |
| Library reference      |                          |

Different teaching-learning methods must be apply for understanding holistic and integrated Materia Medica. There has to be classroom lectures, small group discussions, case discussion where case based learning (CBL) and problem based learning (PBL) are specially helpful. In the applied Materia Medica, case discussion (CBL-PBL) method is beneficial for students. Audio visual (AV) methods for classroom teaching may be an innovative aid in order to demonstrate the related graphics and animations etc. In case of clinical demonstration – DOAP (Demonstration – Observation – Assistance – Performance) is very well applicable.

## 7. CONTENT MAPPING (COMPETENCIES TABLE)

### Topic 1- Definition and introduction of Materia Medica

| Sr. No.                   | Generic Competency    | Subject Area                   | Mile rs Level :<br>Does / Shows how / Knows how / Knows | Specific Competency   | SLO/ Outcome                | Bloom s Domai n | Guilbert' s Level | Must Know/ Desira ble to know/ nice to know | T-L Metho ds | Formativ e Assessm ent | Summati ve Assessm ent | Integratio n Departme nts- Horizontal / Vertical/ Spiral |
|---------------------------|-----------------------|--------------------------------|---|-----------------------|-----------------------------|-----------------|-------------------|---|--------------|------------------------|------------------------|--|
| <b>HomU G- HMM- I-1.1</b> | Information Gathering | Definition and introduction of | Knows   | Knowledge of fundamen | Define the basic MM and HMM | Cognitive       | Remember/ recall  | Must Know                                   | Lecture      | MCQ, SAQ,              | SAQ, Viva voce         | Horizontal Integration with                              |

| Sr. No.                | Generic Competency         | Subject Area    | Millers Level :<br>Does / Shows how / Knows how / Knows | Specific Competency | SLO/ Outcome                                     | Bloom's Domain | Guilbert's Level | Must Know/ Desirable to know/ nice to know | T-L Methods | Formative Assessment | Summative Assessment | Integration Departments- Horizontal / Vertical/ Spiral |
|------------------------|----------------------------|-----------------|---|---------------------|--|----------------|------------------|--|-------------|----------------------|----------------------|--|
| <b>HomUG-HMM-I-1.2</b> | Integration of information | material medica |   | tals of HMM         | Explain what sign and symptoms are with examples |                | Understand       |  |             | Viva Voce            |                      | Organon of Medicine                                    |

| Sr. No.         | Generic Competency | Subject Area | Millers Level :<br>Does / Shows how / Knows how / Knows | Specific Competency | SLO/ Outcome  | Bloom's Domain | Guilbert's Level | Must Know/ Desirable to know/ nice to know | T-L Methods | Formative Assessment | Summative Assessment | Integration Departments- Horizontal / Vertical/ Spiral |
|-----------------|--------------------|--------------|---|---------------------|---|----------------|------------------|--|-------------|----------------------|----------------------|--|
| HomUG-HMM-I-1.3 |                    |              |   |                     | Contrast between MM and HMM                         |                |                  |  |             |                      |                      |  |
| HomUG-HMM-I-1.4 |                    |              |   |                     | Discuss the history of MM with emphasis on Hahneman |                |                  |  |             |                      |                      |  |

| Sr. No. | Generic Competency | Subject Area | Millers Level :<br>Does / Shows how / Knows how / Knows | Specific Competency | SLO/ Outcome    | Blooms Domain | Guilbert's Level | Must Know/ Desirable to know/ nice to know | T-L Methods | Formative Assessment | Summative Assessment | Integration Departments- Horizontal / Vertical/ Spiral |
|---------|--------------------|--------------|---|---------------------|-----------------|---------------|------------------|--|-------------|----------------------|----------------------|--|
|         |                    |              |   |                     | nian directions |               |                  |  |             |                      |                      |  |

## Topic 2- Types of Materia Medica

| Sr. No.                | Generic Competency    | Subject Area            | Millers Level :<br>Does / Shows how/ Knows how/ Knows | Specific Competency           | SLO/ Outcome                  | Bloom's Domain | Guilbert's Level | Must Know/ Desirable to know/ nice to know | T-L Methods                                     | Formative Assessment | Summative Assessment | Integration Departments- Horizontal / Vertical/ Spiral       |
|------------------------|-----------------------|-------------------------|---|-------------------------------|-------------------------------|----------------|------------------|--|---|----------------------|----------------------|--|
| <b>HomUG-HMM-I-2.1</b> | Information Gathering | Types of Materia Medica | Knows   | Identify various types of HMM | Describe various types of HMM | Cognitive      | Remember/ recall | Must Know                                  | Lecture, small group discussion , demonstration | MCQ, SAQ, Viva Voce  | SAQ, Viva voce       | Horizontal Integration with Organon of Medicine and Pharmacy |
| <b>HomUG-HMM-I-2.2</b> | Integration of        |                         |   |                               | Enumerate types of HMM        |                | Understand       |  |   |                      |                      |  |

|                                       |                 |  |               |  |   |  |  |                          |  |  |  |  |
|---------------------------------------|-----------------|--|---------------|--|---|--|--|--------------------------|--|--|--|--|
| <b>HomU<br/>G-<br/>HMM-<br/>I-2.3</b> | informati<br>on |  |               |  | Classify<br>Homoeo<br>pathic<br>Materia<br>Medica<br>as per its<br>types.                               |  |  |                          |  |  |  |  |
| <b>HomU<br/>G-<br/>HMM-<br/>I-2.4</b> |                 |  | Know<br>s how |  | Discuss<br>the<br>characte<br>ristics of<br>each<br>type of<br>HMM<br>based on<br>practical<br>utility. |  |  | Desirab<br>le to<br>know |  |  |  |  |

### Topic 3- Sources of Homoeopathic Materia Medica

| <b>Sr.<br/>No.</b> | <b>Generic<br/>Compete<br/>ncy</b> | <b>Subje<br/>ct<br/>Area</b> | <b>Millers<br/>Level:</b> | <b>Specific<br/>Compete<br/>ncy</b> | <b>SLO/<br/>Outcom<br/>e</b> | <b>Bloom<br/>s</b> | <b>Guilbert<br/>'s Level</b> | <b>Must<br/>Know/<br/>Desira</b> | <b>T-L<br/>Methods</b> | <b>Formati<br/>ve</b> | <b>Summat<br/>ive</b> | <b>Integratio<br/>n<br/>Departme</b> |
|--------------------|------------------------------------|------------------------------|---------------------------|-------------------------------------|------------------------------|--------------------|------------------------------|----------------------------------|------------------------|-----------------------|-----------------------|--------------------------------------|
|--------------------|------------------------------------|------------------------------|---------------------------|-------------------------------------|------------------------------|--------------------|------------------------------|----------------------------------|------------------------|-----------------------|-----------------------|--------------------------------------|

|                          |                            |                | Does/Shows how/ Knows how/ Knows |                                 |   | Domain    |                 | able to know/ nice to know |  | Assessment          | Assessment          | nts-Horizontal / Vertical/ Spiral  |
|--------------------------|----------------------------|----------------|----------------------------------|---------------------------------|---|-----------|-----------------|----------------------------|--|---------------------|---------------------|--|
| <b>HomU G-HMM -I-3.1</b> | Information Gathering      | Sources of HMM | Knows                            | Identify various sources of HMM | Describe the sources of HMM                   | Cognitive | Remember/recall | Must know                  | Lecture, Small Group discussion, Demonstration | MCQ, SAQ, Viva Voce | SAQ, LAQ, Viva voce | Horizontal Integration with Organon of Medicine, Homoeopathic pharmacy<br><br>Vertical and spiral integration with FMT |
| <b>HomU G-HMM -I-3.2</b> | Integration of information |                |                                  |                                 | Understand the concept of source books of HMM |           | Understand      |                            |  |                     |                     |  |
| <b>HomU G-HMM -I-3.3</b> |                            |                |                                  |                                 | List the source books of HMM                  |           |                 |                            |  |                     |                     |  |

|                             |  |  |  |  |   |  |  |  |  |  |  |  |
|-----------------------------|--|--|--|--|---|--|--|--|--|--|--|--|
| HomU<br>G-<br>HMM<br>-I-3.4 |  |  |  |  | Discuss<br>the plans<br>and<br>construc<br>tion of<br>source<br>books of<br>HMM |  |  |  |  |  |  |  |
|-----------------------------|--|--|--|--|---|--|--|--|--|--|--|--|

| Sr. No.            | Generic Competency                                      | Subject Area   | Millers Level:<br><br>Does/Shows how/<br>Knows how/<br>Knows | Specific Competency             | SLO/<br>Outcome  | Bloom's Domain | Guilbert's Level                  | Must Know/<br>Desirable to know/<br>nice to know | T-L Methods                                    | Formative Assessment | Summative Assessment | Integration<br><br>Departments-<br>Horizontal / Vertical/<br>Spiral  |
|--------------------|---|----------------|--|---------------------------------|--|----------------|-----------------------------------|--|--|----------------------|----------------------|--|
| <b>HomUG-I-3.5</b> | Information Gathering<br><br>Integration of information | Sources of HMM | Knows  | Identify various sources of HMM | Enumerate different types of proving as sources of HMM | Cognitive      | Remember/recall<br><br>Understand | Must know  | Lecture, Small Group discussion, Demonstration | MCQ, SAQ, Viva Voce  | SAQ, LAQ, Viva voce  | Horizontal Integration with Organon of Medicine, Homoeopathic pharmacy<br><br>Vertical and spiral integration with FMT |
| <b>HomUG-I-3.6</b> |   |                | Knows how  |                                 | Describe various proving sources of HMM                |                |                                   |  |  |                      |                      |  |

|                                       |  |  |  |                                       |  |  |  |                   |  |  |                |  |
|---------------------------------------|--|--|--|---------------------------------------|--|--|--|-------------------|--|--|----------------|--|
| <b>HomU<br/>G-<br/>HMM<br/>-I-3.7</b> |  |  |  |                                       | Understand the basic concept of various types proving as source of HMM |  |  |                   |  |  |                |  |
| <b>HomU<br/>G-<br/>HMM<br/>-I-3.8</b> |  |  |  | Insight into structure of various HMM | Differentiate the construction of different source books of HMM        |  |  | Desirable to know |  |  | SAQ, Viva voce |  |

| Sr. No.                   | Generic Competency                                      | Subject Area   | Millers Level: Does/Shows how/ Knows how/ Knows | Specific Competency             | SLO/ Outcome   | Bloom's Domain | Guilbert's Level                   | Must Know/ Desirable to know/ Nice to know | T-L Methods                                    | Formative Assessment | Summative Assessment | Integration Departments- Horizontal / Vertical/ Spiral                 |
|---------------------------|---|----------------|---|---------------------------------|--|----------------|------------------------------------|--|--|----------------------|----------------------|--|
| <b>Hom UG-HMM -I-3.9</b>  | Information Gathering<br><br>Integration of information | Sources of HMM | Knows how                                       | Identify various sources of HMM | Understand the construction of various HMM as a compilation based on the source books. | Cognitive      | Remember/ recall<br><br>Understand | Nice to know                               | Lecture, Small Group discussion, Demonstration | Viva voce            | Viva voce            | Horizontal Integration with Organon of Medicine, Homoeopathic pharmacy |
| <b>Hom UG-HMM -I-3.10</b> |   |                |   |                                 | Draw the time line of Homoeopathic   |                |                                    |  |  |                      |                      |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|--|--|--|
|  |  |  |  |  | Materia<br>Medica<br>based on<br>their<br><br>history,<br>evolution<br>and<br>philosoph<br>y |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|--|--|--|

#### Topic 4- Homoeopathic Medicines

| Sr. No.                | Generic Competency   | Subject Area  | Millers Level:<br><br>Does/Shows how/<br>Knows how/<br>Knows | Specific Competency   | SLO/ Outcome   | Blooms Domain                 | Guilbert's Level                                    | Must Know/ Desirable to know/ nice to know | T-L Methods   | Formative Assessment                | Summative Assessment           | Integration Departments- Horizontal/ Vertical/ Spiral  |
|------------------------|--|---|--|---|--|-------------------------------|---|--|---|-------------------------------------|--------------------------------|--|
| <b>HomUG-HMM-I-4.1</b> | Information Gathering<br><br>Integration of information<br><br>Problem formulation | Homoeopathic medicines included in:<br><br>Term I, II and III | Knows,<br><br>Knows how,<br><br>Shows how                    | 1. Evolve the symptomatology of a particular drug<br><br>2. Observe the symptoms of a particular medicine | Describe the drug picture of homoeopathic medicines with following details- pharmacological data, constitution, temperament, sphere of action, doctrine of | Cognitive,<br><br>Psychomotor | Remember/ recall<br><br>Understand<br><br>Interpret | Must Know                                  | Lecture, Small Group discussion, Demonstration (clinical classes in OPD),<br><br>Problem based learning | MCQ, SAQ, LAQ, Practical, Viva Voce | SAQ, LAQ, Practical, Viva voce | Horizontal Integration with pharmacy, psychology, anatomy, physiology and organon of medicine. |

|  |                  |  |  |                        |   |  |  |  |  |  |  |  |
|--|------------------|--|--|------------------------|---|--|--|--|--|--|--|--|
|  | Practical Skills |  |  | e in a clinical set-up | signature, pathogenesis, both mental and physical generals, particular symptoms, characteristic/individualizing symptoms, general and particular modalities, relationship |  |  |  |  |  |  | Longitudinal and spiral with all allied subjects in BHMS |
|--|------------------|--|--|------------------------|---|--|--|--|--|--|--|--|

| Sr. No.                  | Generic Competency   | Subject Area  | Millers Level: Does/Shows how/ Knows how/ Knows | Specific Competency  | SLO/ Outcome   | Blooms Domain                 | Guilbert's Level                                   | Must Know / Desirable to know / nice to know | T-L Methods   | Formative Assessment                | Summative Assessment           | Integration Departments- Horizontal/ Vertical/ Spiral   |
|--------------------------|--|---|---|--|--|-------------------------------|--|--|---|-------------------------------------|--------------------------------|---|
| <b>Hom UG-HMM -I-4.2</b> | Information Gathering<br><br>Integration of information<br><br>Problem formulation | Homoeopathic medicines included in:<br><br>Term I, II and III | Knows,<br><br>Knows how,<br><br>Shows how       | 1. Evolve the symptomatology of a particular drug<br><br>2. Observe the symptoms of a particular | .Formulate the drug picture/ symptomatology of a particular drug using the knowledge of pharmacy, psychology, anatomy, physiology and organon of medicine. | Cognitive,<br><br>Psychomotor | Remember/recall<br><br>Understand<br><br>Interpret | Must Know                                    | Lecture, Small Group discussion ,<br><br>Demonstration (clinical classes in OPD),<br><br>Problem based learning | MCQ, SAQ, LAQ, Practical, Viva Voce | SAQ, LAQ, Practical, Viva voce | Horizontal Integration with pharmacy, psychology, anatomy, physiology and organon of medicine . |

|                                       |                  |  |  |                               |  |  |  |  |  |  |  |  |
|---------------------------------------|------------------|--|--|-------------------------------|--|--|--|--|--|--|--|--|
|                                       | Practical Skills |  |  | medicine in a clinical set-up |  |  |  |  |  |  |  | Longitudinal and spiral with all allied subjects in BHMS |
| <b>Hom<br/>UG-<br/>HMM<br/>-I-4.3</b> |                  |  |  |                               | Understand the symptomatology of a particular medicine in regard to a particular system/organ of the body. |  |  |  |  |  |  |  |

| Sr. No.                  | Generic Competency    | Subject Area                        | Millers Level:<br>Does/Shows how/<br>Knows how/<br>Knows | Specific Competency                            | SLO/<br>Outcome  | Blooms Domain                 | Guilbert's Level                                   | Must Know / Desirable to know / nice to know | T-L Methods   | Formative Assessment                | Summative Assessment           | Integration Departments- Horizontal/ Vertical/ Spiral   |
|--------------------------|-----------------------|-------------------------------------|--|--|--|-------------------------------|--|--|---|-------------------------------------|--------------------------------|---|
| <b>Hom UG-HMM -I-4.4</b> | Information Gathering | Homoeopathic medicines included in: | Knows,<br><br>Knows how,                                 | Evolve the symptomatology of a particular drug | Identify the symptom similarity of a patient with a particular medicine in a clinical set up | Cognitive,<br><br>Psychomotor | Remember/recall<br><br>Understand<br><br>Interpret | Must Know                                    | Lecture, Small Group discussion ,<br><br>Demonstration (clinical classes in OPD),<br><br>Problem based learning | MCQ, SAQ, LAQ, Practical, Viva Voce | SAQ, LAQ, Practical, Viva voce | Horizontal Integration with pharmacy, psychology, anatomy, physiology and organon of medicine . |
| <b>Hom UG-HMM -I-4.5</b> | Problem formulation   | Term I, II and III                  | Shows how  |  | State the relationship of a medicine with other medicines                                    |                               |  |  |   |                                     |                                |   |

|                                       |                     |  |              |  |   |           |                                       |                         |  |                      |              |   |
|---------------------------------------|---------------------|--|--------------|--|---|-----------|---------------------------------------|-------------------------|--|----------------------|--------------|---|
| <b>Hom<br/>UG-<br/>HMM<br/>-I-4.6</b> | Practical<br>Skills |  | Knows<br>how | Observe<br>the<br>symptoms of a<br>particular<br>medicine in a<br>clinical<br>set-up | Understand the<br>relationship status of<br>a medicine and its<br>background  | Cognitive | Remember/<br>recall<br><br>Understand | Desirable<br>to<br>know | Lecture,<br>Small<br>Group<br>discussion<br>,                      | MCQ,<br>Viva<br>Voce | Viva<br>voce | Longitudinal and<br>spiral<br>with all<br>allied<br>subjects<br>in BHMS |
| <b>Hom<br/>UG-<br/>HMM<br/>-I-4.7</b> |                     |  | Knows<br>how |  | Observe the<br>variations in<br>symptomatology of a<br>particular<br>medicine in most<br>commonly used HMM<br>of eminent<br>authors | Cognitive | Remember/<br>recall<br><br>Understand | Nice<br>to<br>know      | Lecture,<br>Small<br>Group<br>discussion<br>,<br><br>Demonstration | Viva<br>Voce         | Viva<br>voce |   |

**Topic 5- Theory of Bio chemic tissue salts, its comparison with homoeopathy and study of 12 tissue remedies with their physico-chemical reaction:**

| Sr.No.                 | Generic Competency  | Subject Area                      | Millers Level: Does/Shows how/ Knows how/ Knows | Specific Competency                            | SLO/ Outcome  | Bloom s Domain | Guilbert' s Level           | Must Know/ Desirable to know/ nice to know | T-L Methods                      | Formative Assessment       | Summative Assessment | Integration Department- Horizontal / Vertical/ Spiral  |
|------------------------|---|-----------------------------------|---|--|---|----------------|-----------------------------|--|----------------------------------|----------------------------|----------------------|--|
| <b>HomUG-HMM-I-5.1</b> | Information Gathering, synthesis and application of knowledge in class room | Theory of Bio chemic tissue salts | Knows   | Describe the Theory of Bio chemic tissue salts | Describe the Theory of Bio chemic tissue salts                                    | Cognitive      | Remember/ recall Understand | Must Know                                  | Lecture , Small Group discussion | MCQ. Viva, Quiz Assignment | SAQ, MCQ             | <b>Horizontal</b><br>Pharmacy, Biochemistry and Physiology<br><br><b>Spiral</b><br>Can compare the drug pathogenesis with Homoeopa |
| <b>HomUG-HMM-I-5.2</b> |   |                                   |   |  | compare and contrast Homoeopathic system of medicine with Bio chemic tissue salts |                |                             |  |                                  |                            |                      |  |

| Sr.No.          | Generic Competency | Subject Area | Millers Level: Does/Shows how/ Knows how/ Knows | Specific Competency | SLO/ Outcome  | Bloom's Domain | Guilbert's Level | Must Know/ Desirable to know/ nice to know | T-L Methods | Formative Assessment | Summative Assessment | Integration Departments- Horizontal / Vertical/ Spiral                                   |
|-----------------|--------------------|--------------|---|---------------------|---|----------------|------------------|--|-------------|----------------------|----------------------|--|
|                 |                    |              |   |                     |   |                |                  |  |             |                      |                      | thic medicines<br><b>Vertical</b>  |
| HomUG-HMM-I-5.3 |                    |              |   |                     | co-relate the importance of knowledge of Biochemistry in better understanding of Biochemic tissue salts |                |                  |  |             |                      |                      | Can explore the utility of Biochemic salts in treating deficiencies in Medicine, OBG etc |

| Sr.No.          | Generic Competency | Subject Area | Millers Level: Does/Shows how/ Knows how/ Knows | Specific Competency | SLO/ Outcome                        | Bloom's Domain | Guilbert's Level | Must Know/ Desirable to know/ nice to know | T-L Methods | Formative Assessment | Summative Assessment | Integration Departments- Horizontal / Vertical/ Spiral |
|-----------------|--------------------|--------------|---|---------------------|-------------------------------------|----------------|------------------|--|-------------|----------------------|----------------------|--|
| HomUG-HMM-I-5.4 |                    |              |   |                     | List the 12 Bio chemic tissue salts |                |                  |  |             |                      |                      |  |

| Sr. No.                  | Generic Competency   | Subject Area   | Millers Level: Does/Shows how/ Knows how/ Knows | Specific Competency  | SLO/ Outcome   | Blooms Domain                  | Guilbert's Level                                    | Must Know / Desirable to know/ nice to know | T-L Methods   | Formative Assessment                        | Summative Assessment                   | Integration Departments- Horizontal/ Vertical/ Spiral   |
|--------------------------|--|--|---|--|--|--------------------------------|---|---|---|---|--|---|
| <b>Hom UG-HMM -I-5.5</b> | Information Gathering<br><br>Integration of information<br><br>Problem formulation | 12 Biochemical medicines included in:<br><br>Term II and III | Knows,<br><br>Knows how,<br><br>Shows how       | 1.Describe individual Biochemical tissue salts<br><br>2.Evolve the symptom-tology of a particular drug | <i>In addition to the competencies for homoeopathic medicines,</i><br><br>Describe individual Biochemical tissue salts | Cognitive ,<br><br>Psychomotor | Remember/ recall<br><br>Understand<br><br>Interpret | Must Know                                   | Lecture, Small Group discussion ,<br><br>Demonstration (clinical classes in OPD),<br><br>Problem based learning | MCQ, SAQ, LAQ, Practical ,<br><br>Viva Voce | SAQ, LAQ, Practical ,<br><br>Viva voce | Horizontal Integration with pharmacy , psychology, anatomy, physiology and organon of medicine.<br><br>Longitudinal and |

|                                       |                     |  |  |   |  |  |  |  |  |  |  |  |   |
|---------------------------------------|---------------------|--|--|---|--|--|--|--|--|--|--|--|---|
| <b>Hom<br/>UG-<br/>HMM<br/>-I-5.6</b> | Practical<br>Skills |  |  | 3.Observ<br>e the<br>sympto<br>ms of a<br>particula<br>r<br>medicin<br>e in a<br>clinical<br>set-up | Explain<br>the<br>pathogen<br>esis and<br>symptom<br>ology of<br>each Bio<br>chemic<br>tissue<br>salts as<br>per Dr,<br>Wilhelm<br>H.<br>Schuessler<br>. |  |  |  |  |  |  |  | spiral<br>with all<br>allied<br>subjects<br>in BHMS |
| <b>Hom<br/>UG-<br/>HMM<br/>-I-5.7</b> |                     |  |  |   | Justify the<br>portrait of<br>each<br>tissue salt<br>in<br>correlatio<br>n with the<br>knowledg<br>e of  |  |  |  |  |  |  |  |   |

|  |  |  |  |  |                   |  |  |  |  |  |  |  |
|--|--|--|--|--|-------------------|--|--|--|--|--|--|--|
|  |  |  |  |  | Biochemis<br>try. |  |  |  |  |  |  |  |
|--|--|--|--|--|-------------------|--|--|--|--|--|--|--|

**Topic 6- Scope and limitation of homoeopathic Materia Medica:**

| <b>Sr. No.</b>         | <b>Generic Competency</b> | <b>Subject Area</b>          | <b>Millers Level:<br/>Does/Shows<br/>how/<br/>Knows<br/>how/<br/>Knows</b> | <b>Specific Competency</b>                           | <b>SLO/ Outcome</b>                   | <b>Bloom's Domain</b> | <b>Guilbert's Level</b> | <b>Must Know/ Desirable to know/ nice to know</b> | <b>T-L Methods</b>          | <b>Formative Assessment</b> | <b>Summative Assessment</b> | <b>Integration Departments- Horizontal / Vertical/ Spiral</b> |
|------------------------|---------------------------|------------------------------|--|--|---------------------------------------|-----------------------|-------------------------|---|-----------------------------|-----------------------------|-----------------------------|---|
| <b>HomUG-HMM-I-6.1</b> | Information Gathering     | Scope and Limitations of HMM | Knows  | Must be able to comprehend the scope and limitations | List the scope and limitations of HMM | Cognitive             | Remember/ recall        | Must Know   | Lecture<br>.<br>Small group | LAQ<br>SAQ<br>Viva,         | LAQ<br>SAQ<br>Viva,         | Horizontal Integration with pharmacy, psychology              |

|                             |                                       |  |              |   |   |  |                |                 |   |  |  |   |
|-----------------------------|---------------------------------------|--|--------------|---|---|--|----------------|-----------------|---|--|--|---|
| HomU<br>G-<br>HMM-<br>I-6.2 | Integrati<br>on of<br>informati<br>on |  | Knows<br>how | of<br>Homoeopa<br>thic<br>Materia<br>Medica | Discuss<br>the<br>scope<br>and<br>limitati<br>ons of<br>HMM                         |  | Underst<br>and | Must<br>Know    | discussi<br>on<br><br>Case<br>Based<br>learnin<br>g<br><br>Proble<br>m<br>Based<br>Learnin<br>g |  |  | y,<br>anatomy,<br>physiology<br>and<br>organon<br>of<br>medicine.<br><br>Longitudin<br>al and<br>spiral with<br>all allied<br>subjects in<br>BHMS |
| HomU<br>G-<br>HMM-<br>I-6.3 |                                       |  | Knows        |   | Discuss<br>the<br>solutio<br>ns to<br>overco<br>me the<br>limitati<br>ons of<br>HMM |  | Underst<br>and | Nice to<br>know |   |  |  |   |

## 8. ASSESSMENT

### Assessment Summary

#### 8A- Number of papers and Mark Distribution

| Sr. No. | Course Code | Papers | Theory | Practical (Assignment+ Spotting) | Viva Voce | Internal Assessment- Practical* | Grand Total |
|---------|-------------|--------|--------|----------------------------------|-----------|---------------------------------|-------------|
| 1       | HomUG-HMM-I | 1      | 100    | 20+10= 30                        | 60        | 10                              | 200         |

*\*Note- For Internal assessment, only Viva marks obtained in three PAs and two TTs will be considered as explained in table 8B-1 and to be calculated as per the table 8B-2 given below. Theory marks shall not be taken into account for this purpose.*

#### 8B-I - Scheme of Assessment (formative and Summative)

| Sr. No | Professional Course     | 1 <sup>st</sup> term (1-6 Months) |                    | 2 <sup>nd</sup> Term (7-12 Months)    |                    | 3 <sup>rd</sup> Term (13-18 Months) |    |
|--------|-------------------------|-----------------------------------|--------------------|---------------------------------------|--------------------|-------------------------------------|----|
| 1      | First Professional BHMS | First PA + 1 <sup>ST</sup> TT     |                    | 2 <sup>nd</sup> PA+2 <sup>ND</sup> TT |                    | 3 <sup>rd</sup> PA+UE               |    |
|        |                         | 1 <sup>st</sup> PA                | 1 <sup>st</sup> TT | 2 <sup>nd</sup> PA                    | 2 <sup>nd</sup> TT | 3 <sup>rd</sup> PA                  | UE |

|  |  |                            |                       |                     |                            |                       |                     |                            |                    |
|--|--|----------------------------|-----------------------|---------------------|----------------------------|-----------------------|---------------------|----------------------------|--------------------|
|  |  | 10 marks<br>practical/viva | 50<br>marks<br>theory | 50<br>marks<br>viva | 10 marks<br>practical/viva | 50<br>marks<br>theory | 50<br>marks<br>viva | 10 marks<br>practical/viva | As per table<br>8A |
|--|--|----------------------------|-----------------------|---------------------|----------------------------|-----------------------|---------------------|----------------------------|--------------------|

**PA: Periodical Assessment to be done only through practical/viva; TT: Term Test shall include both theory and viva; UE: University Examinations shall include both theory and viva as per table 8A**

**8B-II- Method of calculation of internal assessment marks for final university examination:**

| <b>PA1 Practical/Viva<br/>(10 Marks)</b> | <b>PA2<br/>Practical/Viva<br/>(10 Marks)</b> | <b>PA3<br/>Practical/Viva<br/>(10 Marks)</b> | <b>Periodical<br/>Assessment Average<br/><math>PA1+PA2+PA3/3</math></b> | <b>TT1 Practical/<br/>Viva<br/>(50 Marks)</b> | <b>TT2<br/>Practical/<br/>Viva<br/>(50 Marks)</b> | <b>Terminal<br/>Test<br/>Average<br/><math>TT1+TT2/10</math></b> | <b>Final Internal<br/>Assessment<br/>Marks</b> |
|--|--|--|---|---|---|--|--|
| <b>A</b>                                 | <b>B</b>                                     | <b>C</b>                                     | <b><math>D= A+B+C/3</math></b>  | <b>E</b>                                      | <b>F</b>  | <b><math>G=E+F/10</math></b>                                     | <b><math>D+G/2</math></b>                      |

**8C - Paper Layout**

**Summative assessment:**

**Theory- 100 marks**

|     |          |
|-----|----------|
| MCQ | 10 marks |
| SAQ | 40 marks |
| LAQ | 50 marks |

**8 D– I - Distribution of Theory exam**

| Sr. No | Paper  |           |                  | D<br>Type of Questions<br>“Yes” can be asked.<br>“No” should not be asked. |                  |                   |
|--------|--|-----------|------------------|--|------------------|-------------------|
|        | A<br>List of Topics  | B<br>Term | C<br>Marks       | MCQ<br>(1 Mark)  | SAQ<br>(5 Marks) | LAQ<br>(10 Marks) |
| 1      | Definition and introduction of basic materia medica and HMM; compare HMM and other Materia Medica  | I         | Refer Next Table | Yes  | Yes              | No                |
| 2      | Sources, types, construction, scope and limitation of Homoeopathic Materia Medica  | I,III     |                  | Yes  | Yes              | Yes               |
| 3      | Theory of Biochemic system of medicine, its comparison with Homoeopathy and study of <b>12 Biochemic tissue salts</b> with their physico-chemical reaction | II        |                  | Yes  | Yes              | Yes               |

|   |   |          |  |     |     |     |
|---|---|----------|--|-----|-----|-----|
| 4 | Drug Picture- 50 Homoeopathic Medicines | II & III |  | Yes | Yes | Yes |
|---|---|----------|--|-----|-----|-----|

#### 8D– II - Theme table

| Theme* | Topics   | Term      | Marks | MCQ's | SAQ's | LAQ's |
|--------|--|-----------|-------|-------|-------|-------|
| A      | Definition and introduction of basic materia medica and HMM; compare HMM and other Materia Medica  | I         | 7     | Yes   | Yes   | No    |
| B      | Sources, types, construction, scope and limitation of Homoeopathic Materia Medica  | I,III     | 17    | Yes   | Yes   | Yes   |
| C      | Theory of Biochemic system of medicine, its comparison with Homoeopathy and study of <b>12 Biochemic tissue salts</b> with their physico-chemical reaction | II & III  | 22    | Yes   | Yes   | Yes   |
| D      | Drug Picture- 50 Homoeopathic Medicines  | I,II& III | 54    | Yes   | Yes   | Yes   |

#### 8E- Question paper Blue print

| Question Serial Number | Type of Question          | Question Paper Format<br>(Refer table 8D- II Theme table for themes) |
|------------------------|---------------------------|--|
| Q1                     | Multiple choice Questions | 1. Theme A   |

|    |  |   |
|----|--|---|
|    | (MCQ)<br>10 Questions<br>1 mark each<br>All compulsory<br>Must know part: 7 MCQ<br>Desirable to know: 2 MCQ.<br>Nice to know: 1 MCQ  | 2. Theme A<br>3. Theme B<br>4. Theme B<br>5. Theme C<br>6. Theme C<br>7. Theme D<br>8. Theme D<br>9. Theme D<br>10. Theme D |
| Q2 | Short answer Questions<br>(SAQ)<br>Eight Questions<br>5 Marks Each<br>All compulsory<br>Must know part: 6 SAQ<br>Desirable to know: 2 SAQ<br>Nice to know: 0 SAQ           | 1. Theme A<br>2. Theme B<br>3. Theme C<br>4. Theme C<br>5. Theme D<br>6. Theme D<br>7. Theme D<br>8. Theme D                |
| Q3 | Long answer Questions<br>(LAQ)<br>Five Questions<br>10 marks each<br>All compulsory<br>All questions on must know<br>No Questions on Nice to know and<br>Desirable to know | 1. Theme B<br>2. Theme C<br>3. Theme D<br>4. Theme D<br>5. Theme D  |



## 8F - Distribution of Practical Exam

### **Practical & Viva**-100 marks

|                         |                                      |
|-------------------------|--------------------------------------|
| Viva voce               | 60 marks                             |
| Practical (Assignment)* | 20 marks                             |
| Practical (Spotting)    | 10 marks                             |
| Internal assessment**   | 10 marks (viva/ clinical assessment) |

\*Assignment shall comprise of compilation of complete drug-portrait of 6 polychrest remedies and 4 biochemic salts

\*\* Method of calculation explained in table no. 8B-II

#### **9. LIST OF RECOMMENDED REFERENCE BOOKS:**

- Allen HC, 2005, Keynotes Rearranged and Classified with Leading Remedies of the Materia Medica and Bowel Nosodes, Reprint edition, B.Jain Publishers, New Delhi
- Choudhuri NM, 2006, A Study On Materia Medica Enriched with real case studies, Reprint revised edn, B.Jain Publishers, New Delhi
- Kent JT, 2015, Lectures On Homoeopathic Materia Medica, Reprint edn, B.Jain Publishers, New Delhi
- Burt W, 2009, Physiological Materia Medica, Third edn, B.Jain Publishers, New Delhi
- Boericke W, Dewey W, 2016, The Twelve Tissue Remedies By Schessler, Reprint edn, B.Jain Publishers, New Delhi
- All source books may be referred whenever required.

## 10. LIST OF CONTRIBUTORS

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## I PROFESSIONAL BHMS

**Subject NAME:** Organon of Medicine and Homoeopathic philosophy and Fundamentals of Psychology

**Subject CODE:** HomUG-OM-I

### TEACHING HOURS:

1<sup>st</sup> BHMS

Organon of Medicine and Homoeopathic Philosophy, and Fundamentals of Psychology

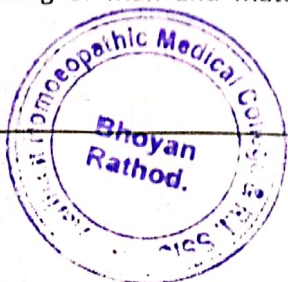
| YEAR                 | TEACHING HOURS- |             |
|----------------------|-----------------|-------------|
|                      | LECTURES        | NON-LECTURE |
| 1 <sup>st</sup> BHMS | 180             | 100         |


### Preamble-

Organon of Medicine with Homoeopathic Philosophy is a central fulcrum around which education and training of a homoeopathic physician revolves. It lays down the foundations of homoeopathic practice, education, training and research. It not only elaborates on the fundamental laws but also how to apply them in practice. It defines the qualities of a healer, guides the homoeopathic physician in inculcating values and attitude and develop skills.

Nature nurtures us. It is well depicted in our science. Therefore, Homoeopathy is in sync with Nature. The need to keep life force within us well balanced with nature is well established in Organon. Hahnemann as an ecologist was well ahead of his time. Philosophically, it connects man and his actions to the dynamic forces available in nature, thus bringing to fore the holistic approach. Lateralization of these concepts helps the student to develop insight into various facets of Life & Living. Organon orients the students to homoeopathy as an Art & Science. Its comprehensive understanding needs a core competency in logic and the concepts of generalization and individualization. Its treatment of disease process and relating to the concept of Miasm makes it a study of the process of scientific investigation.

The biggest challenge in teaching-learning of Organon is to first understand the fundamentals according to the Master's writing and then demonstrate them in practice. Quality and real time integration with other subjects helps a student to conceive the holistic perceiving of Man and Materia Medica. The concepts and knowledge required by the



  
**Principal**  
**Arihant Homoeopathic**  
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**Bhayan Rathod, Gandhinagar**

## I PROFESSIONAL BHMS

**Subject NAME:** Organon of Medicine and Homoeopathic philosophy and Fundamentals of Psychology

**Subject CODE:** HomUG-OM-I

### TEACHING HOURS:

| 1 <sup>st</sup> BHMS<br><b>Organon of Medicine and Homoeopathic Philosophy, and Fundamentals of Psychology</b> |                 |             |
|--|-----------------|-------------|
| YEAR   | TEACHING HOURS- |             |
|  | LECTURES        | NON-LECTURE |
| 1 <sup>ST</sup> BHMS   | 180             | 100         |

### Preamble-

Organon of Medicine with Homoeopathic Philosophy is a central fulcrum around which education and training of a homoeopathic physician revolves. It lays down the foundations of homoeopathic practice, education, training and research. It not only elaborates on the fundamental laws but also how to apply them in practice. It defines the qualities of a healer, guides the homoeopathic physician in inculcating values and attitude and develop skills.

Nature nurtures us. It is well depicted in our science. Therefore, Homoeopathy is in sync with Nature. The need to keep life force within us well balanced with nature is well established in Organon. Hahnemann as an ecologist was well ahead of his time. Philosophically, it connects man and his actions to the dynamic forces available in nature, thus bringing to fore the holistic approach. Lateralization of these concepts helps the student to develop insight into various facets of Life & Living. Organon orients the students to homoeopathy as an Art & Science. Its comprehensive understanding needs a core competency in logic and the concepts of generalization and individualization. Its treatment of disease process and relating to the concept of Miasm makes it a study of the process of scientific investigation.

The biggest challenge in teaching-learning of Organon is to first understand the fundamentals according to the Master's writing and then demonstrate them in practice. Quality and real time integration with other subjects helps a student to conceive the holistic perceiving of Man and Materia Medica. The concepts and knowledge required by the

Physician with operational knowledge of management of patients and their diseases will need horizontal and vertical integration with Homoeopathic subjects and clinical subjects. First BHMS will need horizontal integration with Anatomy, Physiology, Homoeopathic Pharmacy and Homoeopathic Materia Medica. Organon will have spiral integration with itself and vertical integration with clinical subjects. Second year will need integration with pathology, community medicine, forensic medicine, along with other homoeopathic subjects. Third and fourth year establishes links with clinical subjects, research methodology and pharmacology.

Science is never static. Since the time of Hahnemann, medical science has advanced by leaps and bounds. Since Homoeopathy is based on principles rooted in nature, they would stand the test of time. However, their application in the changing times and circumstances would find newer avenues to heal. This is an opportunity for a homoeopath to connect the current advances while relating with the fundamental laws. Mastering all this will make him a master healer and will move him towards higher purpose of existence.

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## 1. Course Code and Name of Course

| Course Code | Name of Course  |
|-------------|---|
| HomUG-OM-I  | Organon of Medicine and Homoeopathic philosophy and Fundamentals of Psychology. |

## 2.COURSE OUTCOMES (CO):

***At the end of course in Organon of Medicine and Homoeopathic philosophy and Fundamentals of Psychology, the BHMS student shall be able to:***

1. Explain the Cardinal Principles and Fundamental laws of Homoeopathy.
2. Describe the concept of Health, Disease and Cure in Homeopathy
3. Interpret a case according to the Hahnemannian Classification of Disease
4. Apply the Theory of Chronic Disease to determine the miasmatical background in a case.
5. Demonstrate case taking and show empathy with the patient and family during case taking
6. Demonstrate Analysis, evaluation of the case to form the Portrait of disease
7. Apply the concept of Susceptibility to determine posology in a given case
8. Interpret the action of the medicine in a case on the basis of Remedy reactions.
9. Apply knowledge of various therapeutic modalities, auxiliary measures & its integration with prevalent & other concepts in the management of patients.
10. Identify the various obstacles to cure and plan treatment accordingly.
11. Display qualities, duties & roles of a Physician as true practitioner of healing art
12. Develop the competencies essential for primary health care in clinical diagnosis and treatment of diseases through the judicious application of homoeopathic principles
13. Recognize the scope and limitation of homoeopathy and to apply the Homoeopathic Principles for curative, prophylactic, promotive, palliative, and rehabilitative primary health care for the benefit of the individual and community.
14. Discern the relevance of other systems of medical practice for rational use of cross referral and life saving measures, so as to address clinical emergencies
15. Develop capacity for critical thinking and research aptitude as required for evidence based homoeopathic practice.
16. Demonstrate aptitude for lifelong learning and develop competencies as and when conditions of practice demand.

17. Be competent enough to practice homoeopathy as per the medical ethics and professionalism.
18. Develop the necessary communication skills to work as a team member in various healthcare setting and contribute towards the larger goals of national policies such as school health, community health, environmental conservation.
19. Identify socio-demographic, psychological, cultural, environmental & economic factors that affect health and disease and plan homoeopathic intervention to achieve the sustainable development Goal.

### **Specific Objectives of Organon of Medicine and Homoeopathic philosophy in 1<sup>st</sup> BHMS**

1. Recall the history of medicine and history of homoeopathy to relate its evolution
2. Correlate the first six aphorisms of Organon of Medicine for the study of anatomy, physiology, pharmacy.
3. Discuss the concept of health, indisposition and disease and its importance into the learning of anatomy, physiology, pharmacy and psychology
4. Discuss concept of Dynamization with health, disease and drug
5. Develop portrait of drug in the context of knowledge of anatomy, physiology, psychology and pharmacy
6. Explain the procedure and ethics of Drug proving

### **COURSE OUTCOMES (CO) of Organon of Medicine and Homoeopathic Philosophy for I BHMS**

At the end of I BHMS, the student should be able to,

1. Summarize the important milestones in the History of Medicine and development of Homoeopathy.
2. Value the contributions and qualities of Dr. Hahnemann as a physician and person
3. Recall the contributions of stalwarts in development of Homoeopathy
4. Explain the Cardinal Principles and Fundamental laws of Homoeopathy
5. Explain the Homoeopathic concept of Health, Disease and Cure in light of modern concepts
6. Apply Inductive and Deductive Logic in the study of the Basic principles of Homoeopathy
7. Describe the important features of the various editions and Ground plan of Organon of Medicine
8. Explain the meaning and significance of aphorisms §1-27
9. Relate the concepts of homoeopathic philosophy with other pre-, para-, and clinical skills by way of horizontal, vertical and spiral integration.

### **3. Contents of Course HomUG-OM-I**

#### **Course Contents-**

#### **1. Introduction:**

1.1. History of medicine

1.2. History of Homoeopathy

Short history of Hahnemann's life, his contributions, and situation leading to discovery of Homoeopathy

1.3. Brief history and contributions of Boenninghausen, Hering, Kent, R L Dutt, M L Sircar & B K Sarkar.

1.4. History and Development of Homoeopathy in brief in India, U.S.A. and European countries

1.5. Fundamental Principles of Homoeopathy.

1.6. Basic concept: Individualistic, Holistic & Dynamic

1.6.1. Life; Hahnemann's concept and modern concept.

1.6.2. Health: Hahnemann's concept and modern concept.

1.6.3. Disease: Hahnemann's concept and modern concept.

1.6.4. Cure.

1.7. Understanding Homoeopathy in vertical, horizontal & spiral integration with pre, para & clinical subject.

2. Logic: To understand Organon of medicine and homoeopathic philosophy, it is essential to be acquainted with the basics of LOGIC to grasp inductive and deductive reasoning. Preliminary lectures on inductive and deductive logic (with reference to philosophy book of Stuart Close Chapter 3 and 16).

3. § 1 to 27 of Organon of medicine, § 105 to 145

4. The physician – purpose of existence, qualities, duties and knowledge

5. Vital force- dynamization- homoeopathic cure- nature's law of cure & its Implications- drug proving

| <b>1: Topics with reference list referring to Chapters from the text books</b>   |             |         |        |         |
|--|-------------|---------|--------|---------|
| Topic  | Kent        | Roberts | Close  | Dhawale |
| Understanding the first six aphorisms and its application in the study of anatomy, physiology, pharmacy.                 | 1-6         | 1       | 6      | 4       |
| Concept of health, indisposition and disease and its importance in learning anatomy, physiology, pharmacy and psychology | 1 to 9      | 2, 3, 4 | 6      | 2       |
| Dynamization and relating with health, disease and drug  | 10, 11      | 2-6     | 14, 15 | 2, 16   |
| Developing portrait of drug with help of knowledge of anatomy, physiology, psychology and pharmacy                       | 13,21-25,26 | 15      | 15     | 16      |

#### **Non lectures– community – OPD/IPD -**

Students will be exposed to OPD/PD-community from first BHMS:

Students will understand the first six aphorisms in action and will get sensitized to socio-cultural-political-economical perspective of the community. They should develop insight into what constitutes health and how disease develops.

Introduce Journals from 1<sup>st</sup> year–

Habit of collecting evidence and noting them down vis-a-vis the expected objective will train them for evidence-based learning and inculcating the habit of using logic so inherent in Homoeopathic practice.

They also will realize the importance of skill and attitude and relevance of each subject in relation to Organon and Homoeopathic philosophy

They will write their experience of the clinic/OPD in relation to Observation/Cure/relief/Mission/Prevention/acute/chronic/indisposition etc.

- (i) 5 medicines from HMM to correlate with Physiology-Anatomy-Pharmacy.
- (ii) 5 cases observed in OPD

### Teaching Learning Method

Assignments- Group work

Problem Based Learning through Cases- Literature

Group Discussion – Problem based learning

Project work with its presentations in class

Practicing Evaluation & Feedback system- after Project work, assignments & Group Discussions.

### Teaching Hours-

| 1 <sup>st</sup> BHMS Organon Classroom teaching and non-lecture hours |                             |             |
|---|-----------------------------|-------------|
| YEAR  | TEACHING HOURS-<br>LECTURES | Non-lecture |
| 1 <sup>ST</sup> BHMS  | 130                         | 78          |

### Teaching Hours Theory

| Sr. No. | List of Topics  | Term   | Lectures  | Non-Lectures |
|---------|---|--------|-----------|--------------|
| 1       | History of medicine in brief<br>History and Development of Homoeopathy In brief in India, U.S.A. & European Countries   | I      | 5         | 5            |
| 2       | Short history of Hahnemann's life, his contributions & situation leading to discovery of Homoeopathy  | I      | 5         | 5            |
| 3       | Brief History & Contributions of Boenninghausen, Hering, Kent, RL Dutt, ML Sircar & BK Sircar   | I      | 15        |              |
| 4       | Logic: To understand organon of medicine & homoeopathic philosophy, it is essential to be acquainted with the basics of LOGIC to grasp inductive & deductive reasoning. Preliminary lectures on inductive & deductive logic with reference to philosophy of Stuart Close. | I      | 5         | 5            |
| 5       | Science & Art in Homoeopathy  | I      | 5         |              |
| 6       | Different Editions & Constructions of Hahnemann's Organon of Medicine   | I      | 10        | 5            |
| 7       | Fundamental Principles of Homoeopathy   | II     | 20        | 5            |
| 8       | Basic concept of: Individualistic & Holistic<br>Life: Hahnemann's concept & Modern Concept<br>Health: Hahnemann's Concept & Modern Concept<br>Disease: Hahnemann's Concept & Modern Concept<br>Cure: Hahnemann's Concept & Modern Concept                                 | II     | 5         | 5            |
| 9       | §1-27&105-145 of Organon of medicine  | II/III | 60(20+40) | 48           |
|         |   |        | 130       | 78           |

#### 4. Table 2-Learning Objectives (Theory) of Course HomUG-OM-I

| Generic Competency                        | Subject Area   | Millers Level: Does/Shows how/ Knows how/ Knows | Specific Competency                                   | SLO/ Outcome  | Blooms Domain | Guilbert's Level                  | Must Know / Desirable to know / Nice to know | T-L Methods                               | Formative Assessment | Summative Assessment | Integration Departments- Horizontal/ Vertical/ Spiral |
|---|--|---|---|---|---------------|-----------------------------------|--|---|----------------------|----------------------|---|
| <b>TOPIC 1(1.1) – HISTORY OF MEDICINE</b> |  |   |   |   |               |                                   |  |   |                      |                      |   |
| Acquiring and Integration of Information  | History of Medicine as it is evolved with important milestones | Knows   | Explain History of Medicine with important milestones | Describe the evolution of Medicine                                      | Cognitive     | Level II Understand and interpret | Must Know                                    | Lecture, small group discussion, Seminars | MCQ, SAQ, LAQ, Quiz  | MCQ, SAQ, LAQ, Viva  | <b>Practise of medicine</b>                           |
|   |  | Knows   |   | Summarize important Milestones in Development and Evolution of Medicine | Cognitive     | Level II Understand and interpret | Nice to Know                                 | Lecture, small group discussion, Seminars | MCQ, SAQ, LAQ, Quiz  | MCQ, SAQ, LAQ, Viva  | <b>Practise of medicine</b>                           |
|   |  | Knows   |   | Describe the contribution of various                                    | Cognitive     | Level II Understand and interpret | Nice to Know                                 | Lecture, small group                      | MCQ, SAQ, LAQ,       | MCQ, SAQ, LAQ,       | <b>Practice of medicine</b>                           |

|   |   |       |                                 |                                      |           |                                   |           |   |                     |                     |                                 |
|---|---|-------|---------------------------------|--------------------------------------|-----------|-----------------------------------|-----------|---|---------------------|---------------------|---------------------------------|
|   |   |       |                                 | Stalwarts in development of medicine |           |                                   |           | discussion, Seminars                    | Quiz                | Viva                |                                 |
| <p><b>TOPIC 1(1.2) – HISTORY OF HOMOEOPATHY</b></p> |   |       |                                 |                                      |           |                                   |           |   |                     |                     |                                 |
| Acquiring and Integration of Information            | History of Homoeopathy as it is evolved with important milestones | Knows | Describe History of Homoeopathy | Describe History of Homoeopathy      | Cognitive | Level II Understand and interpret | Must Know | Lecture small group discussion Seminars | MCQ, SAQ, LAQ, Quiz | MCQ, SAQ, LAQ, Viva | <b>Materia Medica repertory</b> |
|   |   |       |                                 | Describe the important               | Cognitive | Level II Understand               | Must Know | Lecture small                           | MCQ, SAQ,           | MCQ, SAQ,           | <b>Materia Medica</b>           |

|  |  |  |  |  |           |   |              |   |                              |                              |                                     |
|--|--|--|--|--|-----------|---|--------------|---|------------------------------|------------------------------|-------------------------------------|
|  |  |  |  | milestones in the evolution of Homoeopathy                                       |           | and interpret                           |              | group discussion<br>Seminars<br>Quiz                        | LAQ,<br>Quiz                 | LAQ,<br>Viva                 | <b>repertory</b>                    |
|  |  |  |  | Discuss the significance of important milestones in the evolution of Homoeopathy | Cognitive | Level II<br>Understand<br>and interpret | Must<br>Know | Lecture<br>small<br>group<br>discussion<br>Seminars<br>Quiz | MCQ,<br>SAQ,<br>LAQ,<br>Quiz | MCQ,<br>SAQ,<br>LAQ,<br>Viva | <b>Materia Medica<br/>repertory</b> |
| <p><b>TOPIC 1(1.2) – LIFE HISTORY OF DR. HAHNEMANN</b></p> |  |  |  |  |           |   |              |   |                              |                              |                                     |

|  |                          |       |  |  |           |                                   |                   |  |                     |                     |                          |
|--|--------------------------|-------|--|--|-----------|-----------------------------------|-------------------|--|---------------------|---------------------|--------------------------|
| Acquiring and Integration of Information                       | Hahnemann's Life History | Knows | Describe Hahnemann's Life History                  | Explain in detail the Life history of Dr. Hahnemann with his contribution towards Homoeopathy                                    | Cognitive | Level II Understand and interpret | Must Know         | Lecture Small Group Discussions Presentation | MCQ, SAQ, LAQ, Quiz | MCQ, SAQ, LAQ, Viva | Materia Medica           |
|  |                          |       |  | Discuss the contribution and qualities of Dr.Hahnemann as a physician and person   | Affective | Level II Understand and interpret | Must Know         | Lecture Small Group Discussions Presentation | MCQ, SAQ, LAQ, Quiz | MCQ, SAQ, LAQ, Viva |                          |
| <b>TOPIC 1(1.3) – LIFE HISTORY OF STALWARTS OF HOMOEOPATHY</b> |                          |       |  |  |           |                                   |                   |  |                     |                     |                          |
| Acquiring and Integration of Information                       | Stalwarts of Homoeopathy | Knows | Life History of Different Stalwarts In Homoeopathy | Describe Life History of Following stalwarts Dr. Kent, Dr. Boger, Dr.Boenninghausen. Dr, Hering, Dr. T.F. Allen, Dr. M.L. Sircar | Cognitive | Level II Understand and interpret | Desirable to know | Lecture Small Group Discussions Seminars     | MCQ, SAQ, LAQ, Quiz | MCQ, SAQ, LAQ, Viva | Materia Medica Repertory |

|   |   |       |   |   |           |                                   |                   |   |                     |                     |                          |
|---|---|-------|---|---|-----------|-----------------------------------|-------------------|---|---------------------|---------------------|--------------------------|
|   |   |       |   |   |           |                                   |                   |   |                     |                     |                          |
|   |   |       |   | Discuss the Contributions of stalwarts in development of Homoeopathy                  | Cognitive | Level II Understand and interpret | Desirable to know | Lecture Small Group Discussion Seminars | MCQ, SAQ, LAQ, Quiz | MCQ, SAQ, LAQ, Viva | Materia Medica Repertory |
| <b>TOPIC 1(1.4) – HISTORY &amp; DEVELOPMENT OF HOMOEOPATHY IN INDIA. USA &amp; EUROPEAN COUNTRIES</b> |   |       |   |   |           |                                   |                   |   |                     |                     |                          |
| Acquiring and Integration of Information  | History & Development of Homoeopathy in India, USA & European Countries | Knows | History & Development of Homoeopathy in India, USA & European Countries | Explain the History & development of Homoeopathy in India, USA and European countries | Cognitive | Level II Understand and interpret | Desirable to know | Lecture Small Group Discussion Seminars | MCQ, SAQ, LAQ, Quiz | MCQ, SAQ, LAQ, Viva | Materia Medica           |
|   |   | Knows |   | Discuss the Contributions of stalwarts in development of Homoeopathy                  | Cognitive | Level II Understand and interpret | Desirable to know | Lecture Small Group Discussion          | MCQ, SAQ, LAQ, Quiz | MCQ, SAQ, LAQ, Viva | Materia Medica Repertory |

|   |  |       |   |   |               |   |              |   |                              |                              |  |
|---|--|-------|---|---|---------------|---|--------------|---|------------------------------|------------------------------|--|
|   |  |       |   | y in India,<br>USA and<br>European<br>countries   |               |   |              | Seminar<br>s  |                              |                              |  |
| <p><b>TOPIC 1(1.5): Fundamental Principles of Homoeopathy</b></p> |  |       |   |   |               |   |              |   |                              |                              |  |
| Acquirin<br>g and<br>Integrati<br>on of<br>Informat<br>ion        | Fundame<br>ntal<br>Principles<br>of<br>Homoeop<br>athy | Knows | Understa<br>nding the<br>Fundame<br>ntal<br>Principles<br>that<br>govern<br>Homoeop<br>athy | Enumerate<br>the cardinal<br>principles of<br>Homoeopath<br>y                                     | Cognit<br>ive | Level II<br>Understand<br>and interpret | Must<br>know | Lecture<br>Small<br>Group<br>Discussi<br>on<br>Seminar<br>s | MCQ,<br>SAQ,<br>LAQ,<br>Quiz | MCQ,<br>SAQ,<br>LAQ,<br>Viva | Materia<br>Medica<br><b>Pharmacy</b>   |
|   |  | Knows |   | Explain the<br>Cardinal<br>Principles and<br>Fundamental<br>laws of<br>Homoeopath<br>y            | Cognit<br>ive | Understand<br>(Level II)                | Must<br>know | Lecture<br>Small<br>Group<br>Discussi<br>on<br>Seminar<br>s | MCQ,<br>SAQ,<br>LAQ,<br>Quiz | MCQ,<br>SAQ,<br>LAQ,<br>Viva | <b>Materia<br/>Medica<br/>Pharmacy</b> |
|   |  | Knows |   | Describe the<br>significance<br>and<br>importance<br>of Cardinal<br>Principles and<br>Fundamental | Cognit<br>ive | Understand<br>(Level II)                | Must<br>know | Lecture<br>Small<br>Group<br>Discussi<br>on<br>Seminar      | MCQ,<br>SAQ,<br>LAQ,<br>Quiz | MCQ,<br>SAQ,<br>LAQ,<br>Viva | <b>Materia<br/>Medica<br/>Pharmacy</b> |

|   |                                    |       |  |   |           |                       |           |  |                              |                              |   |
|---|------------------------------------|-------|--|---|-----------|-----------------------|-----------|--|------------------------------|------------------------------|---|
|   |                                    |       |  | laws  |           |                       |           | s  |                              |                              |   |
| <b>TOPIC 1(1.6): Concept of Health Disease and Cure as per Hahnemann's concept and correlation with modern concept.</b> |                                    |       |  |   |           |                       |           |  |                              |                              |   |
| Acquiring and Integration of Information  | Concept of Health Disease and Cure | Knows | Knowledge and application of concept of Health, Disease and Cure | Define the terms Health, disease and cure according to Dr. Hahnemann        | Cognitive | Remember (Level I)    | Must know | Lecture<br>Small Group<br>Discussion<br>Seminars | MCQ,<br>SAQ,<br>LAQ,<br>Quiz | MCQ,<br>SAQ,<br>LAQ,<br>Viva | <b>Anatomy<br/>physiology<br/>pharmacy<br/>Materia Medica</b> |
|   |                                    | Knows |  | Define the terms Health, disease and cure according to modern concept.      | Cognitive | Remember (Level I)    | Must know | Lecture<br>Small Group<br>Discussion<br>Seminars | MCQ,<br>SAQ,<br>LAQ,<br>Quiz | MCQ,<br>SAQ,<br>LAQ,<br>Viva | <b>Anatomy<br/>physiology<br/>pharmacy</b>                    |
|   |                                    | Knows |  | Explain Health, disease and cure according to Dr Hahnemann                  | Cognitive | Understand (Level II) | Must know | Lecture<br>Small Group<br>Discussion<br>Seminars | MCQ,<br>SAQ,<br>LAQ,<br>Quiz | MCQ,<br>SAQ,<br>LAQ,<br>Viva | <b>Anatomy,<br/>physiology,<br/>pharmacy</b>                  |
|   |                                    | Knows |  | Differentiate the Hahnemannian concept of health, disease and cure from the | Cognitive | Understand (Level II) | Must know | Lecture<br>Small Group<br>Discussion<br>Seminar  | MCQ,<br>SAQ,<br>LAQ,<br>Quiz | MCQ,<br>SAQ,<br>LAQ,<br>Viva | <b>Materia Medica<br/>Anatomy<br/>Physiology<br/>Pharmacy</b> |

|  |   |       |  |  |               |                          |              |   |                              |                              |  |
|--|---|-------|--|--|---------------|--------------------------|--------------|---|------------------------------|------------------------------|--|
|  |   |       |  | modern concept   |               |                          |              | s   |                              |                              |  |
| <b>TOPIC 1(1.7): Different editions and Constructions of Organon of Medicine</b> |   |       |  |  |               |                          |              |   |                              |                              |  |
| Acquirin<br>g and<br>Integrati<br>on of<br>Informat<br>ion                       | Different<br>editions<br>and<br>Constructi<br>ons of<br>Organon<br>of<br>Medicine | Knows | Significan<br>ce of<br>Different<br>editions<br>and<br>Constructi<br>ons of<br>Organon<br>of<br>Medicine | Explain the<br>history &<br>development<br>different<br>editions and<br>Constructions<br>of Organon of<br>Medicine | Cognit<br>ive | Understand<br>(Level II) | Must<br>know | Lecture<br>Small<br>Group<br>Discussi<br>on<br>Seminar<br>s | MCQ,<br>SAQ,<br>LAQ,<br>Quiz | MCQ,<br>SAQ,<br>LAQ,<br>Viva | <b>Materia<br/>Medica<br/>physiolog<br/>y and<br/>pharmacy</b> |
|  |   | Knows |  | Differentiate<br>between<br>Different<br>editions and<br>Constructions<br>of Organon of<br>Medicine                | Cognit<br>ive | Understand<br>(Level II) | Must<br>know | Lecture<br>Small<br>Group<br>Discussi<br>on<br>Seminar<br>s | MCQ,<br>SAQ,<br>LAQ,<br>Quiz | MCQ,<br>SAQ,<br>LAQ,<br>Viva | <b>Materia<br/>Medica<br/>Pharmacy</b>                         |
| <b>Topic 2: Logic</b>  |   |       |  |  |               |                          |              |   |                              |                              |  |
| Acquirin   | Logic in  | Knows | Utility and  | Explain  | Cognit        | Level 2                  | Must         | Lecture   | MCQ,                         | MCQ,                         | <b>Materia</b>   |

|  |                 |       |   |  |               |  |              |   |                              |                              |   |
|--|-----------------|-------|---|--|---------------|--|--------------|---|------------------------------|------------------------------|---|
| g and Integrati<br>on of Informat<br>ion             | Homoeop<br>athy |       | Correlating<br>Logic to<br>Homoeopat<br>hy              | Inductive Logic<br>2.Deductive<br>Logic  | ive           | Understand<br>and interpret                  | know         | Small<br>Group<br>Discussi<br>on<br>Seminar<br>s            | SAQ,<br>LAQ,<br>Quiz         | SAQ,<br>LAQ,<br>Viva         | <b>Medica<br/>Repertory</b>   |
|  |                 | Knows |   | Differentiate<br>between<br>inductive and<br>deductive<br>logic using<br>examples  | Cognit<br>ive | Level 2<br>Understand<br>and interpret       | Must<br>know | Lecture<br>Small<br>Group<br>Discussio<br>n<br>Seminars     | MCQ,<br>SAQ,<br>LAQ,<br>Quiz | MCQ,<br>SAQ,<br>LAQ,<br>Viva |   |
|  |                 | Knows |   | Apply the<br>concept of<br>Inductive and<br>Deductive<br>Logic to the<br>Fundamental<br>Principles of<br>Homoeopath<br>y | Cognit<br>ive | Level III<br>Decision/pr<br>oblem<br>solving | Must<br>know | Lecture<br>Small<br>Group<br>Discussio<br>n<br>Seminars     | MCQ,<br>SAQ,<br>LAQ,<br>Quiz | MCQ,<br>SAQ,<br>LAQ,<br>Viva | <b>Repertory</b>  |
| <b>Topic3: Aphorisms 1-27 and 105-145</b>            |                 |       |   |  |               |  |              |   |                              |                              |   |
| Acquirin<br>g and Integrati<br>on of Informat<br>ion | Aphorism        | Knows | Understa<br>nding the<br>meaning<br>of<br>Aphorism<br>s | Explain the<br>meaning<br>and<br>significance<br>of<br>Aph. 1-27   | Cognit<br>ive | Understand<br>(Level II)                     | Must<br>know | Lecture<br>Small<br>Group<br>Discussi<br>on<br>Seminar<br>s | MCQ,<br>SAQ,<br>LAQ,<br>Quiz | MCQ,<br>SAQ,<br>LAQ,<br>Viva | <b>Anatomy,<br/>Physiolog<br/>y<br/>Pharmacy<br/>Materia<br/>Medica</b> |
|  |                 |       |   | Explain  | Cognit        | Understand                                   | Must         | Lecture   | MCQ,                         | MCQ,                         | Integrate   |

|   |                        |       |   |  |           |                       |                   |   |                     |                     |                                       |
|---|------------------------|-------|---|--|-----------|-----------------------|-------------------|---|---------------------|---------------------|---------------------------------------|
|   |                        |       |   | Drug proving as per Aph 105-145  | ive       | (Level II)            | know              | Small Group Discussion, seminar         | SAQ, LAQ, Quiz      | SAQ, LAQ, Viva      | d teaching with Homoeopathic Pharmacy |
| <p><b>Topic 4 :Physician- Purpose of existence, qualities, duties and knowledge</b></p> |                        |       |   |  |           |                       |                   |   |                     |                     |                                       |
| Acquiring and Integration of Information  | Homoeopathic Physician | Knows | Qualities and Attributes of a Physician | Recognize the qualities, duties and knowledge expected from a physician                          | Affective | Receiving             | Desirable to know | Lecture Small Group Discussion Seminars | MCQ, SAQ, LAQ, Quiz | MCQ, SAQ, LAQ, Viva |                                       |
|   |                        |       |   | Explain the Mission, qualities, duties & role of a Physician as true practitioner of healing art | Cognitive | Understand (Level II) | Must know         | Lecture Small Group Discussion Seminars | MCQ, SAQ, LAQ, Quiz | MCQ, SAQ, LAQ, Viva |                                       |
|   |                        |       |   |  |           |                       |                   |   |                     |                     |                                       |

| Topic 5: Vital force- dynamisation- homoeopathic cure- natures law of cure & its Implications- drug proving |   |       |   |  |            |                       |           |   |                     |                     |                                |
|---|---|-------|---|--|------------|-----------------------|-----------|---|---------------------|---------------------|--------------------------------|
| Acquiring and Integrati on of Informati on  | Concept of Vital Force and Drug Dynamizati on | Knows | Importanc e of Vital Force in health, disease and Cure and Drug Dynamizati on | Explain the roleof vital force in health, disease and cure | Cogniti ve | Understand (Level II) | Must know | Lecture Small Group Discussio n Seminars  | MCQ, SAQ, LAQ, Quiz | MCQ, SAQ, LAQ, Viva | <b>Materia Medica Pharmacy</b> |
|   |   | Knows |   | Explain the concept of Homoeopat hic Dynamizatio n         | Cogniti ve | Understand (Level II) | Must know | Lecture Small Group Discussio n Seminars  | MCQ, SAQ, LAQ, Quiz | MCQ, SAQ, LAQ, Viva | <b>Materia Medica Pharmacy</b> |
|   |   | Knows |   | Enumerate the methods of Homoeopat hic Dynamizatio n       | Cognit ive | Remember (Level I)    | Must know | Lecture Small Group Discussio n Seminars  | MCQ, SAQ, LAQ, Quiz | MCQ, SAQ, LAQ, Viva | <b>Pharmacy</b>                |
|   |   | Knows |   | Explain the Nature's therapeutic law of cure               | Cognit ive | Understand (Level II) | Must know | Lecture Small Group Discussi on Seminar s | MCQ, SAQ, LAQ, Quiz | MCQ, SAQ, LAQ, Viva |                                |

|  |  |       |  |  |               |                           |              |   |                              |                              |          |
|--|--|-------|--|--|---------------|---------------------------|--------------|---|------------------------------|------------------------------|----------|
|  |  |       |  |  |               |                           |              |   |                              |                              |          |
|  |  | Knows |  | Apply<br>Nature<br>therapeutic<br>law of cure<br>to<br>Homoeopa<br>thy | Cognit<br>ive | Understand<br>(Level III) | Must<br>know | Lecture<br>Small<br>Group<br>Discussi<br>on<br>Seminar<br>s | MCQ,<br>SAQ,<br>LAQ,<br>Quiz | MCQ,<br>SAQ,<br>LAQ,<br>Viva |          |
|  |  | Knows |  | Explain<br>Drug<br>Proving   |               |                           |              |   | MCQ,<br>SAQ,<br>LAQ,<br>Quiz | MCQ,<br>SAQ,<br>LAQ,<br>Viva | Pharmacy |

**Table 3.** Non-Lecture Activities

| Sr. No | Non-Lecture Teaching Learning methods | Total Time Allotted per Activity (Hours) |
|--------|---------------------------------------|--|
| 1      | Seminars/ Workshops                   | 78 hours                                 |
| 2      | Group Discussions                     |  |
| 3      | Problem based learning                |  |
| 4      | Integrated Teaching                   |  |
| 5      | Case Based Learning                   |  |
| 6      | Self-Directed Learning                |  |
| 7      | Tutorials, Assignments, Projects      |  |
|        | <b>Total</b>                          | <b>78 hours</b>                          |

## Psychology

### Preamble

Mind is an invisible dynamic force operating on the body which can be seen and felt with its expressions at multiple levels. While understanding Man it is important to know how he behaves, feels and thinks in general of his life and in different situations.

Health is that balanced condition of the living organism in which the integral, harmonious performance of the vital functions tends to the preservation of the organism ensuring the normal development of the individual. In a similar way, study of mind is an inseparable component of the study of man and is essential for prescribing. Thus mind remains an integral component of Homoeopathic prescribing.

In § 5 of Organon of Medicine, Dr Hahnemann talked of basic knowledges required for Homoeopathic practice of Holistic cure. According to him homoeopathic physician has to have knowledge of :

- a. Constitution of Man
- b. His moral & intellectual character
- c. Mode of living habits
- d. His social & domestic relations
- e. His adaptations with the environment

Above knowledge will help the Homoeopathic physician not only to understand the person in the patient but also to identify the cause of suffering by delving in to detailed enquiry. This may take the form of exploring evolutionary aspects from childhood to present, from family history – past history to present illness - all of which will indicate the qualities of the human in health as well as in disease.

Psychology is a science of mind and behaviour which is important and necessary in all areas of life including the growth and development of human being. Theoretically, psychology examines psychological phenomena and behavioural patterns that appear as individual's external behavioural reactions against any stimulus - be it Biological–Psychological– Emotional –Social-Spiritual.

Modern concept of psychology has talked of Mental Health and Hygiene which indicates the importance and great need for ensuring psychological wellbeing in us. This state is under constant stress due to the rapid changes taking place in the life situation due to internal pressures and external environment.

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**Course outcomes:**

1. Explain the concept of Mind as perceived by Hahnemann and other stalwarts
2. Define the structure of the mind as conscious and unconscious and its various constituents / components in terms of Emotion, Thinking, Behaviour, Sleep and Dreams
3. Identify the conscious expressions of Mind as Emotion, Thought and Behaviour
4. Explain the neurophysiological basis of mental functioning

5. Discuss the relationship between the growth of the brain and the mind and its correlation with physical growth of the from infancy to old age and psychosocial development.
6. Evaluate the role that emotions and intellectual functions play in our daily lives
7. Derive the importance of the role of 'Learning' in human adaptation and change
8. Discuss 'Personality' as a synthesis of inborn traits and learnt responses occurring over the growing years
9. Realize the various forms of 'conflict', their origins and their role in determining the quality of our personal and social lives
10. Integrate the concept of mind as conceived in homoeopathic philosophy with that in modern psychology
11. Demonstrate the importance of the study of the Mind in approaching the study of Repertory and Materia Medica
12. Realize how a healthy individual experiences the harmonious functioning of the different constituents of the mind
13. Summarise the importance of knowledge of Psychology in Modern life and in Homoeopathic practice

### **General Instructions**

1. Instructions in psychology should be planned in such a way that students should be able to present a basic understanding of the structure of mind, brain and its functioning with the kind of interrelationship they are sharing with each other.
2. Each topic should be planned in parallel with others subjects of Homeopathy where ever relevant to achieve integration with other subjects.
3. Since this subject is dealing with the human mind and its functions, topic should be dealt in more interactive ways where maximum learning will be achieved by doing rather than memorizing the things.
4. Emphasis would be more on the organization of the brain areas, their functions and correlated with the medical concept and philosophical concept of Mind.
5. Student should learn the psychological organization with learning the importance of special senses and their functions in great details that forms the foundation of the subject.
6. Most of the basic topics can be studied in interactive ways, discussion based on clinical case or any relevant event/ incidence of daily life.
7. Topics having philosophical connection should be taught with the help of discussion or in the form of story -telling with connections to the principles of philosophy.
8. Topics requiring a lot of analysis of information can be taught with role-play with directed observation method followed by discussion on the same pointing out its relevance and importance.
9. Nice to know topics along with a lot of community related information should be dealt with survey methods
10. Topics which are interrelated with other subjects of Homoeopathy should be presented and discussed.

11. Lectures or demonstration on the clinical and applied part of psychology should be arranged in the 3<sup>rd</sup> semester of the course and it should aim at demonstrating the structural-physiological –psychological basis of mental expressions of the symptoms and its value in Homeopathy.
12. Learning of applied psychology would be more qualitative in the various OPDs/Peripheral OPDs where contact with community will improve their knowledge, observation skills, attitude of communication with the community.
13. Some of the theoretical lectures should conclude with discussion on the learning achieved with its importance.
14. Periodical seminars on general topics related to philosophical aspect and its connection with psychology should be arranged for vertical, horizontal and spiral integration.
15. Role of observation and correlation should be demonstrated while discussing the intricacies of the subject of psychology.
16. Inter-departmental or joint seminars should be planned
17. While working on community survey- purpose should be kept very broad with the following objectives.
  - (i) Experiencing the community in actuality for the demographic configuration, different cultural traditions, different practices and inter-relationship and its effect on Mind and Body as a joint system.
  - (ii) Learning the functioning of human being in multiple situations of stress and process of getting adapted with those.
  - (iii) Quality of Mental Health of the community and its varied expressions
  - (iv) Quality of Inter-relationship within different castes, communities, religions and its impact on Individuals

#### **Course contents:**

Note: Each topic should be related with relevant clinical examples and the relationship with the subjects of Homoeopathic Philosophy, Materia Medica and Repertory must be made.

1. Introduction to the study of Mind in Homoeopathy
  - A. Concept of Mind- i. Contemporary schools of psychology
    - ii. Concept of Mind by Hahnemann
2. Psychological organization and the interrelationship of Thought (Cognition), Feelings (Affect) and Behaviour (Conation); Conscious and Unconscious elements

- A. Psychological Organisation
    - i. Definition of Emotions and its types
    - ii. Definition of Thinking and its types
    - iii. Definition of Behaviour and its types
  - B. Effects on Thought (Cognition), Feelings (Affect) and Behaviour (Conation) on Mind and Body
  - C. Interrelationship of Thought (Cognition), Feelings (Affect) and Behaviour (Conation) on Mind and Body
  - D. Representation of Thought (Cognition), Feelings (Affect) and Behaviour (Conation) in Materia Medica
  - E. Representation of Thought (Cognition), Feelings (Affect) and Behaviour (Conation) in Repertory
- 3. Physiological and Evolutionary basis of behaviour -
  - A. Instincts, Conditioned and unconditioned reflexes
  - B. Conscious and unconscious behaviour
  - C. Scientific study of Behaviour and its expressions
  - D. Evolutionary study of behaviour
  - E. Understanding Relationship of Behaviour to Emotions and Thought
  - F. Expressions of Behaviour in Repertory and Materia Medica
- 4. Understanding Emotion, its different definitions and expressions in Repertory and Materia Medica
  - A. Scientific study of Emotions
    - i. Definition of Emotions and its types
    - ii. Effects Emotions on Mind and Body
    - iii. Effect of emotions on sexual behaviour
    - iv. Interrelationship of Emotions on Mind and Body
  - B. Representation of Emotions in Materia Medica-
  - C. Representation of Emotions in Repertory
- 5. Understanding Intellect: Attention, memory and its function and expression in Repertory and Materia Medica
  - Basic concepts of Thinking
    - A. Definition of Thinking and its types
    - B. Intelligence and its measurement
    - C. Effects of Thinking /Thought (Cognition) on Mind and Body
    - D. Representation of Thinking /Thought (Cognition) in Materia Medica
    - E. Representation of Thinking /Thought in Repertory

6. Motivation and their types with role in our lives
  - Study of Motivation and its types
  - Importance of study of Motivation for Homoeopathic Physicians
7. Learning and its place in adaptation
  - A. Study Learning:
    - Definition of Learning and its types
    - Study of relevance of Learning for Homoeopathic Physician
    - Study of disturbances/ malfunctioning of Learning
  - B. Adaption
    - Definition and its dynamic nature
    - Successful and unsuccessful adaptation
8. Growth and development of Mind and its expressions from Infancy to old age
  - Study of Developmental Psychology
    - i. Normal developments since birth to maturity (both physical and psychological)
    - ii. Deviations- in Growth and Development and its effects on later behaviour
    - iii. Understanding the bio-psycho-socio-cultural-economical-political-spiritual concept of evolution
    - iv. Importance of above study to understand Materia Medica drug proving
9. Structure of Personality, the types, their assessment, relationship to Temperament and representation in Materia Medica
  - i. Definition of Personality and its types
  - ii. Various constituents of Personality like Traits and Temperament
  - iii. Theories of Personality by psychologists
  - iv. Measures for the assessment of Personality, relationship to Temperament and representation in Materia Medica
10. Conflicts: their genesis and effects on the mind and body
  - i. Conflicts and their types
  - ii. Genesis of Conflicts and effects on the mind and body
  - iii. Genesis of Conflicts and related Materia Medica images

11. Applied Psychology: Clinical, Education, Sports, Business, Industrial  
 Application of knowledge of Psychological Components and its Integration in understanding
- Psychological basis of Clinical Conditions
  - Education
  - Sports
  - Business
12. Psychology and Its importance in Homoeopathic Practice for Holistic management of the Patient.

**Semester 1 Topic 1: 1. Introduction to Psychology with overview of different schools**

| Sr.No 1        | Generic competency     | Subject area       | Millers Know/<br>Know<br>how/<br>Show<br>how/<br>Does | Specific competency             | Specific Learning Objectives / Outcomes | Bloom's domain | Guilbert's level    | Must know / desirable to know / nice to know | TL method / media  | Formative Assessment  | Summative Assessment | Integration - Horizontal / Vertical / Spiral             |
|----------------|------------------------|--------------------|---|---------------------------------|---|----------------|---------------------|--|--------------------|-----------------------|----------------------|--|
| HomUG-OM-I.1.1 | Information collection | What is Psychology | Knows   | Discuss Psychology as a science | Define Psychology                       | Cognitive      | Recall level I      | Must know                                    | Class room Lecture | MCQ                   | SAQ<br>LAQ           |  |
|                | Information collection |                    | know  |                                 | Discuss the psychology as a science     | cognitive      | understand level II | Desirable to know                            | Lecture            | True /False sentences | Short Note           | Concept of Logic-Inductive /Deductive Logic from Organon |
|                | Information            |                    | Knows   |                                 | Discuss the factors                     | Cognitive      | Understand          | Must   | Lecture            | MCQ                   | SAQ                  |  |

|                |                            |                                 |           |  |   |           |                     |                   |                         |     |             |   |
|----------------|----------------------------|---------------------------------|-----------|--|---|-----------|---------------------|-------------------|-------------------------|-----|-------------|---|
|                | Analysis                   |                                 |           |  | which make Psychology as a science  |           | Level II            | know              |                         |     | Viva        |   |
|                | Integration of information |                                 | Knows how |  | Explain the utility of the subject for a Homoeopath   | Cognitive | Interpret Level II  | Desirable to know | Lecture with discussion | MCQ | SAQ<br>Viva | Horizontal integration with Organon   |
| HomUG-OM-I.1.2 | Information collection     | Different schools of Psychology | Knows     | Know the different schools of Psychology | Classify different schools of psychology based on their Concept and objectives and methods. | Cognitive | Understand Level II | Must know         | Class room lecture      | SAQ | SAQ<br>Viva | Concept of Man/<br><br>Individualization from the Organon( useful as a preparation of concept for next topic) |

| Sr.No<br>2                 | Generic<br>competency                        | Subject<br>area  | Miller<br>s<br>Know<br>/<br>Know<br>how/<br>Show<br>how/D<br>es | Specific<br>competency  | Specific<br>Learning<br>Objectives /<br>Outcomes  | Bloom<br>'s<br>domain | Guilbert<br>'s<br>level              | Must<br>know<br>/<br>desirable to<br>know<br>/<br>nice<br>to<br>know | TL<br>method<br>/<br>media  | Formative<br>Assessment                     | Summative<br>Assessment | Integration<br>-<br>Horizontal /<br>Vertical /<br>Spiral                        |
|----------------------------|--|--|---|---|---|-----------------------|--------------------------------------|--|---|---|-------------------------|---|
| Hom<br>UG-<br>OM-<br>I.2.1 | Information<br>collection                    | Concept<br>of Mind in<br>Psychology and<br>Homoeopathy | Know<br>s   | Describe<br>the<br>concept<br>of Mind                             | Describe<br>the<br>concept<br>of Mind<br>in<br>different<br>schools<br>of<br>psychology | Cognitive             | Understand and<br>interpret Level II | Must<br>know   | Lecture/(<br>use of<br>'Story<br>telling')/<br>and<br>Discussion on<br>concept<br>of Mind | MCQ   | LAQ / SAQ               | Organon<br>-Concept<br>of Mind<br>as per<br>Hahnemann/<br>Kent<br>/BB/<br>Boger |
| Hom<br>UG-<br>OM-<br>I.2.2 | Information<br>organization and<br>synthesis |  | Know<br>s   | Relate<br>concepts<br>of Mind in<br>psychology and<br>homoeopathy | Discuss<br>concept<br>of Mind<br>as in<br>Organon                                       | Cognitive             | Integrate Level<br>III               | Must<br>know   | Small<br>group<br>discussion Charts<br>/ Models<br><br>Audio-<br>visual<br>aids           | Quiz<br><br>True-<br>false<br>test<br>items | LAQ/SAQ/<br>Viva        | Horizontal<br>Organon   |

|  |          |  |           |  |  |               |                            |                    |         |     |     |  |
|--|----------|--|-----------|--|--|---------------|----------------------------|--------------------|---------|-----|-----|--|
|  |          |  |           |  |  |               |                            |                    |         |     |     |  |
|  | Analysis |  | Know<br>s |  | Compar<br>e and<br>contras<br>t<br>concept<br>of mind<br>in<br>Organo<br>n with<br>that in<br>differen<br>t<br>schools<br>of<br>psychol<br>ogy | Cognit<br>ive | Underst<br>and<br>Level II | Nice<br>to<br>know | Lecture | MCQ | SAQ |  |

**Semester 1 –Topic- 3-Psychological organization of Mind and its interrelationship with Thought (Cognition), Feelings (Affect) and Behaviour (Conation)**

| Sr.No<br>3                 | Generic<br>competency         | Subject<br>area  | Miller<br>s<br>Know<br>/<br>Know<br>how/<br>Showh<br>w/<br>Does | Specific<br>competen<br>cy                              | Specific<br>Learnin<br>g<br>Objectiv<br>es /<br>Outcom<br>es  | Bloo<br>m's<br>domai<br>n | Guilber<br>t's<br>level    | Must<br>know<br>/<br>desira<br>ble to<br>know<br>/<br>nice<br>to<br>know | TL<br>metho<br>d /<br>media                 | Forma<br>tive<br>Assess<br>ment                    | Summ<br>-ative<br>Asses<br>s<br>ment | Integration<br>-<br>Horizontal /<br>Vertical / Spiral                                    |
|----------------------------|-------------------------------|--|---|---|---|---------------------------|----------------------------|--|---|--|--------------------------------------|--|
| Hom<br>UG-<br>OM-<br>I.3.1 | Informati<br>on<br>synthesis  | Organizatio<br>n of Mind<br>and<br>interrelatio<br>nship of its<br>constituent | Know<br>s how   | Identify<br>the<br>topograph<br>y of the<br>mind        | Classify<br>the<br>division<br>s of the<br>mind<br>into<br>conscio<br>us,<br>unconsc<br>ious and<br>sub-<br>conscio<br>us<br>element<br>s | Cogni<br>tive             | Underst<br>and<br>Level II | Must<br>know   | Casele<br>ts and<br>discus<br>sion          | DOPS<br><br>Full<br>form<br>to be<br>writte<br>n ? | LAQ /<br>SAQ                         |  |
| Hom<br>UG-<br>OM-<br>I.3.2 | Informati<br>on<br>collection |  | Know<br>s how   | Identify<br>the<br>constitue<br>nts of the<br>conscious | Distiguish<br>the<br>conscio<br>us<br>mental<br>expressi  | Cogni<br>tive             | Interpr<br>et Level<br>II  | Must<br>know   | Casele<br>ts and<br>Matchi<br>ng<br>exercis | MCQ  | LAQ, /<br>SAQ/<br>Viva               | Integration<br>with concept<br>of Mental and<br>BehavioralExpr<br>essions or<br>symptoms |

|                            |   |   |               |  |  |               |                    |      |                           |                                    |     |                                      |
|----------------------------|---|---|---------------|--|--|---------------|--------------------|------|---------------------------|------------------------------------|-----|--------------------------------------|
|                            |   |   |               | mind   | ons as<br>Emotion<br>,<br>Thought<br>and<br>Behavio<br>ur  |               |                    |      | es                        |                                    |     | from the<br>Organon                  |
| Hom<br>UG-<br>OM-<br>I.3.3 | Informati<br>on<br>Interpret<br>ation<br><br>Self<br>reflection | Interrelatio<br>nship of<br>Emotions/<br>Thinking/<br>Behaviour<br>and Mind<br>and Body | Know<br>s how | Recognize<br>the<br>interrelatio<br>nship of<br>mental<br>constituent<br>s and<br>effects of<br>Mind and<br>Body | Identify<br>the<br>relation<br>ship of<br>mental<br>expressi<br>ons in<br>terms of<br>Emotion<br>,<br>Thinking<br>and<br>Behavio<br>ur on<br>Mind<br>and<br>Body | Affect<br>ive | Receive<br>Level I | Must | Audio-<br>visual<br>media | Casele<br>ts with<br>check<br>list | SAQ | Horizontal<br>integration<br>Organon |

|                        |                                  |   |                  |   |   |                 |                            |                      |   |                                       |         |  |
|------------------------|----------------------------------|---|------------------|---|---|-----------------|----------------------------|----------------------|---|---------------------------------------|---------|--|
| HomU<br>G-OM-<br>I.3.4 | Information<br>Demonstrati<br>on | Demonstrati<br>on of<br>abilities of<br>observation | Show<br>s<br>How | Observe the<br>mental expressio<br>ns in terms of<br>Emotion,<br>Thinking<br>and<br>Behaviour | Identify the<br>evidences of<br>psychological<br>expressions of<br>Emotion,<br>Thinking<br>and<br>Behaviour           | Affective       | Receive<br>Level I         | Mus<br>t<br>kno<br>w | Audio-<br>visual means in<br>Small<br>groups                    | Film<br>viewing                       | Viva    |  |
|                        | Analysis and<br>intergation      | Demonstrati<br>on of<br>abilities of<br>integration | Kno<br>ws<br>how | Distinguish the<br>expressions into<br>Emotion,<br>Thinking<br>and<br>Behaviour               | Align the<br>observations<br>conducted above with<br>the knowledge<br>about emotions,<br>thoughts<br>and<br>behaviour | Cognitive       | Understa<br>nd Level<br>II | Mus<br>t<br>kno<br>w | Process<br>the<br>observatio<br>ns                              | Check list<br>on the<br>film<br>shown | MC<br>Q |  |
| HomU<br>G-OM-<br>I.3.5 | Analytical                       | Application<br>of<br>knowledge<br>in practice       | Show<br>s<br>how | Identify the<br>mental expressio<br>ns in<br>Repertory  | Demonstra<br>te the<br>rubrics from the<br>given case<br>scenarios  | Psychomot<br>or | Imitate<br>Level I         | Mus<br>t<br>kno<br>w | Case-<br>based<br>learning<br><br>Teaching<br>with<br>Repertory | Assignme<br>nts                       | SAQ     | Hor<br>learning<br>with<br>Reperto<br>ry |

**Semester 1 Topic 4 Physiological basis of Emotions, Thought and Behaviour**

| Sr.No.<br>4                | Generic<br>competency     | Subject<br>area                       | Millers<br>Know/<br>Knowhow/<br>Show<br>how/<br>Does | Specific<br>competency  | Specific<br>Learning<br>Objectives /<br>outcomes   | Bloom<br>'s<br>domain | Guilbert<br>'s<br>level                 | Must<br>know<br>/<br>desirable to<br>know<br>/<br>nice<br>to<br>know | TL<br>method /<br>media                                | Formative<br>Assessment | Sum<br>m-<br>ative<br>Assessment | Integration<br>-<br>Horizontal<br>/<br>Vertical<br>/<br>Spiral     |
|----------------------------|---------------------------|---------------------------------------|--|---|--|-----------------------|---|--|--|-------------------------|----------------------------------|--|
| Hom<br>UG-<br>OM-<br>I.4.1 | information<br>Collection | Physiological<br>basis of<br>the mind | Knows  | Understanding the<br>parts of the brain<br>important in<br>understanding<br>mental<br>functions | List the parts of the<br>Brain relevant<br>to understanding<br>the mental<br>functioning | Cognitive             | Recall<br>Level I                       | Must<br>know   | Lecture with a<br>demonstration with<br>model of brain | MCQ                     | SAQ                              | Anatomy<br>- Brain<br>structures can be<br>dealt<br>simultaneously |
| Hom<br>UG-<br>OM-<br>I.4.2 | information<br>collection |                                       | Knows  |   | Explain the<br>different parts of<br>the brain which are<br>the seat of the<br>emotions  | Cognitive             | Understand and<br>interpret Level<br>II | Must<br>know   | Demonstration of<br>brain model with<br>discussion     | MCQ                     | SAQ                              |  |

|                 |  |  |       |  |  |           |                                   |                   |  |     |     |  |
|-----------------|--|--|-------|--|--|-----------|-----------------------------------|-------------------|--|-----|-----|--|
|                 |  |  |       |  | of aggression, love, anger and anxiety   |           |                                   |                   |  |     |     |  |
| Hom UG-OM-I.4.3 |  |  | Knows |  | Explain the different parts of the Brain which are the seat of intellectual functions of attention, memory and executive functions | Cognitive | Understand and interpret Level II | Must know         | Demonstration of brain model with a discussion | MCQ | SAQ |  |
| Hom UG-OM-I.4.4 |  |  | Knows |  | Explain the different parts of the Brain which are responsible for simple  | Cognition | Understand and interpret Level II | Desirable to know | Group discussion                               | MCQ | SAQ |  |

|                            |  |  |              |  |  |               |                                     |              |                     |     |     |   |
|----------------------------|--|--|--------------|--|--|---------------|-------------------------------------|--------------|---------------------|-----|-----|---|
|                            |  |  |              |  | behaviour  |               |                                     |              |                     |     |     |   |
| Hom<br>UG-<br>OM-<br>I.4.5 | Information<br>Interpret<br>ation and<br>Synthesis |  | Knows<br>how | Discuss the<br>genesis of<br>Emotions,<br>Thinking,<br>Behaviour | Integrate<br>the<br>manner in<br>which the<br>emotions,<br>intellectu<br>al and<br>behaviour<br>al<br>function<br>are<br>coordinat<br>ed | Cognit<br>ive | Proble<br>m<br>solving<br>Level III | Must<br>know | Lecture<br>with PPT | MCQ | SAQ | Integratio<br>n with<br>Psycho-<br>physiolog<br>y |

**Semester 1: Topic 5: Understanding behaviour, its origins and its representation in repertory and Materia medica**

| Sr. | Generic | Subject | Miller | Specific | Specific | Bloom' | Guilbert's | Must | TL method | Format | Summ | Integration - |
|-----|---------|---------|--------|----------|----------|--------|------------|------|-----------|--------|------|---------------|
|-----|---------|---------|--------|----------|----------|--------|------------|------|-----------|--------|------|---------------|

| No | Competency           | area                                      | s Know/<br>Know<br>how/<br>Show<br>how/<br>Does | competency                                  | Learning Objectives / Outcomes                         | s domain  | level                    | know / desirable to know / nice to know | / media | ive Assessment | -ative Assessment | Horizontal / Vertical / Spiral |
|----|----------------------|---|---|---|--|-----------|--------------------------|---|---------|----------------|-------------------|--------------------------------|
|    | Information          | Behaviour and Functioning and the origins | Knows   | Instincts and reflexes and their importance | Define instinct and reflex                             | Cognitive | Recall Level I           | Must know                               | Lecture | MCQ            | MCQ               | Physiology                     |
|    | Information          |   | Knows   |   | Enumerate the instincts seen across the animal species | Cognitive | Recall Level I           | Must know                               | Lecture | MCQ            | MCQ               |                                |
|    | Information          |   | Knows   |   | Enumerate the reflexes seen in the new born            | Cognitive | Recall Level I           | Must know                               | Lecture | MCQ            | MCQ               |                                |
|    | Information Analysis |   | Knows   |   | Discuss the role and limitations of these ensuring in  | Cognitive | Understand and interpret | Must know                               | Lecture | SAQ            | SAQ/Viva          |                                |

|  |                                     |  |       |                                 |   |           |                                   |           |                           |     |          |  |
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|  |                                     |  |       |                                 | our survival  |           | Level II                          |           |                           |     |          |  |
|  | Information                         |  | Knows |                                 | Define Conditioned and Unconditioned reflex                         | Cognitive | Recall Level I                    | Must know | Lecture                   | MCQ | MCQ      |  |
|  | Information                         |  | Know  | Define Behavior and Functioning | Define Behaviour as externally observed expressions                 | Cognitive | Recall Level I                    | Must know | Lecture and AV methods    | MCQ | MCQ      | Organon + Repertory – Concept of symptomatology- Physical symptoms |
|  | Information Analysis Self awareness |  | Knows |                                 | Differentiate behaviour as being of conscious and unconscious       | Cognitive | Understand and interpret Level II | Must know | Lecture                   | SAQ | SAQ/Viva |  |
|  | Information collection              |  | Know  |                                 | Define functioning as expressions of the system which needs special | Cognitive | Recall Level I                    | Must know | Lecture and Demonstration | MCQ | MCQ      |  |

|  |                                   |                      |             |   |  |               |   |              |         |     |              |  |
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|  |                                   |                      |             |   | instrument<br>s to<br>measure  |               |   |              |         |     |              |  |
|  | Information<br>Analysis           |                      | Know<br>how |   | Elaborate<br>on the<br>difference<br>between<br>Behaviour<br>and<br>Functionin<br>g      | Cogniti<br>ve | Underst<br>and and<br>interpret<br>Level II | Must<br>know | Lecture | SAQ | SAQ/Vi<br>va |  |
|  | Information<br>System<br>thinking |                      | Knows       |   | Discuss the<br>scientific<br>methods<br>of studying<br>behaviour                         | Cogniti<br>ve | Underst<br>and and<br>interpret<br>Level II | Must<br>know | Lecture | LAQ | LAQ          |  |
|  | Information                       |                      | Knows       | Origins<br>and<br>function<br>of<br>Behaviour | Draw a list<br>of species<br>specific<br>behaviours<br>in birds,<br>fish and<br>primates | Cogniti<br>ve | Recall<br>Level I                           | Must<br>know | Lecture | MCQ | MCQ          |  |
|  | Information<br>Analysis           |                      | Knows       |   | Discuss the<br>function of<br>these<br>specific<br>behaviours                            | Cogniti<br>ve | Underst<br>and and<br>interpret<br>Level II | Must<br>know | Lecture | SAQ | SAQ<br>Viva  |  |
|  | Information                       | Control Behaviour of | Knows       | Factors<br>influencin<br>g                    | Discuss the<br>factors<br>which  | Cogniti<br>ve | Underst<br>and and<br>interpret             | Must<br>know | Lecture | SAQ | SAQ          |  |

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|  |                       |  |       | behaviour | regulate any two of the species specific behaviours listed above                                      |           | Level II                          |           |         |     | Viva     |  |
|  | Information Synthesis |  | Knows |           | Differentiate innate and learned behaviour as originating from unconditioned and conditioned reflexes | Cognitive | Understand and interpret Level II | Must know | Lecture | LAQ | LAQ      |  |
|  | Analytical            |  | Knows |           | Discuss how emotions are the determinants of behaviour and functioning                                | Cognitive | Understand and interpret Level I  | Must know | Lecture | SAQ | SAQ Viva |  |
|  | Analytical            |  | Knows |           | Discuss how   | Cognitive | Understand and                    | Must know | Lecture | SAQ | SAQ      |  |

|  |                              |  |       |   |   |               |   |              |                   |               |               |                   |
|--|------------------------------|--|-------|---|---|---------------|---|--------------|-------------------|---------------|---------------|-------------------|
|  |                              |  |       |   | thoughts<br>are is the<br>determina<br>nt of<br>behaviour<br>and<br>functionin<br>g |               | interpret<br>Level II                       |              |                   |               | Viva          |                   |
|  | Informati<br>on<br>Analysis  | BehaviourBehavio<br>urand<br>Homoeopathy | Knows | Represent<br>ation of<br>Behaviour<br>in the<br>repertory     | Illustrate<br>the place<br>of<br>behaviour<br>in<br>repertory                       | Cogniti<br>ve | Underst<br>and and<br>interpret<br>Level II | Must<br>know | Demonstra<br>tion | Checkli<br>st | MCQ /<br>Viva | Repertory         |
|  | Informati<br>on<br>Synthesis |  | Knows | Represent<br>ation of<br>behaviour<br>in<br>Materia<br>Medica | Illustrate<br>the<br>representa<br>tion of<br>behaviour<br>in Materia<br>Medica     | Cogniti<br>ve | Underst<br>and and<br>interpret<br>Level II | Must<br>know | Demonstra<br>tion | Checkli<br>st | MCQ /<br>Viva | Materia<br>Medica |

Semester 2
 Topic 1-Understanding emotions and their representation in the repertory and Homoeopathic Materia Medica( HMM)

| Sr. No | Generic Competency | Subject area | Millers Know/Kno | Specific competency | Specific Learning Objectives / Outcomes | Bloom's domain | Guilbert's level | Must know / desirable to know | TL method / media | Formative Assessment | Summative Assessment | Integration - Horizontal / Vertical / Spiral |
|--------|--------------------|--------------|------------------|---------------------|---|----------------|------------------|-------------------------------|-------------------|----------------------|----------------------|--|
|        |                    |              |                  |                     |   |                |                  |                               |                   |                      |                      |  |

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|  |                                |   | w<br>how<br>/<br>Sho<br>w<br><br>how<br>/<br>Doe<br>s |  |  |               |   | / nice<br>to<br>know |  |          |              |  |
|  | Informati<br>on                | Understa<br>nding<br>emotions,<br>the types<br>and their<br>origins | Kno<br>ws   | Define<br>emotions<br>and<br>differentia<br>te from<br>feeling<br>and mood | Define<br>emotions,<br>mood and<br>feelings                          | Cognit<br>ive | Recall<br>Level I                               | Must<br>know         | Lecture                                | MCQ      | MCQ          |  |
|  | Analysis                       |   | Kno<br>ws<br>how                                      |  | Differenti<br>ate the<br>above<br>three<br>from each<br>other        | Cognit<br>ive | Underst<br>and and<br>interpre<br>t Level<br>II | Must<br>know         | Lecture                                | Caselets | SAQ/Vi<br>va |  |
|  | Observati<br>on<br><br>Empathy |   | Sho<br>ws   | Recognitio<br>n of facial<br>expressio<br>ns                               | Recognize<br>different<br>emotions<br>exhibited<br>on the<br>screens | Affect<br>ive | Receive<br>Level I                              | Must<br>know         | Images of<br>facial<br>expressio<br>ns | Spotters | MCQ          |  |
|  | System                         |   | Kno   |  | Discuss  | Cognit        | Underst   | Must                 | Lecture                                | MCQ      | MCQ          |  |

|  |             |  |       |                            |  |           |                                   |              |         |     |          |   |
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|  | thinking    |  | w     |                            | the different ways that emotional expression is perceived by us                            | ive       | and and interpret Level II        | know         |         |     |          |   |
|  | Information |  | Knows | Classification of emotions | Discuss the classification of emotions<br><br>Primary and Secondary; Positive and negative | Cognitive | Understand and interpret Level II | Nice to know | Lecture | MCQ | MCQ      |   |
|  | Analysis    |  | Knows |                            | Discuss the implications and limitation of the above classification                        | Cognitive | Understand and interpret Level II | Nice to know | Lecture | SAQ | SAQ/Viva | Integration with Kent's concept of hierarchy of mental symptoms |

|  |                        |  |       |  |  |           |                                   |              |  |     |          |   |
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|  | Information collection |  | Knows | Understand theories of emotions and their significance | Describe the prominent theories of emotions<br><br>James Lange<br><br>Cannon-Bard<br><br>Schacter-Singer<br><br>Cognitive Mediation theory | Cognitive | Understand and interpret Level II | Nice to know | Lecture with cassettes   | SAQ | SAQ/Viva | Integration with signs and symptoms from HMM of few prominent remedies studied simultaneously   |
|  | Information collection |  | Knows |  | The Bhava-Rasa theory of emotions  | Cognitive | Recall level-I                    | Nice to know | Lecture with multimedia-e.g. video films or images demonstrating the theory of Bhav-Rasa | SAQ | SAQ      | Integration with the concept of channelization and its importance in the healing process or cure from the 1 <sup>st</sup> aphorism of Organon |

|  |  |                             |       |                              |   |           |                                   |              |                          |  |          |                         |
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|  |  |                             |       |                              |   |           |                                   |              |                          |  |          | n                       |
|  | Information Analysis                     |                             | Knows |                              | Differentiate the five theories from each other                             | Cognitive | Understand and interpret Level II | Nice to know | Lecture                  | LAQ<br>Essay writing/Model preparation on each theory (can be considered as a project for practical) | LAQ      |                         |
|  | Information Synthesis<br>Problem solving |                             | Knows |                              | Evaluate the implications of each of the theories in understanding emotions | Cognitive | Problem solving level -III        | Nice to know | Discussion with examples | LAQ  | LAQ      |                         |
|  | Information collection                   | Biological view of emotions | Knows | Biological basis of emotions | Enumerate the constituents of the limbic system                             | Cognitive | Recall Level                      | Must know    | Lecture with model       | MCQ  | MCQ/Viva | Anatomy +<br>Physiology |

|  |                                    |  |       |                  |  |           |                                   |           |                        |     |          |            |
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|  |                                    |  |       |                  | important in the understanding of emotions   |           |                                   |           |                        |     |          | y          |
|  | Information Analysis and Synthesis |  | Knows |                  | Discuss the role of the different constituents of the limbic system in expression and regulation of emotions | Cognitive | Understand and interpret Level II | Must know | Discussion with models | LAQ | LAQ      |            |
|  | Information Analysis               |  | Knows |                  | Discuss the effects of hormones in influencing emotions  | Cognitive | Understand and interpret Level II | Must know | Lecture                | SAQ | SAQ/Viva | Physiology |
|  | Information Synthetic              |  | Knows | Sex and emotions | Define sexual activity in terms of emotional   | Cognitive | Understand and interpret Level II | Must know | Lecture                | LAQ | LAQ      |            |

|  |                                   |  |       |  |  |           |                                   |           |         |     |          |  |
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|  |                                   |  |       |  | arousal  |           |                                   |           |         |     |          |  |
|  | Information<br><br>Synthesis      |  | Knows |  | Describe the participation of brain systems in sexual behaviour        | Cognitive | Understand and interpret Level II | Must know | Lecture | LAQ | LAQ      |  |
|  | Information<br><br>interpretation |  | Knows |  | Discuss the effect of early influences on sexual behaviour             | Cognitive | Understand and interpret Level II | Must know | Lecture | SAQ | SAQ/Viva |  |
|  | Information<br><br>Synthesis      |  | Knows |  | Discuss the effects of socio-cultural surroundings on sexual behaviour | Cognitive | Understand and interpret Level II | Must know | Lecture | SAQ | SAQ/Viva |  |
|  | Information<br><br>collection     |  | Knows |  | Enumerate the varieties of sexual orientation seen                     | Cognitive | Recall Level -I                   | Must know | Lecture | MCQ | MCQ      |  |

|  |                        |  |       |   |   |           |                                |           |                                    |     |           |  |
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|  | Information            |  | Knows |   | Identify gender identity and sexual identity  | Cognitive | Recall Level -1                | Must know | Lecture                            | MCQ | MCQ/ Viva |  |
|  | Self awareness         |  | Knows |   | Recognize the challenges faced by differently sexually oriented persons in society                      | Affective | Receive Level-II               | Must know | Visual clips of cases<br>Role play | SAQ | SAQ/Viva  |  |
|  | Information collection | Wholistic<br>Holistic approach to Emotional health | Knows | Emotions and their effects on the self and others | List the effects of emotions on the human system in terms of cognitive, behavioural and physical system | Cognitive | Recall Level-I                 | Must know | Lecture                            | MCQ | MCQ/ Viva |  |
|  | Systems thinking       |  | Knows |   | Discuss the pathways through which  | Cognitive | Understand and interpret Level | Must know | Lecture with demonstrative         | LAQ | LAQ       |  |

|  |                        |  |       |  |  |           |                                   |           |                                     |           |           |            |
|--|------------------------|--|-------|--|--|-----------|-----------------------------------|-----------|-------------------------------------|-----------|-----------|------------|
|  |                        |  |       |  | emotions affect cognition, behaviour and physical system                         |           | II                                |           | examples                            |           |           |            |
|  | Information collection |  | Knows | Positive emotions and their effect on health | Define happiness, joy and peace  | Cognitive | Recall Level I                    | Must know | Lecture with demonstrative examples | SAQ Essay | SAQ/ Viva |            |
|  | Information Analysis   |  | Know  |  | Describe the brain mechanisms responsible for states of happiness, joy and peace | Cognitive | Understand and interpret Level II | Must know | Lecture                             | SAQ       | SAQ       | Anatomy    |
|  | Information Synthesis  |  | Know  |  | Discuss the effects of states of happiness, joy and peace on human systems       | Cognitive | Understand and interpret Level II | Must know | Lecture                             | LAQ       | LAQ       | Physiology |

|  |                                     |  |       |  |   |           |                                   |              |                                     |  |          |  |
|--|-------------------------------------|--|-------|--|---|-----------|-----------------------------------|--------------|-------------------------------------|--|----------|--|
|  | Holistic approach<br>Self awareness |  | Knows |  | Explore the different mechanisms for maintaining a state of joy and peace | Affective | Receive Level-I                   | Must know    | Lecture with demonstrative examples | LAQ  | LAQ      | Integration with concept of harmonious way life or balance life from Organon |
|  | Information collection              |  | Knows | Influence of Cultural on expressions of emotions | Enumerate the effects of different cultures on emotional expression       | Cognitive | Recall level-I                    | Nice to know | Lecture                             | MCQ<br>Project on collection of information from different culture and their concept of emotions and its expressions | MCQ/Viva |  |
|  | Holistic<br>Holistic approach       |  | Knows |  | Discuss the implications of cultures affecting                            | Cognitive | Understand and interpret Level II | Nice to know | Lecture/Films                       | SAQ above exercise will be useful  | SAQ/Viva |  |

|  |                              |                                    |           |   |  |               |   |              |                   |                 |     |                   |
|--|------------------------------|------------------------------------|-----------|---|--|---------------|---|--------------|-------------------|-----------------|-----|-------------------|
|  |                              |                                    |           |   | emotional<br>expressio<br>n  |               |   |              |                   | here as<br>well |     |                   |
|  | Informati<br>on<br>Analysis  | Emotions<br>and<br>Homoeop<br>athy | Kno<br>ws | Represent<br>ation of<br>Emotions<br>in the<br>repertory  | Illustrate<br>the place<br>of<br>emotions<br>in<br>repertory                   | Cognit<br>ive | Underst<br>and and<br>interpre<br>t Level<br>II | Must<br>know | Demonstr<br>ation | DOPS            | MCQ | Repertory         |
|  | Informati<br>on<br>Synthesis |                                    | Kno<br>ws | Represent<br>ation of<br>emotions<br>in Materia<br>Medica | Illustrate<br>the<br>represent<br>ation of<br>emotions<br>in Materia<br>Medica | Cognit<br>ive | Underst<br>and and<br>interpre<br>t Level<br>II | Must<br>know | Demonstr<br>ation | DOPS            | MCQ | Materia<br>Medica |

**Semester 2 Topic 2-Understanding intellect and its representation in repertory and materia medica – Part-I Attention, concentration and memory**

| Sr. No | Generic Competency         | Subject area   | Millers Know/ Knowhow/ Showhow/ Does | Specific competency                                      | Specific Learning Objectives / Outcome s                          | Bloom's domain | Guilbert's level         | Must know / desirable to know / nice to know | TL method / media  | Formative Assessment | Summative Assessment | Integration - Horizontal / Vertical / Spiral |
|--------|----------------------------|--|--------------------------------------|--|---|----------------|--------------------------|--|--------------------|----------------------|----------------------|--|
|        | Information collection     | Introduction to attention and concentration the                            | Knows                                | Definition of terms with psycho-physiological mechanisms | Define attention and concentration                                | Cognitive      | Recall Level I           | Must know                                    | Lecture            | MCQ                  | MCQ/ Viva            |  |
|        | Information interpretation | underlying psycho-physiological mechanisms, regulation and applied aspects | Knows                                |  | Enumerate the brain regions which are involved in these functions | Cognitive      | Recall Level I           | Must know                                    | Lecture with model | MCQ                  | MCQ/ Viva            | Anatomy                                      |
|        | Information                |  | Knows                                |  | Discuss the neural  | Cognitive      | Understand and interpret | Must know                                    | Lecture            | SAQ                  | SAQ/Viva             | Physiology                                   |

|  |  |  |       |  |  |           |                                   |           |               |   |          |  |
|--|--|--|-------|--|--|-----------|-----------------------------------|-----------|---------------|---|----------|--|
|  | synthesis                                |  |       |  | processes which are responsible for regulating attention and concentration |           | t Level II                        |           |               |   |          |  |
|  | Information Interpretation               |  | Knows | Control over attention and concentration | Discuss the factors which affect attention and concentration               | Cognitive | Understand and interpret Level II | Must know | Lecture       | MCQ   | MCQ/Viva |  |
|  | Information Interpretation and synthesis |  | Knows |  | Realize the above processes in our daily life                              | Affective | Receive Level-I                   | Must know | Demonstration | - ? ?<br>survey on attention span with the help of multimedia or any activity | -        |  |

|  |                            |                              |       |   |  |           |                                   |           |               |      |          |  |
|--|----------------------------|------------------------------|-------|---|--|-----------|-----------------------------------|-----------|---------------|------|----------|--|
|  | Information collection     |                              | Knows |   | Discuss the different physical and psychological methods used for regulating attention and concentration | Cognitive | Understand and interpret Level II | Must know | Lecture       | LAQ  | LAQ      |  |
|  | Information Interpretation | Applied aspects of attention | Knows | Application of attention and concentration                      | Discuss the effects of disturbed attention in childhood and adult life                                   | Cognitive | Understand and interpret Level II | Must know | Lecture Video | SAQ  | SAQ/Viva | Spiral integration with anatomy and physiology |
|  | Information Interpretation |                              | Knows | Representation of attention and concentration in the repertoire | Identify the rubrics representing attention and concentration in   | Cognitive | Understand and interpret Level II | Must know | Demonstration | DOPS | MCQ      | use of all the 3 repertoires                   |

|  |                               |  |       |   |  |           |   |              |               |  |          |  |
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|  |                               |  |       |   | the<br>repertory   |           |   |              |               |  |          |  |
|  | Information<br>Interpretation |  | Knows | Reflection<br>of<br>attention<br>in Materia<br>Medica | Identify<br>the<br>reflection<br>of<br>attention<br>and<br>concentration<br>in<br>remedies           | Cognitive | Understand and<br>interpret Level<br>II | Must<br>know | Demonstration | SAQ  | SAQ/Viva | Sources of<br>HMM                                |
|  | Information<br>collection     | Memory<br>types,<br>processes<br>and<br>applied<br>aspects | Knows | Types of<br>Memory<br>and<br>processes                | Enumerate the<br>types of<br>memory  | Cognitive | Recall<br>Level I                       | Must<br>know | Lecture       | MCQ  | MCQ      |  |
|  | Information<br>Interpretation |  | Knows |   | Discuss the<br>models of<br>memory<br><br>Information-<br>processing<br><br>And<br>neural<br>network | Cognitive | Understand and<br>interpret Level<br>II | Must<br>know | Lecture       | SAQ<br><br>Project<br>on<br>models<br>of<br>Memory | SAQ/Viva | Integration<br>with<br>anatomy and<br>physiology |
|  | Information<br>Analysis       |  | Know  |   | Discuss the<br>function<br>of the  | Cognitive | Understand and<br>interpret Level       | Must<br>know | Lecture       | LAQ<br><br>Activity<br>on<br>memory                | LAQ      |  |

|  |                            |                            |          |   |  |           |                                   |           |         |  |          |  |
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|  |                            |                            |          |   | types of memory in our daily lives                             |           | II                                |           |         | games and its importance in day to day to life   |          |  |
|  | Information collection     |                            | Know     | Factors affecting memory and their regulation | Enumerate the factors which affect different types of memories | Cognitive | Recall Level I                    | Must know | Lecture | MCQ  | MCQ/Viva |  |
|  | Information Interpretation |                            | Know how |   | Discuss different ways of assessing different types of memory  | Cognitive | Understand and interpret Level II | Must know | Lecture | SAQ<br>Activity based on memory games (connection can be linked to concept of MSE/MSE) | SAQ/Viva |  |
|  | Information Collection     | Forgetting, its mechanisms | Know     | Forgetting, the types and the                 | Discuss the reasons  | Cognitive | Understand and interpret          | Must know | Lecture | SAQ  | SAQ/Viva |  |

|  |   |                     |          |              |   |           |                                   |           |                                     |  |          |   |
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|  | and Interpretation                      | ms and implications |          | implications | for forgetting  |           | t Level II                        |           |                                     |  |          |   |
|  | Information Synthesis                   |                     | Know how |              | Discuss ways of enhancing recall                              | Cognitive | Understand and interpret Level II | Must know | Lecture Demonstration with examples | SAQ Memory games with concept of mnemonics   | SAQ/Viva |   |
|  | Information collection                  |                     | Knows    |              | Describe the state of memory with senescence                  | Cognitive | Recall Level I                    | Must know | Lecture                             | SAQ  | SAQ/Viva |   |
|  | Information Analysis and Interpretation |                     | Knows    |              | Discuss the implications of loss of memory with advancing age | Cognitive | Understand and interpret Level II | Must know | Lecture                             | SAQ survey on state of memory function with advancing age ( a small article can be published | SAQ/Viva | Integration with anatomy and physiology |

|  |   |                           |       |                             |  |             |                                   |              |               |                                      |     |  |
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|  |   |                           |       |                             |  |             |                                   |              |               | d with the help of survey findings ) |     |  |
|  | Information Interpretation              | Applied aspects of Memory | Knows | Memory changes              | Describe ways in which memory can get distorted  | Cognitive   | Understand and interpret Level II | Nice to know | Lecture       | -                                    | -   |  |
|  | Information Analysis and Interpretation |                           | Knows |                             | Discuss ways of reconstructing a lost memory   | Cognitive   | Understand and interpret Level II | Nice to know | Lecture       | -                                    | -   |  |
|  | Information Interpretation              |                           | Knows |                             | Discuss the implications of the dangers of reconstruction of memory in our everyday life | Cognitive   | Understand and interpret Level II | Nice to know | Lecture       | -                                    | -   |  |
|  | Information                             | Homoeopathic aspects of   | Knows | Representation of sharp and | Identify the rubrics   | psychomotor | Understand and                    | Must know    | Demonstration | DOPS                                 | MCQ |  |

|  |  |        |       |   |   |           |                                  |           |               |     |          |  |
|--|--|--------|-------|---|---|-----------|----------------------------------|-----------|---------------|-----|----------|--|
|  | collection ,Interpretation                       | memory |       | loss of memory in the repertory               | representing memory issues in the repertory   |           | interpret Level I                | w         |               |     |          |  |
|  | Information<br><br>collection and Interpretation |        | Knows | Reflection of memory issues in Materia Medica | Identify the reflection of memory in remedies | Cognitive | Understand and interpret Level I | Must know | Demonstration | SAQ | SAQ/Viva |  |

**Semester 2 Topic 3-Understanding intellect and its representation in repertory and materia medica –Part-II Perception and Intelligence**

| Sr.No | Generic Competency | Subject area | Millers Know/ Know how / Show how | Specific competency | Specific Learning Objectives / Outcomes | Bloom's domain | Guilbert's level | Must know / desirable to know / nice to know | TL method / media | Formative Assessment | Summative Assessment | Integration - Horizontal / Vertical / Spiral |
|-------|--------------------|--------------|-----------------------------------|---------------------|---|----------------|------------------|--|-------------------|----------------------|----------------------|--|
|       |                    |              |                                   |                     |   |                |                  |  |                   |                      |                      |  |

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|                            |   |   | s                |   |  |               |  |              |                                  |  |              |  |
| Hom<br>UG-<br>OM-<br>2.2.1 | Informat<br>ion<br>collectio<br>n                             | Discuss<br>Perceptu<br>al<br>organizat<br>ion | kno<br>ws        | Describe<br>Perceptio<br>n and<br>differenti<br>ate from<br>sensations<br>and<br>thinking | Define<br>Perception<br>.  | Cognitio<br>n | Recall<br>level I                                  | Must<br>know | Small<br>group<br>discussio<br>n | MCQ                                    | MCQ          | Horizontal<br>Anatomy<br>and<br>Physiology |
|                            | Informat<br>ion<br>organiza<br>tion and<br>Interpret<br>ation |   |                  |   | Relate<br>perception<br>to sensory<br>processes<br>and<br>differentia<br>te from<br>thinking | Cognitio<br>n | Unders<br>tand<br>and<br>interpr<br>et<br>Level II | Must<br>know | Visual<br>films                  | SAQ                                    | SAQ          |  |
| Hom<br>UG-<br>OM-<br>2.2.2 | Informat<br>ion<br>Synthesi<br>s                              |   | kno<br>w         | Genesis<br>of<br>perceptio<br>n and<br>importan<br>ce of<br>ground --<br>-                | Describe<br>the<br>Psychophy<br>siology of<br>perception                                     | Cognitio<br>n | Unders<br>tand<br>and<br>interpr<br>et<br>Level II | Must<br>know | Small<br>group<br>discussio<br>n | MCQ                                    | MCQ          |  |
| Hom<br>UG-<br>OM-<br>2.2.3 | Informat<br>ion<br>interpret<br>ation                         |   | Kno<br>ws<br>how | Dynamics<br>of<br>perceptio<br>n and<br>perceptu  | Describe<br>the role of<br>attention<br>and state<br>of the<br>mind,                         | Cognitiv<br>e | Unders<br>tand<br>and<br>interpr<br>et             | Must<br>know | Small<br>group<br>activities     | Observat<br>ion<br><br>Example<br>s or | MCQ/<br>Viva |  |

|                 |                       |  |      |   |  |           |                                   |                   |                      |   |          |   |
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|                 |                       |  |      | al errors                                     | depth, constancy, movement in Perception                                 |           | Level II                          |                   |                      | Activity indicating the role of in attention in perception            |          |   |
| Hom UG-OM-2.2.4 | Information synthesis |  | Know |   | Explain the physiological and psychological basis for Perceptual errors. | Cognitive | Understand and interpret Level II | Desirable to know | Films and images     | Project   | MCQ/Viva |   |
| Hom UG-OM-2.2.5 | Information synthesis |  | Know | Social perception and its impact on our lives | Discuss determinants of social perception                                | Cognitive | Understand and interpret Level II | Must know         | Class room lecture   | MCQ + Survey on this topic demonstrating the impact of social factors | LAQ/SAQ  |   |
|                 | Self reflection       |  | Know |   | Realize the effect of perception on                                      | Affective | Receive Level I                   | Must know         | Media and discussion | SAQ   | SAQ/Viva | Integration with the concept of disposition |

|                 |                       |  |       |  |   |             |                                   |                   |  |                          |          |  |
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|                 |                       |  |       |  | interpersonal and community relationships               |             |                                   |                   | n + Role Play followed by directed discussion                    |                          |          | –Mental specifically / individualization |
| Hom UG-OM-2.2.6 | Holistic approach     |  | Knows | Gestalt perception and its importance to Homoeopathy | Observe gestalt perception                              | psychomotor | Observe/imitate Level II          | Must know         | Small group activity + Role Play followed by directed discussion | Presentation performance | MCQ      |  |
|                 |                       |  |       |  | Illustrate its importance to Homoeopathy in case taking | Cognitive   | Understand and interpret Level II | Desirable to know | Visual films<br>Demonstration in OPD/videos                      |                          | LAQ      | Horizontal/Vertical with Organon         |
| HO MU G OM      | information Synthesis |  | Knows | Applied aspects of Perception                        | Understand the perceptual difficulties                  | Cognitive   | Understand and interpret          | Must know         | Caselets and visual graphics                                     |                          | SAQ/Viva | Vertical integration Psychiatry          |

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| 2.2.7                        | s   |  |                  | n   | of Dyslexia<br>Know the<br>phenomen<br>a of<br>hallucinati<br>on   |               | Level II   |                    |                 |      |               |   |
| HO<br>M<br>UG<br>OM<br>2.2.8 | Informat<br>ion<br>manage<br>ment   |  | Sho<br>ws<br>how | Perceptio<br>n in<br>Repertor<br>y and<br>Materia<br>Medica | Derives<br>rubrics and<br>remedies<br>related to<br>perceptual<br>phenomen<br>a  | Cognitiv<br>e | Unders<br>tand<br>Level II                         | Must<br>know       | Demonst<br>rate | DOPS | SAQ /<br>Viva | Horizontal<br>integration<br>Repertory<br>and HMM |
|                              | Informat<br>ion<br>collectio<br>n   | Intellige<br>nce and<br>its<br>measure<br>ment | Kno<br>ws        | Conceptu<br>al models<br>of<br>Intelligen<br>ce             | Define<br>Intelligenc<br>e   | Cognitiv<br>e | Recall<br>level I                                  | Must<br>know       | Lecture         | MCQ  | MCQ/<br>Viva  |   |
|                              | Informat<br>ion<br>Analysis<br>and<br>informat<br>ion<br>Interpret<br>ation |  | Kno<br>ws        |   | Detail the<br>different<br>approache<br>s to<br>viewing<br>Intelligenc<br>e<br><br>i. Multiple<br>intellige<br>nces<br>(Gardne | Cognitiv<br>e | Unders<br>tand<br>and<br>interpr<br>et<br>Level II | Nice<br>to<br>know | Lecture         | SAQ  | SAQ/V<br>iva  |   |

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|  |   |  |       |                             | r)<br>ii. Triarchic theory (Sternberg)<br>iii. Fluid and Crystallized (Catell's)<br>iv. PASS theory |           |                                   |           |         |     |          |  |
|  | Information collection                  |  | Knows | Measurement of Intelligence | Define Intelligence Quotient (IQ)   | Cognitive | Recall level I                    | Must know | Lecture | SAQ | SAQ/Viva |  |
|  | Information Analysis and interpretation |  | Knows |                             | Discuss the contribution of heredity and environment to intelligence                                | Cognitive | Understand and interpret Level II | Must know | Lecture | SAQ | SAQ/Viva |  |
|  | Information                             |  | Knows |                             | Discuss the pros and cons of  | Cognitive | Understand and                    | Must know | Lecture | SAQ | SAQ/Viva |  |

|  |                                    |                         |       |                                     |  |           |                                   |              |                        |   |          |  |
|--|------------------------------------|-------------------------|-------|-------------------------------------|--|-----------|-----------------------------------|--------------|------------------------|---|----------|--|
|  | Analysis                           |                         |       |                                     | measurement of IQ  |           | interpret Level II                |              |                        |   |          |  |
|  | Information                        |                         | Knows |                                     | Enumerate the methods of assessing intelligence                                      | Cognitive | Recall level I                    | Nice to know | Lecture                | MCQ   | MCQ/Viva |  |
|  | Information collection             | Intelligence as a force | Knows | Emotional intelligence and its uses | Define emotional intelligence  | Cognitive | Recall level I                    | Must know    | Lecture                | MCQ   | MCQ/Viva |  |
|  | Information collection             |                         | Knows |                                     | Define the components of Emotional intelligence                                      | Cognitive | Recall level I                    | Must know    | Lecture                | MCQ   | SAQ/Viva |  |
|  | System thinking and self awareness |                         | Knows |                                     | Discuss the ways in which Emotional intelligence is useful to individuals and groups | Cognitive | Understand and interpret Level II | Must know    | Lecture and discussion | LAQ<br>Activity indicating the usefulness of Emotional Intelligence | LAQ      |  |

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|  |  |  |           |                                    |   |               |  |              |         | ce in day<br>to<br>dayactivi<br>ty /<br>functioni<br>ng                          |              |  |
|  | Informa<br>tion<br>collectio<br>n          |  | Know<br>s | Creativity<br>and its<br>growth    | Define<br>creativity  | Cognitiv<br>e | Recall<br>level I                                  | Must<br>know | Lecture | SAQ  | SAQ/V<br>iva |  |
|  | Informa<br>tion<br><br>Systems<br>thinking |  | Know<br>s |                                    | Illustrate<br>the<br>process of<br>creativity                                 | Cognitiv<br>e | Unders<br>tand<br>and<br>interpr<br>et<br>Level II | Must<br>know | Lecture | Project<br>or<br>activity<br>on any<br>theme<br>indicatin<br>g the<br>creativity |              |  |
|  | Systems<br>thinking                        |  | Know<br>s |                                    | Discuss the<br>ways in<br>which<br>creativity<br>can be<br>fostered           | Cognitiv<br>e | Unders<br>tand                                     | Must<br>know | Lecture | SAQ  | SAQ/V<br>iva |  |
|  | Informa<br>tion<br>collectio<br>n          | Applied<br>aspects<br>of<br>Intellige<br>nce | Know<br>s | Extremes<br>of<br>intelligen<br>ce | List the<br>types of<br>extreme<br>intelligenc<br>e on the<br>Bell-<br>shaped | Cognitiv<br>e | Recall<br>level I                                  | Must<br>know | Lecture | SAQ  | SAQ/V<br>iva |  |

|  |                       |                              |                 |  |   |           |                                   |              |               |      |          |                |
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|  |                       |                              |                 |  | curve   |           |                                   |              |               |      |          |                |
|  | Information Analysis  |                              | Knows           |  | Discuss the special needs of the persons occupying the extremes of intelligence | Cognitive | Understand and interpret Level II | Nice to know | Lecture       | SAQ  | SAQ/Viva |                |
|  | Information Analysis  | Intelligence and Homoeopathy | Knows           | Representation of Intelligence in the repertory  | Illustrate the place of Intelligence in repertory                               | Cognitive | Understand and interpret Level II | Must know    | Demonstration | DOPS | MCQ      | Repertory      |
|  | Information Synthesis |                              | Knows?<br>Shows | Representation of intelligence in Materia Medica | Illustrate the representation of intelligence in Materia Medica                 | Cognitive | Understand and interpret Level II | Must know    | Demonstration | DOPS | SAQ/Viva | Materia Medica |

**Semester 2 Topic 4-Motivation, its types and its relevance for Homoeopath**

| Sr.No            | Generic Competency     | Subject area                                       | Millers Know/ Know how/ Show how/ Does | Specific competency                           | Specific Learning Objectives / Outcomes                                 | Bloom's domain | Guilbert's level | Must know / desirable to know / nice to know | TL method / media       | Formative Assessment | Summative Assessment | Integration - Horizontal / Vertical / Spiral |
|------------------|------------------------|--|--|---|---|----------------|------------------|--|-------------------------|----------------------|----------------------|--|
| Hom UG-OM-2.10.1 | Information collection | Motivation, the types and its role in daily living | Knows                                  | Describe motivation                           | Define motivation   | Cognitive      | Recall level I   | Must know                                    | Class room lecture      | MCQ                  | LAQ/SAQ              |  |
| Hom UG-OM-2.10.2 | Information collection |  | Knows                                  | Understand the nature and types of motivation | Enumerate the types of motivation                                       | Cognitive      | Recall level I   | Must know                                    | Class room lecture      | MCQ                  | LAQ/SAQ              |  |
| Hom UG OM 2.10.3 | Self reflection        |  | Knows how                              |   | Recognize the types of motivation influencing our thinking and emotions | Affective      | Receive level I  | Must know                                    | Audio-visual Discussion | SAQ                  | SAQ/Viva             |  |
| Hom              | Informa                | Use of   | Knows                                  | Models of                                     | Describe  | Cognitive      | Understan        | Must   | Small                   | Assign               | LAQ                  |  |

|                  |                               |   |           |   |   |           |                                   |           |                                |           |          |  |
|------------------|-------------------------------|---|-----------|---|---|-----------|-----------------------------------|-----------|--------------------------------|-----------|----------|--|
| UG-OM-2.10.4     | Interpretation                | Maslow's model of motivation in our personal and professional lives |           | Motivation                                    | the Maslow's self-actualization model                         |           | Understand and interpret Level II | Must know | Group discussion               | Checklist |          |  |
| HOM UG OM 2.10.5 | Self reflection and awareness |   | Knows how |   | Recognize the importance of the model in knowing human beings | Affective | Receive level I                   | Must know | Group discussion with caselets | Checklist | SAQ/Viva |  |
| UG HOM 2.10.6    | Information Synthesis         | Utility of Motivation for a Homoeopath                              | Shows how | Reflection of motivation in Repertory and HMM | Derives rubrics and remedy images related to motivation       | Cognitive | Understand and interpret Level II | Must know | Demonstrate                    | Checklist | MCQ      |  |

#### Semester 2 Topic 5-Learning, its types and its relevance in daily functioning of Humans

| Sr.No | Generic Competency | Subject area | Miller's Know / Know | Specific competency | Specific Learning Objectives / Outcomes | Bloom's domain | Guilbert's level | Must know / desirable to know / nice to | TL method / media | Formative Assessment | Summative Assessment | Integration - Horizontal / Vertical / Spiral |
|-------|--------------------|--------------|----------------------|---------------------|---|----------------|------------------|---|-------------------|----------------------|----------------------|--|
| 8     |                    |              |                      |                     |   |                |                  |   |                   |                      |                      |  |

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|                            |                                   |  | how/<br>Show<br>how/<br>Does |   |  |               |   | know            |                          |               |              |  |
| Hom<br>UG-<br>OM-<br>I.6.1 | Informa<br>tion<br>collectio<br>n | Learning<br>and<br>adaptatio<br>n                        | Know<br>s                    | Define<br>learning and<br>its role in<br>bringing<br>about<br>adaptation to<br>change | Define<br>learning and<br>adaptation   | Cognitiv<br>e | Recall<br>level I                           | Must<br>know    | Class<br>room<br>lecture | MCQ           | LAQ /<br>SAQ |  |
|                            | Informa<br>tion<br>Synthesi<br>s  |  |                              |   | Derive the<br>relationship<br>between the<br>two   | Cognitiv<br>e | Understan<br>d and<br>interpret<br>Level II | Must<br>know    | Caselets                 | Casele<br>ts  | Problem      |  |
| Hom<br>UG-<br>OM-<br>I.6.2 | Informa<br>tion<br>collectio<br>n | Learning<br>forms and<br>their<br>implicatio<br>n for us | Know<br>s                    | Forms of<br>learning  | Explain the<br>three forms of<br>learning viz.<br>Classical<br>conditioning,<br>Instrumental<br>conditioning<br>and<br>observational<br>learning | Cognitiv<br>e | Understan<br>d and<br>interpret<br>Level II | Must<br>know    | Class<br>room<br>lecture | Checkl<br>ist | LAQ/SAQ      |  |
| Hom<br>UG-<br>OM-<br>I.6.3 | Holistic<br>thinking              |  | Does                         | Differentiate<br>the forms or<br>types of<br>learning and<br>their                    | Explain the<br>significance of<br>the above<br>three forms in<br>our daily lives   | Cognitiv<br>e | Understan<br>d and<br>interpret<br>Level II | Must to<br>know | Demons<br>tration        | Projec<br>t   | MCQ          |  |

|  |                        |                        |          |   |  |           |                                   |           |             |             |            |  |
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|  |                        |                        |          | significance                                    |  |           |                                   |           |             |             |            |  |
|  | Information collection |                        | Know     | Determinants of learning and their significance | Enumerate the various factors which determine the quality of learning                    | Cognitive | Recall level I                    | Must know | Lecture     | MCQ         | MCQ        |  |
|  | Problem solving        |                        | Know how |   | Derive the ways in which these factors can be used for enhancing learning                | Cognitive | Problem solving level II          | Must know | Assignments | Casestudies | SAQ / Viva |  |
|  | Analytical             |                        | Knows    |   | Identify the factors which would inhibit learning and which would need to be attended to | Cognitive | Understand and interpret Level II | Must know | Assignment  | SAQ         | SAQ/Viva   |  |
|  | Information collection | Assessment of learning | Knows    | Know the methods of assessing learning          | List the methods whereby learning is assessed  | Cognitive | Recall level I                    | Must know | Lecture     | MCQ         | MCQ/Viva   |  |
|  | Analytical             |                        |          |   | Evaluate the respective value of the different methods to assess                         | Cognitive | Problem solving level III         | Must know | Assignment  | SAQ         | SAQ/Viva   |  |

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|  |                                      |  |              |  | learning   |               |   |              |                 |      |     |  |
|  | Informa<br>tion<br><br>Synthesi<br>s | Utility of<br>Learning<br>and<br>adaptation<br>for a<br>Homoeopa<br>th | Shows<br>how | Reflection of<br>learning and<br>adaptation in<br>Repertory<br>and HMM | Derives<br>rubrics and<br>remedy<br>images<br>related to<br>learning and<br>adaptation | Cognitiv<br>e | Understan<br>d and<br>interpret<br>Level II | Must<br>know | Demons<br>trate | DOPS | MCQ |  |

**Semester 3 Topic 1-Evolution of Mind with Growth and Development: Normal developments since birth to maturity: physical and psychological**

| Sr.No | Generic<br>Compet<br>ency                         | Subject<br>area                          | Millers<br>Know/<br>Know<br>how/Sho<br>w<br><br>how/Doe<br>s | Specific<br>competen<br>cy                    | Specific<br>Learning<br>Objectives /<br>Outcomes                  | Bloom's<br>domain | Guilbert's<br>level | Must<br>know /<br>desirable<br>to know<br>/ nice to<br>know | TL<br>method<br>/ media | Forma<br>tive<br>Assess<br>ment | Summ<br>-ative<br>Assess<br>ment | Integrat<br>ion -<br>Horizon<br>tal /<br>Vertical<br>/ Spiral |
|-------|---|--|--|---|---|-------------------|---------------------|---|-------------------------|---------------------------------|----------------------------------|---|
|       | Informa<br>tion<br>collectio<br>n and<br>analysis | Concept<br>and<br>process<br>of<br>Human | Knows  | Discuss<br>areas of<br>human<br>Growth<br>and | Define and<br>distinguish<br>between<br>Growth and<br>Development | Cognitiv<br>e     | Interpret           | Must<br>know  | Lecture                 | SAQ                             | SAQ/Viva                         |   |

|                            |   |              |              |                 |  |               |   |              |  |   |              |  |
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| Hom<br>UG-<br>OM-<br>I.4.1 | Informa<br>tion<br>collectio<br>n                           | Develop<br>m | Knows        | Developm<br>ent | List the three<br>domains of<br>development<br>Physical,<br>Cognitive and<br>psychosocial<br>development | Cognitiv<br>e | Remembe<br>r- level I                       | Must<br>know | Class<br>room<br>Lecture   | MCQ   | LAQ /<br>SAQ |  |
| Hom<br>UG-<br>OM-<br>I.4.2 | Informa<br>tion<br>Analysis<br>Analytic<br>al               |              | Knows<br>how |                 | Distinguish<br>the<br>characteristics<br>of physical,<br>cognitive and<br>psychosocial<br>development    | Cognitiv<br>e | Understan<br>d and<br>interpret<br>Level II | Must<br>know | Small<br>group<br>discussi<br>on<br>Charts /<br>Models<br><br>Audio-<br>visual<br>aids | Quiz<br><br>True-<br>false<br>test<br>items | LAQ/SAQ      |  |
|                            | Informa<br>tion<br>analysis<br>Analytic<br>al               |              | Knows<br>how |                 | Distinguish<br>between the<br>contribution<br>of nature and<br>nurture in<br>development                 | Cognitiv<br>e | Understan<br>d and<br>interpret<br>Level II | Must<br>know | Lecture  | LAQ   | LAQ          |  |
|                            | informa<br>tion<br>collectio<br>n and<br>Interpre<br>tation |              | Knows        |                 | Define the<br>concept of<br>developmenta<br>l milestones in<br>childhood                                 | Cognitiv<br>e | Recall                                      | Must<br>know | Lecture  | MCQ   | MCQ          |  |

|                            |  |  |              |  |   |               |   |              |  |     |     |  |
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| Hom<br>UG-<br>OM-<br>I.4.3 | Informa<br>tion<br>Organiz<br>ation<br>Analytic<br>al                          | Develop<br>mental<br>stages of<br>Psychose<br>xual,<br>cognitive<br>and<br>psychoso<br>cial<br>develop<br>ment | Knows<br>how | Discuss<br>the<br>theories of<br>cognitive<br>and<br>psychosoci<br>al<br>developm<br>ent | Discuss the<br>theory of<br>psychosexual<br>development<br>as proposed<br>by Freud                              | Cognitiv<br>e | Understan<br>d and<br>interpret<br>Level II | Must<br>know | Small<br>group<br>demonst<br>ration,<br>peer<br>group<br>activitie<br>s. | MCQ | MCQ | Horizon<br>tal<br>integrat<br>ion with<br>Anatom<br>y,<br>physiol<br>ogy |
|                            | Informa<br>tion<br>Analytic<br>al  |  | Knows<br>how |  | Discuss the<br>theory of<br>cognitive<br>development<br>proposed by<br>Piaget                                   | Cognitiv<br>e | Understan<br>d and<br>interpret<br>Level II | Must<br>know | Lecture<br>with<br>example<br>s  | LAQ | LAQ |  |
|                            | Informa<br>tion<br>Analytic<br>al  |  | Knows<br>how |  | Discuss the<br>theory of<br>psychosocial<br>development<br>of Erik<br>Erikson                                   | Cognitiv<br>e | Understan<br>d and<br>interpret<br>Level II | Must<br>know | Lecture  | LAQ | LAQ |  |
|                            | Informa<br>tion<br>collectio<br>n and<br>Interpre<br>tation<br>and<br>Analysis | Human<br>Develop<br>ment<br>across<br>the Life<br>span   | Knows<br>how | Discuss<br>the<br>developm<br>ent of the<br>human<br>being<br>across the<br>lifespan     | Discuss the<br>different<br>stages of<br>physical,<br>emotional and<br>cognitive<br>development<br>of childhood | Cognitiv<br>e | Understan<br>d and<br>interpret<br>Level II | Must<br>know | Lecture  | LAQ | LAQ |  |

|  |   |  |                         |  |   |                         |                                   |           |         |   |     |  |
|--|---|--|-------------------------|--|---|-------------------------|-----------------------------------|-----------|---------|---|-----|--|
|  | Information collection<br>Self reflection             |  | Knows                   |  | Discuss parental styles appropriate to help optimal growth in childhood                         | Cognitive               | Understand and interpret Level II | Must know | Lecture | LAQ<br>Essay on most suitable parenting style | LAQ |  |
|  | Information collection and Interpretation<br>Analysis |  | Knows how               |  | Discuss the different stages of physical, psychosocial and cognitive development of adolescence | Cognitive               | Understand and interpret Level II | Must know | Lecture | LAQ   | LAQ |  |
|  | Information<br>Self reflection                        |  | Knows how<br>/ Show how |  | Discuss the role of home, school and society on the development of the adolescent               | Cognitive<br>?Affective | Understand and interpret Level II | Must know | Lecture | LAQ   | LAQ |  |
|  | Information<br>Analysis                               |  | Knows how               |  | Discuss the different stages of physical, psychosocial and cognitive                            | Cognitive               | Understand and interpret Level II | Must know | Lecture | LAQ   | LAQ |  |

|  |   |  |           |   |  |             |                                   |           |         |     |     |                     |
|--|---|--|-----------|---|--|-------------|-----------------------------------|-----------|---------|-----|-----|---------------------|
|  |   |  |           |   | development of adulthood   |             |                                   |           |         |     |     |                     |
|  | Information Analysis                      |  | Knows how |   | Discuss the different stages of physical, psychosocial and cognitive development of old age and senescence | Cognitive   | Understand and interpret Level II | Must know | Lecture | LAQ | LAQ |                     |
|  | Information Self reflection and awareness | Significance of knowledge of Growth and Development for a homoeopath | Knows how | Discuss significance of growth and development in homoeopathy | Recognize the impact on knowledge of Growth and Development in case taking                                 | Affective   | Receive level I                   | Must know | Lecture | LAQ | LAQ | Hor. with Organon   |
|  | Information Analysis                      |  | Knows     |   | Identify the significance of knowledge of Growth and Development in use of Repertory                       | Psychomotor | Imitation level I                 | Must know | Lecture | LAQ | LAQ | Hor. with Repertory |
|  | Information organization                  |  | Knows     |   | Locate the significance of   | Cognitive   | Understand and interpret          | Must know | Lecture | LAQ | LAQ | Hor. with HMM       |

|  |                  |  |  |  |  |  |          |  |  |  |  |  |
|--|------------------|--|--|--|--|--|----------|--|--|--|--|--|
|  | tion<br>Analysis |  |  |  | knowledge<br>of Growth<br>and Developmen<br>t in<br>Homoeopath<br>ic Materia<br>Medica |  | Level II |  |  |  |  |  |
|--|------------------|--|--|--|--|--|----------|--|--|--|--|--|

### Semester 3 Topic 2- Development of Personality, types, Traits, Temperament

| Sr.No           | Generic Competency     | Subject area                                  | Millers Know/ Know how/Show how/Does | Specific competency                | Specific Learning Objectives / Outcomes | Bloom's domain | Guilbert's level | Must know / desirable to know / nice to know | TL method / media       | Formative Assessment | Summative Assessment | Integration - Horizontal / Vertical / Spiral |
|-----------------|------------------------|---|--------------------------------------|------------------------------------|---|----------------|------------------|--|-------------------------|----------------------|----------------------|--|
| Hom UG-OM-I.9.1 | Information collection | Concept of Personality. Temperament and trait | Knows                                | Discuss the concept of personality | Define the concept of personality       | Cognitive      | Recall level I   | Must know                                    | Lecture with discussion | MCQ                  | SAQ/Viva             | Concept to be discuss with Organon           |
|                 | Informa                |   | Knows                                | Discuss the                        | Discuss the concept of                  | Cognitive      | Understand and   | Must   | Lecture                 | SAQ                  | SAQ                  |  |

|                            |  |   |       |   |  |               |   |                          |   |  |          |  |
|----------------------------|--|---|-------|---|--|---------------|---|--------------------------|---|--|----------|--|
|                            | tion<br>collectio<br>n ,<br>informa<br>tion<br>interpre<br>tation<br>and<br>Synthesi<br>s          |   |       | concept of<br>Temperam<br>ent and its<br>evolution        | temperament<br>and its<br>relation to<br>Body type   | e             | interpret<br>Level II                       | know                     |   |  |          |  |
| Hom<br>UG-<br>OM-<br>I.9.4 | Informa<br>tion<br>collectio<br>n +<br>Informa<br>tion<br>Interpre<br>tation                       |   | Knows | Discuss<br>the<br>concept of<br>traits and<br>its utility | Describe the<br>scientific<br>concept of<br>'Traits' and<br>their<br>importance  | Cognitiv<br>e | Understan<br>d and<br>interpret<br>Level II | Must<br>know             | Lecture<br>with<br>case let<br>discussi<br>on                           | MCQ                                      | SAQ/Viva | Concep<br>t<br>to be<br>discuss<br>with<br>Organo<br>n |
| Hom<br>UG-<br>OM-<br>I.9.5 | Informa<br>tion<br>collectio<br>n<br><br>interpre<br>tation<br>and<br><br>Analysis<br><br>Synthesi | Theories<br>of<br>Personali<br>ty and<br>develop<br>mental<br>process | Knows | Discuss<br>the<br>Theories<br>of<br><br>Personalit<br>y   | Explain the<br>following<br>theories of<br>personality<br><br>1. Biological<br><br>2. Behaviouristi<br>c<br><br>3. Learning<br><br>4. Humanistic | Cognitiv<br>e | Understan<br>d and<br>interpret<br>Level II | Desirabl<br>e to<br>know | Lecture<br>with<br>case<br>discussi<br>on or<br>suitable<br>exampl<br>e | MCQ<br><br>Essay<br>on<br>each<br>theory | SAQ/Viva |  |

|                 |  |                        |           |   |   |           |                                   |                   |                          |     |          |                |
|-----------------|--|------------------------|-----------|---|---|-----------|-----------------------------------|-------------------|--------------------------|-----|----------|----------------|
|                 | s  |                        |           |   | proposed by various psychologists and their implications to a physician |           |                                   |                   |                          |     |          |                |
| Hom UG-OM-I.9.6 | Information<br>Holistic approach                       |                        | Knows how | Discuss the development of Personality and factors determining it | Illustrate the process of personality development                       | Cognitive | Understand and interpret Level II | Desirable to know | Case scenario discussion | MCQ | SAQ      |                |
| Hom UG-OM-I.9.7 | Information collection and Case Interpretation of data |                        | Knows     |   | Enumerate the Factors determining the Personality                       | Cognitive | Recall level I                    | Desirable to know | Case scenario discussion | MCQ | SAQ/Viva |                |
| Hom UG-OM-I.9.9 | Information Analysis<br>Synthesis                      |                        | Knows how | Assessment of personality   | Describe the techniques of assessing Personality                        | Cognitive | Understand and interpret Level II | Nice to know      | Case scenario discussion | MCQ | SAQ/Viva |                |
| Hom UG-OM-      | Information collection                                 | Personality and Homoeo | Knows     | Implications of study of  | Discuss the relevance of concept of                                     | Cognitive | Understand and                    | Must know         | Discussion with case     | MCQ | LAQ      | Hor with Organ |

|                                 |                    |       |       |                                      |   |               |   |                          |                                     |     |     |                   |
|---------------------------------|--------------------|-------|-------|--------------------------------------|---|---------------|---|--------------------------|-------------------------------------|-----|-----|-------------------|
| I.9.1<br>0                      | n                  | pathy |       | personalit<br>y to<br>homoeopa<br>th | Personality to<br>a<br>homoeopath   |               | interpret<br>Level II                       |                          | scenari<br>o                        |     |     | on                |
| Hom<br>UG-<br>OM-<br>I.9.1<br>1 | Problem<br>Solving |       | Knows |                                      | Discuss the<br>relevance of<br>studying<br>Personality<br>from the<br>perspective of<br>Materia<br>Medica | Cognitiv<br>e | Understan<br>d and<br>interpret<br>Level II | Desirabl<br>e to<br>know | Discussi<br>on with<br>scenari<br>o | MCQ | LAQ | Hor<br>with<br>MM |

### Semester 3 Topic 3-Bio-Psycho-Social development of Human Being

| Sr.No<br>7                 | Generic<br>Compet<br>ency | Subject<br>area   | Millers<br>Know/<br>Know<br>how/Sho<br>w<br><br>how/Doe<br>s | Specific<br>competen<br>cy                                      | Specific<br>Learning<br>Objectives /<br>Outcomes | Bloom's<br>domain | Guilbert's<br>level | Must<br>know /<br>desirable<br>to know /<br>nice to<br>know | TL<br>metho<br>d /<br>media | Forma<br>tive<br>Assess<br>ment | Summ<br>-ative<br>Assess<br>ment | Integratio<br>n -<br>Horizonta<br>l /<br>Vertical /<br>Spiral |
|----------------------------|---------------------------|---|--|---|--|-------------------|---------------------|---|-----------------------------|---------------------------------|----------------------------------|---|
| Hom<br>UG-<br>OM-<br>I.5.1 | Informa<br>tion           | Concept<br>of Bio-<br>Psycho-<br>Social<br>model<br>for | Knows  | Describe<br>concept of<br>Bio-<br>Psycho-<br>Social<br>developm | Define the<br>Bio-Psycho-<br>Social model        | Cognitiv<br>e     | Recall<br>level I   | Must<br>know  | Lectur<br>e                 | Ess                             | LAQ/<br>SAQ                      | Anatomy,<br>Physiolog<br>y                                    |

|  |   |               |           |  |   |           |                                   |           |          |     |     |                  |
|--|---|---------------|-----------|--|---|-----------|-----------------------------------|-----------|----------|-----|-----|------------------|
|  | Information Analysis Synthesis          | holistic care | Knows     | ent of Human Being                             | Illustrate how each of the constituent of the Bio-psycho-social model gives a more comprehensive understanding of a human being | Cognitive | Understand and interpret Level II | Must know | Lecturer | LAQ | LAQ |                  |
|  | Holistic approach System based thinking |               | Knows how | Implications of the Bio-psycho-social approach | Discuss the significance of the Bio-psycho-social approach to a human being   | Cognitive | Understand and interpret Level II | Must know | Lecturer | LAQ | LAQ |                  |
|  | Synthesis                               |               | Knows     | Implications in homoeopathic care              | Discuss the similarity between homoeopathic approach to a human being with Bio-psycho-social approach                           | Cognitive | Understand and interpret Level II | Must know | Lecturer | LAQ | LAQ | Hor with Organon |

|                            |                                      |  |              |  |  |               |                   |              |                                  |  |     |  |
|----------------------------|--------------------------------------|--|--------------|--|--|---------------|-------------------|--------------|----------------------------------|--|-----|--|
| Hom<br>UG-<br>OM-<br>I.5.5 | Informa<br>tion<br><br>Synthesi<br>s |  | Knows<br>how | Discuss<br>Socio<br>cultural<br>basis of<br>Behavior | Defines the<br>role of culture<br>in shaping<br>human<br>behavior. | Cognitiv<br>e | Recall<br>level I | Must<br>know | Small<br>group<br>discus<br>sion | Chart<br>prepar<br>ation<br><br>Assign<br>ment | SAQ |  |
|----------------------------|--------------------------------------|--|--------------|--|--|---------------|-------------------|--------------|----------------------------------|--|-----|--|

**Semester 3 Topic 4 Concept of Stress-Conflict: their genesis, types and effects on the mind and body**

| Sr.No                           | Generic<br>Compet<br>ency         | Subject<br>area   | Millers<br>Know/<br>Know<br>how/Sho<br>w<br><br>how/Doe<br>s | Specific<br>competen<br>cy                                       | Specific<br>Learning<br>Objectives /<br>Outcomes | Bloom's<br>domain | Guilbert's<br>level                         | Must<br>know /<br>desirabl<br>e to<br>know /<br>nice to<br>know | TL<br>method<br>/ media              | Forma<br>tive<br>Assess<br>ment | Summ<br>-ative<br>Assess<br>ment | Integratio<br>n -<br>Horizonta<br>l /<br>Vertical /<br>Spiral |
|---------------------------------|-----------------------------------|---|--|--|--|-------------------|---|---|--------------------------------------|---------------------------------|----------------------------------|---|
| Hom<br>UG-<br>OM-<br>I.10.<br>1 | Informa<br>tion<br>collectio<br>n | Stress,<br>Conflicts<br>and<br>Coping<br>Mechani<br>sms | Knows  | Discuss<br>the<br>Concept of<br>Stress and<br>types of<br>stress | Define Stress                                    | Cognitiv<br>e     | Remembe<br>r and<br>Recall<br>Level I       | Must<br>know  | Present<br>ation<br>with<br>case let | MCQ                             | LAQ                              | Observati<br>on in any<br>departme<br>ntal OPD/<br>IPD        |
| Hom<br>UG-<br>OM-<br>I.10.<br>2 | Informa<br>tion and<br>analysis   |   | Knows  |  | Classify the<br>types of stress                  | Cognitiv<br>e     | Understan<br>d and<br>interpret<br>Level II | Must<br>know  | Present<br>ation<br>with<br>case let | MCQ                             | LAQ                              |   |

|                                 |                                   |  |              |                                     |   |               |   |                          |                                      |     |          |  |
|---------------------------------|-----------------------------------|--|--------------|-------------------------------------|---|---------------|---|--------------------------|--------------------------------------|-----|----------|--|
| Hom<br>UG-<br>OM-<br>I.10.<br>3 | Informa<br>tion                   |  | Knows<br>how |                                     | Identify the<br>sources of<br>Stress                        | Cognitiv<br>e | Understan<br>d and<br>interpret<br>Level II | Must<br>know             | Present<br>ation<br>with<br>case let | MCQ | SAQ/Viva |  |
| Hom<br>UG-<br>OM-<br>I.10.<br>4 | Organiz<br>e the<br>data          |  | Knows<br>how |                                     | Discuss the<br>effect of<br>Stresses on<br>Mind and<br>Body | Cognitiv<br>e | Understan<br>d and<br>interpret<br>Level II | Desirabl<br>e to<br>know | Present<br>ation<br>with<br>case let | MCQ | SAQ/Viva |  |
| Hom<br>UG-<br>OM-<br>I.10.<br>5 | Informa<br>tion                   |  | Knows        | Concept of<br>Conflict<br>and types | Define<br>Conflict  | Cognitiv<br>e | Recall<br>level I                           | Must<br>know             | Present<br>ation<br>with<br>case let | MCQ | SAQ/Viva | Observati<br>on in any<br>departme<br>ntal OPD/<br>IPD |
| Hom<br>UG-<br>OM-<br>I.10.<br>6 | Informa<br>tion<br>collectio<br>n |  | Knows        |                                     | State the<br>stages of<br>Conflict                          | Cognitiv<br>e | Recall<br>Level I                           | Must<br>know             | Present<br>ation<br>with<br>case let | MCQ | SAQ/Viva | Observati<br>on in any<br>departme<br>ntal OPD/<br>IPD |
| Hom<br>UG-<br>OM-<br>I.10.      | Organiz<br>e the<br>data          |  | Knows<br>how |                                     | Enumerate<br>the types of<br>Conflict                       | Cognitiv<br>e | Recall<br>Level I                           | Must<br>know             | Present<br>ation<br>with<br>case let | MCQ | SAQ/Viva | Observati<br>on in any<br>departme<br>ntal OPD/        |

|                                  |                           |  |           |  |   |           |                                   |                   |                            |     |          |  |
|----------------------------------|---------------------------|--|-----------|--|---|-----------|-----------------------------------|-------------------|----------------------------|-----|----------|--|
| 7                                |                           |  |           |  |   |           |                                   |                   |                            |     |          | IPD                                      |
| Hom<br>UG-<br>OM-<br>I.10.<br>8  | Analysis<br><br>Synthesis |  | Know      | Describe the relationship between stress and conflict  | Discuss the relationship between Stress and Conflict  | Cognitive | Understand and interpret Level II | Desirable to know | Presentation with case let | MCQ | SAQ/Viva | Observation in any departmental OPD/ IPD |
| Hom<br>UG-<br>OM-<br>I.10.<br>9  | Information               |  | Know      | Discuss the concept of Coping Mechanisms and their use | Define Coping mechanism                               | Cognitive | Recall Level I                    | Must know         | Presentation with case let | MCQ | SAQ/Viva | Observation in any departmental OPD/ IPD |
| Hom<br>UG-<br>OM-<br>I.10.<br>10 | Information               |  | Knows how |  | Enumerate the types of Coping mechanisms              | Cognitive | Recall Level I                    | Must know         | Presentation with case let | MCQ | SAQ/Viva | Observation in any departmental OPD/ IPD |
| Hom<br>UG-<br>OM-<br>I.10.<br>1  | Problem solving           |  | Knows how |  | Discuss the utility of Coping mechanism while dealing | Cognitive | Understand and interpret Level II | Must know         | Presentation with case let | MCQ | MCQ      | Observation in any departmental OPD/ IPD |

|   |  |   |           |   |   |           |                                   |           |                           |     |     |  |
|---|--|---|-----------|---|---|-----------|-----------------------------------|-----------|---------------------------|-----|-----|--|
| 1 |  |   |           |   | with Stress   |           |                                   |           |                           |     |     |  |
|   | Holistic approach<br><br>System based thinking |   | Knows how | Discuss successful resolution of conflict           | Evaluate the role of learning and adaptation in ensuring resolution of stress | Cognitive | Understand and interpret Level II | Must know | Lecture with case example | LAQ | LAQ |  |
|   | Synthetic                                      | Application of stress-conflict in Homoeopathy | Shows How | Exploring effects of stress-conflict in Homoeopathy | Explore the reflection of conflict in Hom Materia Medica                      | Cognitive | Problem solving III               | Must know | Lecture                   | LAQ | LAQ |  |

### Semester 3 Topic- 5- Applied Psychology: Clinical, Education, Sports, Business and Industrial

| Sr.No | Generic Competency | Subject area | Millers Know/ Know how/ Show how/ | Specific competency | Specific Learning Objectives / Outcomes | Bloom's domain | Guilbert's level | Must know / desirable to know / nice to know | TL method / media | Formative Assessment | Summative Assessment | Integration - Horizontal / Vertical / Spiral |
|-------|--------------------|--------------|-----------------------------------|---------------------|---|----------------|------------------|--|-------------------|----------------------|----------------------|--|
|-------|--------------------|--------------|-----------------------------------|---------------------|---|----------------|------------------|--|-------------------|----------------------|----------------------|--|

|                                 |                                   |                           |       |   |   |  |   |                          |  |     |          |  |
|---------------------------------|-----------------------------------|---------------------------|-------|---|---|--|---|--------------------------|--|-----|----------|--|
|                                 |                                   |                           | Does  |   |   |  |   |                          |  |     |          |  |
| Hom<br>UG-<br>OM-<br>I.11.<br>1 | Informa<br>tion<br>Collecti<br>on | Applied<br>Psycholo<br>gy | Knows | Understan<br>d the<br>applicatio<br>n of<br>Psycholo<br>gy in the<br>different<br>fields of<br>Clinical,<br>Educatio<br>n, Sports,<br>Business,<br>Industrial | Define the<br>following<br>terms in<br>Applied<br>Psychology viz<br>Clinical,<br>Business,<br>Education,<br>Sports,<br>Industrial | Cognitiv<br>e                          | Recall<br>Level I                           | Must<br>know             | Discussi<br>on on<br>the<br>utility of<br>the<br>subject<br>in<br>multiple<br>human<br>resource<br>s areas | MCQ | SAQ      |  |
|                                 | Informa<br>tion<br>manage<br>ment |                           | Knows |   | Illustrate the<br>utility of<br>subject<br>Psychology in<br>various fields  | Cognitiv<br>e<br>?<br>Psycho-<br>motor | Understan<br>d and<br>interpret<br>Level II | Desirab<br>le to<br>know | Library<br>referenc<br>es  | SAQ | SAQ/Viva |  |

**Semester 3 Topic 6: Psychology and its importance in Homoeopathic practice for Holistic Management of the patient**

|  |                           |                    |  |                            |  |                   |                     |   |                         |                                 |                                  |   |
|--|---------------------------|--------------------|--|----------------------------|--|-------------------|---------------------|---|-------------------------|---------------------------------|----------------------------------|---|
|  | Generic<br>Compet<br>ency | Subject<br>area    | Millers<br>Know/<br>Know<br>how/<br>Show<br>how/<br>Does | Specific<br>competen<br>cy | Specific<br>Learning<br>Objectives /<br>Outcomes | Bloom's<br>domain | Guilbert's<br>level | Must<br>know /<br>desirabl<br>e to<br>know /<br>nice to<br>know | TL<br>method<br>/ media | Forma<br>tive<br>Assess<br>ment | Summ<br>-ative<br>Assess<br>ment | Integrat<br>ion -<br>Horizon<br>tal /<br>Vertical<br>/ Spiral |
|  | Systems<br>thinking       | Psycholo<br>gy and | Knows  | Summarizi<br>ng the        | Discuss the<br>ways in                           | Cognitive         | Understan<br>d and  | Must<br>know  | Lecture<br>and          | LAQ                             | LAQ                              |   |

|  |  |   |  |                         |  |  |                       |  |                |  |  |  |
|--|--|---|--|-------------------------|--|--|-----------------------|--|----------------|--|--|--|
|  |  | Homoeo<br>pathy for<br>Holistic<br>manage<br>ment |  | course of<br>Psychology | which<br>Psychology<br>may<br>contribute<br>to the<br>holistic<br>manageme<br>nt of the<br>patient |  | interpret<br>Level II |  | discussi<br>on |  |  |  |
|--|--|---|--|-------------------------|--|--|-----------------------|--|----------------|--|--|--|

### Teaching-Learning Methods

- a. Classroom teaching
  - i. Lecture
  - ii. Demonstration
  - iii. Group discussion
  - iv. Problem based learning
- b. Practical
  - i. Psychological theories –Models / Experiments / Any activity
  - ii. Facial recognition spotting
- c. Individual learning
  - i. Assignment
  - ii. Short project -e.g. searching MM or Repertory for representation of emotions, thoughts and behaviour

### V Practical – Lab work – Field – Clinical Hospital work

- a. Journal club: a team of students to present the understanding of current development in psychological aspects of every day events
- b. Field work - Some survey for identification of psychological disturbance in Common Man
- c. Clinical Hospital Work- Small project on psychometric tests.

#### VI No of Teaching Hours: Theory

| Sr. No | Topic   | No of lectures | Non-lectures |
|--------|---|----------------|--------------|
| 1.     | Introduction to the study of Mind in Homoeopathy  | 3              | -            |
| 2.     | Psychological organization and the interrelationship of Thought (Cognition), Feelings (Affect) and Behaviour (Conation); Conscious and Unconscious elements | 2              | 1            |
| 3.     | Physiological basis of behaviour - the place of conditioned and unconditioned reflex  | 3              | 1            |
| 4.     | Understanding Behavior and Functioning and expressions in Repertory and Materia Medica  | 4              | 2            |
| 5.     | Understanding Emotion, its different definitions and expressions in Repertory and Materia Medica  | 5              | 3            |
| 6.     | Understanding Intellect: Attention, memory and its function and expression in Repertory and Materia Medica  | 4              | 3            |
| 7.     | Understanding Intellect: Perception and expressions in Repertory and Materia Medica   | 3              | 2            |
| 8.     | Understanding Intellect: Thinking, intelligence and its measurement and expressions in Repertory and Materia Medica   | 4              | 2            |
| 9.     | Motivation and their types with role in our lives   | 2              | 2            |
| 10.    | Learning and its place in adaptation  | 4              | 2            |

|     |   |    |    |
|-----|---|----|----|
| 11. | Growth and development of Mind and its expressions from Infancy to old age  | 4  | 2  |
| 12. | Structure of Personality, the types, their assessment, relationship to Temperament and representation in Materia Medica | 4  | 2  |
| 13. | Conflicts: their genesis and effects on the mind and body   | 3  | 1  |
| 14. | Applied Psychology: Clinical, Education, Sports, Business, Industrial   | 2  | -  |
| 15. | Psychology and its importance in Homoeopathic practice  | 2  | -  |
|     | Total   | 50 | 22 |

## 8.Assessment

### 8A- Number of papers and Mark Distribution

| Sr. No. | Course Code | Papers | Theory | Practical | Viva Voce | Internal Assessment Practical | Grand Total |
|---------|-------------|--------|--------|-----------|-----------|-------------------------------|-------------|
| 1       | HomUG-OM-I  | 1      | 100    | 50        | 40        | 10                            | 200         |

### 8B - Scheme of Assessment (formative and Summative)

| Sr. No | Professional Course     | 1 <sup>st</sup> term (1-6 Months) | 2 <sup>nd</sup> Term (7-12 Months)    | 3 <sup>rd</sup> Term (13-18 Months) |
|--------|-------------------------|-----------------------------------|---------------------------------------|-------------------------------------|
| 1      | First Professional BHMS | First PA + 1 <sup>ST</sup> TT     | 2 <sup>nd</sup> PA+2 <sup>ND</sup> TT | 3 <sup>rd</sup> PA      UE          |

### 8 C - Evaluation Methods for Periodical Assessment

| Sr. No | Evaluation Dimensions   |
|--------|---|
| 1      | Practical/Clinical Performance  |
| 2      | Viva Voce, MCQs, MEQ (Modified Essay Questions/Structured Questions)  |
| 3      | Open Book Test (Problem Based)  |
| 4      | Reflective writing  |
| 5      | Class Presentations; Work Book Maintenance  |
| 6      | Problem Based Assignment  |
| 8      | Co-curricular Activities, (Social Work, Public Awareness, Surveillance/ Prophylaxis Activities, Sports or Other Activities which may be decided by the Department). |
| 9      | Small Project   |

### 8D - Scheme of Assessment (formative and Summative)

| Sr. No | Professional Course     | 1 <sup>st</sup> term (1-6 Months) |                    |                         | 2 <sup>nd</sup> Term (7-12 Months) |                    |                         | 3 <sup>rd</sup> Term (13-18 Months) |    |
|--------|-------------------------|-----------------------------------|--------------------|-------------------------|------------------------------------|--------------------|-------------------------|-------------------------------------|----|
| 1      | First Professional BHMS | 1 <sup>st</sup> PA                | 1 <sup>ST</sup> TT |                         | 2 <sup>nd</sup> PA                 | 2 <sup>ND</sup> TT |                         | 3 <sup>rd</sup> PA                  | UE |
|        |                         | 10 Marks Practical/Viva           | 50 Marks Theory    | 50 Marks Practical/Viva | 10Marks Practical/Viva             | 50 Marks Theory    | 50 Marks Practical/Viva | 10Marks Practical/Viva              |    |

**For Internal assessment, Only Practical/Viva marks will be considered. Theory marks will not be counted)**

### 8E - Method of Calculation of Internal Assessment Marks for Final University Examination:

|   |   |   |  |   |   |   |  |
|---|---|---|--|---|---|---|--|
| PA1<br>Practical/Viva<br>(10 Marks)<br><br><br><br><br><br><br><br><br><br><b>A</b> | PA2<br>Practical/Viva<br>(10 Marks)<br><br><br><br><br><br><br><br><br><br><b>B</b> | PA3<br>Practical/Viva<br>(10 Marks)<br><br><br><br><br><br><br><br><br><br><b>C</b> | Periodical<br>Assessment<br>Average<br>PA1+PA2+PA3/3<br><br><br><br><br><br><br><br><br><br><b>D</b> | TT1<br>Practical/Viva<br>(50 Marks)<br><br><br><br><br><br><br><br><br><br><b>E</b> | TT2<br>Practical/Viva<br>(50 Marks)<br><br><br><br><br><br><br><br><br><br><b>F</b> | Terminal<br>Test<br>Average<br>TT1+<br>TT2/<br>100*10<br><br><br><br><br><br><br><b>G</b> | Final<br>Internal<br>Assessment<br>Marks<br><br><br><br><br><br><br><br><br><br><b>D+G/2</b> |
|---|---|---|--|---|---|---|--|

PA: Periodical Assessment; TT: Term Test; UE: University Examinations

### 8 F - Paper Layout

Summative assessment:

Theory- 100 marks

Organon -50 marks

|     |          |
|-----|----------|
| MCQ | 5 marks  |
| SAQ | 20 marks |
| LAQ | 25 marks |

Psychology - 50 marks

|     |          |
|-----|----------|
| MCQ | 5 marks  |
| SAQ | 20 marks |
| LAQ | 25 marks |

| Sr.<br>No. | Paper |  |  | <b>D</b><br><br><b>Type of Questions</b><br><br><b>“Yes” can be asked.</b><br><br><b>“No” should not be asked</b> |
|------------|-------|--|--|---|
|------------|-------|--|--|---|

|   | <b>A</b><br><b>List of Topics</b>  | <b>B</b><br><b>Terms</b> | <b>C</b><br><b>Marks</b> | <b>MCQ</b><br><b>(1mark)</b> | <b>SAQ</b><br><b>(5 Marks)</b> | <b>LAQ</b><br><b>(10 Marks)</b> |
|---|--|--------------------------|--------------------------|------------------------------|--------------------------------|---------------------------------|
| 1 | Introductory Topics  | I                        | Refer Next Table         | Yes                          | Yes                            | No                              |
| 2 | Logic  | I                        |                          | No                           | Yes                            | No                              |
| 3 | §1-27&105-145 of Organon of medicine, Vital Force – Dynamisation – Homoeopathic Cure – Natures Law of Cure & Implications – drug proving | II & III                 |                          | No                           | Yes                            | Yes                             |
| 4 | The Physician – Purpose of Existence, Qualities, Duties, Knowledge   | III                      |                          | No                           | No                             | Yes                             |

### 8 G – I – Distribution of Theory Exam - Organon

### 8 G – II – Theme Table - Organon

| Theme* | Topic  | Term     | Marks | MCQ's | SAQ's | LAQ's |
|--------|--|----------|-------|-------|-------|-------|
| A      | Introductory Topics  | I        | 10    | Yes   | Yes   | No    |
| B      | Logic  | I        | 05    | No    | Yes   | No    |
| C      | §1-27&105-145 of Organon of medicine, Vital Force – Dynamisation – Homoeopathic Cure – Natures Law of Cure & Implications – drug proving | II & III | 25    | No    | Yes   | Yes   |
| D      | The Physician – Purpose of Existence, Qualities, Duties, Knowledge   | III      | 10    | No    | No    | Yes   |

### Theme table: -Psychology

| Theme* | Topics  | Term | Marks | MCQ's | SAQ's | LAQ's |
|--------|---|------|-------|-------|-------|-------|
| A      | Introduction to psychology                                    | I    | 05    | NO    | Yes   | No    |
| B      | Psychological organization of Mind –Structural and Functional | I    | 01    | Yes   | No    | No    |
| C      | Understanding   | I    | 16    | Yes   | Yes   | Yes   |

|   |   |     |    |     |     |     |
|---|---|-----|----|-----|-----|-----|
|   | Emotion/thinking/ Behaviour                       |     |    |     |     |     |
| D | Motivation and their types with role in our lives | I   | 05 | No  | Yes | No  |
| E | Growth and development                            | II  | 11 | Yes | No  | Yes |
| F | Personality development and stress management     | III | 06 | NO  | Yes | No  |
| G | Applied Psychology                                | III | 06 | Yes | Yes | No  |

### 8 H Question paper Blue print :

#### Organon -50 marks +Psychology - 50 marks

| A<br>Question Serial Number   | B<br>Type of Question  | Question Paper Format<br>(Refer table 4FII theme table for themes) |
|-------------------------------|--|--|
| <b>Q1 Organon 05 Marks</b>    | Multiple Choice Questions (MCQ)<br>5 Questions<br>1 mark each<br>All Compulsory<br>Must Know part – 3 MCQ<br>Desirable to know – 2 MCQ<br>Nice to know – NIL         | Theme A<br>Theme A<br>Theme A<br>Theme A<br>Theme A                |
| <b>Q1 Psychology 05 Marks</b> | All compulsory<br><br>Multiple choice Questions (MCQ) 5 Questions -<br>1 mark each<br><br>Must know – 3MCQ<br><br>Desirable to know-1 MCQ<br><br>Nice to know -1 MCQ | Theme B+C+E+F+G  |

|                               |   |  |
|-------------------------------|---|--|
| <b>Q2 Organon 15 Marks</b>    | Short Answer Questions (SAQ)<br>3 Questions<br>5 Marks Each<br>All Compulsory<br>Must Know part – 3SAQ<br>Desirable to Know – NIL<br>Nice To Know - NIL                   | Theme A<br>Theme B<br>Theme C                                  |
| <b>Q2 Psychology 25 Marks</b> | Short answer Questions (SAQ) 5 Questions 5 Marks Each<br><br>All compulsory<br><br>Must know part: 4 SAQ<br><br>Desirable to know: 1 SAQ                                  | Theme A+C+D+F+G  |
| <b>Q3 Organon 30 Marks</b>    | Long Answer Questions (LAQ)<br>3 Questions of 10 Marks Each Respectively<br>All Compulsory<br>All questions on must know<br>Desirable to Know – NIL<br>Nice To Know - NIL | Theme C (10 Marks)<br>Theme C (10 Marks)<br>Theme D (10 Marks) |
| <b>Q3 Psychology 20 Marks</b> | Long answer Questions (LAQ) 2 Questions of 10 marks each<br><br>All compulsory<br><br>Must know part: 2 LAQ   | Theme C=10 marks<br><br>Theme E=10 marks                       |

## 8 I - Distribution of Practical Exam

### Practical -100

### Practical Organon: 50 marks

|                     |          |
|---------------------|----------|
| Practical           | 25 marks |
| Viva voce           | 20 marks |
| Internal assessment | 5 marks  |

**Practical Psychology: 50 marks**

|                     |          |
|---------------------|----------|
| Practical           | 25 marks |
| Viva voce           | 20 marks |
| Internal assessment | 5 marks  |

## **9. References**

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**Course-Homoeopathic Pharmacy**

**Course code: Hom-UG-HP**

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# **COMPETENCY BASED DYNAMIC CURRICULUM FOR FIRST BHMS PROFESSIONAL COURSE**

(Applicable from Batch 2022-2023 onwards for 5 years or until further notification by National Commission for Homoeopathy whichever is earlier)

**(Homoeopathic Pharmacy)**



**HOMOEOPATHY EDUCATION BOARD**

**NATIONAL COMMISSION FOR HOMOEOPATHY**

**MINISTRY OF AYUSH, GOVERNMENT OF INDIA**

JAWAHAR LAL NEHRU BHARTIYA CHIKITSA AVUM HOMOEOPATHY ANUSANDHAN BHAVAN

No.61-65, Institutional Area, opp. 'D' block, Janak Puri, New Delhi-110 058

**Course-Homoeopathic Pharmacy**

**Course code:** Hom-UG-HP

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## 1. PREAMBLE

Pharmacy holds a unique place in Homoeopathic practice and education. It involves knowledge of sources of drugs and the process through which these are processed to obtain dynamic, potent homoeopathic drugs for use at the bedside. It encompasses knowledge of drug action, drug proving, methods of Quality testing, standardization & storage with up to date information of changing drug laws related to Homoeopathic Pharmaceutical Industry & Homoeopathy.

We all know the travails which Master went through while establishing the right to manufacture and dispense what he had so painfully discovered. The challenges have not lessened in the modern era when 'scientific' evidence has been gathered for dubbing Homoeopathic medicines as nothing more than a placebo. It is important that the entrant to our science is introduced to the scientific nature of the process employed to prepare our medicines and he develops confidence in the soundness of the practices as well as its efficacy. The student should also appreciate the more than 250 year advance that Hahnemann was able to establish of Homoeopathic science. We now know that Homoeopathy is the 'greenest' of all medical systems in existence and that is sustainable, eco-friendly and the most economic while being effective over a wide range of conditions.

The way that this can be conveyed is by adopting an integrated approach to Pharmacy education and training. Effective linkages with the subjects of Homoeopathic Philosophy and Materia Medica will be able to convey the strong roots that the practice of Pharmacy has not only in the philosophical approach but also the experimental results as seen through the proving from which the world of Materia Medica has evolved.

Simultaneously, the recent advances in the bio-physical and quantum physics has opened new avenues to address the age-old question of how homoeopathic medicines act. A host of researchers are already doing work which the student needs to be made conversant with. That will produce an insight of the way new researches and developments in related fields of the 21<sup>st</sup> century are able to start explaining Hahnemann's insights of the 18<sup>th</sup>! This will also firmly root the student in the first year itself to being a participant in ongoing research related to the discipline which will be his own. Hence the teacher of Pharmacy has a crucial role to play in being abreast of the developments in the field and lend to the student the excitement that becomes a part of teaching-learning.

## **2. PROGRAMME OUTCOMES**

At the end of BHMS program, a student must

- 1) Develop the knowledge, skills, abilities and confidence as a primary care homoeopathic practitioner to attend to the health needs of the community in a holistic manner
- 2) Correctly assess and clinically diagnose common clinical conditions prevalent in the community from time to time
- 3) Identify and incorporate the socio-demographic, psychological, cultural, environmental & economic factors affecting health and disease in clinical work
- 4) Recognize the scope and limitation of homoeopathy in order to apply Homoeopathic principles for curative, prophylactic, promotive, palliative, and rehabilitative primary health care for the benefit of the individual and community
- 5) Be willing and able to practice homoeopathy as per medical ethics and professionalism.
- 6) Discern the scope and relevance of other systems of medical practice for rational use of cross referrals and role of life saving measures to address clinical emergencies
- 7) Develop the capacity for critical thinking, self reflection and a research orientation as required for developing evidence based homoeopathic practice.
- 8) Develop an aptitude for lifelong learning to be able to meet the changing demands of clinical practice
- 9) Develop the necessary communication skills and enabling attitudes to work as a responsible team member in various healthcare settings and contribute towards the larger goals of national health policies such as school health, community health and environmental conservation.

### 3.COURSE OUTCOMES

At the end of the course of Homoeopathic Pharmacy, I BHMS Student will be able to

1. Explain the principles that govern homoeopathic pharmacy.
2. Discuss the pharmacognosical basis of homoeopathic drugs with respect to their identification, nomenclature, source, part used, method of collection and preparation.
3. Prepare homoeopathic medicines from their respective sources according to the different scales & methods of potentisation on a small scale in the laboratory.
4. Describe the pharmacology of homoeopathic drugs with respect to the types of drug action, sphere of action and pharmacological action of homoeopathic drugs integrated with Homoeopathic Materia Medica, Anatomy and physiology.
5. Relate the methodology of Homoeopathic Drug Proving integrated with Organon of Medicine.
6. Apply the principles of Homoeopathic Posology in different health care setting like OPD/IPD integrated with Organon of Medicine and Homoeopathic Materia Medica.
7. State the methods of standardization and quality control of homoeopathic medicines to ensure the genuineness of homoeopathic medicines.
8. Explain the principles of pharmaconomy, dispensing and preservation of homoeopathic medicines.
9. Engage the principles of pharmaco-vigilance, and adverse drug reaction in relation to homoeopathic medicines.
10. Write an ideal prescription.
11. Evaluate the scope for research in homoeopathic pharmacy in the context of the recent advancements in pharmaceutical sciences

## 1. TEACHING HOURS

| Sr No. | Subject              | Theoretical Lecture | Practical + Posting at IPD/OPD/Hospital Dispensing Section |
|--------|----------------------|---------------------|--|
| 01     | Homeopathic Pharmacy | 100 hrs.            | 110 hrs.   |

### Teaching Hours (Theory)

| A. List of Topics  |  | B.Term | C.Teaching Hours |
|--|--|--------|------------------|
| <b>a) General Concepts and Orientation:</b>                              |  |        |                  |
| History of Pharmacy with emphasis on emergence of Homoeopathic Pharmacy. | Definition of Pharmacy & Homoeopathic Pharmacy<br><br>Concept of Drug substance, Drug, Medicine & Remedy<br><br>Forming Basic concept of other AYUSH Schools of Pharmacy (Ayurveda, Siddha, Sowa Rigpa & Unani Pharmacy) | I      | 03               |
| Homoeopathic Pharmacy Basics   | Sources of Homoeopathic Pharmacy<br><br>Branches of Pharmacy<br><br>Scope of Homoeopathic Pharmacy<br><br>Specialty and originality of Homoeopathic Pharmacy<br><br>The Principles of Homoeopathy                        | I      | 04               |

|                            |  |   |    |
|----------------------------|--|---|----|
|                            | <p>Law of Similia, Simplex &amp; Minimum</p> <p>Theory of Chronic Disease &amp; Vital Force</p> <p>Doctrine of Drug Proving &amp; Drug Dynamisation</p>  |   |    |
| Homoeopathic Pharmacopoeia | <p>The Evolution, History &amp; Development of Homoeopathic Pharmacopoeias throughout the world (year wise Publications) – GHP, BHP, HPUS, FHP</p> <p>Official –(HPI) &amp;Unofficial Pharmacopoeias – (M Bhattacharya &amp; Co's Homoeopathic Pharmacopoeia</p> <p>Encyclopaedia of Homoeopathic Pharmacopoeia – P N Verma, Homoeopathic Pharmaceutical Codex)</p> <p>Monograph, Contents of Monograph with its individual importance</p> | I | 04 |
| Ideal laboratory           | <p>Pre requisites of ideal Laboratory (General Laboratory), Laboratory safety Rules</p> <p>Role of Laboratory in Homoeopathic Pharmacy Education</p>   | I | 02 |
| Weights and measurements.  | <p>Metrology</p> <p>Basics &amp; Units of Apothecary System, British Imperial System, Metric System</p> <p>Interrelationship between various systems of Weight &amp; Measure</p> <p>Concept on Domestic Measures with Metric Equivalentents</p>  | I | 01 |

|  |  |   |    |
|--|--|---|----|
| Nomenclature                               | The Basic Rules of Nomenclature<br><br>Nomenclature of Homoeopathic Drugs<br><br>Important terminologies like scientific names, common names, synonyms<br><br>Anomalies in Nomenclature  | I | 02 |
| Pioneers of Homoeopathic Pharmacy          | Role & contributions of Pioneers in development of Homoeopathic Pharmacy   | I | 02 |
| <b>b) Raw Material: Drugs and Vehicles</b> |  |   |    |
| Source of drugs in Homoeopathy             | Different sources - Plant kingdom, Animal kingdom, Mineral kingdom, Nosodes, Sarcodes, Imponderabilia, Synthetic source,<br><br>New Sources - Allersode, Isodes with reference to their clinical utility<br><br>Introduction to Bowel Nosodes, Tissue remedies | I | 07 |
| Collection of drug substances              | General and Specific guidelines for collecting drugs from all available sources  | I | 03 |
| Vehicles.                                  | Definition, classification, General Use<br><br>Source, Properties & Particular use of Vehicles with respect to List Provided in Appendix D<br><br>Preparation – Commercial Lactose, Alcohol<br><br>Purity tests – Water, Alcohol, Sugar of Milk                | I | 06 |
| <b>c) Homoeopathic Pharmaceutics:</b>      |  |   |    |

|   |  |    |    |
|---|--|----|----|
| Mother tincture and its preparation                       | Extraction – Principles & Various Methods<br>Old Method (Based on Class I to IX)<br>Concept of Uniform Drug Strength<br>Estimation of Moisture Content - Necessity<br>New Method/Modern Approach of Homoeopathic Drug Preparation  | II | 07 |
| Various Scales of Potentization in Homoeopathic pharmacy. | History of development, Introducer, Designation, Preparation, Administration & Application with respect to - Centesimal Scale, Decimal Scale & 50 Millesimal Scale   | II | 03 |
| Drugs Dynamisation  | The Evolution of Dynamisation Concept in Homoeopathy<br>Potentisation & its types<br>The Merits of Potentisation<br>Succussion & Trituration<br>Various types of Potency– Fluxion Potency, Jumping Potency, Back Potency, Single Vial Potency, Multiple Vial Potency, Mixed Vial Potency<br>Post-Hahnemannian Potentization Techniques | II | 06 |
| External applications                                     | Scope of administration of External Applications in Homoeopathic Practice<br>Dr Hahnemann's View as per Organon (5 <sup>th</sup> & 6 <sup>th</sup> Ed)<br>Preparation & Uses of lotion, glycerol, liniment   | II | 05 |

|                                      |   |     |    |
|--------------------------------------|---|-----|----|
|                                      | and ointment.<br>Commercial Preparation of Ointment   |     |    |
| Posology                             | Basic principles of Homoeopathic Posology<br>Related aphorisms of Organon of medicine.<br>Criteria for Selection of Potency & Repetition of Dose<br>Various Kinds of Dose, Emphasis on Minimum Dose | III | 06 |
| Prescription                         | Prescription Writing<br>Important Abbreviations<br>Parts & Contents of Prescription<br>Merits & Demerits of Prescription Writing  | III | 02 |
| Dispensing of Homoeopathic Medicines | Various Dosage Forms – Solid, Liquid Dosage Forms,<br>Methods of Dispensing   | II  | 02 |
| Placebo.                             | Concept of Homoeopathic Placebo<br>The Philosophy of administration of placebo<br>Concept of Placebo Effect   | II  | 01 |
| Pharmaconomy                         | Routes of Homoeopathic drug administration.   | II  | 02 |
| Preservation                         | Preservation Rules – Raw Materials Drug Substance, Mother Preparations, Finished products & Vehicles  | II  | 02 |

| d) Pharmacodynamics      |   |     |    |
|--------------------------|---|-----|----|
| ▪ Doctrine of Signature. | Basic Concept, Its Evolution & Application in Ancient Medical System<br><br>Supporters of the Doctrine<br><br>Dr Hahnemann's view on the Doctrine   | II  | 01 |
| ▪ Drug Proving.          | Homoeopathic Pharmacodynamics<br><br>With reference to aphorisms 105 – 145 of Organon of Medicine – 6 <sup>th</sup> Ed)<br><br>Post Hahnemannian Drug Proving<br><br>Homoeopathic Pathogenetic Trial (HPT)<br><br>CCRH & Other Protocols on HPT<br><br>Other Noted Provers & their work on Drug Proving | III | 06 |
| ▪ Adverse Reactions      | Basic Idea, Reporting of ADE<br><br>Drug safety with Ref to HPI<br><br>Medication errors, Causality Assessment<br><br>Incompatible Remedies   | II  | 02 |
| ▪ Pharmaco-vigilance.    | Pharmacovigilance in Homoeopathy<br><br>Activities of Pharmacovigilance Centres<br><br>Awareness on Medicinal Preparations against Homoeopathic Principles – Patents, Combinations  | II  | 02 |
| ▪ Pharmacological        | listed in Appendix-A (Any 15)   | III | 05 |

|   |   |            |           |
|---|---|------------|-----------|
| study of drugs  |   |            |           |
| <b>e) Quality Control:</b>  |   |            |           |
| <ul style="list-style-type: none"> <li>Standardisation Homoeopathy</li> </ul>                 | in Different Methods of Standardisation<br>Quality Control of Raw Materials – Various Evaluation techniques<br>In Process Quality Control<br>Quality Control of finished products – Various standard parameters | II         | 02        |
| <ul style="list-style-type: none"> <li>Industrial pharmacy.</li> </ul>                        | Good Manufacturing Practices (GMP)<br>Schedule M1   | II         | 02        |
| <ul style="list-style-type: none"> <li>Homoeopathic pharmacopoeia laboratory (HPL)</li> </ul> | Functions and Activities of HPL relating to quality control of drugs.<br>Pharmacopoeia Commission for Indian Medicines  | II         | 01        |
| <b>f) Legislations pertaining to Homoeopathic Pharmacy:</b>                                   |   | <b>III</b> | <b>04</b> |
| The Drugs and Cosmetics Act, 1940 (23 to 1940)  |   |            |           |
| Drugs and Cosmetics Rules, 1945   |   |            |           |
| Medicinal and Toilet Preparations (Excise Duties) Act, 1955 (16 of 1955)                      |   |            |           |
| Drugs and Magic Remedies (Objectionable Advertisements) Act, 1954 (21 of 1954)                |   |            |           |
| The Narcotic Drugs and Psychotropic Substances Act, 1985 (61 of 1985)                         |   |            |           |
| Dangerous Drug Act, 1930  |   |            |           |

|  |            |           |
|--|------------|-----------|
| <b>g) Recent Advances in Homoeopathic Pharmacy</b>   | <b>III</b> | <b>02</b> |
| Modern theories related with Homoeopathic Drug action <ul style="list-style-type: none"> <li>▪ Principles of Drug action</li> <li>▪ Introduction to Nanomedicine</li> <li>▪ Molecular Mechanism of Drug Action</li> <li>▪ Mechanism of Action of Homoeopathic Medicines</li> </ul>   |            |           |
| Scope of Research in Homoeopathic Pharmacy <ul style="list-style-type: none"> <li>▪ Drug Discovery</li> <li>▪ Principles of New Drug discovery</li> <li>▪ Clinical evaluation of New Drugs</li> <li>▪ Pre-Clinical Research in Homoeopathic Pharmacy</li> </ul>  | III        | 01        |
| <b>h) Homoeopathic Pharmacy - Relationships</b>  | <b>III</b> | <b>02</b> |
| Relation of Homoeopathic Pharmacy with Anatomy   |            |           |
| Relation of Homoeopathic Pharmacy with Physiology  |            |           |
| Relation of Homoeopathic Pharmacy with Materia Medica<br><br>With reference to Source of Drugs, Identification, Common Name of Drugs, Role of Drug Proving & Other Types of Proving in construction of Materia Medica, Clinical Verification<br><br>Family wise study of Sphere of action – Solanaceae, Loganiaceae, Compositae, Liliaceae, Anacardiaceae, Rubiaceae etc |            |           |

**Teaching Hours (Practical)**

| Homoeopathic Pharmacy Practicals |  | Teaching Hours | Peyton's 4 step assessment criteria |
|----------------------------------|--|----------------|-------------------------------------|
|                                  | Particulars of Experiments   |                |                                     |
| 1                                | Estimation of size of globules   | 2              | Execution                           |
| 2                                | Medication of globules (Small Scale)   | 2              | Execution                           |
| 3                                | Purity test of Sugar of milk   | 2              | Comprehension & Execution           |
| 4                                | Purity test of water   | 2              | Comprehension & Execution           |
| 5                                | Purity test of Ethyl alcohol   | 2              | Comprehension & Execution           |
| 6                                | Determination of Specific gravity of a given liquid Vehicle & identifying the same.      | 2              | Execution                           |
| 7                                | Preparation of dispensing alcohol from strong alcohol.                                   | 1              | Comprehension & Execution           |
| 8                                | Preparation of dilute alcohol from strong alcohol.                                       | 1              | Comprehension & Execution           |
| 9                                | Trituration of drug in Old Method (One each of Class VII, VIII & IX)                     | 3              | Execution                           |
| 10                               | Trituration of one drug as per HPI   | 1              | Execution                           |
| 11                               | Succussion in decimal scale from Mother Tincture (Prepared in Old Method) to 3X potency. | 2              | Execution                           |
| 12                               | Succussion in decimal scale from Mother Tincture (Prepared in New Method) to 3X potency  | 2              | Execution                           |
| 13                               | Succussion in centesimal scale from Mother Tincture (Prepared in Old Method) to 3C       | 2              | Execution                           |
| 14                               | Succussion in centesimal scale from Mother Tincture (Prepared in New Method) to 3C       | 2              | Execution                           |
| 15                               | Conversion of Trituration to liquid potency: Decimal scale 6X to 8X potency.             | 1              | Execution                           |

|    |   |   |           |  |
|----|---|---|-----------|--|
| 16 | Conversion of Trituration to liquid potency: Centesimal scale 3C to 4C potency.                       | 1 | Execution |  |
| 17 | Preparation of 0/2 potency (Solid form) (LM scale) of 1 Drug from 3 <sup>rd</sup> Degree Trituration. | 2 | Execution |  |
| 18 | Preparation of external applications – Lotion   | 1 | Execution |  |
| 19 | Preparation of external applications – Glycerol   | 1 | Execution |  |
| 20 | Preparation of external applications – Liniment   | 1 | Execution |  |
| 21 | Preparation of external applications – Ointment   | 1 | Execution |  |
| 22 | Writing of prescription & Dispensing the Medicine in Water with preparation of Doses                  | 1 | Execution |  |
| 23 | Writing of prescription & Dispensing the Medicine in Sugar of Milk with Preparation of Doses          | 1 | Execution |  |
| 24 | Preparation of mother tinctures according to Old Hahnemannian method (Class I, II, III, IV)           | 8 | Execution |  |
| 25 | Preparation of mother solutions according to Old Hahnemannian method (Class Va, Vb, VIa, VIb)         | 4 | Execution |  |

## 5. COURSE CONTENT

### A. THEORY

| Table 4: Homoeopathic Pharmacy Theory                                    |   |
|--|---|
| a) General Concepts and Orientation:                                     |   |
| History of Pharmacy with emphasis on emergence of Homoeopathic Pharmacy. | Definition of Pharmacy & Homoeopathic Pharmacy<br>Concept of Drug substance, Drug, Medicine & Remedy<br>Forming Basic concept of other AYUSH Schools of Pharmacy (Ayurveda, Siddha, Sowa Rigpa & Unani Pharmacy)  |
| Homoeopathic Pharmacy Basics   | Sources of Homoeopathic Pharmacy<br>Branches of Pharmacy<br>Scope of Homoeopathic Pharmacy<br>Specialty and originality of Homoeopathic Pharmacy<br>The Principles of Homoeopathy<br>Law of Similia, Simplex & Minimum<br>Theory of Chronic Disease & Vital Force<br>Doctrine of Drug Proving & Drug Dynamisation |

|  |   |
|--|---|
| Homoeopathic Pharmacopoeia                 | <p>The Evolution, History &amp; Development of Homoeopathic Pharmacopoeias throughout the world (year wise Publications) – GHP, BHP, HPUS, FHP</p> <p>Official –(HPI) &amp;Unofficial Pharmacopoeias –</p> <p>(M Bhattacharya &amp; Co’s Homoeopathic Pharmacopoeia</p> <p>Encyclopaedia of Homoeopathic Pharmacopoeia – P N Verma, Homoeopathic Pharmaceutical Codex)</p> <p>Monograph, Contents of Monograph with its individual importance</p> |
| Ideal laboratory                           | <p>Pre requisites of ideal Laboratory (General Laboratory), Laboratory safety Rules</p> <p>Role of Laboratory in Homoeopathic Pharmacy Education</p>  |
| Weights and measurements.                  | <p>Metrology</p> <p>Basics &amp; Units of Apothecary System, British Imperial System, Metric System</p> <p>Interrelationship between various systems of Weight &amp; Measure</p> <p>Concept on Domestic Measures with Metric Equivalents</p>  |
| Nomenclature                               | <p>The Basic Rules of Nomenclature</p> <p>Nomenclature of Homoeopathic Drugs</p> <p>Important terminologies like scientific names, common names, synonyms</p> <p>Anomalies in Nomenclature</p>  |
| Pioneers of Homoeopathic Pharmacy          | <p>Role &amp; contributions of Pioneers in development of Homoeopathic Pharmacy</p>   |
| <b>b) Raw Material: Drugs and Vehicles</b> |   |

|   |   |
|---|---|
| Source of drugs in Homoeopathy                            | <p>Different sources - Plant kingdom, Animal kingdom, Mineral kingdom, Nosodes, Sarcodes, Imponderabilia, Synthetic source,</p> <p>New Sources - Allersode, Isodes with reference to their clinical utility</p> <p>Introduction to Bowel Nosodes, Tissue remedies</p> |
| Collection of drug substances                             | General and Specific guidelines for collecting drugs from all available sources   |
| Vehicles.   | <p>Definition, classification, General Use</p> <p>Source, Properties &amp; Particular use of Vehicles with respect to List Provided in Appendix D</p> <p>Preparation – Commercial Lactose, Alcohol</p> <p>Purity tests – Water, Alcohol, Sugar of Milk</p>            |
| <b>c) Homoeopathic Pharmaceuticals:</b>                   |   |
| Mother tincture and its preparation                       | <p>Extraction – Principles &amp; Various Methods</p> <p>Old Method (Based on Class I to IX)</p> <p>Concept of Uniform Drug Strength</p> <p>Estimation of Moisture Content - Necessity</p> <p>New Method/Modern Approach of Homoeopathic Drug Preparation</p>          |
| Various Scales of Potentization in Homoeopathic pharmacy. | History of development, Introducer, Designation, Preparation, Administration & Application with respect to - Centesimal Scale, Decimal Scale & 50 Millesimal Scale  |

|                                      |   |
|--------------------------------------|---|
| Drugs Dynamisation                   | <p>The Evolution of Dynamisation - Concept in Homoeopathy</p> <p>Potentisation &amp; its types</p> <p>The Merits of Potentisation</p> <p>Succussion &amp; Trituration</p> <p>Various types of Potency– Fluxion Potency, Jumping Potency, Back Potency, Single Vial Potency, Multiple Vial Potency, Mixed Vial Potency</p> <p>Post-Hahnemannian Potentization Techniques</p> |
| External applications                | <p>Scope of administration of External Applications in Homoeopathic Practice</p> <p>Dr Hahnemann's View as per Organon (5<sup>th</sup> &amp; 6<sup>th</sup> Ed)</p> <p>Preparation &amp; Uses of lotion, glycerol, liniment and ointment.</p> <p>Commercial Preparation of Ointment</p>   |
| Posology                             | <p>Basic principles of Homoeopathic Posology</p> <p>Related aphorisms of Organon of medicine.</p> <p>Criteria for Selection of Potency &amp; Repetition of Dose</p> <p>Various Kinds of Dose, Emphasis on Minimum Dose</p>  |
| Prescription                         | <p>Prescription Writing</p> <p>Important Abbreviations</p> <p>Parts &amp; Contents of Prescription</p> <p>Merits &amp; Demerits of Prescription Writing</p>   |
| Dispensing of Homoeopathic Medicines | <p>Various Dosage Forms – Solid, Liquid Dosage Forms,</p> <p>Methods of Dispensing</p>  |

|                            |      |   |
|----------------------------|------|---|
| Placebo.                   |      | <p>Concept of Homoeopathic Placebo</p> <p>The Philosophy of administration of placebo</p> <p>Concept of Placebo Effect</p>  |
| Pharmaconomy               |      | Routes of Homoeopathic drug administration.   |
| Preservation               |      | Preservation Rules – Raw Materials Drug Substance, Mother Preparations, Finished products & Vehicles  |
| <b>d) Pharmacodynamics</b> |      |   |
| ▪ Doctrine Signature.      | of   | <p>Basic Concept, Its Evolution &amp; Application in Ancient Medical System</p> <p>Supporters of the Doctrine</p> <p>Dr Hahnemann's view on the Doctrine</p>  |
| ▪ Drug Proving.            |      | <p>Homoeopathic Pharmacodynamics</p> <p>With reference to aphorisms 105 – 145 of Organon of Medicine – 6<sup>th</sup> Ed)</p> <p>Post Hahnemannian Drug Proving</p> <p>Homoeopathic Pathogenetic Trial (HPT)</p> <p>CCRH &amp; Other Protocols on HPT</p> <p>Other Noted Provers &amp; their work on Drug Proving</p> |
| ▪ Adverse Reactions        | Drug | <p>Basic Idea, Reporting of ADE</p> <p>Drug safety with Ref to HPI</p> <p>Medication errors, Causality Assessment</p> <p>Incompatible Remedies</p>  |

|  |  |
|--|--|
| ▪ Pharmaco-vigilance.  | Pharmacovigilance in Homoeopathy<br>Activities of Pharmacovigilance Centres<br>Awareness on Medicinal Preparations against Homoeopathic Principles – Patents, Combinations                                   |
| ▪ Pharmacological study of drugs   | listed in Appendix-A (Any 15)  |
| <b>e) Quality Control:</b>   |  |
| • Standardisation in Homoeopathy   | Different Methods of Standardisation<br>Quality Control of Raw Materials – Various Evaluation techniques<br>In Process Quality Control<br>Quality Control of finished products – Various standard parameters |
| • Industrial pharmacy.   | Good Manufacturing Practices (GMP)<br>Schedule M1  |
| • Homoeopathic pharmacopoeia laboratory (HPL)                                  | Functions and Activities of HPL relating to quality control of drugs.<br>Pharmacopoeia Commission for Indian Medicines   |
| <b>f) Legislations pertaining to Homoeopathic Pharmacy:</b>                    |  |
| The Drugs and Cosmetics Act, 1940 (23 of 1940)                                 |  |
| Drugs and Cosmetics Rules, 1945  |  |
| Medicinal and Toilet Preparations (Excise Duties) Act, 1955 (16 of 1955)       |  |
| Drugs and Magic Remedies (Objectionable Advertisements) Act, 1954 (21 of 1954) |  |
| The Narcotic Drugs and Psychotropic Substances Act, 1985 (61 of 1985)          |  |

|  |
|--|
| Dangerous Drug Act, 1930   |
| <b>g) Recent Advances in Homoeopathic Pharmacy</b>   |
| Modern theories related with Homoeopathic Drug action <ul style="list-style-type: none"> <li>1. Principles of Drug action</li> <li>2. Introduction to Nanomedicine</li> <li>3. Molecular Mechanism of Drug Action</li> <li>4. Mechanism of Action of Homoeopathic Medicines</li> </ul>   |
| Scope of Research in Homoeopathic Pharmacy <ul style="list-style-type: none"> <li>1. Drug Discovery</li> <li>2. Principles of New Drug discovery</li> <li>3. Clinical evaluation of New Drugs</li> <li>4. Pre-Clinical Research in Homoeopathic Pharmacy</li> </ul>  |
| <b>h) Homoeopathic Pharmacy - Relationships</b>  |
| Relation of Homoeopathic Pharmacy with Anatomy   |
| Relation of Homoeopathic Pharmacy with Physiology  |
| Relation of Homoeopathic Pharmacy with Materia Medica<br><br>With reference to Source of Drugs, Identification, Common Name of Drugs, Role of Drug Proving & Other Types of Proving in construction of Materia Medica, Clinical Verification<br><br>Family wise study of Sphere of action – Solanaceae, Loganiaceae, Compositae, Liliaceae, Anacardiaceae, Rubiaceae etc |

## **B. Practical – Lab Work – Field – Clinical Hospital Work**

### **1. Laboratory Work –**

Practical Class (Experiments) - Maintaining Record of Experiments Conducted

(Principle, Requirements, Calculation if applicable, Process, Label, Conclusion/Inference)

Practical Class (Demonstration) – Maintaining Records of Practical Demonstrated

(Principle, Requirements, Calculation if applicable, Process, Label, Conclusion/Inference)

#### Field Visits-

- A) **Maintain File/Report on Visit to GMP Compliant Large Scale Medicine Manufacturing Unit (Format should be as per Appendix – E)**
- B) **Maintain File/Report on Visit to Medicinal Plant Garden (Format should be as per Appendix - F)**

#### Activity –

- (a) **Clinical Hospital Work** – Maintain Record (Activities/Posting in Dispensing Section, Prescriptions based on Homoeopathic Principles in IPD/OPD) – Record to be maintained as per format in Appendix G
- (b) **Seminar** – Maintain Record on Seminar Presentation on Topics of Homoeopathic Pharmacy as assigned – Record to be maintained as per Appendix - H
- (c) **Herbarium** – Maintenance of 30 Plant Drug Substances Samples

#### B. PRACTICALS

| Table 5 : Homoeopathic Pharmacy Practicals |                                |
|--|--------------------------------|
| Sr<br>No.                                  |                                |
|  | Particulars of Experiments     |
| 1  | Estimation of size of globules |

|    |   |
|----|---|
| 2  | Medication of globules (Small Scale)  |
| 3  | Purity test of Sugar of milk  |
| 4  | Purity test of water  |
| 5  | Purity test of Ethyl alcohol  |
| 6  | Determination of Specific gravity of a given liquid Vehicle & identifying the same.                   |
| 7  | Preparation of dispensing alcohol from strong alcohol.  |
| 8  | Preparation of dilute alcohol from strong alcohol.  |
| 9  | Trituration of drug in Old Method (One each of Class VII, VIII & IX)                                  |
| 10 | Trituration of one drug as per HPI  |
| 11 | Succussion in decimal scale from Mother Tincture (Prepared in Old Method) to 3X potency.              |
| 12 | Succussion in decimal scale from Mother Tincture (Prepared in New Method) to 3X potency               |
| 13 | Succussion in centesimal scale from Mother Tincture (Prepared in Old Method) to 3C                    |
| 14 | Succussion in centesimal scale from Mother Tincture (Prepared in New Method) to 3C                    |
| 15 | Conversion of Trituration to liquid potency: Decimal scale 6X to 8X potency.                          |
| 16 | Conversion of Trituration to liquid potency: Centesimal scale 3C to 4C potency.                       |
| 17 | Preparation of 0/2 potency (Solid form) (LM scale) of 1 Drug from 3 <sup>rd</sup> Degree Trituration. |
| 18 | Preparation of external applications – Lotion   |
| 19 | Preparation of external applications – Glycerol   |
| 20 | Preparation of external applications – Liniment   |
| 21 | Preparation of external applications – Ointment   |
| 22 | Writing of prescription & Dispensing the Medicine in Water with preparation of Doses                  |

|    |   |
|----|---|
| 23 | Writing of prescription & Dispensing the Medicine in Sugar of Milk with Preparation of Doses  |
| 24 | Preparation of mother tinctures according to Old Hahnemannian method (Class I, II, III, IV)   |
| 25 | Preparation of mother solutions according to Old Hahnemannian method (Class Va, Vb, VIa, VIb) |

### **Demonstration**

1. Homoeopathic pharmaceutical instruments and appliances with their cleaning (List provided in Appendix C)
2. Estimation of moisture content using water bath
3. Paper chromatography & TLC of any mother tincture
4. Laboratory methods – Sublimation, distillation, decantation, filtration, crystallization.
5. Preparation of mother tincture – Maceration and Percolation
6. Study & demonstration of Drug Substances (listed in Appendix B)-
  - i) Macroscopic Characteristic (Any 15)
  - ii) Microscopic characteristic (Any 05)
7. Study & demonstration of vehicles (Solid, Liquid & Semi solid – as available)
8. Microscopical study of Trituration (One drug up to 3X Potency)
9. Medication of Globule (Large Scale)

### **Activities**

1. Collection of 30 drugs for herbarium
2. Visit to a Large-scale manufacturing unit of Homoeopathic medicine (GMP compliant).
3. Visit to a Medicinal Plant /Botanical Garden & shall keep details Visit report
4. Clinical Class: Visit to IPD, OPD to take note on prescriptions as per Homoeopathic Principles & keep record

5. Visit to Hospital dispensing section to observe & gain knowledge on Dispensing techniques & Keep Records

### **Demonstration**

1. Homoeopathic pharmaceutical instruments and appliances with their cleaning (List provided in Appendix C)-06 Hours

2. Estimation of moisture content using water bath-02 Hours

3. Paper chromatography & TLC of any mother tincture-04 Hours

4. Laboratory methods – Sublimation, distillation, decantation, filtration, crystallization.-04 Hours

5. Preparation of mother tincture – Maceration and Percolation- 04 Hours

6. Study & demonstration of Drug Substances (listed in Appendix B)- 10 Hours

i) Macroscopic Characteristic (Any 15)

ii) Microscopic characteristic (Any 05)

7. Study & demonstration of vehicles (Solid, Liquid & Semi solid – as available)- 02 Hours

8. Microscopical study of Trituration (One drug up to 3X Potency)-02 Hours

9. Medication of Globule (Large Scale)-1 Hour

**Clinical Hospital Work** – Maintain Record (Activities/Posting in Dispensing Section, Prescriptions based on Homoeopathic Principles in IPD/OPD) – Record to be maintained as per format in Appendix G- 20 Hours

**Seminar** – Maintain Record on Seminar Presentation on Topics of Homoeopathic Pharmacy as assigned- 07 Hours

## **6.TEACHING LEARNING METHODS**

The Teaching Learning activities in Homoeopathic Pharmacy requires change in structure & process in order to be more skill based & providing hands on experience. The Teaching Learning methods with respect to Homoeopathic Pharmacy may be covered in the following manner –

- a) **Class Room Lectures** – Oral Presentation, Board Work, Power point Presentation
- b) **Tutorials** – Special Classes on Doubt Clearing of Completed topics/Chapters, Special Classes for Slow Learners (involving Students in Groups comprising 5-10)
- c) **Practical Class** – Demonstration & Explanation of the Experiments, this would follow by conduction of the Experiment by the students on their own, write up of the Experiment conducted
- d) **Clinical Class** – Visit to IPD/OPD for gaining Knowledge on Prescription writing, Administration of Homoeopathic medicines based on Homoeopathic Posology, Visiting Hospital Pharmacy to observe & Gain Knowledge on dispensing techniques
- e) **Field Visit** – Visit to One GMP Compliant Homoeopathic Manufactory.  
  
Visit to One Medicinal Plant Garden
- f) **Student Activities** – Working out the Assignments, Projects, Power point presentations as assigned

## 7.CONTENT MAPPING (COMPETENCY TABLE)

**Topic:** History of Pharmacy

### Learning Outcomes (LO):

At the end of the topic, I-BHMS student must be able to –

Interpret the difference in concept of Pharmacy in different AYUSH systems of medicine

| Sr. No              | Generic Competencies | Subject Area                                      | Miller's Level Does/ Shows how/ Knows how/ Know | Specific Competencies                       | Specific Learning Objectives | Bloom's Domain | Guilbert's Levels | Must to know/ desirable to know/ Nice to know | Teaching - Learning Method  | Assessment /Evaluation                        |                    | Integration                         |
|---------------------|----------------------|---|---|---|------------------------------|----------------|-------------------|---|---|---|--------------------|-------------------------------------|
|                     |                      |   |   |   |                              |                |                   |   |   | Formative                                     | Type (Summative)   |                                     |
| Ho mU G- HP- 1.1. 1 | Integration of Knowl | History of Pharmacy with emphasis to emergence of | Knows   | Must be able to interpret the difference in | Define Pharmacy              | Cognitive      | Level 1 Recall    | Must Know                                     | 1.Lecture Demonstrations<br>2. Small Group Discussions/<br>3.Peer teaching (Think-Pair-Share, | 1.Structured Oral Examination<br>2. Tutorials | Theory & Viva Voce | Horizontal with Organon of Medicine |

|                  |  |                           |  |  |  |                       |                       |   |  |           |  |  |
|------------------|--|---------------------------|--|--|--|-----------------------|-----------------------|---|--|-----------|--|--|
|                  | edge                                   | Homoeopathic Pharmacology |  | concept of Pharmacy among various systems of AYUSH |  |                       |                       | Jigsaw Strategy)<br>4. Quiz<br>5. Student Seminars<br>6. Integrated Teaching with of Organon Medicine | 3. Assignments<br>4. MCQ's<br>5. 2 marks question<br>6.SAQ's and LAQ's |           |  |  |
| Ho mU G-HP-1.1.2 | Synthesis and application of knowledge |                           | Knows  |  | Define Homoeopathic Pharmacy               |                       | Level 1<br>Recall     |   |  | Must know |  |  |
| Knows            |  |                           | Describe the Basic concepts of Different schools of Pharmacy with reference to AYUSH |  |  | Level 2<br>Understand | Nice to Know          |   |  |           |  |  |
| Ho m-UG-HP-1.1.4 |  |                           | Knows  |  | Differentiate between Drug-Medicine-Remedy |                       | Level 2<br>Understand |   |  | Must know |  |  |

**TOPIC:** Basics of Homoeopathic Pharmacy

**Topic:** Basics of Homoeopathic Pharmacy

**Learning Outcomes (LO):**

At the end of the topic, I-BHMS student must be able to –  
Enumerate the fundamental Principles of Homoeopathic Pharmacy

| Sr. No              | Generic Competencies                          | Subject Area                    | Miller's Level Does/ Shows how/ Knows how/ Know | Specific Competencies                                      | Specific Learning Objectives                      | Bloom's Domain | Guilbert's Levels | Must to know/ desirable to know/Nice to know | Teaching - Learning Method                                     | Assessment /Evaluation                                       |                                | Integration                                     |
|---------------------|---|---------------------------------|---|--|---|----------------|-------------------|--|--|--|--------------------------------|---|
|                     |   |                                 |   |  |   |                |                   |  |  | Formative  | Summative                      | Horizontal Integration with Organon of Medicine |
| Ho mU G- HP- 1.2. 1 | Integration of Knowledge<br><br>Synthesis and | Basics of Homoeopathic Pharmacy | Knows   | Must be able to state the fundamental Principles governing | 1. Enumerate the Sources of Homoeopathic Pharmacy | Cognitive      | Level 1 Recall    | Must Know                                    | 1. Lecture Demonstrations<br>2. Small Group Discussions / Peer | 1. Structured Oral Examination<br>2. Tutorials<br>3. Assignm | SAQ<br>MCQ<br>LAQ<br>Viva Voce |   |

|                                    |  |  |       |  |   |  |                                  |           |  |  |  |  |
|------------------------------------|--|--|-------|--|---|--|----------------------------------|-----------|--|--|--|--|
| Ho<br>mU<br>G-<br>HP-<br>1.2.<br>2 | Applic<br>ation<br>of<br>knowl<br>edge |  | Knows | ng<br>Homoe<br>opathic<br>Pharma<br>cy | 2.Explai<br>n the<br>Branch<br>es of<br>Homoe<br>opathic<br>Pharma<br>cy                        |  | Level 2<br><br>Understa<br>nding | Must Know | teaching<br>(Think-Pair-<br>Share,<br>Jigsaw<br>Strategy)<br><br>3. Quiz<br><br>4. Student<br>Seminars<br><br>5. Guest<br>Lecture<br><br>6. Problem<br>based<br>learning | ents<br><br>4. MCQ's<br><br>5. 2<br>marks<br>question<br><br>6.SAQ's<br>and<br>LAQ's |  |  |
| Ho<br>mU<br>G-<br>HP-<br>1.2.<br>3 |  |  | Knows |  | 3.Illustr<br>ate the<br>Scope<br>of<br>Homoe<br>opathic<br>Pharma<br>cy                         |  | Level 2<br><br>Understa<br>nding | Must Know |  |  |  |  |
| Ho<br>m-<br>UG<br>HP-<br>1.2.<br>4 |  |  | Knows |  | 4.Descr<br>ibe the<br>Original<br>ity &<br>Specialt<br>y of<br>Homoe<br>opathic<br>Pharma<br>cy |  | Level 2<br><br>Understa<br>nding | Must Know |  |  |  |  |
| Ho<br>mU<br>G-                     |  |  | Knows |  | 5.Explai<br>n the<br>Funda  |  | Level 2<br><br>Understa          | Must Know |  |  |  |  |

|          |  |  |  |  |  |  |       |  |  |  |  |  |  |
|----------|--|--|--|--|--|--|-------|--|--|--|--|--|--|
| HP-1.2.5 |  |  |  |  | mental Principles, Laws & Doctrines related to Homoeopathic Pharmacy |  | nding |  |  |  |  |  |  |
|----------|--|--|--|--|--|--|-------|--|--|--|--|--|--|

**TOPIC:** Nomenclature of Homoeopathic Medicines

**Learning Outcomes (LO):**

At the end of the topic, I-BHMS student must be able to –  
State the basic rules of Nomenclature of Homoeopathic medicines

| Sr. No | Generic Competencies | Subject Area | Miller's Level Does / Shows how/ Know | Specific Competencies | Specific Learning Objectives | Bloom's Domain | Guilbert's Levels | Must to know/ desirable to know/ | Teaching Learning Method | Assessment /Evaluation |           |
|--------|----------------------|--------------|---------------------------------------|-----------------------|------------------------------|----------------|-------------------|----------------------------------|--------------------------|------------------------|-----------|
|        |                      |              |                                       |                       |                              |                |                   |                                  |                          | Formative              | Summative |
|        |                      |              |                                       |                       |                              |                |                   |                                  |                          |                        |           |

|                            |   |  |                         |   |   |           |                              |                    |   |   |                      |  |
|----------------------------|---|--|-------------------------|---|---|-----------|------------------------------|--------------------|---|---|----------------------|--|
|                            |   |  | ws<br>how/<br>Know<br>w |   |   |           |                              | Nice<br>to<br>know |   |   |                      |  |
| Hom<br>UG-<br>HP-<br>1.3.1 | Integrati<br>on of<br>Knowled<br>ge<br><br>Synthesi<br>s and<br>Applicati<br>on of<br>knowled<br>ge | Nomencla<br>ture of<br>Homoeop<br>athic<br>Medicines | Know<br>ws              | Must be able to<br>describe the<br>principles<br>followed in<br>nomenclature<br>of<br>Homoeopathic<br>medicines | 1.State the<br>Basic rules<br>of<br>Nomenclatu<br>re                                    | Cognitive | Level 1<br>Recall            | Must<br>Know       | 1.Lecture<br>Demonstrati<br>ons<br><br>2. Small<br>Group<br>Discussions/<br>Peer teaching<br>(Think-Pair-<br>Share, Jigsaw<br>Strategy) | 1.Structured<br>Oral<br>Examination<br><br>2. Tutorials<br><br>3. Assignments<br><br>4. MCQ's<br><br>5. 2 marks<br>question | SAQ<br><br>Viva Voce |  |
| Hom<br>UG-<br>HP-<br>1.3.2 |   |  | Know<br>ws              |   | 2.Describe<br>the<br>nomenclatu<br>re of<br>Homoeopat<br>hic Drugs                      |           | Level 2<br>Unders<br>tanding | Must<br>Know       | 3. Quiz<br><br>4. Student<br>Seminars   |   |                      |  |
| Hom<br>UG-<br>HP-<br>1.3.3 |   |  | Know<br>ws              |   | 3.Enumerat<br>e the<br>important<br>terminologi<br>es related<br>to<br>Nomenclatu<br>re |           | Level 1<br>Recall            | Must<br>Know       | 5. Guest<br>Lecture<br><br>6. Problem<br>based<br>learning  |   |                      |  |

|                            |  |  |       |  |  |           |                         |              |  |  |  |  |
|----------------------------|--|--|-------|--|--|-----------|-------------------------|--------------|--|--|--|--|
| Hom<br>UG-<br>HP-<br>1.3.4 |  |  | Knows |  | 4. Define Scientific Name  |           | Level 1 Recall          | Must Know    |  |  |  |  |
| Hom<br>UG-<br>HP-<br>1.3.5 |  |  | Knows |  | 5. Define Common Name  |           | Level 1 Recall          | Must Know    |  |  |  |  |
| Hom<br>UG-<br>HP-<br>1.3.6 |  |  | Knows |  | 6. Enumerate the advantages of Scientific Name                               | Cognitive | Level 1 Recall          | Must Know    |  |  |  |  |
| Hom<br>UG-<br>HP-<br>1.3.7 |  |  | Knows |  | 7. Enumerate the Advantages of Common Name                                   | Cognitive | Level 1 Recall          | Must know    |  |  |  |  |
| Hom<br>UG-<br>HP-<br>1.3.8 |  |  | Knows |  | 8. Identify the existing anomalies in Nomenclature of Homoeopathic Medicines | Cognitive | Level 3 Problem Solving | Nice to know | 1. Lecture Demonstration<br>2. Procedural Skills Teaching<br>3. Problem Based Learning |  |  |  |

## TOPIC: Pioneers of Homoeopathic Pharmacy

### Learning Outcomes (LO):

At the end of the topic, I-BHMS student must be able to.-

State the Contribution of various Pioneers in the field of Homoeopathic Pharmacy

| Sr. No              | Generic Competencies   | Subject Area                      | Miller's Level Does/ Shows how/ Knows how/ Knows | Specific Competencies   | Specific Learning Objectives   | Bloom's Domain | Guilbert's Levels | Must to know/ desirable to know/ Nice to know | Teaching Learning Method  | Assessment /Evaluation   |                         |
|---------------------|--|-----------------------------------|--|---|--|----------------|-------------------|---|---|--|-------------------------|
|                     |  |                                   |  |   |  |                |                   |   |   | Formative  | Summative               |
| Ho mU G- HP- 1.4. 1 | Integration of Knowledge<br><br>Synthesis and Application of knowledge | Pioneers of Homoeopathic Pharmacy | Knows  | Must be able to state the contributions of various pioneers in the field of Homoeopathic Pharmacy | 1.Outline the contributions of the Pioneers of Homoeopathy in the field of Homoeopathic Pharmacy | Cognitive      | Level 1 Recall    | Nice to Know                                  | 1.Lecture Demonstrations<br>2. Small Group Discussions/<br>3. Quiz<br>4. Student Seminars | 1.Structured Oral Examination<br>2. Tutorials<br>3. Assignments<br>4. MCQ's<br>5. 2 marks question | SAQ<br>MCQ<br>Viva Voce |

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**TOPIC:** Pharmacopoeia

**Learning Outcomes (LO):**

At the end of the topic, I-BHMS student must be able abide by the homoeopathic pharmacopoeia guidelines for preparation of homoeopathic medicines.

| Sr. No     | Generic Competencies | Subject Area  | Miller's Level Does/ Shows how/ Knows how/ Know | Specific Competencies        | Specific Learning Objectives | Bloom's Domain | Guilbert's levels | Must to know/ desirable to know/ Nice to know | Teaching Learning Method | Assessment /Evaluation |           |
|------------|----------------------|---------------|---|------------------------------|------------------------------|----------------|-------------------|---|--------------------------|------------------------|-----------|
|            |                      |               |   |                              |                              |                |                   |   |                          | Formative              | Summative |
| Hom UG-HP- | Problem solution     | Pharmacopoeia | Knows   | Must be able to abide by the | 1. Define Pharmacopoeia      | Cognitive      | Level 1 Recall    | Must Know                                     | 1.Lecture Demonstrations | 1.Structured Oral      | SAQ MCQ   |

|                 |  |  |       |  |  |  |                       |           |   |                     |           |
|-----------------|--|--|-------|--|--|--|-----------------------|-----------|---|---------------------|-----------|
| 1.5.1           | Integration of Knowledge               |  |       | homoeopathic pharmacopoeia guidelines for preparation of homoeopathic medicines. |  |  |                       |           | 2. Small Group Discussions/ Peer teaching (Think-Pair-Share, Jigsaw Strategy) | Examination         | Viva Voce |
| Hom UG-HP-1.5.2 | Synthesis and application of knowledge |  | Knows |  | 2. Enumerate the different types of homoeopathic pharmacopoeia with suitable examples. |  | Level 1 Recall        | Must Know | 3. Quiz   | 2. Tutorials        |           |
| Hom UG-HP.1.5.3 |  |  | Knows |  | 3. Explain the different types of homoeopathic pharmacopoeia.                          |  | Level 2 Understanding | Must Know | 4. Student Seminars   | 3. Assignments      |           |
| Hom UG-HP-1.5.4 |  |  | Knows |  | 4. Explain HPI in detail   |  | Level 2 Understanding | Must Know |   | 4. MCQ's            |           |
| Hom UG-HP-1.5.5 |  |  | Knows |  | 5. Explain what is monograph?  |  | Level 2 Understanding | Must Know |   | 5. 2 marks question |           |
|                 |  |  |       |  |  |  |                       |           |   | 6.SAQ's, LAQ's      |           |
|                 |  |  |       |  |  |  |                       |           |   | 7.Proj ects         |           |

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|                            |  |  |           |  |  |           | ng                         |              |   |   |   |
| Hom<br>UG-<br>HP-<br>1.5.6 |  |  | Knows how |  | 6.Apply the guidelines laid down in the official homoeopathic pharmacopoeia w.r.t. identification, collection, preservation, preparation and dispensing of homoeopathic medicine | Cognitive | Level 3<br>Problem solving | Nice to know | 1. Practical Demonstration<br>2. Lecture Demonstration<br>3. Projects<br>4. Herbarium<br>5. Journal | 1. DOPS<br>2. OSPE<br>3. Evaluation of projects<br>4. Evaluation of Journal & Herbarium | SAQ<br>MC<br>QLA<br>Q<br>Viva<br>Voice<br>Practical Examination / Checklist |
| Hom<br>UG-<br>HP-<br>1.5.7 |  |  | Knows how |  | 7.Demonstrate care, professionalism & commitment & follow all the guidelines   | Affective | Level 1<br>Receiving       | Nice to know | 1. Practical Demonstration<br>2. Lecture Demonstration  | 1. DOPS<br>2. OSPE<br>3. Evaluation   | Viva<br>Voice   |

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|  |  |  |  |  | meticulously as given in official homoeopathic pharmacopoeia w.r.t. identification, collection, preservation, preparation and dispensing of homoeopathic medicine |  |  |  | 3. Projects<br>4. Herbarium<br>5. Journal | of projects<br>4. Evaluation of Journal & Herbarium |  |
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**TOPIC:** Plant Kingdom

**Topic:** Plant Kingdom

**Learning Outcomes (LO):**

At the end of the topic, I-BHMS student must be able to identify the plant drug substances for preparation of homoeopathic medicines.

| Sr. No | Generic Competencies | Subject Area | Miller's Level Does/ | Specific Competenci | Specific Learning | Bloom's | Guilbert's | Must to | Teaching - Learning | Assessment /Evaluation |  |
|--------|----------------------|--------------|----------------------|---------------------|-------------------|---------|------------|---------|---------------------|------------------------|--|
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|                            |  |                     | Shows how/<br>Knows how/<br>Know | es   | Objectives  | Domain    | Levels                       | know/<br>desirable<br>to know/<br>Nice to<br>know | Method   | Formative   | Type<br>Summative                 |
|----------------------------|--|---------------------|----------------------------------|--|---|-----------|------------------------------|---|--|---|-----------------------------------|
| Hom<br>UG-<br>HP-<br>1.6.1 | Integration of<br>knowledge<br><br>Synthesis and<br>application of<br>knowledge<br><br>Classroom to<br>herbarium and<br>lab transfer | Sources<br>of drugs | Knows                            | Must be<br>able to<br>identify the<br>plant drug<br>substances<br>for<br>preparation<br>of<br>homoeopathic<br>medicines. | 1. Explain in<br>detail the<br>part used<br>and drug<br>prepared<br>from plant<br>kingdom | Cognitive | Level 2<br><br>Understanding | Must<br>know                                      | 1.Lecture<br>Demonstrations<br><br>2. Small<br>Group<br>Discussions/<br><br>Peer<br>teaching<br>(Think-<br>Pair-<br>Share,<br>Jigsaw<br>Strategy)<br><br>3. Quiz<br><br>4. Student<br>Seminars<br><br>5. Guest | 1.Structured<br>Oral<br>Examination<br><br>2. Tutorials<br><br>3. Assignments<br><br>4. MCQ's<br><br>5. 2 marks<br>question<br><br>6.SAQ's and<br>LAQ's<br><br>7. Herbarium | SAQ<br>MCQ<br>LAQ<br>Viva<br>Voce |
| Hom<br>UG-<br>HP-<br>1.6.2 |  |                     | Knows                            |  | 2. List any 4<br>examples of<br>drugs from<br>particular<br>part of the<br>plant.         |           | Level 1<br><br>Recall        | Must<br>know                                      |  |   |                                   |

|                            |  |  |           |  |  |               |                                   |                 |  |   |                                  |
|----------------------------|--|--|-----------|--|--|---------------|-----------------------------------|-----------------|--|---|----------------------------------|
| Hom<br>UG-<br>HP-<br>1.6.3 |  |  | Knows     |  | 3. Explain classification of plant kingdom with examples.                          |               | Level 2<br>Unders<br>tanding      | Must<br>know    | Lecture<br><br>6. Problem based learning<br><br>7. Flipped Classroom<br><br>8. Videos  |   |                                  |
| Hom<br>UG-<br>HP-<br>1.6.4 |  |  | Does      |  | 4. Identify the plant and its parts used for preparation of homoeopathic medicines | Cogniti<br>ve | Level 3<br>Proble<br>m<br>solving | Must<br>know    | 1.Practical Demonstr<br>ation<br><br>2.Procedu<br>ral Skills<br>Teaching<br><br>3.<br>Herbarium<br><br>4.<br>Experienti<br>al learning<br>(Projects) | 1.DOPS<br><br>2. OSPE<br><br>3. Herbarium | Practi<br>cal<br>Exami<br>nation |
| Hom<br>UG-<br>HP-<br>1.6.5 |  |  | Shows how |  | 5.Demonstra<br>te care while<br>identifying &<br>collecting the<br>plant drug      | Affectiv<br>e | Level 1<br>Receivi<br>ng          | Nice to<br>know | 1.Lecture Demonstr<br>ation<br><br>2.<br>Problem<br>Based  | 1.Herbarium                               | Practi<br>cal<br>Exami<br>nation |

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|  |  |  |  |  | substances |  |  |  | Learning |  |  |
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**TOPIC:** Animal Kingdom

**Learning Outcomes (LO):**

At the end of the topic, I-BHMS student must be able to identify the animal drug substances for preparation of homoeopathic medicines.

| Sr. No | Generic Competencies | Subject Area | Miller's Level Does/ Shows how/ Knows how/ Know | Specific Competencies | Specific Learning Objectives | Bloom's Domain | Guilbert's Levels | Must to know/ desirable to know/Nice to know | Teaching - Learning Method | Assessment /Evaluation |           |  |
|--------|----------------------|--------------|---|-----------------------|------------------------------|----------------|-------------------|--|----------------------------|------------------------|-----------|--|
|        |                      |              |   |                       |                              |                |                   |  |                            | Formative              | Summative |  |
|        |                      |              |   |                       |                              |                |                   |  |                            |                        |           |  |

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|----------------------------|--|---------------------|-------|---|--|---------------|----------------------------------|-----------|--|--|-----------------------------------|
| Hom<br>UG-<br>HP-<br>1.7.1 | Integration of<br>knowledge<br><br>Synthesis and<br>application of<br>knowledge<br><br>Classroom to<br>herbarium and<br>lab transfer | Sources<br>of drugs | Knows | Must be<br>able to<br>identify<br>the<br>animal<br>drug<br>substanc<br>es for<br>preparati<br>on of<br>homoeop<br>athic<br>medicine<br>s. | 1. Explain<br>the part<br>used<br>and<br>drug<br>prepare<br>d from<br>animal<br>kingdo<br>m      | Cogniti<br>ve | Level 2<br><br>Underst<br>anding | Must know | 1.Lecture<br>Demonstra<br>tions<br><br>2. Small<br>Group<br>Discussions<br>/<br>Peer<br>teaching<br>(Think-<br>Pair-Share,<br>Jigsaw<br>Strategy)<br><br>3. Quiz<br><br>4. Student<br>Seminars<br><br>5. Guest<br>Lecture<br><br>6. Problem<br>based<br>learning<br><br>7. Flipped<br>Classroom<br><br>8. Videos | 1.Structure<br>d Oral<br>Examination<br><br>2. Tutorials<br><br>3. Assignment<br>s<br><br>4. MCQ's<br><br>5. 2 marks<br>question<br><br>6.SAQ's and<br>LAQ's<br><br>7. Herbarium | LAQ<br>SAQ<br>MCQ<br>Viva<br>Voce |
| Hom<br>UG-<br>HP-<br>1.7.2 |  |                     | Knows |   | 2. List<br>any 4<br>exampl<br>es of<br>drugs<br>from<br>particul<br>ar part<br>of the<br>animal. |               | Level 1<br><br>Recall            | Must Know |  |  |                                   |

|                            |  |  |              |  |   |               |                                       |           |   |  |                              |
|----------------------------|--|--|--------------|--|---|---------------|---------------------------------------|-----------|---|--|------------------------------|
| Hom<br>UG-<br>HP-<br>1.7.3 |  |  | Knows        |  | 3.<br>Explain<br>classific<br>ation of<br>animal<br>kingdo<br>m   |               | Level 2<br><br>Underst<br>anding      | Must Know |   |  |                              |
| Hom<br>UG-<br>HP-<br>1.7.4 |  |  | Does         |  | 4.<br>Identify<br>the<br>animal<br>and its<br>parts<br>used<br>for<br>prepara<br>tion of<br>homoe<br>opathic<br>medicin<br>es | Cogniti<br>ve | Level 3<br><br>Proble<br>m<br>Solving | Must Know | 1.Practical<br>Demonstra<br>tion<br><br>2.Procedur<br>al Skills<br>Teaching<br><br>3.<br>Herbarium<br><br>4.<br>Experientia<br>l learning<br>(Projects) | 1.DOPS<br><br>2. OSPE<br><br>3.<br>Herbarium | Practical<br>Examina<br>tion |
| Hom<br>UG-<br>HP-<br>1.7.5 |  |  | Shows<br>how |  | 5.Demo<br>nstrate<br>care<br>while<br>identify<br>ing &<br>collecti<br>ng the<br>animal                                       | Affecti<br>ve | Level 1<br><br>Receivi<br>ng          | Must Know | 1.Lecture<br>Demonstra<br>tion<br><br>2. Problem<br>Based<br>Learning   | 1.Herbariu<br>m                              | Practical<br>Examina<br>tion |

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|  |  |  |  |  | drug substances |  |  |  |  |  |  |  |
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**TOPIC:** Mineral Kingdom

**Learning Outcomes (LO):**

At the end of the topic, I-BHMS student must be able to identify the mineral drug substances for preparation of homoeopathic medicines.

| Sr. No          | Generic Competencies   | Subject Area     | Miller's Level Does/ Shows how/ Knows how/ Know | Specific Competencies   | Specific Learning Objectives                                    | Bloom's Domain | Guilbert's Levels     | Must to know/ desirable to know/Nice to know | Teaching - Learning Method   | Assessment /Evaluation   |                                    |
|-----------------|--|------------------|---|---|---|----------------|-----------------------|--|--|--|------------------------------------|
|                 |  |                  |   |   |   |                |                       |  |  | Formative  | Summative                          |
| Hom UG-HP-1.8.1 | Integration of knowledge<br><br>Synthesis and application of knowledge<br><br>Classroom to | Sources of drugs | Knows   | Must be able to identify the mineral drug substances for preparation of | 1. Explain the part used and drug prepared from mineral kingdom | Cognitive      | Level 2 Understanding | Must know                                    | 1.Lecture Demonstrations<br><br>2. Small Group Discussions/<br><br>Peer teaching | 1.Structured Oral Examination<br><br>2. Tutorials<br><br>3. Assignme | LAQ<br>SAQ<br>MCQ<br><br>Viva Voce |

|                 |                            |  |       |                         |  |           |                         |           |                                     |                     |                       |
|-----------------|----------------------------|--|-------|-------------------------|--|-----------|-------------------------|-----------|-------------------------------------|---------------------|-----------------------|
|                 | herbarium and lab transfer |  |       | homoeopathic medicines. |  |           |                         |           | (Think-Pair-Share, Jigsaw Strategy) | nts                 |                       |
| Hom UG-HP-1.8.2 |                            |  | Knows |                         | 2. List any 4 examples of drugs from prepared from minerals.           |           | Level 1 Recall          | Must know | 3. Quiz                             | 4. MCQ's            |                       |
| Hom UG-HP-1.8.3 |                            |  | Knows |                         | 3. Explain the classification of mineral kingdom                       |           | Level 2 Understanding   | Must know | 4. Student Seminars                 | 5. 2 marks question |                       |
|                 |                            |  |       |                         |  |           |                         |           | 5. Guest Lecture                    | 6.SAQ's and LAQ's   |                       |
|                 |                            |  |       |                         |  |           |                         |           | 6. Problem based learning           | 7. Herbarium        |                       |
|                 |                            |  |       |                         |  |           |                         |           | 7. Flipped Classroom                |                     |                       |
|                 |                            |  |       |                         |  |           |                         |           | 8. Videos                           |                     |                       |
| Hom UG-HP-1.8.4 |                            |  | Does  |                         | 4. Identify the mineral used for preparation of homoeopathic medicines | Cognitive | Level 3 Problem solving | Must know | 1.Practical Demonstration           | 1.DOPS              | Practical Examination |
|                 |                            |  |       |                         |  |           |                         |           | 2.Procedural Skills Teaching        | 2. OSPE             |                       |
|                 |                            |  |       |                         |  |           |                         |           | 3. Herbarium                        | 3. Herbarium        |                       |
|                 |                            |  |       |                         |  |           |                         |           | 4.                                  |                     |                       |

|                 |  |  |           |  |  |           |                   |              |  |             |                       |
|-----------------|--|--|-----------|--|--|-----------|-------------------|--------------|--|-------------|-----------------------|
|                 |  |  |           |  |  |           |                   |              | Experiential learning (Projects)                     |             |                       |
| Hom UG-HP-1.8.5 |  |  | Shows how |  | 5.Demonstrate care while identifying &collecting the mineral drug substances | Affective | Level 1 Receiving | Nice to know | 1.Lecture Demonstration<br>2. Problem Based Learning | 1.Herbarium | Practical Examination |

**TOPIC:** Sarcodes &Nosodes

**Learning Outcomes (LO):**

At the end of the topic, I-BHMS student must be able to identify the drug substances from nosodes and sarcodes for preparation of homoeopathic medicines.

| Sr. No | Generic Compet | Subject | Miller's | Specific Competenc | Specific Learning | Bloom's | Guilbert's Levels | Must to | Teaching - Learning | Assessment /Evaluation |
|--------|----------------|---------|----------|--------------------|-------------------|---------|-------------------|---------|---------------------|------------------------|
|--------|----------------|---------|----------|--------------------|-------------------|---------|-------------------|---------|---------------------|------------------------|

|                                    | encies  | Area                           | Level<br>Does/<br>Shows<br>how/<br>Knows<br>how/<br>Know | ies  | Objectives   | Domain        |                                  | know/<br>desirabl<br>e<br><br>to<br>know/Ni<br>ce to<br>know | Method  | Formative   | Summativ<br>e               |
|------------------------------------|---|--------------------------------|--|--|--|---------------|----------------------------------|--|---|---|-----------------------------|
| Ho<br>mU<br>G-<br>HP-<br>1.9.<br>1 | Integrat<br>ion of<br>knowle<br>dge<br><br>Synthesi<br>s and<br>applicat<br>ion of<br>knowle<br>dge | Sour<br>ces<br>of<br>drug<br>s | Knows  | Must be<br>able to<br>identify the<br>drug<br>substances<br>from<br>nosodes<br>and<br>sarcodes<br>for<br>preparatio<br>n of<br>homoeopat | 1. Explain<br>the part<br>used and<br>drug<br>prepared<br>from<br>nosodes  | Cognitiv<br>e | Level 2<br><br>Understand<br>ing | Must<br>know   | 1.Lecture<br>Demonstrati<br>ons<br><br>2. Small<br>Group<br>Discussions/<br><br>Peer<br>teaching<br>(Think-Pair-<br>Share,<br>Jigsaw<br>Strategy) | 1.Structure<br>d Oral<br>Examinatio<br>n<br><br>2. Tutorials<br><br>3.<br>Assignment<br>s<br><br>4. MCQ's<br><br>5. 2 marks<br>question | LAQ SAQ<br>MCQ Viva<br>Voce |
| Ho<br>mU<br>G-<br>HP-<br>1.9.<br>2 |   |                                | Knows  | hic<br>medicines   | 2. List any 4<br>examples of<br>drugs from<br>prepared<br>from<br>nosodes. |               | Level 1<br><br>Recall            | Must<br>Know   | 3. Quiz<br><br>4. Student<br>Seminars<br><br>5. Guest<br>Lecture<br><br>6. Problem  | 6.SAQ's and<br>LAQ's  |                             |

|                                       |  |  |       |  |  |  |                                  |              |   |  |  |
|---------------------------------------|--|--|-------|--|--|--|----------------------------------|--------------|---|--|--|
| Ho<br>mU<br>G-<br>HP<br><br>1.9.<br>3 |  |  | Knows |  | 3. Explain<br>classificatio<br>n of<br>nosodes.                            |  | Level 2<br><br>Understand<br>ing | Must<br>Know | based<br>learning<br><br>7. Flipped<br>Classroom<br><br>8. Videos |  |  |
| Ho<br>mU<br>G-<br>HP<br><br>1.9.<br>4 |  |  | Knows |  | 4.Explain<br>the part<br>used and<br>drug<br>prepared<br>from<br>sarcodes  |  | Level 2<br><br>Understand<br>ing | Must<br>Know |   |  |  |
| Ho<br>mU<br>G-<br>HP<br><br>1.9.<br>5 |  |  | Knows |  | 5. List any 4<br>examples of<br>drugs from<br>prepared<br>from<br>sarcodes |  | Level 1<br><br>Recall            | Must<br>Know |   |  |  |
| Ho<br>mU<br>G-<br>HP<br><br>1.9.<br>6 |  |  | Knows |  | 6. Explain<br>classificatio<br>n of<br>sarcodes                            |  | Level 2<br><br>Understand<br>ing | Must<br>Know |   |  |  |

|                                       |  |  |           |  |  |           |                            |              |  |                    |                       |
|---------------------------------------|--|--|-----------|--|--|-----------|----------------------------|--------------|--|--------------------|-----------------------|
| Ho<br>mU<br>G-<br>HP<br><br>1.9.<br>7 |  |  | Does      |  | 7. Identify the sarcodes/nosodes used for preparation of homoeopathic medicines  | Cognitive | Level 3<br>Problem solving | Must know    | 1. Practical Demonstration<br><br>2. Procedural Skills Teaching<br><br>3. Experiential learning (Projects) | 1. DOPS<br>2. OSPE | Practical Examination |
| Ho<br>mU<br>G-<br>HP<br><br>1.9.<br>8 |  |  | Shows how |  | 8. Demonstrate care while identifying & collecting the diseased part/secretion for preparation of nosodes & healthy part/secretion for preparation of sarcodes | Affective | Level 1<br>Receiving       | Nice to know | 1. Lecture Demonstration<br><br>2. Problem Based Learning  | 1. Monographs      | Practical Examination |

**TOPIC:** Imponderabilia

### Learning Outcomes (LO):

At the end of the topic, I-BHMS student must be able to identify the drug substances from energy sources for preparation of homoeopathic medicines.

| Sr. No           | Generic Competencies  |  | Subject Area     | Miller's Level<br>Does/<br>Shows<br>how/<br>Knows<br>how/<br>Know | Specific Competencies  | Specific Learning Objectives                                     | Bloom's Domain | Guilbert's Levels     | Must to know/<br>desirable to know/Nice to know | Teaching - Learning Method  | Assessment /Evaluation  |                                |
|------------------|---|--|------------------|---|--|--|----------------|-----------------------|---|---|---|--------------------------------|
|                  |   |  |                  |   |  |  |                |                       |   |   | Formative   | Summative                      |
| Hom UG-HP-1.10.1 | Integration of knowledge<br><br>Synthesis and application of knowledge<br><br>Classroom to and herbarium lab transfer |  | Sources of drugs | Knows   | Must be able to identify the drug substances from energy sources for preparation of homoeopathic medicines . | 1. Explain the energy used and drug prepared from imponderabilia | Cognitive      | Level 2 Understanding | Must know                                       | 1.Lecture Demonstrations<br>2. Small Group Discussions/<br>Peer teaching (Think-Pair-Share, Jigsaw Strategy)<br>3. Quiz<br>4. | 1.Structured Oral Examination<br>2. Tutorials<br>3. Assignments<br>4. MCQ's<br>5. 2 marks question<br>6.SAQ's | LAQ<br>SAQ<br>MCQ<br>Viva Voce |
| Hom UG-HP-1.10.  |   |  |                  | Knows   |  | 2. List any 4 examples of drugs prepared from                    |                | Level 1 Recall        | Must know                                       |   |   |                                |

|                  |  |  |  |           |  |  |           |                         |              |  |                   |                       |
|------------------|--|--|--|-----------|--|--|-----------|-------------------------|--------------|--|-------------------|-----------------------|
| 2                |  |  |  |           |  | imponderabilia   |           |                         |              | Student Seminars<br>5. Guest Lecture<br>6. Problem based learning<br>7. Flipped Classroom<br>8. Videos | and LAQ's         |                       |
| Hom UG-HP-1.10.3 |  |  |  | Knows     |  | 3. Explain classification of imponderabilia.   |           | Level 2 Understanding   | Must know    |  |                   |                       |
| Hom UG-HP-1.10.4 |  |  |  | Does      |  | 4. Identify the energy source used for preparation of homoeopathic medicines from imponderabilia | Cognitive | Level 3 Problem solving | Nice to know | 1.Practical Demonstration<br>2.Procedural Skills Teaching<br>3. Experiential learning (Projects)       | 1.DOPS<br>2. OSPE | Practical Examination |
| Hom UG-HP-1.10.  |  |  |  | Shows how |  | 5.Demonstrate care & commitment while  | Affective | Level 1 Receiving       | Nice to know | 1.Lecture Demonstration  | 1.Monographs      | Practical Examination |

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| 5 |  |  |  |  |  | identifying<br>& collecting<br>the<br>different<br>energy<br>sources for<br>preparation<br>of<br>imponderab<br>ilia<br>medicines |  |  |  | 2.<br>Problem<br>Based<br>Learning |  | nation |
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**TOPIC:** Allersodes, Isodes, Synthetic Source

**Learning Outcomes (LO):**

At the end of the topic, I-BHMS student must be able to identify drug substances of Allersodes, Isodes, Synthetic Source for preparation of homoeopathic medicines.

| Sr.<br>No | Generic<br>Competencies | Subject<br>Area | Miller's<br>Level Does/<br>Shows how/<br>Knows how/<br>Know | Specific<br>Competenci<br>es | Specific<br>Learning<br>Objectives | Bloom's<br>Domain | Guilbert'<br>s Levels | Must to<br>know/<br>desirable<br>to<br>know/Ni<br>ce to | Teaching -<br>Learning<br>Method | Asses<br>men<br>t<br>/Eval<br>uatio<br>n | Form | Summ |
|-----------|-------------------------|-----------------|---|------------------------------|------------------------------------|-------------------|-----------------------|---|----------------------------------|--|------|------|
|           |                         |                 |   |                              |                                    |                   |                       |   |                                  |  |      |      |

|                                 |  |                     |       |  |   |               |                                  |              |  |  |                                   |
|---------------------------------|--|---------------------|-------|--|---|---------------|----------------------------------|--------------|--|--|-----------------------------------|
|                                 |  |                     |       |  |   |               |                                  | know         |  | ative  | ative                             |
| Hom<br>UG-<br>HP-<br>1.11.<br>1 | Integration of<br>knowledge<br><br>Synthesis and<br>application of<br>knowledge<br><br>Classroom to<br>herbarium and<br>lab transfer | Sources<br>of drugs | Knows | Must be<br>able to<br>identify<br>drug<br>substances<br>of<br>Allersodes,<br>Isodes,<br>Synthetic<br>Source for<br>preparation<br>of<br>homoeopat<br>hic<br>medicines. | 1. Explain<br>the<br>preparation<br>of<br>Allersodes,<br>Isodes&<br>Synthetic<br>Source of<br>homoeopat<br>hic<br>medicines | Cognitiv<br>e | Level 2<br><br>Underst<br>anding | Must<br>know | 1.Lecture<br>Demonstr<br>ations<br><br>2. Small<br>Group<br>Discussio<br>ns/<br><br>Peer<br>teaching<br>(Think-<br>Pair-<br>Share,<br>Jigsaw<br>Strategy)<br><br>3. Quiz<br><br>4. Student<br>Seminars | 1.Str<br>uctur<br>ed<br>Oral<br>Exam<br>inatio<br>n<br><br>2.<br>Tutor<br>ials<br><br>3.<br>Assig<br>nmen<br>ts<br><br>4.<br>MCQ'<br>s | LAQ<br>SAQ<br>MCQ<br>Viva<br>Voce |
| Hom<br>UG-<br>HP-<br>1.11.<br>2 |  |                     | Knows |  | 2. List any 4<br>examples of<br>drugs<br>prepared<br>from<br>Allersodes,<br>Isodes&Synt<br>hetic Source                     |               | Level 1<br><br>Recall            | Must<br>know | 5. Guest<br>Lecture<br><br>6.<br>Problem<br>based<br>learning<br><br>7. Flipped<br>Classroo  | 5. 2<br>mark<br>s<br>quest<br>ion<br><br>6.SA<br>Q's<br>and<br>LAQ's   |                                   |

|                                 |  |  |           |  |   |           |                            |              |   |             |                       |
|---------------------------------|--|--|-----------|--|---|-----------|----------------------------|--------------|---|-------------|-----------------------|
|                                 |  |  |           |  |   |           |                            |              | m<br>8. Videos  |             |                       |
| Hom<br>UG-<br>HP-<br>1.11.<br>3 |  |  | Does      |  | 3. Identify the part used for preparation of Allersodes, Isodes& Synthetic Source.  | Cognitive | Level 3<br>Problem solving | Must know    | Experiential learning (Projects)                      | Projects    | Practical Examination |
| Hom<br>UG-<br>HP-<br>1.11.<br>4 |  |  | Shows how |  | 4. Demonstrate care & commitment while identifying & collecting the different parts for preparation of Allersodes, Isodes& Synthetic Source | Affective | Level 1<br>Receiving       | Nice to know | 1. Lecture Demonstration<br>2. Problem Based Learning | 1. Projects | Practical Examination |

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**TOPIC:** Collection of Drug Substances

**Learning Outcomes (LO):**

At the end of the topic, I-BHMS student must be able to collect a particular part/ source for preparation of homoeopathic drugs

| Sr. No           | Generic Competencies | Subject Area                  | Miller's Level Does/ Shows how/ Knows how/ Know | Specific Competencies                      | Specific Learning Objectives                           | Bloom's Domain | Guilbert's Levels     | Must to know/ desirable to know/Nice to know | Teaching - Learning Method | Assessment /Evaluation        |                  |
|------------------|----------------------|-------------------------------|---|--|--|----------------|-----------------------|--|----------------------------|-------------------------------|------------------|
|                  |                      |                               |   |  |  |                |                       |  |                            | Formative                     | Summative        |
| Ho mU G- HP- 1.1 | Problem solution     | Collection of Drug Substances | Knows   | Must be able to collect a particular part/ | 1. Explain the general rules for collecting drugs from | Cognitive      | Level 2 Understanding | Must know                                    | 1.Lecture Demonstrations   | 1.Structured Oral Examination | LAQ SAQ MCQ Viva |

|                    |   |  |       |  |  |  |                       |           |  |                     |   |
|--------------------|---|--|-------|--|--|--|-----------------------|-----------|--|---------------------|---|
| 2.1                | Integration of Knowledge                |  |       | source for preparation of homoeopathic drugs | vegetable kingdom.   |  |                       |           | 2. Small Group Discussions/ Peer teaching (Think-Pair-Share, Jigsaw Strategy ) | n                   | a |
| Ho mU G-HP-1.1 2.2 | Classroom to Herbarium transfer         |  | Knows |  | 2. Explain the particular rules for collecting drugs from vegetable kingdom. |  | Level 2 Understanding | Must know | 3. Quiz  | 2. Tutorials        | e |
| Ho mU G-HP-1.1 2.3 | Practice based learning and improvement |  | Knows |  | 3. Explain the general rules for collecting drugs from animal kingdom.       |  | Level 2 Understanding | Must know | 4. Student Seminars  | 3. Assignments      |   |
| Ho mU G-HP-        |   |  | Knows |  | 4. Explain the particular rules for  |  | Level 2 Understanding | Must know | 5. Guest Lecture   | 4. MCQ's            |   |
|                    |   |  |       |  |  |  |                       |           | 6. Flipped Classroom   | 5. 2 marks question |   |
|                    |   |  |       |  |  |  |                       |           | 7. Videos  | 6.SAQ's and LAQ's   |   |
|                    |   |  |       |  |  |  |                       |           |  | 7.Proj ects         |   |
|                    |   |  |       |  |  |  |                       |           |  | 8. Herbarium        |   |

|                                     |  |  |       |  |  |                 |                                  |              |  |  |  |
|-------------------------------------|--|--|-------|--|--|-----------------|----------------------------------|--------------|--|--|--|
| 1.1<br>2.4                          |  |  |       |  | collecting drugs from animal kingdom.                        |                 |                                  |              |  |  |  |
| Ho<br>mU<br>G-<br>HP-<br>1.1<br>2.5 |  |  | Knows |  | 5. Explain the collection of drugs from mineral kingdom.     |                 | Level 2<br><br>Understa<br>nding | Must<br>know |  |  |  |
| Ho<br>mU<br>G-<br>HP-<br>1.1<br>2.6 |  |  | Knows |  | 6. Explain collection of Nosodes, Sarcodes & Imponderabilia. |                 | Level 2<br><br>Understa<br>nding | Must<br>know |  |  |  |
| Ho<br>mU<br>G-<br>HP-<br>1.1<br>2.7 |  |  | Does  |  | 7. Collect the drugs from vegetable kingdom.                 | Psycho<br>motor | Level 3<br><br>Automati<br>on    | Must<br>know | 1. Practical Demonstrations<br><br>2. Procedural Skills Teaching | 1.DO<br>PS<br><br>2.OSP<br>E<br><br>3.Proj<br>ects<br><br>4.Spo<br>tting | Prac<br>tical<br>Exa<br>min<br>atio<br>n |

|  |  |  |           |  |   |           |                       |              |  |              |                       |
|--|--|--|-----------|--|---|-----------|-----------------------|--------------|--|--------------|-----------------------|
|  |  |  |           |  |   |           |                       |              | 3.Experimental Learning                                | 5.Herbarium. |                       |
| Ho<br>mU<br>G-<br>HP-<br>1.1<br>2.8      |  |  | Does      |  | 8. Collect the drugs from animal kingdom.   |           | Level 3<br>Automation | Must know    |  |              |                       |
| Ho<br>mU<br>G-<br>HP.<br>1.1<br>2.9      |  |  | Does      |  | 9. Collect the drugs from nosodes, sarcodes & imponderabilia.                           |           | Level 2<br>Control    | Must know    |  |              |                       |
| Ho<br>mU<br>G-<br>HP-<br>1.1<br>2.1<br>0 |  |  | Shows how |  | 10. Demonstrate care & commitment while collecting drugs from vegetable kingdom, animal | Affective | Level 1<br>Receiving  | Nice to know | 1. Lecture Demonstration<br>2. Practical Demonstration | Herbarium    | Practical Examination |

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|--|--|--|--|--|--|--|--|--|--|--|--|
|  |  |  |  |  | kingdom,<br>nosodes,<br>sarcodes<br>&impondera<br>bilia. |  |  |  |  |  |  |
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**TOPIC:** Cleansing

**Learning Outcomes (LO):**

At the end of the topic, I-BHMS student must be able to clean the instruments used in homoeopathic pharmaceutical laboratory.

| Sr.<br>No | Generic<br>Competenci<br>es | Subje<br>ct<br>Area | Miller's<br>Level<br>Does/<br>Shows<br>how/<br>Knows<br>how/ | Specific<br>Compete<br>ncies | Specific<br>Learning<br>Objectives | Bloom'<br>s<br>Domain | Guilbert's<br>Levels | Must to<br>know/<br>desirable<br>to<br>know/Ni<br>ce | Teaching<br>Learning<br>Method | Assessment /Evaluation |               |
|-----------|-----------------------------|---------------------|--|------------------------------|------------------------------------|-----------------------|----------------------|--|--------------------------------|------------------------|---------------|
|           |                             |                     |  |                              |                                    |                       |                      |  |                                | Formative              | Summati<br>ve |

|                                 |   |  | Know  |   |  |               |                                  | toknow       |   |   |                            |     |
|---------------------------------|---|--|-------|---|--|---------------|----------------------------------|--------------|---|---|----------------------------|-----|
| Hom<br>UG-<br>HP-<br>1.13.<br>1 | Integration<br>of<br>Knowledge                          | Clean<br>sing<br>of<br>instru<br>ments | Knows | Must be<br>able to<br>clean the<br>instrume<br>nts used<br>in<br>homoeo<br>pathic<br>pharmac<br>eutical<br>laborator<br>y | 1. Explain<br>the<br>cleansing of<br>mortar &<br>pestle. | Cogniti<br>ve | Level 2<br><br>Understand<br>ing | Must<br>know | 1.Lecture<br>Demonstrati<br>ons<br><br>2. Small<br>Group<br>Discussions/<br>Peer teaching<br>(Think-Pair-<br>Share, Jigsaw<br>Strategy) | 1.Structured<br>Oral<br>Examination<br><br>2. Tutorials<br><br>3.<br>Assignments<br><br>4. MCQ's<br><br>5. 2 marks<br>question<br><br>6.SAQ's<br><br>7.Projects | LAQ<br>MCQ<br>Viva<br>Voce | SAQ |
| Hom<br>UG-<br>HP-<br>1.13.<br>2 | Classroom<br>to Lab<br>transfer                         |  | Knows |   | 2. Explain<br>the<br>cleansing of<br>spatula.            |               | Level 2<br><br>Understand<br>ing | Must<br>know | 3. Quiz   |   |                            |     |
| Hom<br>UG-<br>HP.1<br>.13.3     | Practice<br>based<br>learning<br>and<br>improveme<br>nt |  | Knows |   | 3. Explain<br>the<br>cleansing of<br>glass<br>bottles.   |               | Level 2<br><br>Understand<br>ing | Must<br>know | 4. Student<br>Seminars<br><br>5. Flipped<br>Classroom   |   |                            |     |
| Hom<br>UG-<br>HP.1<br>.13.4     |   |  | Knows |   | 4. Explain<br>the<br>cleansing of<br>corks.              |               | Level 2<br><br>Understand<br>ing | Must<br>know |   |   |                            |     |

|                                 |  |  |       |  |   |                 |                                  |              |   |  |                              |  |
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| Hom<br>UG-<br>HP.1<br>.13.5     |  |  | Knows |  | 5. Explain<br>the<br>cleansing of<br>wooden<br>instruments<br>. |                 | Level 2<br><br>Understand<br>ing | Must<br>know |   |  |                              |  |
| Hom<br>UG-<br>HP.1<br>.13.6     |  |  | Does  |  | 6. Demonstrat<br>e the<br>cleansing of<br>mortar &<br>pestle.   | Psycho<br>motor | Level 3<br><br>Automatism        | Must<br>know | 1. Practical<br>Demonstrati<br>ons<br><br>2. Procedural<br>Skills<br>Teaching<br><br>3.Experiential<br>Learning | 1.DOPS<br><br>2.OSPE<br><br>3.Spotting | Practical<br>Examinat<br>ion |  |
| Hom<br>UG-<br>HP.1<br>.13.7     |  |  | Does  |  | 7. Demonstrat<br>e the<br>cleansing of<br>spatula               |                 | Level 3<br><br>Automatism        | Must<br>know |   |  |                              |  |
| Hom<br>UG-<br>HP-<br>1.13.<br>8 |  |  | Does  |  | 8. Demonstrat<br>e the<br>cleansing of<br>glass<br>bottles.     |                 | Level 3<br><br>Automatism        | Must<br>know |   |  |                              |  |

|                                  |  |  |              |  |  |           |                       |                 |  |                  |                          |  |
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| Hom<br>UG-<br>HP-<br>1.13.<br>9  |  |  | Does         |  | 9.<br>Demonstrate the<br>cleansing of<br>corks.                      |           | Level 3<br>Automatism | Must<br>know    |  |                  |                          |  |
| Hom<br>UG-<br>HP-<br>1.13.<br>10 |  |  | Does         |  | 10.<br>Demonstrate the<br>cleansing of<br>wooden<br>instruments<br>. |           | Level 3<br>Automatism | Must<br>know    |  |                  |                          |  |
| Hom<br>UG-<br>HP-<br>1.13.<br>11 |  |  | Shows<br>how |  | 11.<br>Demonstrate care while<br>cleaning the<br>instruments<br>.    | Affective | Level 1<br>Receiving  | Nice to<br>know | 1. Lecture<br>Demonstration<br><br>2. Practical<br>Demonstration | 1.DOPS<br>2.OSPE | Practical<br>Examination |  |

**TOPIC:** Lab Methods

**Learning Outcomes (LO):**

At the end of the topic, I-BHMS student must be able to select and apply a particular lab method for preparation of homoeopathic medicines and for standardization of homoeopathic medicines.

| Sr. | Generic | Subject |  | Miller' | Specific | Specific | Bloom' | Guilbe | Must to | Teaching - | Assessment |
|-----|---------|---------|--|---------|----------|----------|--------|--------|---------|------------|------------|
|-----|---------|---------|--|---------|----------|----------|--------|--------|---------|------------|------------|

| no                               | Competencies  | Area        |  | s<br>Level<br>Does/<br>Shows<br>how/<br>Knows<br>how/<br>Know | Competenci<br>es   | Learning<br>Objectives   | s<br>Domain | rt's<br>Levels    | know/<br>desirable<br>to<br>know/Ni<br>ce to<br>know | Learning<br>Method  | /Evaluation   |                                   |
|----------------------------------|---|-------------|--|---|--|--|-------------|-------------------|--|---|---|-----------------------------------|
|                                  |   |             |  |   |  |  |             |                   |  |   | Formati<br>ve   | Sum<br>mati<br>e                  |
| Hom<br>.UG-<br>HP-<br>1.14.<br>1 | <p>Problem solution</p> <p>Integration of Knowledge</p> <p>Synthesis and application of knowledge</p> <p>Classroom to lab transfer</p> <p>Practice based learning and improvement</p> | Lab Methods |  | Knows   | Must be able to select and apply a particular lab method for preparation of homoeopathic medicines and for standardiza tion of homoeopat hic medicines | 1. Define decantation, sedimentatio n, filtration, distillation, sublimation, precipitation. | Cognitiv e  | Level 1<br>Recall | Must know  | <p>1.Lecture Demonstrati ons</p> <p>2. Small Group Discussions/ Peer teaching (Think-Pair-Share, Jigsaw Strategy)</p> <p>3. Quiz</p> <p>4. Student Seminars</p> <p>5. Guest Lecture</p> <p>6. Problem based</p> | <p>1.Struct ured Oral Examina tion</p> <p>2. Tutorials</p> <p>3. Assignm ents</p> <p>4. MCQ's</p> <p>5. 2 marks question</p> <p>6.SAQ's and LAQ's</p> <p>7.Projec</p> | LAQ<br>SAQ<br>MCC<br>Viva<br>Voce |

|                   |  |  |  |       |  |   |  |                       |           |                      |    |  |
|-------------------|--|--|--|-------|--|---|--|-----------------------|-----------|----------------------|----|--|
|                   |  |  |  |       |  |   |  |                       |           | learning             | ts |  |
|                   |  |  |  |       |  |   |  |                       |           | 7. Flipped Classroom |    |  |
|                   |  |  |  |       |  |   |  |                       |           | 8. Videos            |    |  |
| Hom .UG-HP-1.14.2 |  |  |  | Knows |  | 2. Explain the process of decantation, sedimentation, filtration, distillation, sublimation, precipitation          |  | Level 2 Understanding | Must know |                      |    |  |
| Hom .UG-HP-1.14.3 |  |  |  | Knows |  | 3.Explain the homoeopathic uses of decantation, sedimentation, filtration, distillation, sublimation, precipitation |  | Level 2 Understanding | Must know |                      |    |  |

|                   |  |  |  |           |  |   |             |                         |                   |   |                                |                       |
|-------------------|--|--|--|-----------|--|---|-------------|-------------------------|-------------------|---|--------------------------------|-----------------------|
| Hom .UG-HP-1.14.4 |  |  |  | Knows how |  | 4.Differentiate between filtration&distillation   |             | Level 2 Understanding   | Must know         |   |                                |                       |
| Hom .UG-HP-1.14.5 |  |  |  | Knows how |  | 5. Differentiate between decantation & filtration in detail.  |             | Level 2 Understanding   | Must know         |   |                                |                       |
| Hom .UG-HP-1.14.6 |  |  |  | Does      |  | 6. Select a specific lab method according to the different processes carried out in a homoeopathic pharmacy laboratory. |             | Level 3 Problem solving | Desirable to know |   |                                |                       |
| Hom .UG-HP-1.14.7 |  |  |  | Does      |  | 7. Demonstrate the processes decantation, sedimentation, filtration, distillation, sublimation                          | Psychomotor | Level 2 Control         | Desirable to know | 1. Practical Demonstrations<br>2. Procedural Skills | 1.DOPS<br>2.OSPE<br>3.Projects | Practical Examination |

|                                  |  |  |  |              |  |  |               |                                 |                 |  |      |                                  |
|----------------------------------|--|--|--|--------------|--|--|---------------|---------------------------------|-----------------|--|------|----------------------------------|
|                                  |  |  |  |              |  | imation,preci<br>pitation  |               |                                 |                 | Teaching<br>3.Experienti<br>al Learning                                  |      |                                  |
| Hom<br>.UG-<br>HP-<br>1.14.<br>8 |  |  |  | Shows<br>how |  | 8.Demonstra<br>te care &<br>commitment<br>while<br>carrying out<br>the different<br>lab methods<br>involved in<br>preparation<br>of<br>homoeopathi<br>c medicine | Affectiv<br>e | Level<br>1<br><br>Receiv<br>ing | Nice to<br>know | 1. Lecture<br>Demonstrati<br>on<br><br>2. Practical<br>Demonstrati<br>on | DOPS | Practi<br>cal<br>Exami<br>nation |

**TOPIC:** Standardization of homoeopathic drugs

**Learning Outcomes (LO):**

At the end of the topic, I-BHMS student must be able to select an appropriate method for standardization of homoeopathic medicines.

| Sr. No | Generic Competencies | Subject Area | Miller's Level Does/ Shows how/ Knows | Specific Competencies | Specific Learning Objectives | Bloom's Domain | Guilbert's Levels | Must to know/ desirable to know/Nic | Teaching - Learning Method | Assessment /Evaluation |           |
|--------|----------------------|--------------|---------------------------------------|-----------------------|------------------------------|----------------|-------------------|-------------------------------------|----------------------------|------------------------|-----------|
|        |                      |              |                                       |                       |                              |                |                   |                                     |                            | Formative              | Summative |
|        |                      |              |                                       |                       |                              |                |                   |                                     |                            |                        |           |

|                   |  |                                       | how/<br>Know |  |   |           |                       | e to<br>know      |   |   |                                   |
|-------------------|--|---------------------------------------|--------------|--|---|-----------|-----------------------|-------------------|---|---|-----------------------------------|
| Hom. UG-HP-1.15.1 | Integration of Knowledge<br><br>Synthesis and application of knowledge   | Standardization of homoeopathic drugs | Knows        | Must be able to select an appropriate method for standardization of homoeopathic medicines | 1. Enumerate the different methods of standardization of homoeopathic drugs | Cognitive | Level 1 Recall        | Must know         | 1.Lecture Demonstrations<br><br>2. Small Group Discussions/<br><br>Peer teaching (Think-Pair-Share, Jigsaw Strategy)<br><br>3. Quiz<br><br>4. Student Seminars<br><br>5. Flipped Classroom<br><br>6. Videos | 1.Structured Oral Examination<br><br>2. Tutorials<br><br>3. Assignments<br><br>4. MCQ's<br><br>5. 2 marks question<br><br>6.SAQ's<br><br>7.Projects | LAQ<br>SAQ<br>MCQ<br>Viva<br>Voce |
| Hom. UG-HP-1.15.2 | Classroom to Lab transfer<br><br>Practice based learning and improvement |                                       | Knows        |  | 2. Explain the individual method of standardization of homoeopathic drugs   |           | Level 2 Understanding | Must know         |   |   |                                   |
| Hom. UG-HP-1.15.3 |  |                                       | Does         |  | 3. Estimate the standard of homoeopathic drugs before and after manufacturi |           | Level 2 Control       | Desirable to know |   |   |                                   |

|                                  |  |  |      |  |  |                 |                               |                      |  |   |   |
|----------------------------------|--|--|------|--|--|-----------------|-------------------------------|----------------------|--|---|---|
|                                  |  |  |      |  | ng of<br>homoeopat<br>hic<br>medicines.  | Psycho<br>motor |                               |                      |  |   |   |
| Hom.<br>UG-<br>HP-<br>1.15.<br>4 |  |  | Does |  | 4. Demonstrat<br>e the<br>microscopic<br>study of<br>triturations.   | Psycho<br>motor | Level 2<br>Control            | Desirable<br>to know | 1. Practical<br>Demonstr<br>ations<br><br>2. Procedura<br>l Skills<br>Teaching | 1.Spotti<br>ng<br><br>2. Assessm<br>ent of<br>research<br>project<br>output | Viva<br>Voce<br>&<br>Practi<br>ca<br>Exami<br>natio<br>ns |
| Hom.<br>UG-<br>HP-<br>1.15.<br>5 |  |  | Does |  | 5. Identify<br>the drug<br>specimen<br>applying the<br>different<br>methods of<br>standardizat<br>ion of drugs | Cogniti<br>ve   | Level 3<br>Problem<br>solving | Desirable<br>to know | 3.Experien<br>tial<br>Learning<br><br>4. Research<br>Projects                  |   |   |
| Hom.<br>UG-<br>HP-<br>1.15.<br>6 |  |  | Does |  | 6. Analyze<br>the purity of<br>mother<br>tincture<br>with the<br>help of<br>HPTLC.                             | Psycho<br>motor | Level 2<br>Control            | Nice to<br>know      |  |   |   |

|                                  |  |  |           |  |  |              |                       |              |   |                       |           |
|----------------------------------|--|--|-----------|--|--|--------------|-----------------------|--------------|---|-----------------------|-----------|
| Hom.<br>UG-<br>HP-<br>1.15.<br>7 |  |  | Does      |  | 7. Analyze and identify the purity of mother substances and dilutions with the help of U.V. Spectroscopy.  | Psycho motor |                       | Nice to know |   |                       |           |
| Hom.<br>UG-<br>HP-<br>1.15.<br>8 |  |  | Shows how |  | 8. Abide by the rules of standardization of homoeopathic drugs laid down by HPL & value the importance of genuine medicine in homoeopathic practice. | Affective    | Level 3 Internalizing | Nice to know | 1. Lecture Demonstration<br>2. Monographs | Herbarium Assignments | Viva Voce |

**TOPIC:** Quality Control in Homoeopathy

**Learning Outcomes (LO):**

At the end of the topic, I-BHMS student must be able to conduct the quality control as per the appropriate method

| Sr. No | Generic | Subject | Miller's | Specific | Specific | Bloom's | Guilbert | Must to | Teachin | Assessment |
|--------|---------|---------|----------|----------|----------|---------|----------|---------|---------|------------|
|--------|---------|---------|----------|----------|----------|---------|----------|---------|---------|------------|

|                          | Competencies   | Area            | Level<br>Does/<br>Shows<br>how/<br>Knows<br>how/<br>Know | Competencies  | Learning<br>Objectives   | Domain    | 's Levels                | know/<br>desirable<br>to know/Nice to know | g-Learning Method   | /Evaluation   |                                |
|--------------------------|--|-----------------|--|---|--|-----------|--------------------------|--|---|---|--------------------------------|
|                          |  |                 |  |   |  |           |                          |  |   | Formative   | Summative                      |
| Hom.U<br>G-HP-<br>1.16.1 | Integration of Knowledge<br><br>Synthesis and application of knowledge   | Quality control | Knows  | Must be able to conduct the quality control as per the appropriate method | 1. Enumerate the different methods of quality control.             | Cognitive | Level 1<br>Recall        | Must Know                                  | 1. Lecture Demonstrations<br>2. Small Group Discussions/<br>Peer teaching (Think-Pair-Share, Jigsaw Strategy )<br>3. Quiz<br>4. | 1. Structured Oral Examination<br>2. Tutorials<br>3. Assignments<br>4. MCQ's<br>5. 2 marks question | LAQ<br>SAQ<br>MCQ<br>Viva Voce |
| Hom.U<br>G-HP-<br>1.16.2 | Classroom to Lab transfer<br><br>Practice based learning and improvement |                 | Knows  |   | 2. Explain the individual method of quality control in homoeopathy |           | Level 2<br>Understanding | Must Know                                  |   |   |                                |

|                          |  |  |       |  |  |  |                               |                 |  |                               |  |  |
|--------------------------|--|--|-------|--|--|--|-------------------------------|-----------------|--|-------------------------------|--|--|
| Hom.U<br>G-HP-<br>1.16.3 |  |  | Knows |  | 3.Explain the functions of HPL in quality control of Homoeopathic medicines                                  |  | Level 2<br>Underst<br>anding  | Must<br>Know    | Student<br>Seminar<br>s<br><br>5. Flipped Classroom<br><br>6. Videos | 6.SAQ's<br><br>7.Proje<br>cts |  |  |
| Hom.U<br>G-HP-<br>1.16.4 |  |  | Does  |  | 4. Determine the quality of homoeopathic medicine based on the parameters of quality control                 |  | Level 3<br>Problem<br>solving | Nice to<br>Know |  |                               |  |  |
| Hom.U<br>G-HP-<br>1.16.5 |  |  | Does  |  | 5. Take part in the process of quality control at different stages of preparation of homoeopathic medicines. |  | Level 3<br>Problem<br>solving | Nice to<br>Know |  |                               |  |  |

|                          |  |  |                           |  |   |              |                    |              |  |  |                                    |
|--------------------------|--|--|---------------------------|--|---|--------------|--------------------|--------------|--|--|------------------------------------|
| Hom.U<br>G-HP-<br>1.16.6 |  |  | D<br>oes,<br>shows<br>how |  | 6. Demonstrate the microscopic study of triturations.   | Psycho motor | Level 2<br>Control | Nice to Know | 1. Practical Demonstrations<br>2. Procedural Skills Teaching<br>3. Experiential Learning<br>4. Research Projects | 1. Spotting<br>2. Assessment of the outcome of research projects | Viva Voce & Practical Examinations |
| Hom.U<br>G-HP-<br>1.16.7 |  |  |                           |  | 7. Analyze the purity of mother tinctures with the help of HPTLC.   |              | Level 2<br>Control | Nice to know |  |  |                                    |
| Hom.U<br>G-HP-<br>1.16.8 |  |  | Does                      |  | 8. Analyze and identify the purity of mother substances and dilutions with the help of U.V. Spectroscopy. |              |                    | Nice to know |  |  |                                    |

|                          |  |  |      |  |  |           |                          |              |  |                                    |                       |
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| Hom.U<br>G-HP-<br>1.16.9 |  |  | Does |  | 9. Abide by the rules of quality control laid down by HPL & value the importance of genuine medicine in homoeopathic practice. | Affective | Level 3<br>Internalizing | Nice to know | 1. Lecture Demonstrations<br>2. Practical Demonstrations | SAQ/LAQ<br>Projects<br>Assignments | Practical Examination |
|--------------------------|--|--|------|--|--|-----------|--------------------------|--------------|--|------------------------------------|-----------------------|

**TOPIC:** Ideal Laboratory

**Learning Outcomes (LO):**

- At the end of the topic, I-BHMS student must be able to –
1. State the pre requisites of an Ideal Laboratory

| Sr. No | Generic Competencies | Subject Area | Miller's Level Does/ Shows how/ Knows how/ Know | Specific Competencies | Specific Learning Objectives | Bloom's Domain | Guilbert's Levels | Must to know/ desirable to know/Nice to | Teaching Learning Method | Assessment /Evaluation |           |
|--------|----------------------|--------------|---|-----------------------|------------------------------|----------------|-------------------|---|--------------------------|------------------------|-----------|
|        |                      |              |   |                       |                              |                |                   |   |                          | Formative              | Summative |
|        |                      |              |   |                       |                              |                |                   |   |                          |                        |           |

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|-------------------|--|------------------|-------|---|---|-----------|-------------------------|-------------------|---|--|--------------------------------|
|                   |  |                  |       |   |   |           |                         | know              |   |  |                                |
| Hom .UG-HP-1.17.1 | Integration of Knowledge                             | Ideal Laboratory | Knows | Must be able to state the pre requisites of an ideal laboratory | List the pre requisites for an ideal Laboratory                     | Cognitive | Level 2 Understanding   | Must Know         | 1.Lecture Demonstrations<br>2. Small Group Discussions/                         | 1.Stru cture d Oral Exami natio n  | LAQ<br>SAQ<br>MCQ<br>Viya Voce |
| Hom .UG-HP-1.17.2 | Synthesis and Application of knowledge               |                  | Knows |   | Formulate the Laboratory Safety Rules                               |           | Level 3 Problem solving | Nice to know      | Peer teaching (Think-Pair-Share, Jigsaw Strategy)                               | 2. Tutori als  |                                |
| Hom .UG-HP-1.17.3 | Problem formulation<br><br>Classroom to lab transfer |                  | Knows |   | Describe the role of Laboratory in Homoeopath ic Pharmacy education |           | Level 2 Understanding   | Desirable to know | 3. Quiz<br>4. Student Seminars<br>5. Guest Lecture<br>6. Problem based learning | 3. Assign ments<br>4. MCQ' s<br>5. 2 marks questi on<br>6.SAQ 's and LAQ's |                                |

**TOPIC:** Industrial Pharmacy

**Learning Outcomes (LO):**

At the end of the topic, I-BHMS student must be able to –  
Correlate the provisions under Schedule M-I

| Sr. No            | Generic Competencies   | Subject Area        | Miller's Level Does/ Shows how/ Knows how/ Know | Specific Competencies                                       | Specific Learning Objectives                         | Bloom's Domain | Guilbert's Levels     | Must to know/ desirable to know/Nice to know | Teaching - Learning Method   | Assessment /Evaluation  |                                     |
|-------------------|--|---------------------|---|---|--|----------------|-----------------------|--|--|---|-------------------------------------|
|                   |  |                     |   |   |  |                |                       |  |  | Formative   | Summative                           |
| Hom. UG-HP-1.18.1 | Integration of Knowledge<br><br>Synthesis and Application of knowledge | Industrial Pharmacy | Knows   | Must be able to correlate provisions related to Schedule M1 | Explain in details the provisions under Schedule M-I | Cognitive      | Level 2 Understanding | Must Know                                    | 1.Lecture Demonstrations<br>2. Small Group Discussions / Peer teaching (Think-Pair-Share, Jigsaw | 1.Structured Oral Examination<br>2. Tutorials<br>3. Assignments | LAQ<br>SAQ<br>MCCQ<br>Viva<br>Voice |

|  |  |  |  |  |  |  |  |  |                                |   |  |
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|  | Problem<br>formatio<br><br>Classroom<br>to lab<br>transfer |  |  |  |  |  |  |  | Strategy)<br>3. Field<br>Visit | 4. MCQ's<br>5. 2<br>marks<br>questi<br>on<br><br>6.SAQ'<br>s and<br>LAQ's |  |
|--|--|--|--|--|--|--|--|--|--------------------------------|---|--|

**TOPIC:** Homoeopathic Vehicles- Solid Vehicles

**Topic:** Homoeopathic Vehicles- Solid Vehicles

**Learning Outcomes (LO):**

At the end of the topic, I-BHMS student must be able to select a particular solid vehicle for preparation or dispensing of homoeopathic medicines.

| Sr.<br>No | Generic Competencies | Subject Area | Miller's Level<br>Does/ Shows<br>how/ Knows<br>how/ Know | Specific Competencies | Specific Learning Objectives | Bloom's Domain | Guilbert's Levels | Must to know/<br>desirable<br><br>to know/<br>Nice to | Teaching -<br>Learning Method | Assess<br>ment<br>/Evalua<br>tion | Summ<br>ative |
|-----------|----------------------|--------------|--|-----------------------|------------------------------|----------------|-------------------|---|-------------------------------|-----------------------------------|---------------|
|           |                      |              |  |                       |                              |                |                   |   |                               | Formati<br>ve                     |               |
|           |                      |              |  |                       |                              |                |                   |   |                               |                                   |               |

|                   |                           |          |       |   |   |           |                       |           |   |   |                                |
|-------------------|---------------------------|----------|-------|---|---|-----------|-----------------------|-----------|---|---|--------------------------------|
|                   |                           |          |       |   |   |           |                       | know      |   |   |                                |
| Hom .UG-HP-1.19.1 | Integration of Knowledge  | Vehicles | Knows | Selecting a particular solid vehicle for preparation or dispensing of homoeopathic medicines. | 1. Define Vehicle   | Cognitive | Level 1 Recall        | Must Know | 1. Lecture Demonstrations<br>2. Small Group Discussions / Peer teaching (Think-Pair-Share, Jigsaw Strategy) | 1. Structured Oral Examination<br>2. Tutorials<br>3. Assignments<br>4. MCQ's<br>5. 2 marks question<br>6. SAQ's and LAQ's | LAQ<br>SAQ<br>MCQ<br>Viya Voce |
| Hom .UG-HP-1.19.2 | Problem formulation       |          | Knows |   | 2. Classify vehicles in detail  |           | Level 2 Understanding | Must Know |   |   |                                |
| Hom .UG-HP-1.19.3 | Classroom to lab transfer |          | Knows |   | 3. List all the solid vehicles used in homoeopathy.                   |           | Level 1 Recall        | Must Know | 3. Quiz<br>4. Student Seminars<br>5. Guest Lecture<br>6. Problem based learning                             |   |                                |
| Hom .UG-HP-1.19.4 |                           |          | Knows |   | 4. Explain the preparation, properties and uses of all solid vehicles |           | Level 2 Understanding | Must Know |   |   |                                |

|                   |  |  |           |  |  |             |                         |              |  |                   |                       |
|-------------------|--|--|-----------|--|--|-------------|-------------------------|--------------|--|-------------------|-----------------------|
| Hom .UG-HP-1.19.5 |  |  | Does      |  | 5. Select the appropriate solid vehicle for dispensing of homoeopathic medicines, potentisation etc. |             | Level 3 Problem Solving | Must Know    |  |                   |                       |
| Hom .UG-HP-1.19.6 |  |  | Does      |  | 6. Identify the given solid vehicle.   | Cognitive   | Level 3 Problem solving | Must Know    | 1.Practical Demonstration<br>2.Procedural Skills Teaching<br>3. Problem Based Learning | 1.DOPS<br>2. OSPE | Practical Examination |
| Hom .UG-HP-1.19.7 |  |  | Show How  |  | 7. Estimate the purity of the given solid vehicle.   | Psychomotor | Level 2 Control         | Must know    | 4. Experiential learning   |                   |                       |
| Hom .UG-HP-1.19.8 |  |  | Shows how |  | 8.Demonstrate care and commitment in preparing & dispensing of homoeopath                            | Affective   | Level 1 Receiving       | Nice to know | 1.Lecture Demonstration<br>2.Procedural Skills Teaching                                | 1.DOPS            | Practical Examination |

|  |  |  |  |  |                                 |  |  |  |  |   |  |  |
|--|--|--|--|--|---------------------------------|--|--|--|--|---|--|--|
|  |  |  |  |  | ic medicine<br>with<br>accuracy |  |  |  |  | 3. Problem<br>Based<br>Learning<br><br>4. Experiential<br>learning<br><br>5. Practical<br>Demonstration |  |  |
|--|--|--|--|--|---------------------------------|--|--|--|--|---|--|--|

**TOPIC:** Homoeopathic Vehicles- Liquid Vehicles

**Learning Outcomes (LO):**

At the end of the topic, I-BHMS student must be able to select a particular liquid vehicle for preparation or dispensing of homoeopathic medicines.

| Sr. No         | Generic Competencies | Subject Area | Miller's Level<br>Does/<br>Shows<br>how/<br>Knows<br>how/<br>Know | Specific Competencies | Specific Learning Objective | Bloom's Domain | Guilbert's Levels | Must to know/<br>desirable<br>to know/Nice to know | Teaching Learning Method   | Assessment /Evaluation |            |  |
|----------------|----------------------|--------------|---|-----------------------|-----------------------------|----------------|-------------------|--|----------------------------|------------------------|------------|--|
|                |                      |              |   |                       |                             |                |                   |  |                            | Formative              | Summative  |  |
| Hom.U<br>G-HP- | Integration of       | Vehicles     | Knows   | Selecting a           | 1.Define Vehicle            | Cognitive      | Level 1           | Must Know  | 1.Lecture<br>Demonstration | 1.Structured           | LAQ<br>SAQ |  |

|                   |  |  |       |  |   |  |                         |           |   |                     |               |
|-------------------|--|--|-------|--|---|--|-------------------------|-----------|---|---------------------|---------------|
| 1.20.1            | Knowledge                              |  |       | particular liquid vehicle for preparation or dispensing of |   |  | Recall                  |           | ions  | Oral Examination    | MCQ Viva Voce |
| Hom.U G-HP-1.20.2 | Synthesis and Application of knowledge |  | Knows | homoeopathic medicines .                                   | 2. Classify vehicles in detail  |  | Level 2 Understanding   | Must Know | 2. Small Group Discussions/ Peer teaching (Think-Pair-Share, Jigsaw Strategy) | 2. Tutorials        |               |
| Hom.U G-HP-1.20.3 | Problem formulation                    |  | Knows |  | 3. List all the liquid vehicles used in homoeopathy.                    |  | Level 1 Recall          | Must Know | 3. Quiz   | 3. Assignments      |               |
| Hom.U G-HP-1.20.4 | Classroom to lab transfer              |  | Knows |  | 4. Explain the preparation, properties and uses of all liquid vehicles. |  | Level 2 Understanding   | Must Know | 4. Student Seminars   | 4. MCQ's            |               |
| Hom.U G-HP-1.20.5 |  |  | Does  |  | 5. Select the appropriate liquid vehicle for dispensing of homoeop      |  | Level 3 Problem solving | Must Know | 5. Guest Lecture  | 5. 2 marks question |               |
|                   |  |  |       |  |   |  |                         |           | 6. Problem based learning   | 6. SAQ's and LAQ's  |               |

|                          |  |  |           |  |  |             |                       |              |  |                   |                       |
|--------------------------|--|--|-----------|--|--|-------------|-----------------------|--------------|--|-------------------|-----------------------|
|                          |  |  |           |  | athic medicines , potentisation etc.                           |             |                       |              |  |                   |                       |
| Hom.U<br>G-HP-<br>1.20.6 |  |  | Does      |  | 6. Identify the given liquid vehicle.                          | Cognitive   | Level 2 Understanding | Must Know    | 1.Practical Demonstration<br><br>2.Procedural Skills Teaching<br><br>3. Problem Based Learning | 1.DOPS<br>2. OSPE | Practical Examination |
| Hom.U<br>G-HP-<br>1.20.7 |  |  | Shows how |  | 7. Estimate the purity of the given liquid vehicle.            | Psychomotor | Level 2 Control       | Must Know    | 4. Experiential learning   |                   |                       |
| Hom.U<br>G-HP-<br>1.20.8 |  |  | Shows how |  | 8.Demonstrate care and commitment in preparing & dispensing of | Affective   | Level 1 Receiving     | Nice to Know | 1.Lecture Demonstration<br><br>2.Procedural Skills Teaching<br><br>3. Problem Based            | 1.DOPS            | Practical Examination |

|  |  |  |  |  |                                     |  |  |  |  |  |  |  |
|--|--|--|--|--|-------------------------------------|--|--|--|--|--|--|--|
|  |  |  |  |  | homoeopathic medicine with accuracy |  |  |  | Learning<br>4. Experiential learning<br>5. Practical Demonstration |  |  |  |
|--|--|--|--|--|-------------------------------------|--|--|--|--|--|--|--|

**TOPIC:** Homoeopathic Vehicles- Semi-solid Vehicles

**Learning Outcomes (LO):**

At the end of the topic, I-BHMS student must be able to select a particular semi solid vehicle for preparation or dispensing of homoeopathic medicines.

| Sr. No           | Generic Competencies | Subject Area     | Miller's Level Does/ Shows how/ Knows how/ Know | Specific Competencies             | Specific Learning Objectives | Bloom's Domain | Guilbert's Levels | Must to know/ desirable to know/ Nice to know | Teaching Learning Method | Assessment /Evaluation        |              |     |
|------------------|----------------------|------------------|---|-----------------------------------|------------------------------|----------------|-------------------|---|--------------------------|-------------------------------|--------------|-----|
|                  |                      |                  |   |                                   |                              |                |                   |   |                          | Formative                     | Summative    |     |
| Hom .UG-HP-1.21. | Integration of Knowl | Semisolid Vehicl | Knows   | Selecting a particular semi-solid | 1.Define Vehicle             | Cognitive      | Level 1 Recall    | Must know                                     | 1.Lecture Demonstrations | 1.Structured Oral Examination | LAQ MCQ Viva | SAQ |

|                   |  |    |           |  |   |  |                         |           |   |                     |      |
|-------------------|--|----|-----------|--|---|--|-------------------------|-----------|---|---------------------|------|
| 1                 | edge                                   | es |           | vehicle for preparation or dispensing of homoeopathic medicines. |   |  |                         |           | 2. Small Group Discussions/ Peer teaching (Think-Pair-Share, Jigsaw Strategy) | 2. Tutorials        | Voce |
| Hom .UG-HP-1.21.2 | Synthesis and Application of knowledge |    | Knows how |  | 2. Classify vehicles  |  | Level 2 Understanding   | Must Know | 3. Quiz   | 3. Assignments      |      |
| Hom .UG-HP-1.21.3 | Problem formulation                    |    | Knows     |  | 3. List all the semi-solid vehicles used in homoeopathy   |  | Level 1 Recall          | Must Know | 4. Student Seminars   | 4. MCQ's            |      |
| Hom .UG-HP-1.21.4 | Classroom to lab transfer              |    | Knows     |  | 4. Explain the preparation, properties and uses of all semi-solid vehicles                            |  | Level 2 Understanding   | Must Know | 5. Guest Lecture  | 5. 2 marks question |      |
| Hom .UG-HP-1.21.5 |  |    | Does      |  | 5. Select the appropriate semi-solid vehicle for dispensing of homoeopathic medicines, preparation of |  | Level 3 Problem solving | Must Know | 6. Problem based learning   | 6. SAQ's and LAQ's  |      |

|                   |  |  |           |  |  |             |                         |              |  |                   |                       |
|-------------------|--|--|-----------|--|--|-------------|-------------------------|--------------|--|-------------------|-----------------------|
|                   |  |  |           |  | external applications etc.   |             |                         |              |  |                   |                       |
| Hom .UG-HP-1.21.6 |  |  | Does      |  | 6. Identify the given semi-solid vehicle.  | Cognitive   | Level 3 Problem solving | Must know    | 1.Practical Demonstration<br>2.Procedural Skills Teaching<br>3. Problem Based Learning                           | 1.DOPS<br>2. OSPE | Practical Examination |
| Hom .UG-HP-1.21.7 |  |  | Shows how |  | 7. Estimate the purity of the given semisolid vehicle.   | Psychomotor | Level 2 Control         | Must know    | 4. Experiential learning   |                   |                       |
| Hom .UG-HP-1.21.8 |  |  | Shows how |  | 8.Demonstrate care and commitment in preparing & dispensing of homoeopathic medicine with accuracy | Affective   | Level 1 Receiving       | Nice to know | 1.Lecture Demonstration<br>2.Procedural Skills Teaching<br>3. Problem Based Learning<br>4. Experiential learning | 1.DOPS            | Practical Examination |

|  |  |  |  |  |  |  |  |  |                            |  |  |  |
|--|--|--|--|--|--|--|--|--|----------------------------|--|--|--|
|  |  |  |  |  |  |  |  |  | 5. Practical Demonstration |  |  |  |
|--|--|--|--|--|--|--|--|--|----------------------------|--|--|--|

**TOPIC:** External Applications

**Learning Outcomes (LO):**

At the end of the topic, I-BHMS student must be able to prescribe an external application as per the scope and limitations of external applications.

| Sr. No            | Generic Competencies                                      | Subject Area          | Miller's Level Does/ Shows how/ Knows how/ Know | Specific Competencies                                | Specific Learning Objectives   | Bloom's Domain | Guilbert's levels | Must to know/ desirable to know/ Nice to know | Teaching Learning Method   | Assessment /Evaluation  |                                | Integration                              |
|-------------------|---|-----------------------|---|--|--------------------------------|----------------|-------------------|---|--|---|--------------------------------|--|
|                   |   |                       |   |  |                                |                |                   |   |  | Formative   | Summative                      |  |
| Hom .UG-HP-1.22.1 | Integration of Knowledge<br><br>Synthesis and Application | External Applications | Knows   | Prescribing an external application as per its scope | 1. Define External Application | Cognitive      | Level 1 Recall    | Must know                                     | 1. Lecture Demonstrations<br><br>2. Small Group Discussions/ Peer teaching | 1. Structured Oral Examination<br><br>2. Tutorials<br><br>3. Assignment | LAQ<br>SAQ<br>MCQ<br>Viva Voce | Horizontal with Organization of Medicine |

|                   |                           |  |       |                 |   |  |                       |           |                                     |                     |  |  |
|-------------------|---------------------------|--|-------|-----------------|---|--|-----------------------|-----------|-------------------------------------|---------------------|--|--|
|                   | of knowledge              |  |       | and limitations |   |  |                       |           | (Think-Pair-Share, Jigsaw Strategy) | s                   |  |  |
|                   | Problem formulation       |  |       |                 |   |  |                       |           | 3. Quiz                             | 4. MCQ's            |  |  |
|                   |                           |  |       |                 |   |  |                       |           | 4. Student Seminars                 | 5. 2 marks question |  |  |
|                   |                           |  |       |                 |   |  |                       |           | 5. Guest Lecture                    | 6.SAQ's and LAQ's   |  |  |
| Hom .UG-HP-1.22.2 | Classroom to lab transfer |  | Knows |                 | 2. List all the external applications used in homoeopathy |  | Level 1 Recall        | Must know | 6. Problem based learning           |                     |  |  |
| Hom .UG-HP-1.22.3 |                           |  | Knows |                 | 3. Explain the preparation & uses of specific homoe       |  | Level 2 Understanding | Must know | 7. Flipped Classroom                |                     |  |  |



|                   |  |  |                |  |  |             |                         |                   |  |                    |                       |  |
|-------------------|--|--|----------------|--|--|-------------|-------------------------|-------------------|--|--------------------|-----------------------|--|
|                   |  |  |                |  | preparation of external application.                             |             |                         |                   |  |                    |                       |  |
| Hom .UG-HP-1.22.6 |  |  | Does           |  | 6. Select appropriate external application as per the case.      |             | Level 3 Problem solving | Desirable to Know |  |                    |                       |  |
| Hom .UG-HP.1.22.7 |  |  | Does Shows how |  | 7. Demonstrate the preparation of specific external applications | Psychomotor | Level 2 Control         | Must know         | 1. Practical Demonstration<br>2. Procedural Skills Teaching<br>3. Problem Based Learning<br>4. Experiential learning | 1. DOPS<br>2. OSPE | Practical Examination |  |

|                                  |  |  |                   |  |  |           |                          |                 |  |        |                                  |  |  |
|----------------------------------|--|--|-------------------|--|--|-----------|--------------------------|-----------------|--|--------|----------------------------------|--|--|
| Hom<br>.UG-<br>HP-<br>1.22.<br>8 |  |  | Shows how<br>Does |  | 8.Demo<br>nstrate<br>care<br>and<br>commit<br>ment in<br>prepari<br>ng &<br>dispens<br>ing of<br>externa<br>l<br>applica<br>tion<br>with<br>accurac<br>y | Affective | Level 1<br>Receivi<br>ng | Nice to<br>know | 1.Lecture<br>Demonstratio<br>n<br><br>2.Procedural<br>Skills<br>Teaching<br><br>3. Problem<br>Based<br>Learning<br><br>4.<br>Experiential<br>learning<br><br>5. Practical<br>Demonstratio<br>n | 1.DOPS | Practi<br>cal<br>Exami<br>nation |  |  |
|----------------------------------|--|--|-------------------|--|--|-----------|--------------------------|-----------------|--|--------|----------------------------------|--|--|

**TOPIC:** Metrology

**Learning Outcomes (LO):**

At the end of the topic, I-BHMS student must be able to select appropriate scale of measurement in the homoeopathic pharmaceutical laboratory.

| Sr. No            | Generic Competencies   | Subject Area | Miller's Level Does/ Shows how/ Knows how/ Know | Specific Competencies   | Specific Learning Objectives   | Bloom's Domain | Guilbert's levels     | Must to know/ desirable to know/ Nice to know | Teaching - Learning Method   | Assessment /Evaluation   |                     |             |
|-------------------|--|--------------|---|---|--|----------------|-----------------------|---|--|--|---------------------|-------------|
|                   |  |              |   |   |  |                |                       |   |  | Formative  | Summative           |             |
| Hom .UG-HP-1.23.1 | Problem solving<br><br>Problem formulation<br><br>Integration of Knowledge | Metrology    | Knows   | Must be able to select appropriate scale of measurement in the homoeopathic pharmaceutical laboratory . | 1. Enumerate the different scales of measurement for preparation of homoeopathic drugs | Cognitive      | Level 1<br><br>Recall | Must Know                                     | 1.Lecture Demonstrations<br><br>2. Small Group Discussions/<br><br>Peer teaching (Think-Pair-Share, Jigsaw Strategy)<br><br>3. Quiz<br><br>4. Problem Based learning<br><br>5. Flipped classroom | 1.Structured Oral Examination<br><br>2. Tutorials<br><br>3. Assignments<br><br>4. MCQ's<br><br>5. 2 marks question | LAQ<br>MCQ<br>Voice | SAC<br>Viva |

|                   |  |  |       |  |  |  |         |               |           |         |  |  |
|-------------------|--|--|-------|--|--|--|---------|---------------|-----------|---------|--|--|
|                   | Synthesis and application of knowledge |  |       |  |  |  |         |               |           | 6.SAQ's |  |  |
|                   | Classroom to lab transfer              |  |       |  |  |  |         |               |           |         |  |  |
| Hom .UG-HP-1.23.2 |  |  | Knows |  | 2. Explain the different scales of measurement for preparation of homoeopathic drugs |  | Level 2 | Understanding | Must Know |         |  |  |
| Hom .UG-HP-1.23.3 |  |  | Does  |  | 3. Select appropriate scale of measurement for                                       |  | Level 3 | Problem       | Must Know |         |  |  |

|                   |  |  |           |  |   |             |                       |           |   |                    |                                    |  |
|-------------------|--|--|-----------|--|---|-------------|-----------------------|-----------|---|--------------------|------------------------------------|--|
|                   |  |  |           |  | preparation of homoeopathic drugs.  |             | m solving             |           |   |                    |                                    |  |
| Hom .UG-HP-1.23.4 |  |  | Does      |  | 4. Measure the given quantity of the drug substance and vehicle for preparation of homoeopathic medicines | Psychomotor | Level 3<br>Automatism | Must know | 1. Practical Demonstrations<br>2. Experiential Learning | 1. DOPS<br>2. OSPE | Viva Voce & Practical Examinations |  |
| Hom .UG-HP-1.23.5 |  |  | Shows how |  | 5. Show care while measuring the drugs for preparation of homoeopathic medicines                          | Affective   | Level 2<br>Respond    | Must know | 1. Lecture Demonstration<br>2. Practical Demonstration  | 1. DOPS<br>2. OSPE | Theory & Practical Examination     |  |

**TOPIC:** Potentisation & Scales of Potentisation

**Learning Outcomes (LO):** At the end of the topic of Potentisation, I-BHMS student must be able to:

1. Prepare Homoeopathic Medicine according to the scale.

| Sr. No            | Generic Competencies  | Subject Area  | Miller's Level Does/ Shows how/ Knows how/ Know | Specific Competencies                                 | Specific Learning Objectives                     | Bloom's Domain | Guilbert's level      | Must to know/ desirable to know | Teaching Learning Method  | Assessment /Evaluation  |                       | Integration                     |
|-------------------|---|---------------|---|---|--|----------------|-----------------------|---------------------------------|---|---|-----------------------|---------------------------------|
|                   |   |               |   |   |  |                |                       |                                 |   | Formative   | Summative             |                                 |
| Hom .UG-HP-1.24.1 | Problem solution<br><br>Integration of knowledge<br><br>Practice based learning | Potentisation | Knows   | Prepare Homoeopathic Medicine according to the scale. | 1. Explain the different scales of potentisation | Cognitive      | Level 2 Understanding | Must Know                       | 1.Lecture Demonstrations<br><br>2.Practical Demonstrations<br><br>3. Small Group Discussions/Peer teaching (Think-Pair-Share, Jigsaw Strategy)<br><br>4. Problem based learning | 1.Structured Oral Examination<br><br>2. Tutorials<br><br>3. Assignments<br><br>4. SAQ's and LAQ's<br><br>5. MCQ's | LAQ SAQ MCQ Viva Voce | Organon of Medicine- Horizontal |

|                   |   |  |           |  |   |             |                         |           |  |   |                       |  |  |
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| Hom .UG-HP-1.24.2 | g and improvement<br><br>Synthesis and Application of knowledge<br><br>Classroom to lab |  | Knows     |  | 2.Explain the two methods potentiation                            | Cognitive   | Level 2 Understanding   | Must Know | 5. Student Seminars<br>6.Study Tour (Field Visit)<br>7. Integrated Teaching with Organon of Medicine | 1.Structured Oral Examination<br>2. Tutorials<br>3. Assignments<br>4. SAQ's and LAQ's<br>5. MCQ's |                       |  |  |
| Hom .UG-HP-1.24.3 | Practical skills  |  | Does      |  | 3. Select the appropriate vehicles used for potentiation.         | Cognitive   | Level 3 Problem solving | Must Know |  | DOPS<br>Spotting<br>OSPE<br>Assessment of PBL   |                       |  |  |
| Hom .UG-HP-1.24.4 |   |  | Shows How |  | 4. Demonstrate trituration according to the scale of potentiation | Psychomotor | Level 3 AUTOMATISM      | Must Know | 1. Practical Demonstration<br>2.Procedural Skills Teaching   | 1.DOPS<br>2. OSPE   | Practical Examination |  |  |

|                   |  |  |                        |  |  |              |                    |              |   |                   |                       |  |  |
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|                   |  |  |                        |  | on.  |              |                    |              |   |                   |                       |  |  |
| Hom .UG-HP-1.24.5 |  |  | Shows How              |  | 5. Demonstrate succussion according to the scale of potentisation.     | Psycho motor | Level 3 AUTOMATISM | Must Know    | 1. Practical Demonstration<br>2. Procedural Skills Teaching | 1.DOPS<br>2. OSPE |                       |  |  |
| Hom .UG-HP-1.24.6 |  |  | Shows How              |  | 6. Prepare 8X (Liq) potency from 6X (Triturate) (Jumping Potency)      | Psycho motor | Level 3 AUTOMATISM | Must Know    | 1. Practical Demonstration<br>2. Procedural Skills Teaching | 1.DOPS<br>2. OSPE |                       |  |  |
| Hom .UG-HP-1.24.7 |  |  | Knows how<br>Shows how |  | 7. Demonstrate care and commitment in preparing medicine with accuracy | Affective    | Level 1 RECEIVING  | Nice to Know | Practical Demonstration                                     | DOPS              | Practical Examination |  |  |

**TOPIC:** Old Methods of Preparation of Homoeopathic Drugs

**Learning Outcomes (LO):**

At the end of the topic, I-BHMS student must be able to prepare the homoeopathic medicines as per the old methods.

| Sr. No                   | Generic Competencies  | Subject Area                                     | Miller's Level Does/ Show s how/ Know s how/ Know | Specific Competencies                              | Specific Learning Objectives                                  | Bloom's Domain | Guilbert's Levels     | Must to know/ desirable to know/ Nice to know | Teaching Learning Method  | Assessment /Evaluation   |   |     |
|--------------------------|---|--|---|--|---|----------------|-----------------------|---|---|--|---|-----|
|                          |   |  |   |  |   |                |                       |   |   | Formative  | Summative                                     |     |
| Hom.U<br>G-HP-<br>1.25.1 | Problem solution<br><br>Integration of Knowledge<br><br>Synthesis | Old Methods of Preparation of Homoeopathic Drugs | Know s  | Must be able to prepare the homoeopathic medicines | 1. Classify Old Methods of preparation of homoeopathic drugs. | Cognitive      | Level 2 Understanding | Must know                                     | 1.Lecture Demonstrations<br><br>2. Small Group Discussions/ Peer teaching (Think-Pair-Share, Jigsaw Strategy) | 1.Structured Oral Examination<br><br>2. Tutorials<br><br>3. Assignments<br><br>4. MCQ's<br><br>5. 2 marks question | LAQ<br>MCQ, Viva Voce (Formative & Summative) | SAQ |

|                          |   |  |           |                                  |  |  |                              |              |                              |                      |
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|                          | and applicatio<br>n of knowledg<br>e                |  |           | as per<br>the<br>old meth<br>ods |  |  |                              |              | 3. Quiz                      | 6.SAQ's and<br>LAQ's |
| Hom.U<br>G-HP-<br>1.25.2 | Classroom<br>to lab<br>transfer                     |  | Know<br>s |                                  | 2.Enlist the<br>fundamental<br>rule, drug<br>strength,<br>drug: vehicle<br>ratio nature<br>of drug<br>substances &<br>5 examples<br>of drugs<br>under Class I-<br>IX according<br>to Old<br>methods. |  | Level 1<br>Recall            | Must<br>know | 4. Student<br>Seminars       | 7.Projects           |
| Hom.U<br>G-HP-<br>1.25.3 | Practice<br>based<br>learning<br>and<br>improvement |  | Know<br>s |                                  | 3.Explain the<br>preparation<br>&potentisati<br>on of mother<br>tinctures<br>under class I-<br>IV according<br>to the scale.   |  | Level 2<br>Understa<br>nding | Must<br>know | 5. Guest<br>Lecture          |                      |
| Hom.U<br>G-HP-<br>1.25.4 |   |  | Know<br>s |                                  | 4.Explain the<br>preparation<br>&potentisati<br>on of mother<br>solutions<br>under Class V   |  | Level 2<br>Understa<br>nding | Must<br>know | 6. Problem<br>based learning |                      |
|                          |   |  |           |                                  |  |  |                              |              | 7. Flipped<br>Classroom      |                      |

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|------------------------------|--|--|-----------|--|---|-----------------|----------------------------------|--------------|--|--------------------|------------------------------|
|                              |  |  |           |  | & VI according to the scale.  |                 |                                  |              |  |                    |                              |
| Hom.U<br>G-HP-<br>1.25.5     |  |  | Know<br>s |  | 5.Explain the potentisation of mother substances under Class VII, VIII & IX according to the scale. |                 | Level 2<br><br>Understa<br>nding | Must<br>know |  |                    |                              |
| Hom.U<br>G-HP-<br>1.25.6     |  |  | Does      |  | 6. Demonstrate the preparation of mother tincture under Class I-IV according to Old Methods.        | Psycho<br>motor | Level 3<br><br>Automati<br>sm    | Must<br>know | 1. Practical Demonstratio<br>ns<br><br>2. Procedural Skills Teaching | 1. DOPS<br>2. OSPE | Practical<br>Examinati<br>on |
| Hom.U<br>G-<br>HP.1.25<br>.7 |  |  | Does      |  | 7. Demonstrate the potentisation of mother tincture   |                 | Level 3<br><br>Automati<br>sm    | Must<br>Know |  |                    |                              |

|                          |  |  |      |  |   |  |                       |           |  |  |  |  |
|--------------------------|--|--|------|--|---|--|-----------------------|-----------|--|--|--|--|
|                          |  |  |      |  | according to the scale under Class I-IV according to Old Method.  |  |                       |           |  |  |  |  |
| Hom.U<br>G-HP-<br>1.25.8 |  |  | Does |  | 8.Demonstrate the preparation of mother solution under Class V-VI according to Old Methods.                         |  | Level 3<br>Automatism | Must Know |  |  |  |  |
| Hom.U<br>G-HP-<br>1.25.9 |  |  | Does |  | 9. Demonstrate the potentisation of mother solution according to the scale under Class V-VI according to Old Method |  | Level 3<br>Automatism | Must Know |  |  |  |  |

|                           |  |  |           |  |  |           |                       |              |                            |      |  |                       |
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| Hom.U<br>G-HP-<br>1.25.10 |  |  | Does      |  | 10. Demonstrate the potentisation of mother substances according to the scale under Class VII, VIII & IX according to Old Method.        |           | Level 3<br>Automatism | Must Know    |                            |      |  |                       |
| Hom.U<br>G-HP-<br>1.25.11 |  |  | Shows how |  | 11. Demonstrate care & commitment in preparing and dispensing medicine with accuracy according to the scale and Class under Old Methods. | Affective | Level 1<br>Receiving  | Nice to know | 1. Practical Demonstration | DOPS |  | Practical Examination |

**TOPIC:** New Methods of Preparation of Homoeopathic Drugs

**Learning Outcomes (LO):**

At the end of the topic, I-BHMS student must be able to prepare the homoeopathic medicines as per the new methods.

| Sr. No           | Generic Competencies                   | Subject Area                                     | Miller's Level Does/ Shows how/ Knows how/ Know | Specific Competencies   | Specific Learning Objectives         | Bloom's Domain | Guilbert's Levels     | Must to know/ desirable to know/ Nice to know | Teaching Learning Method  | Assessment /Evaluation  |                   |     |
|------------------|--|--|---|---|--------------------------------------|----------------|-----------------------|---|---|---|-------------------|-----|
|                  |  |  |   |   |                                      |                |                       |   |   | Formative   | Summative         |     |
| HomU G-HP-1.26.1 | Problem solution                       | New Methods of Preparation of Homoeopathic Drugs | Knows   | Must be able to prepare the homoeopathic medicines as per the new methods | 1. Define Maceration & Percolation . | Cognitive      | Level 1 Recall        | Must know                                     | 1.Lecture Demonstrations<br>2. Small Group Discussions/<br>Peer teaching (Think-Pair-Share, Jigsaw Strategy)<br>3. Quiz | 1.Structured Oral Examination<br>2. Tutorials<br>3. Assignments<br>4. MCQ's<br>5. 2 marks question<br>6.SAQ's and LAQ's<br>7.Projects | LAQ MCQ Viva Voce | SAQ |
| HomU G-HP-1.26.2 | Synthesis and application of knowledge |  | Knows   |   | 2. Explain the process of maceration |                | Level 2 Understanding | Must know                                     | 4. Student Seminars<br>5. Guest Lecture   |   |                   |     |
| HomU G-HP-1.26.3 |  |  | Knows   |   | 3.Explain the process of percolation |                | Level 2 Understanding | Must know                                     | 6. Problem based learning<br>7. Flipped   |   |                   |     |

|                         |  |  |               |  |   |                 |                                  |              |  |                                |                              |
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| HomU<br>G-HP-<br>1.26.4 | Classro<br>om to<br>lab<br>transfe<br>r<br><br>Practic<br>e based<br>learnin<br>g and<br>improv<br>ement |  | Know<br>s how |  | 4.Differenti<br>ate<br>between<br>old & new<br>methods of<br>preparatio<br>n of<br>homoeopa<br>thic drugs |                 | Level 2<br><br>Understan<br>ding | Must<br>know | Classroom<br><br>8. Videos   |                                |                              |
| HomU<br>G-HP-<br>1.26.5 |  |  | Know<br>s how |  | 5.Differenti<br>ate<br>between<br>maceration<br>&<br>percolation<br>in detail.                            |                 | Level 2<br><br>Understan<br>ding | Must<br>know |  |                                |                              |
| HomU<br>G-HP-<br>1.26.6 |  |  | Know<br>s     |  | 6. Define<br>the terms-<br>merc,<br>magma,<br>menstrum  |                 | Recall                           | Must<br>know |  |                                |                              |
| HomU<br>G-HP-<br>1.26.7 |  |  | Does          |  | 7. Demonstra<br>te the<br>preparatio<br>n of<br>mother<br>tincture by<br>maceration                       | Psychom<br>otor | Level 2<br><br>Control           | Must<br>know | 1. Practical<br>Demonstrations<br><br>2. Procedural<br>Skills Teaching<br><br>3.Experiential<br>Learning | 1.DOPS<br>2.OSPE<br>3.Projects | Practical<br>Examinat<br>ion |

|                          |  |  |           |  |  |           |                      |                   |  |      |                       |
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|                          |  |  |           |  |  |           |                      |                   |  |      |                       |
| HomU<br>G-HP-<br>1.26.8  |  |  | Does      |  | 8.Demonstrate the preparation of mother solution by percolation                                |           | Level 2<br>Control   | Must know         |  |      |                       |
| HomU<br>G-HP-<br>1.26.9  |  |  | Does      |  | 9. Demonstrate the towing of a percolator  |           | Level 2<br>Control   | Desirable to know |  |      |                       |
| HomU<br>G-HP-<br>1.26.10 |  |  | Shows how |  | 10.Demonstrate care & commitment in preparing of homoeopathic medicine with accuracy according | Affective | Level 1<br>Receiving | Nice to know      | 1. Lecture Demonstration<br>2. Practical Demonstration | DOPS | Practical Examination |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
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|  |  |  |  |  | to the New<br>methods of<br>preparation<br>of<br>homoeopa<br>thic drugs. |  |  |  |  |  |  |  |
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**TOPIC:** Pharmaconomy

**Learning Outcomes (LO):**

At the end of the topic, I-BHMS student must be able to select appropriate route of administration of homoeopathic medicines.

| Sr. No | Generic Competencies | Subject Area | Miller's Level<br>Does / Shows<br>how/ Knows<br>how/ Knows | Specific Competencies | Specific Learning Objectives | Bloom's Domain | Guilbert's Levels | Must to know/<br>desirable<br>to know/<br>Nice to know | Teaching Learning Method | Assessment /Evaluation |           |
|--------|----------------------|--------------|--|-----------------------|------------------------------|----------------|-------------------|--|--------------------------|------------------------|-----------|
|        |                      |              |  |                       |                              |                |                   |  |                          | Formative              | Summative |
|        |                      |              |  |                       |                              |                |                   |  |                          |                        |           |

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|---------------------------------|---|------------------|-----------|---|---|-----------------|-----------------------------------|--------------------------|---|--|--------------------|-------------|
| Hom<br>UG-<br>HP-<br>1.27.<br>1 | Integrat<br>ion of<br>Knowle<br>dge<br><br>Synthes<br>is and<br>applicat<br>ion of<br>knowle<br>dge | Pharmac<br>onomy | Know<br>s | Must be<br>able to<br>select<br>appropri<br>ate route<br>of<br>administr<br>ation of<br>homoeop<br>athic<br>medicines | 1. Enumerate<br>the different<br>routes of<br>administratio<br>n of<br>homoeopathi<br>c medicines.                      | Cognitiv<br>e   | Level 1<br><br>Recall             | Must<br>know             | 1.Lecture<br>Demonstration<br>s<br><br>2. Small Group<br>Discussions/<br>Peer teaching<br>(Think-Pair-<br>Share, Jigsaw<br>Strategy)<br><br>3. Quiz<br><br>4. Flipped<br>Classroom<br><br>6. Videos | 1.Structured<br>Oral<br>Examination<br><br>2. Tutorials<br><br>3. Assignments<br><br>4. MCQ's<br><br>5. 2 marks<br>question<br><br>6.SAQ's<br><br>7.Projects | LAQ<br>MCQ<br>Voce | SAQ<br>Viva |
| Hom<br>UG-<br>HP-<br>1.27.<br>2 | Classro<br>om to<br>Clinic<br>transfer  |                  | Know<br>s |   | 2. Explain the<br>different<br>routes of<br>administratio<br>n of<br>homoeopathi<br>c medicines.                        |                 | Level 2<br><br>Understand<br>ing  | Must<br>know             |   |  |                    |             |
| Hom<br>UG-<br>HP-<br>1.27.<br>3 |   |                  | Does      |   | 3. Select<br>appropriate<br>route of<br>administratio<br>n of<br>homoeopathi<br>c medicines<br>according to<br>the case |                 | Level 3<br><br>Problem<br>solving | Desirab<br>le to<br>know |   |  |                    |             |
| Hom<br>UG-<br>HP-               |   |                  |           |   | 4. Administer<br>the<br>homoeopathi   | Psychom<br>otor | Level 2<br><br>Control            | Nice to<br>know          | 1. Practical<br>Demonstration<br>s  | 1. Case based<br>assessment<br><br>2. Simulation   | Viva Voce          |             |

|                  |  |  |                  |  |  |           |                 |                   |  |   |                    |             |
|------------------|--|--|------------------|--|--|-----------|-----------------|-------------------|--|---|--------------------|-------------|
| 1.27.4           |  |  | Show<br>s<br>how |  | c medicine through appropriate route of administration according to the case |           |                 |                   | 2.Experiential Learning<br>3. Projects<br>4. Case based Learning<br>5. Simulation teaching                 | based assessment  |                    |             |
| Hom UG-HP-1.27.5 |  |  | Know<br>s<br>how |  | 5.Show care while administering homoeopathic medicine via different routes   | Affective | Level 2 Respond | Desirable to know | 1. Lecture Demonstration<br>2. Practical Demonstration<br>3. Case based Learning<br>4. Simulation teaching | Case based assessment<br>2. Simulation based assessment | LAQ<br>MCQ<br>Voce | SAQ<br>Viva |

**TOPIC:** Dispensing of Medicines

**Learning Outcomes (LO):**

At the end of the topic, I-BHMS student must be to

1. Select an appropriate dosage form for dispensing of homoeopathic medicines.
2. Dispense homoeopathic medicine to patients.

| Sr. No           | Generic Competencies   | Subject Area                        | Miller's Level Does/ Shows how/ Knows how/ Know | Specific Competencies  | Specific Learning Objectives                                      | Bloom's Domain | Guilbert's Levels     | Must to know/ desirable to know/ Nice to know | Teaching Learning Method   | Assessment /Evaluation  |                     |             |
|------------------|--|-------------------------------------|---|--|---|----------------|-----------------------|---|--|---|---------------------|-------------|
|                  |  |                                     |   |  |   |                |                       |   |  | Formative   | Summative           |             |
| Hom UG-HP-1.28.1 | Problem solution<br><br>Integration of Knowledge<br><br>Synthesis and Application of Knowledge | Dispensing of homeopathic medicines | Knows   | Select an appropriate dosage form for dispensing of homeopathic medicines. | 1. Enumerate the different dosage forms.                          | Cognitive      | Level 1 Recall        | Must know                                     | 1.Lecture Demonstrations<br>2. Small Group Discussions/ Peer teaching (Think-Pair-Share, Jigsaw Strategy)<br>3. Quiz<br>4. Student Seminars<br>5. Problem based learning<br>6. Guest Lecture | 1.Structured Oral Examination<br>2. Tutorials<br>3. Assignments<br>4. MCQ's<br>5. 2 marks question<br>6.SAQ's and LAQ's | LAQ<br>MCQ<br>Voice | SAC<br>Viva |
| Hom UG-HP-1.28.2 | Classroom to   |                                     | Knows   | Dispense homeopathic medicine to patients                                  | 2. Explain the various modes for dispensing of solid dosage forms |                | Level 2 Understanding | Must know                                     |  |   |                     |             |

|                                 |                                  |  |                      |  |   |                 |                                  |                 |   |                       |                              |
|---------------------------------|----------------------------------|--|----------------------|--|---|-----------------|----------------------------------|-----------------|---|-----------------------|------------------------------|
| Hom<br>UG-<br>HP-<br>1.28.<br>3 | OPD/IPD/<br>Pharmacy<br>transfer |  | Knows                |  | 3. Explain the various modes for dispensing of liquid dosage forms        |                 | Level 2<br><br>Understand<br>ing | Must<br>know    |   |                       |                              |
| Hom<br>UG-<br>HP-<br>1.28.<br>4 |                                  |  | Knows                |  | 4. Enlist the vehicles used for dispensing of various dosage forms        |                 | Level 1<br><br>Recall            | Must<br>know    |   |                       |                              |
| Hom<br>UG-<br>HP-<br>1.28.<br>5 |                                  |  | Knows                |  | 5. Explain the quality assurance while dispensing homoeopathic medicines. |                 | Level 2<br><br>Understand<br>ing | Nice to<br>know |   |                       |                              |
| Hom<br>UG-<br>HP-<br>1.28.<br>6 |                                  |  | Shows<br>how<br>Does |  | 6. Demonstrate the dispensing of liquid dosage forms                      | Psychom<br>otor | Level 2<br><br>Control           | Must<br>know    | 1.Practical<br>Demonstration<br><br>2.Procedural<br>Skills Teaching<br><br>3. Problem<br>Based Learning | 1.DOPS<br><br>2. OSPE | Practical<br>Examinati<br>on |
| Hom<br>UG-<br>HP-<br>1.28.      |                                  |  | Shows<br>how<br>Does |  | 7. Demonstrate the dispensing of solid dosage                             |                 | Level 2<br><br>Control           | Must<br>know    |   |                       |                              |

|                                 |  |  |      |  |   |           |                          |                 |  |        |                          |  |
|---------------------------------|--|--|------|--|---|-----------|--------------------------|-----------------|--|--------|--------------------------|--|
| 7                               |  |  |      |  | forms   |           |                          |                 |  |        |                          |  |
| Hom<br>UG-<br>HP-<br>1.28.<br>8 |  |  | Does |  | 8.<br>Demonstrate<br>care and<br>commitment<br>while<br>dispensing of<br>homoeopathic<br>medicines. | Affective | Level 1<br><br>Receiving | Nice to<br>know | 1.Lecture<br>Demonstration<br><br>3. Problem<br>Based Learning | 1.DOPS | Practical<br>Examination |  |

**TOPIC:** Placebo

**Learning Outcomes (LO):**

At the end of the topic, I-BHMS student must be able to indicate placebo in a particular case

| Sr.<br>No | Generic<br>Compet<br>encies | Subjec<br>t Area | Mille<br>r's<br>Level<br>Does<br>/<br>Show<br>s<br>how/<br>Kno<br>ws<br>how/<br>Kno<br>w | Specific<br>Competen<br>cies | Specific<br>Learning<br>Objective<br>s | Bloom<br>'s<br>Domain | Guilbert's<br>levels | Must to<br>know/<br>desirable<br><br>to<br>know/Nice<br>to<br>know | Teaching<br>Learning<br>Method | Assessment /Evaluation |           |
|-----------|-----------------------------|------------------|--|------------------------------|--|-----------------------|----------------------|--|--------------------------------|------------------------|-----------|
|           |                             |                  |  |                              |  |                       |                      |  |                                | Formative              | Summative |
|           |                             |                  |  |                              |  |                       |                      |  |                                |                        |           |

|                                 |  |         |           |   |  |               |                                   |              |   |   |                    |             |
|---------------------------------|--|---------|-----------|---|--|---------------|-----------------------------------|--------------|---|---|--------------------|-------------|
| Hom<br>UG-<br>HP-<br>1.29.<br>1 | Problem<br>solution<br><br>Integrati<br>on of<br>Knowle<br>dge | Placebo | Kno<br>ws | Must be<br>able to<br>indicate<br>placebo in<br>a<br>particular<br>case | 1. Define<br>Placebo                                   | Cogniti<br>ve | Level 1<br><br>Recall             | Must<br>Know | 1.Lecture<br>Demonstrations<br><br>2. Small Group<br>Discussions/<br><br>Peer teaching<br>(Think-Pair-<br>Share, Jigsaw<br>Strategy)<br><br>3. Case based<br>learning | 1.Structured<br>Oral<br>Examination<br><br>2. Tutorials<br><br>3. Assignments<br><br>4. MCQ's<br><br>5. 2 marks<br>question<br><br>6.SAQ's,<br>7.Projects | LAQ<br>MCQ<br>Voce | SAQ<br>Viva |
| Hom<br>UG-<br>HP-<br>1.29.<br>2 | Synthesi<br>s and applicati<br>on of knowled<br>ge             |         | Kno<br>ws |   | 2. Enumera<br>te the<br>vehicles<br>used as<br>placebo |               | Level 1<br><br>Recall             | Must<br>Know |   |   |                    |             |
| Hom<br>UG-<br>HP-<br>1.29.<br>3 | Classroom to<br>clinic<br>transfer                             |         | Kno<br>ws |   | 3. Explain<br>the<br>indicatio<br>ns of<br>placebo     |               | Level 2<br><br>Understan<br>ding  | Must<br>Know |   |   |                    |             |
| Hom<br>UG-<br>HP-<br>1.29.<br>4 |  |         | Does      |   | 4.Select a<br>placebo<br>for a<br>particular<br>case   |               | Level 3<br><br>Problem<br>solving | Must<br>Know |   |   |                    |             |

**TOPIC:** Preservation of Homoeopathic Medicines

### Learning Outcomes (LO):

At the end of the topic, I-BHMS student must be able to preserve homoeopathic medicines for long shelf life.

| Sr. No           | Generic Competencies                   | Subject Area                          | Miller's Level Does/ Shows how/ Knows how/ Know | Specific Competencies   | Specific Learning Objectives   | Bloom's Domain | Guilbert's Levels     | Must to know/ desirable to know/Nice to know | Teaching Learning Method                                     | Assessment /Evaluation  |                    |             |
|------------------|--|---------------------------------------|---|---|--|----------------|-----------------------|--|--|---|--------------------|-------------|
|                  |  |                                       |   |   |  |                |                       |  |  | Formative   | Summative          |             |
| Hom UG-HP-1.30.1 | Integration of Knowledge               | Preservation of Homoeopathic medicine | Knows   | Must be able to preserve homoeopathic medicines for long shelf life | 1. Enumerate the different methods of preservation of homoeopathic medicines | Cognitive      | Level 1 Recall        | Must Know                                    | 1.Lecture Demonstrations<br>2. Small Group Discussions/      | 1.Structured Oral Examination<br>2. Tutorials<br>3. Assignments | LAQ<br>MCQ<br>Voce | SAQ<br>Viva |
| Hom UG-HP-1.30.2 | Synthesis and application of knowledge |                                       | Knows   |   | 2. Explain the individual method of preservation of homoeopathic medicine.   |                | Level 2 Understanding | Must Know                                    | Peer teaching (Think-Pair-Share, Jigsaw Strategy)<br>3. Quiz | 4. MCQ's<br>5. 2 marks question<br>6.SAQ's                      |                    |             |

|                                 |   |  |      |  |  |                 |                            |                   |  |                                    |                       |
|---------------------------------|---|--|------|--|--|-----------------|----------------------------|-------------------|--|------------------------------------|-----------------------|
| Hom<br>UG-<br>HP-<br>1.30.<br>3 | Classro<br>om to<br>Clinic<br>transfe<br>r<br><br>Practic<br>e based<br>learnin<br>g and<br>improv<br>ement |  | Does |  | 3. Select an appropriate mode of preservation of homoeopathic medicines.       |                 | Level 3<br>Problem solving | Must Know         |  | 7.Projects                         |                       |
| Hom<br>UG-<br>HP-<br>1.30.<br>4 |   |  | Does |  | 4. Demonstrate the method of preservation of mother substances & preparations  | Psychom<br>otor | Level 2<br>Control         | Desirable to Know | 1. Practical Demonstrations<br>2. Procedural Skills Teaching | Viva Voce<br>Practical Examination | Practical Examination |
| Hom<br>UG-<br>HP-<br>1.30.<br>5 |   |  | Does |  | 5. Demonstrate the method of preservation of potentised homoeopathic medicines |                 |                            | Desirable to Know | 3.Experiential Learning<br>4. Projects                       |                                    |                       |

|                                 |  |  |           |  |   |           |                 |                   |  |   |                       |
|---------------------------------|--|--|-----------|--|---|-----------|-----------------|-------------------|--|---|-----------------------|
| Hom<br>UG-<br>HP-<br>1.30.<br>6 |  |  | Does      |  | 6. Demonstrate the method of preservation of homoeopathic mother tinctures                    |           |                 | Desirable to Know |  |   |                       |
| Hom<br>UG-<br>HP-<br>1.30.<br>7 |  |  | Shows how |  | 7. Show care & commitment while preserving homoeopathic preparations and potentised medicine. | Affective | Level 2 Respond | Nice to know      | 1. Lecture Demonstration<br>2. Practical Demonstration | SAQ, 2 marks question<br>Projects<br>Assignments<br>Tutorials<br>Viva Voce<br>Practical Examination | Practical Examination |

**TOPIC:** Pharmacovigilance and adverse drug reaction

**Learning Outcomes (LO):**

At the end of the topic, I-BHMS student must be able to identify any adverse drug reaction and comprehend the necessity of pharmacovigilance in homoeopathy

| Sr. | Generic | Subject | Miller's | Specific | Specific | Bloom's | Guilber | Must to | Teaching | - | Assessment /Evaluation |
|-----|---------|---------|----------|----------|----------|---------|---------|---------|----------|---|------------------------|
|-----|---------|---------|----------|----------|----------|---------|---------|---------|----------|---|------------------------|

| No               | Competencies                           | Area  | Level<br>Does/<br>Shows<br>how/<br>Knows<br>how/<br>Know | Competencies                                       | Learning Objectives  | Domain    | t's levels            | know/<br>desirable<br>to<br>know/Nice<br>to<br>know | Learning Method   | Formative                     | Summative |      |
|------------------|--|---|--|--|--|-----------|-----------------------|---|---|-------------------------------|-----------|------|
| Hom UG-HP-1.31.1 | Problem solution                       | Pharmacovigilance and adverse drug reaction | Knows  | Must be able to identify any adverse drug reaction | 1. Define adverse drug reaction                                    | Cognitive | Level 1 Recall        | Must Know   | 1.Lecture Demonstrations  | 1.Structured Oral Examination | LAQ       | SAC  |
| Hom UG-HP-1.31.2 | Integration of Knowledge               |   | Knows  | Comprehend the of pharmacovigilance in homoeopathy | 2. Enumerate the types of adverse drug reactions                   |           | Level 1 Recall        | Must Know   | 2. Small Group Discussions/ Peer teaching (Think-Pair-Share, Jigsaw Strategy) | 2. Tutorials                  | MCQ Voce  | Viva |
| Hom UG-HP-1.31.3 | Synthesis and application of knowledge |   | Knows  |  | 3. Explain the management of adverse drug reactions in homoeopathy |           | Level 2 Understanding | Must Know   | 3. Case based learning  | 3. Assignments                |           |      |
| Hom UG-HP-1.31.4 | Classroom to clinic transfer           |   | Knows  |  | 4. Define pharmacovigilance  |           | Level 1 Recall        | Desirable to Know                                   |   | 4. MCQ's                      |           |      |
|                  |  |   |  |  |  |           |                       |   |   | 5. 2 marks question           |           |      |
|                  |  |   |  |  |  |           |                       |   |   | 6.SAQ's, 7.Projects           |           |      |

|                                 |  |  |       |  |   |  |                              |                      |  |  |  |  |
|---------------------------------|--|--|-------|--|---|--|------------------------------|----------------------|--|--|--|--|
| Hom<br>UG-<br>HP-<br>1.31.<br>5 |  |  | Knows |  | 5.Explain in detail the process of pharmacovigilance in Homoeopathy |  | Level 2<br>Unders<br>tanding | Desirable<br>to know |  |  |  |  |
|---------------------------------|--|--|-------|--|---|--|------------------------------|----------------------|--|--|--|--|

**TOPIC:** Doctrine of Signature

**Learning Outcomes (LO):**

At the end of the topic, I-BHMS student must be able to apply doctrine of signature while selecting a Homoeopathic simillimum.

| Sr.<br>No                       | Generi<br>c<br>Comp<br>etenci<br>es | Subje<br>ct<br>Area                 | Miller's<br>Level Does/<br>Shows how/<br>Knows<br>how/ Know | Specifi<br>c<br>Compe<br>tencie<br>s                 | Specific<br>Learning<br>Objectives                                  | Domain        | Guilbe<br>rt's<br>Levels         | Must to<br>know/<br>desirable<br>to<br>know/Nice<br>toknow | Teaching<br>-<br>Learning Method  | Assessment /Evaluation  |                    |             |
|---------------------------------|-------------------------------------|-------------------------------------|---|--|---|---------------|----------------------------------|--|---|---|--------------------|-------------|
|                                 |                                     |                                     |   |  |   |               |                                  |  |   | Formative   | Summative          |             |
| Hom<br>UG-<br>HP-<br>1.32.<br>1 | Proble<br>m<br>formul<br>ation      | Doctr<br>ine<br>of<br>Signa<br>ture | Knows   | Must<br>be<br>able<br>to<br>apply<br>doctri<br>ne of | 1. Define<br>Doctrine of<br>Signature                               | Cognitiv<br>e | Level 1<br>Recall                | Must<br>Know   | 1.Lecture<br>Demonstrations<br><br>2. Small Group<br>Discussions/<br><br>Peer teaching<br>(Think-Pair-Share,<br>Jigsaw Strategy)<br><br>3. Quiz<br><br>4. Student | 1.Structured<br>Oral<br>Examination<br><br>2. Tutorials<br><br>3. Assignments<br><br>4. MCQ's<br><br>5. 2 marks<br>question | LAQ<br>MCQ<br>Voce | SAQ<br>Viva |
| Hom<br>UG-<br>HP-<br>1.32.<br>2 | Integr<br>ation<br>of<br>Knowl      |                                     | Knows   | signature<br>while<br>selecti<br>ng a                | 2. Explain<br>doctrine of<br>signature with<br>suitable<br>examples |               | Level 2<br>Unders<br>tandin<br>g | Must<br>Know   |   |   |                    |             |

|                                 |  |  |            |                                       |   |               |                                       |                 |   |   |           |  |
|---------------------------------|--|--|------------|---------------------------------------|---|---------------|---------------------------------------|-----------------|---|---|-----------|--|
| Hom<br>UG-<br>HP-<br>1.32.<br>3 | edge<br><br>Synth<br>esis<br>and<br>applic<br>ation<br>of<br>knowl<br>edge |  | Knows how  | Homo<br>eopath<br>ic<br>simili<br>mum | 3.Apply the<br>logic behind<br>doctrine of<br>signature in<br>patients<br>showing the<br>same signs<br>particularly in<br>one sided case. |               | Level 3<br><br>Proble<br>m<br>solving | Nice to<br>know | Seminars<br><br>5. Case based<br>learning<br><br>6.Case Simulation<br><br>7. Experiential<br>Learning | 6.SAQ's<br><br>7.Projects<br><br>8.Assessment<br>of case<br><br>9. Simulation<br>assessment |           |  |
| Hom<br>UG-<br>HP-<br>1.32.<br>4 |  |  | Shows how  |                                       | 4.Select a<br>remedy for a<br>one -sided case<br>based on the<br>doctrine of<br>signature   |               | Level 3<br><br>Proble<br>m<br>solving | Nice to<br>know |   |   |           |  |
| Hom<br>UG-<br>HP-<br>1.32.<br>5 |  |  | Shows hows |                                       | 5.Demonstrate<br>care,<br>professionalism<br>&commitment<br>while<br>prescribing on<br>the basis of<br>doctrine of<br>signature           | Affectiv<br>e | Level 2<br><br>Respo<br>nd            | Nice to<br>know | 1. Case based<br>learning<br><br>2. Case<br>Simulation<br><br>3.Experiential<br>Learning              | 1. Assessment<br>of case<br><br>2. Simulation<br>assessment                                 | Viva Voce |  |

**TOPIC:** Drug Proving

**Learning Outcomes (LO):**

At the end of the topic, I-BHMS student must be able to prove a given drug on healthy human being

| Sr. No          | Generic Competencies   | Subject Area | Miller's Level Does/ Shows how/ Knows how/ Know | Specific Competencies                       | Specific Learning Objectives   | Bloom's Domain | Guilbert's level        | Must to know/ desirable to know/ Nice to know | Teaching Learning Method  | Assessment /Evaluation  |                                | Integration                       |
|-----------------|--|--------------|---|---|--|----------------|-------------------------|---|---|---|--------------------------------|-----------------------------------|
|                 |  |              |   |   |  |                |                         |   |   | Method Formative  | Type (Summative)               |                                   |
| HomUG-HP-1.33.1 | Problem Solution<br><br>Integration of Knowledge<br><br>Synthesis and application of knowledge | Drug Proving | Knows   | Proving a given drug on healthy human being | 1. Define Drug Proving.  | Cognitive      | Level 1 Recall          | Must Know                                     | 1.Lecture Demonstrations<br>2. Small Group Discussions/ Peer teaching (Think-Pair-Share, Jigsaw Strategy) | 1.Structured Oral Examination<br>2. Tutorials<br>3. Assignments<br>4. MCQ's | LAQ<br>SAQ<br>MCQ<br>Viva Voce | Horizontal with Organ of Medicine |
| HomUG-HP-1.33.2 |  |              | Knows   |   | 2. Illustrate the qualities of an ideal prover.  | Cognitive      | Level 1 Recall          | Must Know                                     | 4. Quiz<br>5. Student Seminars<br>6. Guest Lecture<br>7. Integrated                                       | 5.SAQ's and LAQ's<br>6. 2 marks questions                                   |                                |                                   |
| HomUG-HP-1.33.3 |  |              | Shows how                                       |   | 3. Apply the selection criteria (inclusion & exclusion) for provers during drug proving. | Cognitive      | Level 3 Problem Solving | Desirable to know                             |   |   |                                |                                   |

|                 |                 |  |       |  |   |             |                         |                   |  |                                |                         |  |  |
|-----------------|-----------------|--|-------|--|---|-------------|-------------------------|-------------------|--|--------------------------------|-------------------------|--|--|
| HomUG-HP.1.33.4 | Problem solving |  | Knows |  | 4. Explain the methodology for drug proving.    | Cognitive   | Level 2 Understanding   | Must Know         | Teaching with Organon of Medicine                                      |                                |                         |  |  |
| HomUG-HP-1.33.5 |                 |  | Does  |  | 5. Design the protocol for Drug Proving.        | Cognitive   | Level 3 Problem Solving | Nice to know      | 1. Lecture Demonstration<br>2. Procedural Skills Teaching              | 1. Simulation based assessment | LAQ<br>SAQ<br>Viva Voce |  |  |
| HomUG-HP-1.33.6 |                 |  | Does  |  | 6. Select ideal prover for drug proving         |             | Level 3 Problem Solving | Desirable to know | 3. Problem Based Learning<br>4. Role Plays<br>5. Experiential learning |                                |                         |  |  |
| HomUG-HP-1.33.7 |                 |  | Does  |  | 7. Prepare the test substance for drug proving. | Psychomotor | Level 2 Control         | Nice to know      | 6. Team based learning   |                                |                         |  |  |
| HomUG-HP-1.33.8 |                 |  | Does  |  | 8. Formulate the team for drug proving          | Cognitive   | Level 3 Problem Solving | Nice to know      |  |                                |                         |  |  |
| HomUG-HP-1.33.9 |                 |  | Does  |  | 9. Record the symptoms of drug proving          | Psychomotor | Level 2 Control         | Nice to know      |  |                                |                         |  |  |

|                  |  |  |           |  |  |           |                         |              |  |                               |           |  |  |
|------------------|--|--|-----------|--|--|-----------|-------------------------|--------------|--|-------------------------------|-----------|--|--|
| HomUG-HP-1.33.10 |  |  | Does      |  | 10. Interpret the provers symptoms   | Cognitive | Level 3 Problem solving | Nice to know |  |                               |           |  |  |
| HomUG-HP-1.33.11 |  |  | Does      |  | 11. Translate the provers symptoms in Materia Medica language              |           | Level 3 Problem solving | Nice to know |  |                               |           |  |  |
| HomUG-HP-1.33.12 |  |  | Shows how |  | 12. Show professionalism and care during drug proving towards the provers. | Affective | Level 2 Responding      | Nice to know | 1. Lecture Demonstration<br>2.Procedural Skills Teaching<br>3. Problem Based Learning<br>4. Role Plays<br>5. Experiential learning | 1.Simulation based assessment | Viva Voce |  |  |
| HomUG-HP-1.33.13 |  |  | Does      |  | 13. Value the privacy & integrity of the provers.                          |           | Level 3 Internalize     | Nice to know |  |                               |           |  |  |
| HomUG-HP-1.33.14 |  |  | Does      |  | 14. Value the consent of the prover.                                       |           | Level 3 Internalize     | Nice to know | 6. Team based learning   |                               |           |  |  |



|                         |   |              | how/<br>Know |   |   |           |                               | to<br>know/<br>Nice to<br>know |  |   |                             |  |
|-------------------------|---|--------------|--------------|---|---|-----------|-------------------------------|--------------------------------|--|---|-----------------------------|--|
| HomU<br>G-HP-<br>1.34.1 | Problem<br>solution<br><br>Integration of<br>Knowledge<br><br>Practice based<br>learning and<br>improvement | Pos<br>ology | Knows        | Selecting<br>a<br>particular<br>potency<br>for a<br>particular<br>case. Selecting<br>a<br>particular<br>dose<br>for a<br>particular | 1. Define<br>posology   | Cognitive | Level 1<br>Recall             | Must<br>Know                   | 1. Lecture<br>Demonstrations<br>2. Small Group<br>Discussions/<br>Peer teaching<br>(Think-Pair-Share,<br>Jigsaw Strategy)<br>3. Quiz<br>4. Student<br>Seminars<br>5. Guest Lecture | 1. Structured<br>Oral<br>Examination<br>2. Tutorials<br>3. Assignments<br>4. MCQ's<br>5. 2 marks<br>question<br>6. SAQ's and<br>LAQ's | LAQ SAQ<br>MCQ<br>Viva Voce | Horizontal with<br>Organon<br>of<br>Medicine |
| HomU<br>G-HP-<br>1.34.2 | Synthesis and<br>application of<br>knowledge  |              | Knows        | Repeating the<br>dose as per the<br>criteria for<br>repletion of<br>doses.  | 2. Explain the<br>criteria for<br>selection of<br>potency                   |           | Level 2<br>Understand         | Must<br>know                   | 6. Integrated<br>Teaching with<br>Organon of<br>Medicine<br>7. Case based<br>learning<br>8. Case<br>simulation<br>learning   | 7. Simulation<br>based<br>assessment<br>8. Case based<br>assessment   |                             |  |
| HomU<br>G-HP-<br>1.34.3 |   |              | Knows<br>how |   | 3. Apply the<br>criteria for<br>selection of<br>potency for<br>a particular |           | Level 3<br>Problem<br>solving | Desirable<br>to<br>know        |  |   |                             |  |

|                         |  |  |           |  |  |  |                              |                       |  |   |  |  |
|-------------------------|--|--|-----------|--|--|--|------------------------------|-----------------------|--|---|--|--|
|                         | Classro<br>om to<br>OPD/IP<br>D transfer |  |           |  | case.  |  |                              |                       |  |   |  |  |
| HomU<br>G-HP-<br>1.34.4 |  |  | Knows     |  | 4. Enlist the different types of doses                               |  | Level 1<br>Recall            | Must know             |  |   |  |  |
| HomU<br>G-HP-<br>1.34.5 |  |  | Knows     |  | 5. Explain the criteria for repetition of doses.                     |  | Level 2<br>Understa<br>nding | Must know             |  |   |  |  |
| HomU<br>G-HP-<br>1.34.6 |  |  | Shows how |  | 6. Apply the criteria for repetition of doses for a particular case. |  | Level 3<br>Problem Solving   | Desirab<br>le to know |  |   |  |  |
| HomU<br>G-HP-<br>1.34.7 |  |  | Does      |  | 7. Choose the correct potency for a particular case                  |  | Level 3<br>Problem Solving   | Desirab<br>le to know | 1. Lecture Demonstration<br>2. Procedural Skills Teaching<br>3. Problem Based Learning<br>4. Experiential learning | 1. Simulation based assessment<br>2. Case based assessment<br>3. OSPE | LAQ SAQ<br>MCQ<br>Practical<br>Examinati<br>on |  |

|                          |  |  |           |  |  |           |                            |                   |   |                                |           |  |  |
|--------------------------|--|--|-----------|--|--|-----------|----------------------------|-------------------|---|--------------------------------|-----------|--|--|
|                          |  |  |           |  |  |           |                            |                   | 5. Team based learning<br>6. Case based learning<br>7. Case simulation learning                           |                                |           |  |  |
| HomU<br>G-HP-<br>1.34.8  |  |  | Does      |  | 8. Choose the proper dosage for a particular case                    |           | Level 3<br>Problem Solving | Desirable to know |   |                                |           |  |  |
| HomU<br>G-HP-<br>1.34.9  |  |  | Does      |  | 9. Design the dosage and repetition for a particular case            |           | Level 3<br>Problem Solving | Nice to know      |   |                                |           |  |  |
| HomU<br>G-HP-<br>1.34.10 |  |  | Shows how |  | 10. Show professionalism and care while selection of potency & dose. | Affective | Level 2<br>Respond         | Nice to know      | 1. Lecture Demonstration<br>2. Procedural Skills Teaching<br>3. Problem Based Learning<br>4. Experiential | 1. Simulation based assessment | Viva Voce |  |  |

|                              |  |  |              |  |   |  |                                |                 |   |  |  |  |  |
|------------------------------|--|--|--------------|--|---|--|--------------------------------|-----------------|---|--|--|--|--|
| HomU<br>G-HP-<br>1.34.1<br>1 |  |  | Shows<br>how |  | 11. Value<br>the privacy<br>& integrity<br>of the<br>patient/cas<br>e   |  | Level 3<br><br>Internaliz<br>e | Nice to<br>know | learning<br><br>5. Team based<br>learning<br><br>6. Case based<br>learning<br><br>7. Case<br>simulation<br>learning |  |  |  |  |
| HomU<br>G-HP-<br>1.34.1<br>2 |  |  | Shows<br>how |  | 12. Value<br>the ethical<br>considerati<br>ons during<br>selection of<br>potency,<br>dose and<br>repetition<br>of doses |  | Level 3<br><br>Internaliz<br>e | Nice to<br>know |   |  |  |  |  |
| HomU<br>G-HP-<br>1.34.1<br>3 |  |  | Shows<br>how |  | 13. Value<br>the<br>importance<br>of rational<br>prescription   |  | Level 3<br><br>Internaliz<br>e | Nice to<br>know |   |  |  |  |  |

**TOPIC:** Prescription Writing

### Learning Outcomes (LO):

At the end of the topic, I-BHMS student must have knowledge of writing an ideal prescription

| Sr. No           | Generic Competencies  | Subject Area         | Miller's Level Does/ Shows how/ Knows how/ Know | Specific Competencies         | Specific Learning Objectives                                | Bloom's Domain | Guilbert's Level      | Must to know/ desirable to know/ Nice to know | Teaching Learning Method   | Assessment /Evaluation  |                     |             |
|------------------|---|----------------------|---|-------------------------------|---|----------------|-----------------------|---|--|---|---------------------|-------------|
|                  |   |                      |   |                               |   |                |                       |   |  | Formative   | Summative           |             |
| Hom UG-HP-1.35.1 | Integration of Knowledge<br><br>Practice based learning and improvement | Prescription Writing | Knows   | Writing an ideal prescription | 1. Define Prescription writing.                             | Cognitive      | Level 1 Recall        | Must Know                                     | 1. Lecture Demonstrations<br>2. Small Group Discussions/<br>Peer teaching (Think-Pair-Share, Jigsaw Strategy)<br>3. Quiz<br>4. Student Seminars<br>5. Guest Lecture<br>6. Case based | 1. Structured Oral Examination<br>2. Tutorials<br>3. Assignments<br>4. MCQ's<br>5. 2 marks question<br>6. SAQ's and LAQ's | LAQ<br>MCQ<br>Voice | SAQ<br>Viva |
| Hom UG-HP-1.35.2 |   |                      | Knows   |                               | 2. Explain the parts of an ideal prescription.              |                | Level 2 Understanding | Must Know                                     |  |   |                     |             |
| Hom UG-HP-1.35.3 | Synthesis and application of  |                      | Knows   |                               | 3. List the abbreviations used in prescription writing with |                | Level 1 Recall        | Must Know                                     |  |   |                     |             |

|                                 |  |  |              |  |  |             |                                   |                 |  |   |                          |  |
|---------------------------------|--|--|--------------|--|--|-------------|-----------------------------------|-----------------|--|---|--------------------------|--|
|                                 | knowledge  |  |              |  | meaning.   |             |                                   |                 | learning   |   |                          |  |
| Hom<br>UG-<br>HP-<br>1.35.<br>4 | Problem<br>solution<br><br>Classroom to<br>OPD/IPD<br>Transfer |  | Knows        |  | 4. Explain the<br>advantages<br>of<br>prescription<br>to the<br>patients and<br>to the<br>physician. |             | Level 2<br><br>Understand<br>ing  | Must<br>Know    | 7. Case<br>simulation<br>learning  |   |                          |  |
| Hom<br>UG-<br>HP-<br>1.35.<br>5 |  |  | Shows<br>how |  | 5. Critically<br>analyse a<br>prescription<br>for any<br>faults.                                     |             | Level 3<br><br>Problem<br>solving | Nice to<br>know |  |   |                          |  |
| Hom<br>UG-<br>HP-<br>1.35.<br>6 |  |  | Does         |  | 6. Write an<br>ideal<br>prescription   | Psychomotor | Level 2<br><br>Control            | Must<br>know    | 1. Lecture<br>Demonstration<br><br>2. Procedural<br>Skills Teaching<br><br>3. Problem<br>Based Learning<br><br>4. Experiential<br>learning | 1. Simulation<br>based<br>assessment<br><br>2. Case<br>based<br>assessment<br><br>3. OSPE | Practical<br>Examination |  |
| Hom<br>UG-<br>HP-               |  |  | Shows<br>how |  | 7. Criticize a<br>wrong<br>prescription  | Cognitive   | Level 3<br><br>Problem            | Nice to<br>know |  |   |                          |  |

|                  |  |  |           |  |  |           |                     |              |   |                                |                       |  |
|------------------|--|--|-----------|--|--|-----------|---------------------|--------------|---|--------------------------------|-----------------------|--|
| 1.35.7           |  |  |           |  |  |           | solving             |              | 5. Team based learning<br>6. Case based learning<br>7. Case simulation learning<br>8. Practical Demonstration   |                                |                       |  |
| Hom UG-HP-1.35.8 |  |  | Shows how |  | 8. Show professionalism and commitment while writing a prescription with accuracy. | Affective | Level 2 Respond     | Nice to know | 1. Lecture Demonstration<br>2. Procedural Skills Teaching<br>3. Problem Based Learning<br>4. Experiential learning<br>5. Team based learning<br>6. Case based learning<br>7. Case simulation learning | 1. Simulation based assessment | Practical Examination |  |
| Hom UG-HP-1.35.9 |  |  |           |  | 9. Value the privacy & integrity of the prescription.                              |           | Level 3 Internalize | Nice to know |   |                                |                       |  |

|                                  |  |  |  |  |  |  |                        |              |                            |  |  |
|----------------------------------|--|--|--|--|--|--|------------------------|--------------|----------------------------|--|--|
| Hom<br>UG-<br>HP-<br>1.35.<br>10 |  |  |  |  | 10. Value the ethical considerations during writing a prescription |  | Level 3<br>Internalize | Nice to know | 8. Practical Demonstration |  |  |
| Hom<br>UG-<br>HP-<br>1.35.<br>11 |  |  |  |  | 11. Value the importance of rational prescription                  |  | Level 3<br>Internalize | Nice to know |                            |  |  |

**TOPIC:** Legislation

**Learning Outcomes (LO):**

At the end of the topic, I-BHMS student must be able to follow and practice ethically all the laws that govern homoeopathic pharmacy.

| Sr. No | Generic Competencies | Subject Area | Miller's Level Does/ Shows how/ Knows | Specific Competencies | Specific learning Objectives | Bloom's Domain | Guilbert's Levels | Must to know/ desirable to know/Ni | Teaching Learning Method | - | Assessment /Evaluation |           |
|--------|----------------------|--------------|---------------------------------------|-----------------------|------------------------------|----------------|-------------------|------------------------------------|--------------------------|---|------------------------|-----------|
|        |                      |              |                                       |                       |                              |                |                   |                                    |                          |   | Formative              | Summative |
|        |                      |              |                                       |                       |                              |                |                   |                                    |                          |   |                        |           |

|                                 |  |                 | how/<br>Know |  |   |               |                              | ce to<br>know |   |   |             |      |
|---------------------------------|--|-----------------|--------------|--|---|---------------|------------------------------|---------------|---|---|-------------|------|
| Hom<br>UG-<br>HP-<br>1.36.<br>1 | Integrati<br>on of<br>Knowled<br>ge                      | Legisl<br>ation | Knows        | Must be<br>able to<br>follow and<br>practice<br>ethically<br>all the<br>laws that<br>govern<br>homoeopa<br>thic<br>pharmacy. | 1.List all the acts<br>that govern the<br>legal aspects of<br>homoeopathic<br>pharmacy. | Cognitiv<br>e | Level 1<br>Recall            | Must<br>know  | 1.Lecture<br>Demonstration<br>s<br>2. Small Group<br>Discussions/<br>Peer teaching<br>(Think-Pair-<br>Share, Jigsaw<br>Strategy)<br>3. Quiz<br>4. Student<br>Seminars<br>5. Guest<br>Lecture<br>6. Problem<br>based learning<br>7. Flipped<br>Classroom | 1.Structure<br>d Oral<br>Examination<br>2. Tutorials<br>3.<br>Assignment<br>s<br>4. MCQ's<br>5. 2 marks<br>question<br>6.SAQ's and<br>LAQ's | LAQ<br>Voce | Viva |
| Hom<br>UHP-<br>1.36.<br>2       | Synthesi<br>s and<br>Applicati<br>on of<br>knowled<br>ge |                 | Knows        |  | 2. Illustrate the<br>provisions<br>under the Drugs<br>& Cosmetic Act                    |               | Level 2<br>Understa<br>nding | Must<br>know  |   |   |             |      |
| Hom<br>UG-<br>HP-<br>1.36.<br>3 | Problem<br>solution                                      |                 | Knows        |  | 3. Illustrate the<br>provisions<br>under the<br>Schedule M1                             |               | Level 2<br>Understa<br>nding | Must<br>know  |   |   |             |      |
| Hom<br>UG-<br>HP-<br>1.36.<br>4 |  |                 | Knows        |  | 4. Illustrate the<br>provisions<br>under the Drugs<br>& Magic<br>Remedies Act           |               | Level 2<br>Understa<br>nding | Must<br>know  |   |   |             |      |

|                                 |  |  |                      |  |  |                 |                              |              |  |                    |                                     |  |
|---------------------------------|--|--|----------------------|--|--|-----------------|------------------------------|--------------|--|--------------------|-------------------------------------|--|
| Hom<br>UG-<br>HP-<br>1.36.<br>5 |  |  | Knows                |  | 5. Illustrate the provisions under the Medicinal & Toilet Preparation Act  |                 | Level 2<br>Understa<br>nding | Must<br>know |  |                    |                                     |  |
| Hom<br>UG-<br>HP-<br>1.36.<br>6 |  |  | Knows                |  | 6. Illustrate the provisions under the Dangerous Drugs Act   |                 | Level 2<br>Understa<br>nding | Must<br>know |  |                    |                                     |  |
| Hom<br>UG-<br>HP-<br>1.36.<br>7 |  |  | Knows                |  | 7. Illustrate the provisions under the Prevention of Illicit Traffic in Narcotic Drugs & Psychotropic Substances Act |                 | Level 2<br>Understa<br>nding | Must<br>know |  |                    |                                     |  |
| Hom<br>UG-<br>HP-<br>1.36.<br>8 |  |  | Knows                |  | 8. Illustrate the provisions under the Homoeopathic Central Council Act  |                 | Level 2<br>Understa<br>nding | Must<br>know |  |                    |                                     |  |
| Hom<br>UG-<br>HP-<br>1.36.      |  |  | Does<br>Shows<br>how |  | 9. Demonstrate the labelling of homoeopathic medicine  | Psychom<br>otor | Level 2<br>Control           | Must<br>know | 1. Practical<br>Demonstration<br>2. Procedural | 1. DOPS<br>2. OSPE | LAQ<br>Practical<br>Examinati<br>on |  |

|                   |  |  |       |  |   |           |                      |              |  |                      |           |
|-------------------|--|--|-------|--|---|-----------|----------------------|--------------|--|----------------------|-----------|
| 9                 |  |  |       |  | according to Part IX of the Drugs & Cosmetic Act 1940   |           |                      |              | Skills Teaching<br>3. Problem Based Learning<br>4. Experiential learning |                      |           |
| Hom UG-HP-1.36.10 |  |  | Knows |  | 10.Demonstrate care and commitment and abide by the provisions laid down in the various acts. | Affective | Level 1<br>Receiving | Nice to know | 1.Lecture Demonstration<br>3. Problem Based Learning                     | Role Play Assessment | Viva Voce |

**TOPIC:** Drug Action

**Learning Outcomes (LO):**

At the end of the topic, I-BHMS student must be able to differentiate the different mechanisms of drug action of homoeopathic medicines

| Sr. No | Generic Competencies | Subject Area | Miller's Level Does/ Shows how/ Knows how/ Know | Specific Competencies | Specific learning Objectives | Bloom's Domain | Guilbert's Levels | Must to know/ desirable to know/Nice to know | Teaching Learning Method | Assessment /Evaluation |           |
|--------|----------------------|--------------|---|-----------------------|------------------------------|----------------|-------------------|--|--------------------------|------------------------|-----------|
|        |                      |              |   |                       |                              |                |                   |  |                          | Formative              | Summative |
|        |                      |              |   |                       |                              |                |                   |  |                          |                        |           |

|                  |  |             |           |   |   |           |                         |                   |  |  |  |     |
|------------------|--|-------------|-----------|---|---|-----------|-------------------------|-------------------|--|--|--|-----|
| Hom UG-HP-1.37.1 | Integration of Knowledge               | Drug Action | Knows how | Must be able to differentiate the different mechanisms of drug action of homoeopathic medicines | 1. Classify the different types of drug action.   | Cognitive | Level 2 Understanding   | Nice to Know      | 1.Lecture Demonstrations<br>2. Small Group Discussions/<br>Peer teaching (Think-Pair-Share, Jigsaw Strategy)<br>3. Quiz<br>4. Flipped Classroom<br>6. Videos<br>7. Integrated Teaching | 1.Structured Oral Examination<br>2. Tutorials<br>3. Assignments<br>4. MCQ's<br>5. 2 marks question<br>6.SAQ's<br>7.Projects<br>8. Spotting | LAQ<br>MCQ<br>Practical Examination<br>Viva Voce | SAC |
| Hom UG-HP-1.37.2 | Synthesis and application of knowledge |             | Knows     |   | 2. Explain the individual family drug action according to their sphere of action.               |           | Level 2 Understanding   | Desirable to Know |  |  |  |     |
| Hom UG-HP-1.37.3 | Classroom to Clinic transfer           |             | Knows     |   | 3. Explain the individual family drug action according to nature of drug & family relationship. |           | Level 2 Understanding   | Desirable to Know |  |  |  |     |
| Hom UG-HP-1.37.4 |  |             | Does      |   | 4. Analyze the action of drug on patients.  | Cognitive | Level 3 Problem solving | Nice to know      | 1. Practical Demonstrations<br>2.Experiential Learning   | 1. Spotting<br>2. Pharmacological action of 30 drugs as specified  | -----  |     |

|                                 |  |  |       |  |  |           |                    |              |   |                           |       |  |
|---------------------------------|--|--|-------|--|--|-----------|--------------------|--------------|---|---------------------------|-------|--|
| Hom<br>UG-<br>HP-<br>1.37.<br>5 |  |  | Does  |  | 5. Co-relate the action of drugs with the family characteristics.                                  |           |                    | Nice to know | 3. Projects   | in journal<br>3. Projects |       |  |
| Hom<br>UG-<br>HP-<br>1.37.<br>6 |  |  | Knows |  | 6. Show care in prescribing homoeopathic medicine based on action of drugs and drug relationships. | Affective | Level 2<br>Respond | Must know    | 1. Lecture<br>2. Integrated teaching of Pharmacological drug action with Materia Medica | Journal Assessment        | ----- |  |

**TOPIC:** Relation of Pharmacy with Materia Medica, Anatomy, Physiology

**Learning Outcomes (LO):**

At the end of the topic, I-BHMS student must be able to correlate homoeopathic pharmacy with Materia Medica, Anatomy and Physiology

| Sr. No | Generic Competencies | Subject Area | Miller's Level<br>Does/<br>Shows<br>how/<br>Knows | Specific Competencies | Specific Learning Objectives | Bloom's Domain | Guilbert's Levels | Must to know/<br>desirable<br>to know/Nice | Teaching - Learning Method | Assessment /Evaluation | Summa |
|--------|----------------------|--------------|---|-----------------------|------------------------------|----------------|-------------------|--|----------------------------|------------------------|-------|
|        |                      |              |   |                       |                              |                |                   |  |                            | Form                   |       |

|                     |  |   | how/<br>Know |  |  |               |                                  | to<br>know           |   | ative   | tive                |
|---------------------|--|---|--------------|--|--|---------------|----------------------------------|----------------------|---|---|---------------------|
| HomUG-HP<br>1.38.1  | Problem<br>formulation                       | Relation<br>of<br>Pharmacy<br>with<br>Materia<br>Medica | Knows        | Must be<br>able to<br>correlate<br>homoeop<br>athic<br>pharmacy<br>with<br>material<br>medica,<br>Anatomy<br>and<br>Physiolog<br>y | 1. Explain the<br>correlation of<br>homoeopathic<br>pharmacy with<br>the basics of<br>Homoeopathic<br>Materia<br>Medica. | Cognit<br>ive | Level 2<br><br>Understa<br>nding | Desirable to<br>Know | 1.Lecture<br>Demonstr<br>ations<br><br>2. Small<br>Group<br>Discussion<br>s/<br><br>Peer<br>teaching<br>(Think-<br>Pair-<br>Share,<br>Jigsaw<br>Strategy) | 1.Structur<br>ed Oral<br>Examinati<br>on<br><br>2. Tutorials<br><br>3. Assignmen<br>ts<br><br>4. MCQ's<br><br>5. 2 marks<br>question<br><br>6.SAQ's,<br>LAQ's | SAQ<br>Viva<br>Voce |
| HomUG-HP-<br>1.38.2 | Synthesis and<br>application of<br>knowledge |   | Knows        |  | 2. Explain the<br>correlation of<br>homoeopathic<br>pharmacy with<br>the basics of<br>Anatomy                            |               |                                  | Desirable to<br>Know |   |   |                     |
| HomUG-HP-<br>1.38.3 |  |   | Knows        |  | 3. Explain the<br>correlation of<br>homoeopathic<br>pharmacy and<br>Physiology   |               |                                  | Desirable to<br>Know | 3. Quiz<br><br>4. Student<br>Seminars<br><br>5. Flipped<br>Classroom  | 7.Projects  |                     |

|                 |  |  |           |  |   |           |                         |                   |  |   |       |
|-----------------|--|--|-----------|--|---|-----------|-------------------------|-------------------|--|---|-------|
| HomUG-HP-1.38.4 |  |  | Knows how |  | 4. Apply the principles of posology during case taking after selection of similimum based on knowledge of Homoeopathic Materia Medica.                                | Cognitive | Level 3 Problem Solving | Desirable to know | 1. Practical Demonstration<br>2. Lecture Demonstration<br>3. Experimental Research projects<br>4. Case based learning<br>5. Problem based learning<br>6. Case simulation | 1. DOPS<br>2. OSPE<br>3. Evaluation of projects<br>4. Evaluation of case based learning<br>5. Evaluation of PBL<br>6. Evaluation of Case simulation | ----- |
| HomUG-HP-1.38.5 |  |  | Knows how |  | 5. Apply the knowledge of drug action based on familial relationship and remedy relationship as noted in Homoeopathic Materia Medica and organ affection with anatomy |           |                         | Desirable to know |  |   |       |
| HomUG-HP-       |  |  | Knows how |  | 6. Apply the knowledge of sources of  |           |                         | Desirable to know |  |   |       |

|                 |  |  |           |  |  |           |                      |                   |   |  |           |
|-----------------|--|--|-----------|--|--|-----------|----------------------|-------------------|---|--|-----------|
| 1.38.6          |  |  |           |  | drugs and collection of drugs while preparation of homoeopathic medicines according to the scale of potentisation.                           |           |                      |                   |   |  |           |
| HomUG-HP-1.38.7 |  |  | Knows how |  | 7. Apply the knowledge of pharmacological action of drugs with the normal physiology of human body   |           |                      | Desirable to know |   |  |           |
| HomUG-HP-1.38.8 |  |  | Knows how |  | 8. Demonstrate care, professionalism & commitment & follow all the guidelines meticulously as given in 6 <sup>th</sup> edition of Organon of | Affective | Level 1<br>Receiving | Nice to know      | 1. Practical Demonstration<br>2. Lecture Demonstration<br>3. Experiment | 1. DOPS<br>2. OSPE<br>3. Evaluation of projects<br>4. Evaluation of case based | Viva Voce |

|                 |  |  |  |  |   |  |  |  |   |  |  |
|-----------------|--|--|--|--|---|--|--|--|---|--|--|
|                 |  |  |  |  | medicine while selecting a particular homoeopathic medicine in a particular potency.  |  |  |  | tal Research projects   | learning   |  |
| HomUG-HP-1.38.9 |  |  |  |  | 9. Demonstrate care, professionalism & commitment & follow all the guidelines meticulously as given in 6 <sup>th</sup> edition of Organon of medicine while preparation of homoeopathic medicine according to the scale of potentisation. |  |  |  | 4. Case based learning<br>5. Problem based learning<br>6. Case simulation | 5. Evaluation of PBL<br>6. Evaluation of Case simulation |  |

|                          |  |  |  |  |   |  |  |  |  |  |  |
|--------------------------|--|--|--|--|---|--|--|--|--|--|--|
| HomUG-<br>HP-<br>1.38.10 |  |  |  |  | 10. Demonstrate care, professionalism & commitment & follow all the guidelines meticulously as given in 6 <sup>th</sup> edition of Organon of medicine while prescribing a particular external application for a particular case. |  |  |  |  |  |  |
| HomUG-<br>HP-<br>1.38.11 |  |  |  |  | 11. Should ensure that all the resources are used to the fullest without any wastage while preparing homoeopathic   |  |  |  |  |  |  |

|  |  |  |  |  |           |  |  |  |  |  |  |  |
|--|--|--|--|--|-----------|--|--|--|--|--|--|--|
|  |  |  |  |  | medicine. |  |  |  |  |  |  |  |
|--|--|--|--|--|-----------|--|--|--|--|--|--|--|

**TOPIC:** Recent advancements and scope of research in Homoeopathic Pharmacy

**Learning Outcomes (LO):**

At the end of the topic, I-BHMS student must be able to undertake a short term research in Homoeopathic Pharmacy

| Sr. No               | Generic Competencies     | Subject Area                                 | Miller's Level Does/ Shows how/ Knows how/ Know | Specific Competencies                              | Specific Learning Objectives                               | Bloom's Domain | Guilbert's levels | Must to know/ desirable to know/Nice to know | Teaching Learning Method  | Assessment /Evaluation                                      |           |
|----------------------|--------------------------|--|---|--|--|----------------|-------------------|--|---|---|-----------|
|                      |                          |  |   |  |  |                |                   |  |   | Formative   | Summative |
| Ho mU G- HP- 1.3 9.1 | Problem solution Integra | Recent advancements and scope of research in | Knows   | Must be able to undertake a short term research in | 1.Enumerate the types of research in homoeopathic pharmacy | Cognitive      | Level 1 Recall    | Nice to know                                 | 1.Lecture Demonstrations<br>2. Small Group Discussions/ Peer teaching | 1.Structured Oral Examination<br>2. Assignments<br>3. MCQ's | -----     |

|                    |  |                       |       |                       |   |  |                         |              |                                     |         |  |
|--------------------|--|-----------------------|-------|-----------------------|---|--|-------------------------|--------------|-------------------------------------|---------|--|
|                    | tion of Knowledge                      | Homoeopathic Pharmacy |       | Homoeopathic Pharmacy |   |  |                         |              | (Think-Pair-Share, Jigsaw Strategy) | 4.SAQ's |  |
| Ho mU G-HP-1.3 9.2 | Synthesis and application of knowledge |                       | Knows |                       | 2.Explain the recent advancements in the field of homoeopathic pharmacy           |  | Level 2 Understanding   | Nice to Know | 3. Visit to research laboratories   |         |  |
| Ho mU G-HP-1.3 9.3 | Classroom to lab transfer              |                       | Does  |                       | 3.Design the protocol for a short term research proposal in homoeopathic pharmacy |  | Level 3 Problem solving | Nice to know |                                     |         |  |

### Non-Lecture Activities

1. Collection of 30 drugs for herbarium
2. Visit to a Large-scale manufacturing unit of Homoeopathic medicine (GMP compliant).
3. Visit to a Medicinal Plant /Botanical Garden & shall keep details Visit report
4. Clinical Class: Visit to IPD, OPD to take note on prescriptions as per Homoeopathic Principles and keep record

5. Visit to Hospital dispensing section to observe & gain knowledge on Dispensing techniques & Keep Records

## 8.PRACTICAL TOPICS

| Homoeopathic Pharmacy Practicals |  |
|----------------------------------|--|
| Sr No.                           | Particulars of Experiments   |
| 1                                | Estimation of size of globules   |
| 2                                | Medication of globules (Small Scale)   |
| 3                                | Purity test of Sugar of milk   |
| 4                                | Purity test of water   |
| 5                                | Purity test of Ethyl alcohol   |
| 6                                | Determination of Specific gravity of a given liquid Vehicle & identifying the same.      |
| 7                                | Preparation of dispensing alcohol from strong alcohol.                                   |
| 8                                | Preparation of dilute alcohol from strong alcohol.                                       |
| 9                                | Trituration of drug in Old Method (One each of Class VII, VIII & IX)                     |
| 10                               | Trituration of one drug as per HPI   |
| 11                               | Succussion in decimal scale from Mother Tincture (Prepared in Old Method) to 3X potency. |
| 12                               | Succussion in decimal scale from Mother Tincture (Prepared in New Method) to 3X potency  |
| 13                               | Succussion in centesimal scale from Mother Tincture (Prepared in Old Method) to 3C       |
| 14                               | Succussion in centesimal scale from Mother Tincture (Prepared in New Method) to 3C       |
| 15                               | Conversion of Trituration to liquid potency: Decimal scale 6X to 8X potency.             |

|    |   |
|----|---|
| 16 | Conversion of Trituration to liquid potency: Centesimal scale 3C to 4C potency.                       |
| 17 | Preparation of 0/2 potency (Solid form) (LM scale) of 1 Drug from 3 <sup>rd</sup> Degree Trituration. |
| 18 | Preparation of external applications – Lotion   |
| 19 | Preparation of external applications – Glycerol   |
| 20 | Preparation of external applications – Liniment   |
| 21 | Preparation of external applications – Ointment   |
| 22 | Writing of prescription & Dispensing the Medicine in Water with preparation of Doses                  |
| 23 | Writing of prescription & Dispensing the Medicine in Sugar of Milk with Preparation of Doses          |
| 24 | Preparation of mother tinctures according to Old Hahnemannian method (Class I, II, III, IV)           |
| 25 | Preparation of mother solutions according to Old Hahnemannian method (Class Va, Vb, VIa, VIb)         |

### **Demonstration**

1. Homoeopathic pharmaceutical instruments and appliances with their cleaning (List provided in Appendix C)
2. Estimation of moisture content using water bath
3. Paper chromatography & TLC of any mother tincture
4. Laboratory methods – Sublimation, distillation, decantation, filtration, crystallization.
5. Preparation of mother tincture – Maceration and Percolation
6. Study & demonstration of Drug Substances (listed in Appendix B)-
  - i) Macroscopic Characteristic (Any 15)
  - ii) Microscopic characteristic (Any 05)
7. Study & demonstration of vehicles (Solid, Liquid & Semi solid – as available)
8. Microscopical study of Trituration (One drug up to 3X Potency)

## 9. Medication of Globule (Large Scale)

### **Activities**

1. Collection of 30 drugs for herbarium
2. Visit to a Large-scale manufacturing unit of Homoeopathic medicine (GMP compliant).
3. Visit to a Medicinal Plant /Botanical Garden & shall keep details Visit report
4. Clinical Class: Visit to IPD, OPD to take note on prescriptions as per Homoeopathic Principles & keep record
5. Visit to Hospital dispensing section to observe & gain knowledge on Dispensing techniques & Keep Records

### **Demonstration**

1. Homoeopathic pharmaceutical instruments and appliances with their cleaning (List provided in Appendix C)-06 Hours
2. Estimation of moisture content using water bath-02 Hours
3. Paper chromatography & TLC of any mother tincture-04 Hours
4. Laboratory methods – Sublimation, distillation, decantation, filtration, crystallization.-04 Hours
5. Preparation of mother tincture – Maceration and Percolation- 04 Hours
6. Study & demonstration of Drug Substances (listed in Appendix B)- 10 Hours
  - i) Macroscopic Characteristic (Any 15)
  - ii) Microscopic characteristic (Any 05)
7. Study & demonstration of vehicles (Solid, Liquid & Semi solid – as available)- 02 Hours
8. Microscopical study of Trituration (One drug up to 3X Potency)-02 Hours
9. Medication of Globule (Large Scale)-1 Hour

**Clinical Hospital Work** – Maintain Record (Activities/Posting in Dispensing Section, Prescriptions based on Homoeopathic Principles in IPD/OPD) – Record to be maintained as per format in Appendix G- 20 Hours

**Seminar** – Maintain Record on Seminar Presentation on Topics of Homoeopathic Pharmacy as assigned- 07 Hours

## 9. ASSESSMENT

### Assessment Summary

#### 9A- Number of papers and Mark Distribution

| Sr. No. | Course Code | Papers | Theory | Practical | Viva Voce | Internal Assessment- Practical | Electives Grade Obtained |  | Grand Total |
|---------|-------------|--------|--------|-----------|-----------|--------------------------------|--------------------------|--|-------------|
| 1       | HomUG-HP    | 1      | 100    | 50        | 40        | 10                             |                          |  | 100         |

#### 9B - Scheme of Assessment (formative and Summative)

| Sr. No | Professional Course     | 1 <sup>st</sup> term (1-6 Months) |                    |                          | 2 <sup>nd</sup> Term (7-12 Months) |                    |                          | 3 <sup>rd</sup> Term (13-18 Months) |    |
|--------|-------------------------|-----------------------------------|--------------------|--------------------------|------------------------------------|--------------------|--------------------------|-------------------------------------|----|
| 1      | First Professional BHMS | 1 <sup>st</sup> PA                | 1 <sup>ST</sup> TT |                          | 2 <sup>nd</sup> PA                 | 2 <sup>ND</sup> TT |                          | 3 <sup>rd</sup> PA                  | UE |
|        |                         | 10 Marks Practical/Viva           | 50 Marks Theory    | 50 Marks Practical/ Viva | 10 Marks Practical/Viva            | 50 Marks Theory    | 50 Marks Practical/ Viva | 10 Marks Practical/Viva             |    |

**For Internal assessment, Only Practical/Viva marks will be considered. Theory marks will not be counted.**

**Method of Calculation of Internal Assessment Marks for Final University Examination:**

|   |   |   |  |   |   |  |  |
|---|---|---|--|---|---|--|--|
| PA1<br>Practical/Viva<br>(10 Marks)<br><b>A</b> | PA2<br>Practical/Viva<br>(10 Marks)<br><b>B</b> | PA3<br>Practical/Viva<br>(10 Marks)<br><b>C</b> | Periodical<br>Assessment<br>Average<br>PA1+PA2+PA3/3<br><b>D</b> | TT1<br>Practical/Viva<br>(50 Marks)<br><b>E</b> | TT2<br>Practical/Viva<br>(50 Marks)<br><b>F</b> | Terminal Test<br>Average<br>TT1+TT2/100*10<br><b>G</b> | Final<br>Internal<br>Assessment<br>Marks<br><b>D+G/2</b> |
|---|---|---|--|---|---|--|--|

**PA-** Periodical Assessment **TT-** Terminal Test **UE-** University Examination

**9C - Evaluation Methods for Periodical Assessment**

| Sr. No   | Evaluation Criteria   |
|----------|-----------------------|
| <b>1</b> | Practical Performance |
| <b>2</b> | Viva Voce             |

**9 D- Paper Layout**

|     |          |
|-----|----------|
| MCQ | 10 marks |
| SAQ | 40 marks |
| LAQ | 50 marks |

### 9 E– I - Distribution of Theory exam

| Sr. No | Paper  |           |                        | D<br>Type of Questions<br>“Yes” can be asked.<br>“No” should not be asked. |                     |                   |
|--------|--|-----------|------------------------|--|---------------------|-------------------|
|        | A<br>List of Topics                              | B<br>Term | C<br>Marks             | MCQ<br>(1 Mark)  | SAQ<br>(5<br>Marks) | LAQ<br>(10 Marks) |
| 1      | General Concepts and Orientation                 | I         | Refer<br>Next<br>Table | Yes  | Yes                 | Yes               |
| 2      | Raw Material: Drugs and Vehicles                 | I         |                        | Yes  | Yes                 | Yes               |
| 3      | Homoeopathic Pharmaceutics                       | II        |                        | Yes  | Yes                 | Yes               |
| 4      | Pharmacodynamics                                 | III       |                        | Yes  | Yes                 | Yes               |
| 5      | Quality Control                                  | II        |                        | No   | Yes                 | No                |
| 6      | Legislations pertaining to Homoeopathic Pharmacy | III       |                        | No   | No                  | Yes               |
| 7      | Homoeopathic Pharmacy - Relationships            | III       |                        | No   | Yes                 | No                |

### 9 E – II - Theme table

| Theme* | Topics               | Term | Marks | MCQ's | SAQ's | LAQ's |
|--------|----------------------|------|-------|-------|-------|-------|
| A      | General Concepts and | I    | 16    | Yes   | Yes   | Yes   |

|   |  |     |    |     |     |     |
|---|--|-----|----|-----|-----|-----|
|   | Orientation                                      |     |    |     |     |     |
| B | Raw Material: Drugs and Vehicles                 | I   | 25 | Yes | Yes | Yes |
| C | Homoeopathic Pharmaceutics                       | II  | 23 | Yes | Yes | Yes |
| D | Pharmacodynamics                                 | III | 16 | Yes | Yes | Yes |
| E | Quality Control                                  | II  | 05 | No  | Yes | No  |
| F | Legislations pertaining to Homoeopathic Pharmacy | III | 10 | No  | No  | Yes |
| G | Homoeopathic Pharmacy - Relationships            | III | 05 | No  | Yes | No  |

## 9 F Question paper Blueprint

| A<br>Question Serial Number | B<br>Type of Question  | Question Paper Format<br>(Refer table 7 F II Theme table for themes)  |
|-----------------------------|--|---|
| Q1                          | Multiple choice Questions<br>(MCQ)<br><br>10 Questions<br><br>1 mark each<br><br>All compulsory<br><br>Must know part: 6 MCQ<br><br>Desirable to know: 2 MCQ.<br><br>Nice to know: 2 MCQ | 1. Theme A<br><br>2. Theme B<br><br>3. Theme B<br><br>4. Theme B<br><br>5. Theme B<br><br>6. Theme B<br><br>7. Theme C<br><br>8. Theme C<br><br>9. Theme C<br><br>10. Theme D |
| Q2                          | Short answer Questions<br>(SAQ)<br><br>8 Questions<br><br>5 Marks Each<br><br>All compulsory<br><br>Must know part: 9 SAQ<br><br>Desirable to know: 1 SAQ                                | 1. Theme A<br><br>2. Theme B<br><br>3. Theme B<br><br>4. Theme C<br><br>5. Theme C<br><br>6. Theme D<br><br>7. Theme E  |

|    |  |   |
|----|--|---|
|    | Nice to know: Nil  | 8. Theme G  |
| Q3 | <p>Long answer Questions (LAQ)</p> <p>5 Questions</p> <p>10 marks each</p> <p>All compulsory</p> <p>All questions on must know</p> <p>No Questions on Nice to know and Desirable to know</p> | <p>1. Theme A</p> <p>2. Theme B</p> <p>3. Theme C</p> <p>4. Theme D</p> <p>5. Theme F</p> |

### 9 G - Distribution of Practical Exam

**Practical, Viva& Internal Assessment** → 100 marks

|            |          |
|------------|----------|
| Spotting   | 20 marks |
| Experiment | 20 marks |
| Journal    | 10 marks |

|                     |          |
|---------------------|----------|
| Viva voce           | 40 marks |
| Internal assessment | 10 marks |

## 10.LIST OF RECOMMENDED BOOKS

### Text Books

1. Dr. Partha Mandal & Dr. Biman Mandal, A Textbook of Homoeopathic Pharmacy, Revised and Enlarged 3rd Edition, 2012, New Central Book Agency Publishers.
2. Dr. Sumit Goel, Art and Science of Homoeopathic Pharmacy, 4<sup>TH</sup> Enlarged Revised Edition, 2021, IBPP Publishers.
3. Dr. D.D. Banerjee, Augmented Textbook of Homoeopathic Pharmacy, 2<sup>nd</sup> Edition, 2012, B. Jain Publishers.
4. Dr. K.P. Mujumdar, Textbook of Homoeopathic Pharmacy, 2013, New Central Book Agency Publishers

### Reference Texts

1. Banerjee SK & Sinha N. (Reprint edition, 1993). A Treatise on Homoeopathic Pharmacy. B Jain Publishers, New Delhi.
2. Govt. of India, Ministry of Health & Family Welfare, New Delhi (1971 to 2006). Homoeopathic Pharmacopoeia of India (1-9 Vol.)
3. Hughes R (Reprint edition, 1999). A Manual of Pharmacodynamics. B Jain Publishers, New Delhi.
4. Dr. P.N. Verma & Dr. (Mrs.) Indu Vaid, Encyclopaedia of Homoeopathic Pharmacopoeia, Vol- I, II, III, Edition 2002, B. Jain Publishers.

### APPENDIX – A

List of drugs included in the syllabus of Homoeopathic Pharmacy for study of Pharmacological action: -

|                      |                          |
|----------------------|--------------------------|
| 1. Aconitum Napellus | 16. Glonoinum            |
| 2. Adonis vernalis   | 17. Hydrastis Canadensis |
| 3. Allium cepa       | 18. Hyoscyamus niger     |
| 4. Argentum Nitricum | 19. Kali bichromicum     |
| 5. Arsenicum album   | 20. Lachesis             |
| 6. Atropa Belladonna | 21. Lithium carbonicum   |

|                            |                          |
|----------------------------|--------------------------|
| 7. Cactus grandifloras     | 22. Mercurius corrosivus |
| 8. Cantharis vesicatoria   | 23. Naja tripudians      |
| 9. Cannabis indica         | 24. Nitricum acidum      |
| 10. Cannabis sativa        | 25. Nux vomica           |
| 11. Cinchona officinalis   | 26. Passiflora incarnate |
| 12. Coffea cruda           | 27. Stannum metallicum   |
| 13. Crataegus oxyacantha   | 28. Stramonium           |
| 14. Crotalus horridus      | 29. Symphytum officinale |
| 15. Gelsemium sempervirens | 30. Tabacum              |

## APPENDIX – B

### List of drugs for identification

#### i. Vegetable Kingdom

1. Aegle folia
2. Anacardium orientale
3. Andrographis paniculata
4. Calendula officianlis
5. Cassia sophera
6. Cinchona officinalis
7. Cocculus indicus
8. Coffea cruda

9. Colocynthis
10. Crocus sativa
11. Croton tiglium
12. Cynodon dactylon
13. Ficus religiosa
14. Holarrhena antidysenterica
15. Hydrocotyle asiatica
16. Justicia adhatoda
17. Lobelia inflata
18. Nux vomica
19. Ocimum sanctum
20. Opium
21. Rauwolfia serpentina
22. Rheum
23. Saraca indica
24. Senna
25. Stramonium
26. Vinca minor

**ii. Chemicals or Minerals**

1. Acetic acid
2. Alumina

3. Argentum Metallicum
4. Argentum Nitricum
5. Arsenicum Album
6. Calcareo Carbonica
7. Carbo Vegetabilis
8. Graphites
9. Magnesium Phosphoric
10. Natrum Muriaticum
11. Sulphur

### iii. Animal Kingdom

1. Apis mellifica
2. Blatta orientalis
3. Formica rufa
4. Sepia
5. Tarentula cubensis

## Appendix C

### List of Instrument & Appliances for Demonstration & Study

|                           |                         |                |                |
|---------------------------|-------------------------|----------------|----------------|
| Crucible with lid         | Test Tube               | Tripod stand   | Hot Air Oven   |
| Porcelain Basin           | Conical Flask           | Wire gauze     | Water bath     |
| Mortar & Pestle Porcelain | Volumetric flask        | Spatula        | Macerating Jar |
| Ointment Slab             | Minim glass             | Leather pad    | Percolator     |
| Chemical Balance          | Thermometer             | Stop watch     | Microscope     |
| Hydrometer                | Mortar & Pestle - Glass | Chopping Board | pH Meter       |
| Alcoholometer             | Glass Phials            | Chopping Knife | Burette        |
| Lactometer                | Pyknometer              | Sieve          | Pipette        |
| Spoon                     | Measuring Cylinder      | Tincture Press | Dropper        |
| Beaker                    | Graduated Conical Flask | Funnel         | Glass Rod      |

#### Appendix – D (List of Important Vehicles for Study)

| Appendix – D (List of Important Vehicles for Study) |               |            |
|---|---------------|------------|
| Solid   | Liquid        | Semisolid  |
| Sugar of Milk                                       | Water         | Vaseline   |
| Globules  | Ethyl Alcohol | Beeswax    |
| Tablets   | Glycerine     | Lanolin    |
| Cane Sugar  | Olive Oil     | Spermaceti |
|   | Simple Syrup  | Isin glass |

|  |  |  |
|--|--|--|
|  | Lavender Oil, Sesame Oil, Rosemary Oil, Almond Oil |  |
|--|--|--|

## Appendix E

### Format for Maintaining Record on visit to Homoeopathic Manufactory (GMP Compliant)

Date of Visit

No. of Visiting Students & Teaching Faculty

Name of Teaching Faculty

Detail of the Instructor/s at the Manufactory

How the Tour was arranged

Name & Location of the Homoeopathic Manufactory

History about the Manufactory

Different Sections of the manufactory with its working process

Activities of R&D Dept

How the visit helped in correlation with topics studied in Theory

Conclusion

**(Any other related information, not mentioned in format, if required can be included)**

**Appendix F****Format for Maintaining Record on visit to Medicinal Plant Garden**

Date of the Visit

No. of visiting Students & Teaching Faculty

Name of Teaching Faculty

Detail of Instructor/s

How the Tour was arranged

Name & Location of the Medicinal Plant Garden

History & about the Medicinal Plant Garden

A list Medicinal Plants seen with brief description,

Conclusion

**Appendix G****Format for maintaining record on Hospital Activities (Visit to OPD/IPD & Dispensing Section)**

Record on Prescriptions based on Homoeopathic Principles in IPD/OPD

No of Cases: Total 10 cases (5 Acute, 5 Chronic)

Format -

Patient ID

Complaint

Diagnosis

Details of 1<sup>st</sup> Prescription – Name of Medicine, Potency, Dose with its Repetition,  
Second Prescription (if Record is available)  
Conclusion at the end of Acute & Chronic Cases on Lessons learnt on Homoeopathic Principles

Record on Activities/Posting in Hospital Dispensing Section

Total No. of Patients Date wise,

Sl No as per Prescription Register,

Dosage form- Liquid/solid,

Name of Vehicle used,

Medication Process etc

Conclusion at the end on Lessons learnt on Homoeopathic Dispensing Techniques

## **Appendix H**

**Format for Maintaining record on Departmental Seminars**

Maintenance of Record on Seminar Presentation on Topics of Homoeopathic Pharmacy as assigned

Circular/Notice of Departmental Seminar

Title of Topic for Presentation,

Date

Presented by Name of Student/s

Brief Report on the Seminar

Any New Information provided by the Speakers

Rating on a Scale of 10

No of Students & Faculty Members attending the Seminar

Photos

Signed by the Departmental Head

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Course- Human physiology & Biochemistry

Course code: Hom UG - PB

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Principal  
Arihant Homoeopathic  
Medical College & R.I.  
Rathod, Gandhinagar

# COMPETENCY BASED DYNAMIC CURRICULUM FOR FIRST BHMS PROFESSIONAL COURSE

(Applicable from Batch 2022-2023 onwards for 5 years or until further notification by National Commission for Homoeopathy whichever is earlier)

(Human physiology & Biochemistry)



**HOMOEOPATHY EDUCATION BOARD**  
**NATIONAL COMMISSION FOR HOMOEOPATHY**  
**MINISTRY OF AYUSH, GOVERNMENT OF INDIA**

JAWAHAR LAL NEHRU BHARTIYA CHIKITSA AVUM HOMOEOPATHY ANUSANDHAN BHAVAN

No.61-65, Institutional Area, opp. 'D' block, Janak Puri, New Delhi-110 058

**Course-** Human physiology & Biochemistry

**Course code:** Hom UG - PB

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## **1. PREAMBLE**

Physiology studies the functional organization of man at several levels like atom, chemical, cells, tissues, organ systems and the whole body to understand fundamental mechanisms that operate in a living organism. The underlying goal is to explain the operations in a living organism.

Besides satisfying a natural curiosity about how humans function, the study of physiology is of central importance in medicine and related health sciences, as it underpins advances in our understanding of disease and our ability to treat it more effectively. It is also important from psychological and philosophical viewpoints, helping us to understand the different systems. Homoeopathic Philosophy postulates the force animating every cell as the Vital Force which helps in homoeostasis. When it is deranged due to web of causes, disease develops.

Homoeopath must understand Man in a holistic way which would help him to deliver the therapeutic action for the purpose of bringing about a cure. Understanding the structural organisation i.e., Anatomy along with psychological organisation go hand in hand. Their interplay maintains health and delivers optimum function for healthy living and progressing towards higher purpose as per Hahnemannian guidelines. Hence physiology needs to be integrated horizontally with Anatomy, Materia Medica, Organon of Medicine, Psychology & Pharmacy as well as vertically with Pathology, Surgery, Obstetrics & Gynaecology, Community Medicine, Practice of Medicine & Repertory for better grasp of health, disease and process of cure.

Advances in biochemical processes have been occurring at an astonishing pace. The action of homoeopathic medicines does occur at sub-cellular levels. Hence an in-depth understanding and correlation of the processes in health and disease can open up a whole new way of understanding Homoeopathic drugs and their far-reaching effects.

## **2.PROGRAMME OUTCOMES:**

At the end of the course of the undergraduate studies, the homoeopathic physician must

- 1) Develop the knowledge, skills, abilities and confidence as a primary care homoeopathic practitioner to attend to the health needs of the community in a holistic manner
- 2) Correctly assess and clinically diagnose common clinical conditions prevalent in the community from time to time
- 3) Identify and incorporate the socio-demographic, psychological, cultural, environmental & economic factors affecting health and disease in clinical work
- 4) Recognize the scope and limitation of homoeopathy in order to apply Homoeopathic principles for curative, prophylactic, promotive, palliative, and rehabilitative primary health care for the benefit of the individual and community
- 5) Be willing and able to practice homoeopathy as per medical ethics and professionalism.
- 6) Discern the scope and relevance of other systems of medical practice for rational use of cross referrals and role of life saving measures to address clinical emergencies
- 7) Develop the capacity for critical thinking, self reflection and a research orientation as required for developing evidence based homoeopathic practice.
- 8) Develop an aptitude for lifelong learning to be able to meet the changing demands of clinical practice
- 9) Develop the necessary communication skills and enabling attitudes to work as a responsible team member in various healthcare settings and contribute towards the larger goals of national health policies such as school health, community health and environmental conservation.

### **3. Course Outcomes (COs):**

At the end of the course the student will be able to:

1. Discuss the Homoeopathic concept of health in relation to integrated body structure and functions.
2. Explain the normal functioning of the human body at all levels of organization.
3. Relate the concept of homoeostasis with relevant ideas in Anatomy, Materia medica and Organon of Medicine at BHMS I level .
4. Elucidate the physiological aspects of normal growth and development with focus on evolution.
5. Correlate micro functions at cellular level with macro functions at organ-system level.
6. Use necessary communication skills required for history-taking of the patient & relating various clinical findings in the patient.
7. Perform experiments in haematology, clinical physiology & biochemistry as required for the study of physiological phenomena and for assessment of normal function.
8. Identify the normal values of haematology, clinical physiology & biochemistry.
9. Perform clinical – physiological examination under supervision.
10. Correlate knowledge of Organon & Materia Medica with Physiology.
11. Explain the integrated responses of the organ systems of the body to physiological and pathological stresses.

#### 4. TEACHING HOURS

| Sr No. | Subject                   | Theoretical Lecture | Practical / Tutorial / Seminar / Clinical Posting |
|--------|---------------------------|---------------------|---|
| 01     | PHYSIOLOGY & BIOCHEMISTRY | 325 hrs.            | 330 hrs.  |

#### Theory Wise Teaching Hours Distribution – 325 Hours

| Sr. No | Paper-I                                  |                |
|--------|--|----------------|
|        | List of System                           | Teaching Hours |
| 1      | General Physiology                       | 20             |
| 2      | Bio Physics Science                      | 15             |
| 3      | Skin & The Integumentary System          | 15             |
| 4      | Body fluids & Immune mechanism           | 35             |
| 5      | Nerve Muscle physiology                  | 15             |
| 6      | Cardiovascular system                    | 20             |
| 7      | Respiratory and Environmental Physiology | 25             |
| 8      | Renal Physiology                         | 20             |
|        | <b>Total</b>                             | <b>165</b>     |
| Sr. No | Paper-II                                 |                |
|        | List of System                           | Teaching Hours |
| 1      | Central Nervous System                   | 35             |
| 2      | Endocrinology                            | 30             |
| 3      | Reproduction                             | 15             |
| 4      | Special Senses                           | 20             |
| 5      | Digestion and Nutrition                  | 35             |
| 6      | Biochemistry                             | 25             |
|        | <b>Total</b>                             | <b>160</b>     |

**Practical / Clinical Physiology / OPD Wise Teaching Hours Distribution – 330 Hours**

| <b>Physiology – Practical – lab work</b> |  |                                    |                                 |
|--|--|------------------------------------|---------------------------------|
| <b>No</b>                                | <b>Practical</b>   | <b>Demonstration / Performance</b> | <b>Number of Teaching Hours</b> |
| <b>HAEMATOLOGY</b>                       |  |                                    |                                 |
| 1  | Study of the Compound Microscope                                       | Performance                        | 05                              |
| 2.                                       | Collection of Blood Samples  | Performance                        | 05                              |
| 3  | Estimation of Haemoglobin Concentration                                | Performance                        | 05                              |
| 4  | Determination of Haematocrit   | Demonstration                      | 05                              |
| 5  | Hemocytometry  | Performance                        | 05                              |
| 6  | Total RBC Count  | Performance                        | 10                              |
| 7  | Determination of RBC Indices   | Demonstration                      | 05                              |
| 8  | Total Leucocytes Count (TLC)   | Performance                        | 10                              |
| 9  | Preparation And Examination Of Blood Smear                             | Performance                        | 10                              |
| 10                                       | Differential Leucocyte Count (DLC)                                     | Performance                        | 10                              |
| 11                                       | Absolute Eosinophil Count  | Demonstration                      | 05                              |
| 12                                       | Determination of Erythrocyte Sedimentation Rate                        | Demonstration                      | 05                              |
| 13                                       | Determination of Blood Groups  | Performance                        | 05                              |
| 14                                       | Determination of Bleeding Time and Coagulation Time                    | Performance                        | 05                              |
| <b>BIOCHEMISTRY</b>                      |  |                                    |                                 |
| 1  | Demonstration of Uses Of Instruments Or Equipment                      | Demonstration                      | 05                              |
| 2  | Qualitative Analysis of Carbohydrates, Proteins And Lipids             | Performance                        | 10                              |
| 3  | Normal Characteristics of Urine  | Performance                        | 04                              |
| 4  | Abnormal Constituents of Urine   | Performance                        | 10                              |
| 5  | Quantitative Estimation of Glucose, Total Proteins, Uric Acid in Blood | Performance                        | 05                              |
| 6  | Liver Function Tests   | Demonstration                      | 04                              |
| 7  | Kidney Function Tests  | Demonstration                      | 04                              |
| 8  | Lipid Profile  | Demonstration                      | 04                              |
| 9  | <u>Interpretation and Discussion of Results of Biochemical Tests</u>   | Demonstration                      | 04                              |
|  | <b>Total</b>   |                                    | <b>140</b>                      |

| <b>CLINICAL PHYSIOLOGY</b>      |  |                             |            |
|---------------------------------|--|-----------------------------|------------|
| 1                               | Case Taking & Approach to pt   | Performance                 | 05         |
| 2                               | General Concept Of Examination   | Performance                 | 10         |
| 3                               | Examination of muscles, joints,  | Performance                 | 10         |
| 4                               | Cardio-Vascular System – Blood Pressure Recording, Radial Pulse, ECG, Clinical Examination | Performance                 | 15         |
| 5                               | Nervous System- Clinical Examination   | Performance                 | 15         |
| 6                               | Respiratory System- Clinical Examination, Spirometry, Stethography                         | Performance                 | 15         |
| 7                               | Special Senses- Clinical Examination   | Performance                 | 15         |
| 8                               | Reproductive System- Diagnosis of Pregnancy  | Performance                 | 05         |
| 9                               | Gastrointestinal System- Clinical Examination  | Performance                 | 10         |
|                                 | Total  |                             | <b>100</b> |
| <b>OPD – APPLIED PHYSIOLOGY</b> |  |                             |            |
| 1                               | OPD ( Applied Physiology )   | Demonstration & Performance | 90         |
|                                 | <b>TOTAL</b>   |                             | <b>90</b>  |

#### Semester Wise Distribution of Theory, Practical, Clinical Physiology & OPDs

| Sr. No  | Theory, Practical, Clinical Physiology & OPDs  |
|---|--|
| <b>SEMESTER - 1</b>   |  |
| Module 1.<br>Organization of the human body                                     | <b>Theory :</b> <ul style="list-style-type: none"> <li>General physiology</li> <li>Bio Physics Science</li> <li>Skin &amp; The integumentary System</li> </ul> <b>Clinical Physiology :</b> <ul style="list-style-type: none"> <li>Case Taking &amp; Approach to Patient</li> <li>General concept of examination.</li> </ul> |
| <b>Module 2</b><br>Principals of Support System & Movements with transportation | <b>Theory :</b> <ul style="list-style-type: none"> <li>Body Fluid &amp; Immune Mechanism</li> <li>Nerve Muscles Physiology</li> </ul>  |

|   |   |
|---|---|
|   | <p><b>Practical :</b></p> <ul style="list-style-type: none"> <li>• Study of the Compound Microscope</li> <li>• Collection of Blood Samples</li> <li>• Estimation of Haemoglobin Concentration</li> <li>• Determination of Haematocrit</li> <li>• Haemocytometry</li> <li>• Total RBC Count</li> <li>• Determination of RBC Indices</li> <li>• Total Leucocytes Count (TLC)</li> <li>• Preparation And Examination Of Blood Smear</li> <li>• Differential Leucocyte Count (DLC)</li> <li>• Absolute Eosinophil Count</li> <li>• Determination of Erythrocyte Sedimentation Rate</li> <li>• Determination of Blood Groups</li> <li>• Determination of Bleeding Time and Coagulation Time</li> </ul> <p><b>Clinical Physiology :</b><br/>Examination of muscles, joints,</p> |
| <p>4<sup>th</sup> Month – 5 days PA<br/>6<sup>th</sup> Month – 10 days TT – including Viva Voce</p> |   |
| <b>SEMESTER – 2</b>   |   |
| <p><b>Module 3.</b><br/>Vital Maintenance of the human body</p>                                     | <p><b>Theory :</b></p> <ul style="list-style-type: none"> <li>• Cardiovascular System</li> <li>• Respiratory &amp; Environmental Physiology</li> </ul> <p><b>Clinical Physiology :-</b></p> <ul style="list-style-type: none"> <li>• Cardio-Vascular System – Blood Pressure Recording, Radial Pulse, ECG, Clinical Examination</li> <li>• Respiratory System- Clinical Examination, Spirometry, Stethography</li> <li>• OPD ( Applied Physiology )</li> </ul>  |

|  |   |
|--|---|
| <b>Module 4.</b><br>Control system of the human body with continuity                           | <b>Theory :</b> <ul style="list-style-type: none"> <li>• Central Nervous System</li> <li>• Endocrinology</li> </ul> <b>Clinical Physiology :</b> <ul style="list-style-type: none"> <li>• Nervous System- Clinical Examination</li> <li>• Special Senses- Clinical Examination</li> <li>• Reproductive System – Diagnosis of pregnancy</li> <li>• OPD</li> </ul>  |
| 9 <sup>th</sup> Month – 5 days PA<br>12 <sup>th</sup> Month – 10 days TT – including Viva Voce |   |
| <b>SEMESTER - 3</b>  |   |
| <b>Module 5.</b><br><b>Energy maintenance of human body</b>                                    | <b>Theory :</b> <ul style="list-style-type: none"> <li>• Reproductive System</li> <li>• Special Senses</li> <li>• Digestion System &amp; Nutrition</li> <li>• Renal Physiology</li> <li>• Bio-Chemistry</li> </ul> <b>Practical : -</b> <ul style="list-style-type: none"> <li>• Demonstration of Uses Of Instruments Or Equipment</li> <li>• Qualitative Analysis of Carbohydrates, Proteins And Lipids</li> <li>• Normal Characteristics of Urine</li> <li>• Abnormal Constituents of Urine</li> <li>• Quantitative Estimation of Glucose, Total Proteins, Uric Acid in Blood</li> <li>• Liver Function Tests</li> <li>• Kidney Function Tests</li> <li>• Lipid Profile</li> <li>• Interpretation and Discussion of Results of Biochemical Tests</li> </ul> <b>Clinical Physiology :-</b> |

|   |  |
|---|--|
|   | <ul style="list-style-type: none"> <li>• Gastrointestinal System- Clinical Examination</li> <li>• OPD</li> </ul> |
| 14 <sup>th</sup> Month – 5 days PA<br>18 <sup>th</sup> Month – 12 days TT – including Viva Voce – University exam |  |

## 5.COURSE CONTENT

1. The purpose of a course in physiology is to enable the students to learn the functions, processes and inter-relationship of the different organs and systems of the normal disturbance in disease so that the student is familiar with normal standards of reference while diagnosing deviations from the normal, and while treating the patients.
2. There can be no symptoms of disease without vital force animating the human organism and it is primarily the vital force which is maintaining state of health
3. Physiology shall be taught from the stand point of describing physical processes underlying them in health;
4. Applied aspect of every system including the organs is to be stressed upon while teaching the subject.
5. Correlation with Organon and philosophy especially the concept of health and its derangement the interplay of different cell, tissue organ and system, their representation in repertory and integration in HMM
6. There should be close co-operation between the various departments while teaching the different systems;

7. There should be joint courses between the two departments of anatomy and physiology so that there is maximum co-ordination in the teaching of these subjects;
8. Seminars should be arranged periodically and lecturers of anatomy, physiology and bio-chemistry should bring home the point to the students that the integrated approach is more meaningful.

**THEORY:-**

**1. GENERAL PHYSIOLOGY:**

- Introduction to cellular physiology
- Cell Junctions
- Transport through cell membrane and resting membrane potential Body fluids compartments
- Homeostasis

**2. BIO-PHYSICAL SCIENCES**

- Filtration Ultra-filtration Osmosis
- Diffusion Adsorption Hydrotropy, Colloid
- Donnan Equilibrium Tracer elements Dialysis
- Absorption Assimilation Surface tension

**3. SKIN &THE INTEGUMENTARY SYSTEM**

- Skin & Integumentary System
- Layers of Skin
- Function of Skin
- Sweat
- Body temperature and its regulation

**4. BODY FLUID & IMMUNE MECHANISM**

- Blood
- Plasma Proteins
- Red Blood Cells
- Erythropoiesis
- Haemoglobin and Iron Metabolism

- Erythrocyte Sedimentation Rate
- Packed Cell Volume and Blood Indices
- Haemolysis and Fragility of Red Blood Cells
- White Blood Cell
- Immunity
- Platelets
- Haemostasis
- Coagulation of Blood
- Blood groups
- Blood Transfusion
- Blood volume
- Reticulo-endothelial System and Tissue Macrophage Lymphatic System and Lymph
- Tissue Fluid and Oedema

## **5. NERVE MUSCLE PHYSIOLOGY**

- Physiological properties of nerve fibres
- Nerve fibre- types, classification, function, Degeneration and regeneration of peripheral nerves
- Neuro-Muscular junction
- Physiology of Skeletal muscle
- Physiology of Cardiac muscle
- Physiology of Smooth muscle
- EMG

## **6. CARDIO-VASCULAR SYSTEM**

- Introduction to cardiovascular system Properties of cardiac muscle
- Cardiac cycle
- General principles of circulation Heart sounds
- Regulation of cardiovascular system
- Normal and abnormal Electrocardiogram (ECG)
- Cardiac output

- Heart rate
- Arterial blood pressure
- Radial Pulse
- Regional circulation- Cerebral, Splanchnic, Capillary, Cutaneous & skeletal muscle circulation.
- Cardiovascular adjustments during exercise

## **7. RESPIRATORY SYSTEM AND ENVIRONMENTAL PHYSIOLOGY**

- Physiological anatomy of respiratory tract
- Mechanism of respiration: Ventilation, diffusion of gases
- Transport of respiratory gases Regulation of respiration Pulmonary Function Test
- High altitude and space physiology Deep sea physiology
- Artificial respiration
- Effects of exercise on respiration

## **8. CENTRAL NERVOUS SYSTEM**

- Introduction to nervous system Neuron
- Neuroglia
- Receptors
- Synapse
- Neurotransmitters
- Reflex
- Spinal cord
- Somato-sensory system and somato-motor system Physiology of pain
- Brain stem, Vestibular apparatus
- Cerebral cortex
- Thalamus
- Hypothalamus
- Internal capsule
- Basal ganglia
- Limbic system

- Cerebellum – Posture and equilibrium
- Reticular formation
- Proprioceptors
- Higher intellectual function Electroencephalogram (EEG)
- Physiology of sleep
- Cerebro-spinal fluid (CSF) Autonomic Nervous System (ANS)

## **9. ENDOCRINOLOGY**

- Introduction of endocrinology and importance of PNEI axis Hormones and hypothalamo- hypophyseal axis
- Pituitary gland
- Thyroid gland
- Parathyroid
- Endocrine functions of pancreas Adrenal cortex
- Adrenal medulla
- Endocrine functions of other organs

## **10. REPRODUCTIVE SYSTEM**

- Male reproductive system-testis and its hormones; seminal vesicles, prostate gland, semen.
- Introduction to female reproductive system
- Menstrual cycle
- Ovulation
- Menopause
- Infertility
- Pregnancy and parturition Placenta
- Pregnancy tests
- Mammary glands and lactation Fertility
- Foetal circulation

## **11. SPECIAL SENSES**

- Eye: Photochemistry of vision, Visual pathway, Pupillary reflexes, Colour vision, Errors of refraction
- Ear: Auditory pathway, Mechanism of hearing, Auditory defects

- Sensation of taste: Taste receptors, Taste pathways
- Sensation of smell: Olfactory receptors, olfactory, pathways Sensation of touch

## **12. DIGESTIVE SYSTEM & NUTRITION**

- Introduction to digestive system
- Composition and functions of digestive juices
- Physiological anatomy of Stomach, Pancreas, Liver and Gall bladder, Small intestine, Large intestine
- Movements of gastrointestinal tract
- Gastrointestinal hormones
- Digestion and absorption of carbohydrates, proteins and lipids

## **13. RENAL PHYSIOLOGY**

- Physiological anatomy of kidneys and urinary tract
- Fluid & electrolyte with acid base balance need to be include
- Renal circulation
- Urine formation: Renal clearance, glomerular filtration, tubular reabsorption, selective secretion, concentration of urine, acidification of urine
- Renal functions tests
- Micturition

## **14. BIO-CHEMISTRY THEORY**

- Carbohydrates: (Chemistry, Metabolism, Glycolysis, TCA, HMP, Glycogen synthesis and degradation, Blood glucose regulation)
- Lipids: (Chemistry, Metabolism, Intestinal uptake, Fat transport, Utilization of stored fat, Activation of fatty acids, Beta oxidation and synthesis of fatty acids)
- Proteins: (Chemistry, Metabolism, Digestion of protein, Transamination, Deamination Fate of Ammonia, Urea cycle, End products of each amino acid and their entry into TCA cycle)
- Enzymes: (Definition, Classification, Biological Importance, Diagnostic use, Inhibition)
- Vitamins: (Daily requirements, Dietary source, Disorders and physiological role)
- Minerals (Daily requirement, Dietary Sources, Disorders and physiological role) mineral metabolism
- Organ function tests

**PRACTICAL & CLINICAL PHYSIOLOGY:-**

| No                                   | Practical  | Demonstration / Performance |
|--------------------------------------|--|-----------------------------|
| <b>Haematology</b>                   |  |                             |
| 1                                    | Study of the Compound Microscope                                       | Performance                 |
| 2.                                   | Collection of Blood Samples  | Performance                 |
| 3                                    | Estimation of Haemoglobin Concentration                                | Performance                 |
| 4                                    | Determination of Haematocrit   | Demonstration               |
| 5                                    | Hemocytometry  | Performance                 |
| 6                                    | Total RBC Count  | Performance                 |
| 7                                    | Determination of RBC Indices   | Demonstration               |
| 8                                    | Total Leucocytes Count (TLC)   | Performance                 |
| 9                                    | Preparation And Examination Of Blood Smear                             | Performance                 |
| 10                                   | Differential Leucocyte Count (DLC)                                     | Performance                 |
| 11                                   | Absolute Eosinophil Count  | Demonstration               |
| 12                                   | Determination of Erythrocyte Sedimentation Rate                        | Demonstration               |
| 13                                   | Determination of Blood Groups  | Performance                 |
| 14                                   | Determination of Bleeding Time and Coagulation Time                    | Performance                 |
| <b>Biochemistry</b>                  |  |                             |
| 1                                    | Demonstration of Uses Of Instruments Or Equipment                      | Demonstration               |
| 2                                    | Qualitative Analysis of Carbohydrates, Proteins And Lipids             | Performance                 |
| 3                                    | Normal Characteristics of Urine  | Performance                 |
| 4                                    | Abnormal Constituents of Urine   | Performance                 |
| 5                                    | Quantitative Estimation of Glucose, Total Proteins, Uric Acid in Blood | Performance                 |
| 6                                    | Liver Function Tests   | Demonstration               |
| 7                                    | Kidney Function Tests  | Demonstration               |
| 8                                    | Lipid Profile  | Demonstration               |
| 9                                    | Interpretation and Discussion of Results of Biochemical Tests          | Demonstration               |
| <b>Clinical Physiology &amp; OPD</b> |  |                             |
| 1                                    | Case Taking & Approach to pt   | Performance                 |
| 2                                    | General Concept Of Examination   | Performance                 |

|    |  |                             |
|----|--|-----------------------------|
| 3  | Examination of muscles, joints,  | Performance                 |
| 4  | Cardio-Vascular System – Blood Pressure Recording, Radial Pulse, ECG, Clinical Examination | Performance                 |
| 5  | Respiratory System- Clinical Examination, Spirometry, Stethography                         | Performance                 |
| 6  | Nervous System- Clinical Examination   | Performance                 |
| 7  | Special Senses- Clinical Examination   | Performance                 |
| 8  | Reproductive System- Diagnosis of Pregnancy  | Performance                 |
| 9  | Gastrointestinal System- Clinical Examination  | Performance                 |
| 10 | OPD  | Demonstration & Performance |

## 6. TEACHING LEARNING METHODS

Different teaching-learning methods must be apply for understanding holistic and integrated way of physiology. There has to be classroom lectures, small group discussions, case discussion where case based learning (CBL) and problem based learning (PBL). In the applied physiology, Case discussion (CBL-PBL) methods are helpful for students. AV – Methods for demonstration of physiological processes will be very helpful. In process of Clinical Physiology – DOAP (Demonstration – Observation – Assistance – Performance) is very well applicable.

Practical & Clinics are the best medium to demonstrate all physiological processes in objective ways. They help us to understand and explain the physiological signs. Haematological & Biochemistry practical are done in laboratory, where one can apply the DOAP (Demonstration – Observation – Assistance – Performance) & OSPE (Objective Structured Practical Examination) methods. All this should be recorded in the journal.

In the clinics / OPD / IPD / Bed side there shall be exposure of Clinical & Applied Physiology. These can be demonstrated by DOAP (Demonstration – Observation – Assistance – Performance) & OSCE (Objective Structured Clinical Examination) methods. These methods are more objective, and t will help students to develop the attitude as clinicians. In these type of exposure students has to observe the teachers or consultants and able to corelate what they have learned in clinical physiology classes. They do not have to examine the patient by themselves but only observe the teachers. They can keep the record of all physiological function which are disturbed.

Other Innovative methods include preparation of charts and models.

## 7.CONTENT MAPPING (COMPETENCY TABLE)

### SEMESTER – 1

|                            |  |
|----------------------------|--|
| <b>Topic No</b>            | <b>1</b>                                     |
| <b>Theory</b>              | <b>General Physiology</b>                    |
| <b>Practical</b>           | -  |
| <b>Clinical Physiology</b> | <b>Case Taking &amp; Approach to Patient</b> |

#### Learning Outcome: -

At the end of the chapter General Physiology, the student must be able to –

- Discuss the principles of cellular physiology.
- Classify cell junctions.
- Explain the process of transport through cell membrane
- Describe the resting membrane potential.
- Categorise body fluids compartments.
- Explain the concept of homeostasis

| S.No          | Generic competency                | Subject area        | Miller's Level | Specific competency               | Specific Learning Objectives / outcomes                                | Bloom's domain | Guilbert's level               | Must know/ desirable to know / nice to know | TL method / media               | Formative Assessment | Summative Assessment | Integration - Horizontal / Vertical / Spiral |
|---------------|-----------------------------------|---------------------|----------------|-----------------------------------|--|----------------|--------------------------------|---|---------------------------------|----------------------|----------------------|--|
| Hom UG-PB 1.1 | Integration Of Information ( K-1) | Introduction & Cell | Knows          | Definition & general introduction | Define Physiology.   | Cognitive      | Level 1 (Remember / recall)    | Must know                                   | Lecture, Small group discussion | MCQs                 | –                    |  |
| Hom UG-PB 1.2 |                                   |                     | Knows How      |                                   | Discuss the importance of learning physiology in a homoeopathic course | Cognitive      | Level 2 Understand / interpret | Must know                                   | Lecture, Small group discussion | MCQs                 | Viva Voce            | Organon                                      |
| Hom UG-PB 1.3 |                                   |                     | Knows How      |                                   | Discuss the Internal & external  | Cognitive      | Level 2 Understand / interpret | Desirable to Know                           | Lecture, Small group discussion | SAQs                 | SAQs, Viva Voce      |  |

|                |                                   |                                 |             |  |  |           |                                |                   |                                 |      |                 |                            |
|----------------|-----------------------------------|---------------------------------|-------------|--|--|-----------|--------------------------------|-------------------|---------------------------------|------|-----------------|----------------------------|
|                |                                   |                                 |             |  | environment of Body                              |           |                                |                   |                                 |      |                 |                            |
| Hom UG-PB 1.4  | Integration Of Information ( K-1) | Homeostasis                     | Knows How W | Describe and discuss the principles of homeostasis       | Explain the regulation of internal environment   | Cognitive | Level 2 Understand / interpret | Desirable to know | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Medicine Pathology Organon |
| Hom UG-PB 1.5  |                                   |                                 | Knows How   |  | Explain homoeostasis & it's control              | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | MCQs | LAQs, Viva Voce |                            |
| Hom UG-PB 1.6  | Integration Of Information ( K-1) | The Cellular Level Organisation | Knows How   | Describe the structure and functions of a mammalian cell | Describe the structure of cell                   | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs | LAQs, Viva Voce | Anatomy Pathology          |
| Hom UG-PB 1.7  |                                   |                                 | Knows How   |  | Describe the functions of cell                   | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Pathology Organon          |
| Hom UG-PB 1.8  |                                   |                                 | Knows       |  | List the organelles present in cell              | Cognitive | Level 1 (Remember / recall)    | Must know         | Lecture, Small group discussion | MCQs | SAQs, Viva Voce |                            |
| Hom UG-PB 1.9  |                                   |                                 | Knows       |  | Enumerate the functions of organelles            | Cognitive | Level 1 (Remember / recall)    | Must Know         | Lecture, Small group discussion | SAQs | LAQs, Viva Voce | Pathology                  |
| Hom UG-PB 1.10 |                                   |                                 | Knows       |  | List the name of intracellular junction          | Cognitive | Level 1 (Remember / recall)    | Desirable to Know | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Anatomy                    |
| Hom UG-PB 1.11 |                                   |                                 | Knows How   |  | Discuss the importance of intracellular Junction | Cognitive | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion | MCQs | Viva Voce       | Anatomy                    |

|                |   |                               |           |  |                                    |           |                                |                   |                                 |             |                 |              |
|----------------|---|-------------------------------|-----------|--|------------------------------------|-----------|--------------------------------|-------------------|---------------------------------|-------------|-----------------|--------------|
| Hom UG-PB 1.12 | Integration Of Information ( K-1)   |                               | Knows How | To understand transport mechanisms across cell membranes | Explain Passive transportation     | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion | SAQs        | SAQs, Viva Voce | Biochemistry |
| Hom UG-PB 1.13 |   |                               | Knows How |  | Explain Active Transportation      | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion | SAQs        | SAQs, Viva Voce | Biochemistry |
| Hom UG-PB 1.14 |   |                               | Knows How |  | Explain Vesicular Transportation   | Cognitive | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion | SAQs        | SAQs, Viva Voce | Biochemistry |
| Hom UG-PB 1.15 | Information Gathering , Integration Of information, Problem Integration (K-2) | Clinical & Applied Physiology | Shows How | To conduct History taking                                | Demonstrate history taking process | Affective | Level 1 Receiving              | Must know         | Demonstration, Role Play        | Observation | DOPS            |              |

|                            |                            |
|----------------------------|----------------------------|
| <b>Topic No</b>            | <b>2</b>                   |
| <b>Theory</b>              | <b>Bio Physics Science</b> |
| <b>Practical</b>           | -                          |
| <b>Clinical Physiology</b> | -                          |

### Learning Outcomes: -

At the end of the chapter Bio Physics Science, the student must be able to –

- Define biophysics.
- Illustrate the biophysical activity across the cell membrane.
- Explain membrane potential.
- Describe the chemical bond & solution.

| S.No          | Generic competency                | Subject area        | Miller's Level | Specific competency                                     | Specific Learning Objectives / outcomes                | Bloom's domain | Guilbert's level               | Must know / desirable to know / nice to know | TL method / media               | Formative Assessment | Summative Assessment | Integration - Horizontal / Vertical / Spiral |
|---------------|-----------------------------------|---------------------|----------------|---|--|----------------|--------------------------------|--|---------------------------------|----------------------|----------------------|--|
| Hom UG-PB 2.1 | Integration Of Information ( K-1) | Bio Physics Science | Knows          | To understand the bio-Physical science of cell membrane | Define the terms Filtration& Ultrafiltration           | Cognitive      | Level 1 (Remember / recall)    | Nice to know                                 | Lecture, Small group discussion | SAQs                 | SAQs, Viva Voce      | Biochemistry                                 |
| Hom UG-PB 2.2 |                                   |                     | Knows          |   | Define intra cellular communication                    | Cognitive      | Level 1 (Remember / recall)    | Nice to know                                 | Lecture, Small group discussion | SAQs                 | SAQs, Viva Voce      | Biochemistry                                 |
| Hom UG-PB 2.3 |                                   |                     | Knows          |   | Define the terms adsorption & Absorption               | Cognitive      | Level 1 (Remember / recall)    | Nice to know                                 | Lecture, Small group discussion | SAQs                 | SAQs, Viva Voce      | Biochemistry                                 |
| Hom UG-PB 2.4 |                                   |                     | Knows          |   | Define the terms Hydro trophy, Dialysis & Assimilation | Cognitive      | Level 1 (Remember / recall)    | Nice to know                                 | Lecture, Small group discussion | SAQs                 | SAQs, Viva Voce      | Biochemistry Medicine                        |
| Hom UG-PB 2.5 |                                   |                     | Knows          |   | Define Surface Tension                                 | Cognitive      | Level 1 (Remember / recall)    | Desirable to Know                            | Lecture, Small group discussion | SAQs                 | SAQs, Viva Voce      | Biochemistry Medicine                        |
| Hom UG-PB 2.6 | Integration Of Information ( K-1) | Bio Physics Science | Knows How      | Discuss the Membrane Physiology &Membrane Potential     | Explain Action Potential                               | Cognitive      | Level 2 Understand / interpret | Must know                                    | Lecture, Small group discussion | SAQs                 | SAQs, Viva Voce      | Biochemistry                                 |
| Hom UG-PB 2.7 |                                   |                     | Knows          |   | Define Donnan Equilibrium                              | Cognitive      | Level 1 (Remember / recall)    | Nice to know                                 | Lecture, Small group discussion | SAQs                 | SAQs, Viva Voce      | Biochemistry                                 |

|                |                                   |                                 |           |  |  |           |                                |                   |                                 |      |                 |              |
|----------------|-----------------------------------|---------------------------------|-----------|--|--|-----------|--------------------------------|-------------------|---------------------------------|------|-----------------|--------------|
| Hom UG-PB 2.8  |                                   |                                 | Knows     |  | Define Transmembrane Potential                                     | Cognitive | Level 1 (Remember / recall)    | Desirable to Know | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Biochemistry |
| Hom UG-PB 2.9  |                                   |                                 | Knows How |  | Explain nerve action potential                                     | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs | SAQs, Viva Voce |              |
| Hom UG-PB 2.10 |                                   |                                 | Knows     |  | Define Tracer Elements   | Cognitive | Level 1 (Remember / recall)    | Nice to know      | Lecture, Small group discussion | SAQs | SAQs, Viva Voce |              |
| Hom UG-PB 2.11 |                                   |                                 | Knows     |  | Define Rhythmicity of some excitable tissues                       | Cognitive | Level 1 (Remember / recall)    | Nice to know      | Lecture, Small group discussion | SAQs | SAQs, Viva Voce |              |
| Hom UG-PB 2.12 | Integration Of Information ( K-1) | The Chemical Level Organisation | Knows How | Understand the chemical bonds                | Describe the Ionic Bond  | Cognitive | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Biochemistry |
| Hom UG-PB 2.13 |                                   |                                 | Knows How |  | Describe the covalent bond   | Cognitive | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Biochemistry |
| Hom UG-PB 2.14 |                                   |                                 | Knows How |  | Describe the Hydrogen Bond   | Cognitive | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion | SAQs | Viva Voce       | Biochemistry |
| Hom UG-PB 2.15 | Integration Of Information ( K-1) |                                 | Knows     | Understand the inorganic Compound & Solution | Define the terms Colloid, Solution & Suspension                    | Cognitive | Level 1 (Remember / recall)    | Desirable to know | Lecture, Small group discussion | MCQs | SAQs, Viva Voce | Biochemistry |
| Hom UG-PB 2.16 |                                   |                                 | Knows How |  | Discuss the characteristics of acids, Base & Salts                 | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Biochemistry |
| Hom UG-PB 2.17 |                                   |                                 | Knows How |  | Discuss acid - base balance & its application to the concept of pH | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Biochemistry |

|                      |  |  |              |  |  |           |                                      |           |                                       |      |                       |              |
|----------------------|--|--|--------------|--|--|-----------|--------------------------------------|-----------|---------------------------------------|------|-----------------------|--------------|
| Hom<br>UG-PB<br>2.18 |  |  | Knows<br>How |  | Describe the<br>maintaining of<br>pH: Buffer<br>System | Cognitive | Level 2<br>Understand<br>/ interpret | Must know | Lecture,<br>Small group<br>discussion | MCQs | SAQs,<br>Viva<br>Voce | Biochemistry |
|----------------------|--|--|--------------|--|--|-----------|--------------------------------------|-----------|---------------------------------------|------|-----------------------|--------------|

|                            |   |
|----------------------------|---|
| <b>Topic No</b>            | <b>3</b>                                    |
| <b>Theory</b>              | <b>Skin &amp; The Integumentary System</b>  |
| <b>Practical</b>           | -   |
| <b>Clinical Physiology</b> | <b>Demonstration of General Examination</b> |

**Learning Outcomes: -**

At the end of the chapter Skin & the Integumentary System, the student must be able to –

- Discuss the functions of skin, nail, and hair.
- Conduct examination of the Integumentary System under supervision.

| S.No          | Generic competency                                  | Subject area                    | Miller's Level | Specific competency                         | Specific Learning Objectives / outcomes                               | Bloom's domain | Guilbert's level               | Must know/ desirable to know / nice to know | TL method / media               | Formative Assessment | Summative Assessment | Integration - Horizontal / Vertical / Spiral     |
|---------------|---|---------------------------------|----------------|---|---|----------------|--------------------------------|---|---------------------------------|----------------------|----------------------|--|
| Hom UG-PB 3.1 | Integration Of Information ( K-1)                   | Skin & The Integumentary System | Knows How      | Understand the Structure & function of Skin | Discuss layers of skin with their functions                           | Cognitive      | Level 2 Understand / interpret | Must know                                   | Lecture, Small group discussion | SAQs                 | SAQs, Viva Voce      | Anatomy Medicine Organon Materia Medica Pharmacy |
| Hom UG-PB 3.2 |   |                                 | Knows How      |   | Relate the structure of hair with its function                        | Cognitive      | Level 2 Understand / interpret | Must Know                                   | Lecture, Small group discussion | SAQs                 | LAQs, Viva Voce      | Anatomy  |
| Hom UG-PB 3.3 |   |                                 | Knows How      |   | Relate the structure of nail with its function                        | Cognitive      | Level 2 Understand / interpret | Desirable To Know                           | Lecture, Small group discussion | SAQs                 | SAQs, Viva Voce      | Anatomy  |
| Hom UG-PB 3.4 |   |                                 | Knows How      |   | Relate the structure of different glands of skin with their functions | Cognitive      | Level 2 Understand / interpret | Must Know                                   | Lecture, Small group discussion | SAQs                 | SAQs, Viva Voce      | Anatomy  |
| Hom UG-PB 3.5 |   |                                 | Knows How      |   | Describe the glands of skin   | Cognitive      | Level 2 Understand / interpret | Must Know                                   | Lecture, Small group discussion | MCQs                 | SAQs, Viva Voce      |  |
| Hom UG-PB 3.6 |   |                                 | Knows How      |   | Explain the regulation of body temperature through skin               | Cognitive      | Level 2 Understand / interpret | Must know                                   | Lecture, Small group discussion | SAQs                 | LAQs, Viva Voce      | Medicine   |
| Hom UG-PB 3.7 | Information Gathering , Integration Of information, | Clinical & Applied              | Shows How      | To demonstrate General examination          | Demonstrate the examination of Skin & Mucus Membrane                  | Psycho Motor   | Level 1 Observe / Imitate      | Must know                                   | DOAP                            | Observation          | OSCE                 | Medicine   |

|                     |                                 |            |              |  |  |                 |                                 |           |      |             |      |          |
|---------------------|---------------------------------|------------|--------------|--|--|-----------------|---------------------------------|-----------|------|-------------|------|----------|
| Hom<br>UG-PB<br>3.8 | Problem<br>Integration<br>(K-2) | Physiology | Shows<br>How |  | Demonstrate the<br>examination of<br>Conjunctive, Nail<br>& Glands | Psycho<br>Motor | Level 1<br>Observe /<br>Imitate | Must know | DOAP | Observation | OSCE | Medicine |
|---------------------|---------------------------------|------------|--------------|--|--|-----------------|---------------------------------|-----------|------|-------------|------|----------|

|                            |  |
|----------------------------|--|
| <b>Topic No</b>            | <b>4</b>   |
| <b>Theory</b>              | <b>Nerve Muscle Physiology</b>   |
| <b>Practical</b>           | -  |
| <b>Clinical Physiology</b> | <b>Demonstrate effect of mild, moderate and severe exercise and record changes in cardiorespiratory parameters<br/>Perform Ergography, Examination of muscles, joints,</b> |

**Learning Outcomes: -**

At the end of the chapter Nerve Muscle Physiology, the student must be able to –

- Discuss the properties and functions of neurons.
- Illustrate a neuromuscular junction.
- Classify muscle fibres.
- Describe the properties of skeletal, cardiac, and smooth muscle fibres.
- Demonstrate effect of mild, moderate and severe exercise and record changes in cardiorespiratory parameters.

- Perform Ergography under supervision.

| S.No          | Generic competency                | Subject area            | Miller's Level   | Specific competency                                     | Specific Learning Objectives / outcomes             | Bloom's domain                 | Guilbert's level               | Must know / desirable to know / nice to know | TL method / media               | Formative Assessment | Summative Assessment | Integration - Horizontal / Vertical / Spiral |
|---------------|-----------------------------------|-------------------------|--|---|---|--------------------------------|--------------------------------|--|---------------------------------|----------------------|----------------------|--|
| Hom UG-PB 4.1 | Integration Of Information ( K-1) | Nerve Muscle Physiology | Knows  | To understand the functional anatomy of Nerve fibers    | Define Neuron<br>Classify neurons                   | Cognitive                      | Level 1 (Remember/recall)      | Must know                                    | Lecture, Small group discussion | SAQs                 | SAQs, Viva Voce      | Anatomy                                      |
| Hom UG-PB 4.2 |                                   |                         | Knows How  |   | Explain structure and function of neuroglia         | Cognitive                      | Level 2 Understand / interpret | Must know                                    | Lecture, Small group discussion | MCQs                 | SAQs, Viva Voce      | Anatomy                                      |
| Hom UG-PB 4.3 | Knows                             |                         | To understand the physiological properties of nerve fibers | Define the terms<br>Excitability & Conductivity         | Cognitive   | Level 1 (Remember/recall)      | Desirable To Know              | Lecture, Small group discussion              | SAQs                            | SAQs Viva Voce       |                      |  |
| Hom UG-PB 4.4 | Knows How                         |                         |  | Discuss graded & action potential                       | Cognitive   | Level 2 Understand / interpret | Must know                      | Lecture, Small group discussion              | MCQs                            | SAQs, Viva Voce      |                      |  |
| Hom UG-PB 4.5 | Integration Of Information ( K-1) |                         | Knows How  | To understand the degeneration & regeneration of neuron | Discuss the causes & grade of injury                | Cognitive                      | Level 2 Understand / interpret | Must know                                    | Lecture, Small group discussion | MCQs                 | SAQs, Viva Voce      | Medicine                                     |
| Hom UG-PB 4.6 |                                   |                         | Knows How  |   | Identify the stages of degeneration                 | Cognitive                      | Level 2 Understand / interpret | Desirable To Know                            | Lecture, Small group discussion | SAQs                 | SAQs, Viva Voce      | Pathology                                    |
| Hom UG-PB 4.7 |                                   |                         | Knows How  |   | Discuss the stages of regeneration                  | Cognitive                      | Level 2 Understand / interpret | Desirable To Know                            | Lecture, Small group discussion | SAQs                 | SAQs, Viva Voce      |  |
| Hom UG-PB 4.8 | Integration Of Information ( K-1) |                         | Knows How  | To describe Neuromuscular Junction                      | Illustrate the Structure of Neuro-Muscular Junction | Cognitive                      | Level 2 Understand / interpret | Must know                                    | Lecture, Small group discussion | SAQs                 | SAQs, Viva Voce      | Anatomy                                      |

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| Hom UG-PB 4.9  | Integration Of Information ( K-1) |  | Knows How |   | Discuss the Neuromuscular Transmission   | Cognitive | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion           | SAQs | Viva Voce       | Anatomy  |
| Hom UG-PB 4.10 |                                   |  | Knows How |   | Discuss Disorders of neuromuscular Junction  | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion, CBL, PBL | MCQs | SAQs, Viva Voce | Medicine |
| Hom UG-PB 4.11 |                                   |  | Knows How | To understand the physiological properties of Skeletal Muscle | Illustrate the mechanism of skeletal muscle contraction. Describe the general mechanism of muscle contraction. | Cognitive | Level 2 Understand / interpret | Desirable To Know | Lecture, Small group discussion           | SAQs | SAQs, Viva Voce | Anatomy  |
| Hom UG-PB 4.12 |                                   |  | Knows How |   | Discuss Molecular mechanism  | Cognitive | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion           | SAQs | Viva Voce       |          |
| Hom UG-PB 4.13 |                                   |  | Knows How |   | Discuss Energetic of muscle contraction  | Cognitive | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion           | SAQs | Viva Voce       | Anatomy  |
| Hom UG-PB 4.14 |                                   |  | Knows How |   | Discuss Excitation of skeletal muscle  | Cognitive | Level 2 Understand / interpret | Desirable To Know | Lecture, Small group discussion           | SAQs | SAQs, Viva Voce |          |
| Hom UG-PB 4.15 | Integration Of Information ( K-1) |  | Knows How | To understand the physiological properties of Smooth Muscle   | Explain Contraction of smooth muscle   | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion           | SAQs | LAQs, Viva Voce | Anatomy  |
| Hom UG-PB 4.16 |                                   |  | Knows How |   | Explain Nervous & hormonal control of smooth muscle contraction  | Cognitive | Level 2 Understand / interpret | Desirable To Know | Lecture, Small group discussion           | SAQs | SAQs, Viva Voce | Medicine |

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| Hom UG-PB 4.17 | Integration Of Information ( K-1)   |   | Knows How | To understand the physiological properties of Cardiac Muscle   | Illustrate Functional Anatomy of cardiac Muscle                    | Cognitive    | Level 2 Understand / interpret | Must know    | Lecture, Small group discussion | SAQs        | LAQs, Viva Voce | Anatomy  |
| Hom UG-PB 4.18 |   |   | Knows How |  | Explain process of excitability & contractility                    | Cognitive    | Level 2 Understand / interpret | Must know    | Lecture, Small group discussion | MCQs        | SAQs, Viva Voce | Anatomy  |
| Hom UG-PB 4.19 |   |   | Knows How |  | Explain properties of cardiac muscle                               | Cognitive    | Level 2 Understand / interpret | Must know    | Lecture, Small group discussion | MCQs        | SAQs, Viva Voce | Medicine |
| Hom UG-PB 4.20 |   |   | Knows How |  | Discuss the disorders of Skeletal Muscles                          | Cognitive    | Level 2 Understand / interpret | Nice to know | Lecture, Small group discussion | SAQs        | SAQs, Viva Voce | Medicine |
| Hom UG-PB 4.21 | Information Gathering , Integration Of information, Problem Integration (K-2) | Clinical & Applied Physiology Of Muscle | Shows How | Demonstrate effect of mild, moderate and severe exercise and record changes in cardio - respiratory parameters | Measure the parameters of cardio-pulmonary changes during exercise | Psycho Motor | Level 2 Control                | Must Know    | Demonstration                   | Observation | OSCE            | Medicine |
| Hom UG-PB 4.22 |   |   | Shows How | Perform Ergography   | Demonstrate the sequence of performing ergography.                 | Psycho Motor | Level 1 Observe / Imitate      | Nice to know | Demonstration                   | Observation | OSCE            | Medicine |

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| <b>Topic No</b>            | <b>5</b>                                |
| <b>Theory</b>              | <b>Body Fluid&amp; Immune Mechanism</b> |
| <b>Practical</b>           | <b>Hematology</b>                       |
| <b>Clinical Physiology</b> |   |

**Learning Outcomes: -**

At the end of the chapter on Body Fluid & Immune System & Hematology, the student must be able to –

- Describe the composition and functions of blood components
- Describe the origin, Forms, Variations and functions of plasma Protein
- Illustrate the synthesis of Haemoglobin
- Describe RBC formation (erythropoiesis) and its regulation
- Describe WBC formation (granulopoiesis) and its regulation
- Classify Anaemias & Jaundice
- Explain the role of lymphoid tissues in immune responses
- Classify different types of immunity
- Describe the development and regulation of immunity.
- Explain the formation and functions of platelets.
- Illustrate the physiological basis of haemostasis
- Describe different blood groups
- Discuss the clinical importance of blood grouping

- Describe blood transfusion
- Estimate Hb, RBC, TLC, RBC indices, DLC, Blood groups, BT/CT

| S.No          | Generic competency                | Subject area                      | Miller's Level | Specific competency  | Specific Learning Objectives / outcomes            | Bloom's domain | Guilbert's level               | Must know / desirable to know / nice to know | TL method / media               | Formative Assessment | Summative Assessment | Integration - Horizontal / Vertical / Spiral |
|---------------|-----------------------------------|-----------------------------------|----------------|--|--|----------------|--------------------------------|--|---------------------------------|----------------------|----------------------|--|
| Hom UG-PB 5.1 | Integration Of Information ( K-1) | Blood Fluid and It's Constituents | Knows How      | Describe the composition and functions of blood components             | Discuss the composition of Blood                   | Cognitive      | Level 2 Understand / interpret | Must know                                    | Lecture, Small group discussion | MCQs                 | LAQs, Viva Voce      | Anatomy                                      |
| Hom UG-PB 5.2 |                                   |                                   | Knows How      |  | Describe the function of blood                     | Cognitive      | Level 2 Understand / interpret | Must know                                    | Lecture, Small group discussion | SAQs                 | LAQs, Viva Voce      | Anatomy Pathology Medicine                   |
| Hom UG-PB 5.3 |                                   |                                   | Knows          |  | Define serum                                       | Cognitive      | Level 1 recall                 | Must Know                                    | Lecture, Small group discussion | SAQs                 | SAQs, Viva Voce      | Pathology Medicine                           |
| Hom UG-PB 5.4 |                                   |                                   | Knows How      |  | Explain the difference between serum & Plasma      | Cognitive      | Level 2 Understand / interpret | Desirable to Know                            | Lecture, Small group discussion | MCQs                 | SAQs, Viva Voce      | Biochemistry                                 |
| Hom UG-PB 5.5 | Integration Of Information ( K-1) |                                   | Knows How      | Describe the origin, Forms, Variations and functions of plasma Protein | Discuss the origin of plasma protein               | Cognitive      | Level 2 Understand / interpret | Must know                                    | Lecture, Small group discussion | SAQs                 | SAQs, Viva Voce      | Biochemistry                                 |
| Hom UG-PB 5.6 |                                   |                                   | Knows How      |  | Explain the forms and functions of plasma proteins | Cognitive      | Level 2 Understand / interpret | Must know                                    | Lecture, Small group discussion | SAQs                 | LAQs, Viva Voce      | Pathology                                    |

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| Hom UG-PB 5.7  |                                   |  | Knows How |  | Identify the relation of diet to plasma protein          | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion | SAQs | SAQs, Viva Voce |                             |
| Hom UG-PB 5.8  | Integration Of Information ( K-1) |  | Knows How | Describe and discuss the synthesis and functions of Haemoglobin            | Illustrate the structure of Haemoglobin                  | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Biochemistry                |
| Hom UG-PB 5.9  |                                   |  | Knows How |  | Discuss the synthesis of Haemoglobin                     | Cognitive | Level 2 Understand / interpret | Must Know         | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Biochemistry                |
| Hom UG-PB 5.10 |                                   |  | Knows     |  | Define Normal function of Haemoglobin                    | Cognitive | Level 1 recall                 | Must know         | Lecture, Small group discussion | SAQs | LAQs, Viva Voce | Biochemistry Materia Medica |
| Hom UG-PB 5.11 |                                   |  | Knows     |  | State normal Value of different varieties of Haemoglobin | Cognitive | Level 1 recall                 | Must know         | Lecture, Small group discussion | MCQs | SAQs, Viva Voce | Medicine                    |
| Hom UG-PB 5.12 |                                   |  | Knows How |  | Explain Iron metabolism                                  | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Biochemistry                |
| Hom UG-PB 5.13 | Integration Of Information ( K-1) |  | Knows How | Describe RBC formation (erythropoiesis & its regulation) and its functions | Discuss the normal structure of RBC with its morphology  | Cognitive | Level 2 Understand / interpret | Desire to Know    | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Anatomy Pathology Medicine  |
| Hom UG-PB 5.14 |                                   |  | Knows How |  | discuss stages and regulation of erythropoiesis          | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs | LAQs, Viva Voce |                             |
| Hom UG-PB 5.15 |                                   |  | Knows How |  | Discuss the fate of RBC                                  | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion | SAQs | SAQs, Viva Voce |                             |
| Hom UG-PB 5.16 |                                   |  | Knows How |  | Discuss the hemolysis                                    | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group            | SAQs | SAQs, Viva Voce | Medicine FMT                |

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|                      |  |  |              |  |  |           |                                      |                      | discussion,<br>CBL                                 |      |                       |  |  |
| Hom<br>UG-PB<br>5.17 | Information<br>Gathering<br>,Integration<br>Of<br>information<br>, Problem<br>Integration<br>(K-2) |  | Knows<br>How | Describe<br>different types<br>of anemia &<br>Jaundice | Classify the<br>anemia<br>according to<br>their morphology<br>& etiology | Cognitive | Level 2<br>Understand<br>/ interpret | Must know            | Lecture,<br>Small group<br>discussion,<br>CBL, PBL | MCQs | LAQs,<br>Viva<br>Voce | Medicine,<br>Pathology                                   |  |
| Hom<br>UG-PB<br>5.18 |  |  | Knows<br>How |  | Discuss the<br>different anemia  | Cognitive | Level 2<br>Understand<br>/ interpret | Desirable to<br>know | Lecture,<br>Small group<br>discussion,<br>CBL, PBL | MCQs | LAQs,<br>Viva<br>Voce | Medicine,<br>Pathology<br>Materia<br>Medica<br>Repertory |  |
| Hom<br>UG-PB<br>5.19 |  |  | Knows<br>How |  | Enumerate the<br>different<br>abnormal<br>functions in<br>anaemia        | Cognitive | Level 2<br>Understand<br>/ interpret | Desirable to<br>know | Lecture,<br>Small group<br>discussion,<br>CBL, PBL | SAQs | SAQs,<br>Viva<br>Voce | Medicine   |  |
| Hom<br>UG-PB<br>5.20 |  |  | Knows<br>How |  | Discuss the fate<br>of bilirubin   | Cognitive | Level 2<br>Understand<br>/ interpret | Desirable to<br>Know | Lecture,<br>Small group<br>discussion,<br>CBL      | SAQs | SAQs,<br>Viva<br>Voce | Medicine,<br>Pathology<br>Materia<br>Medica<br>Repertory |  |
| Hom<br>UG-PB<br>5.21 |  |  | Knows<br>How |  | Explain<br>Physiological<br>Jaundice                                     | Cognitive | Level 2<br>Understand<br>/ interpret | Desirable to<br>Know | Lecture,<br>Small group<br>discussion,<br>CBL      | SAQs | SAQs,<br>Viva<br>Voce | Materia<br>Medica<br>Repertory                           |  |
| Hom<br>UG-PB<br>5.22 |  |  | Knows<br>How |  | Explain Jaundice<br>in new-born  | Cognitive | Level 2<br>Understand<br>/ interpret | Nice to Know         | Lecture,<br>Small group<br>discussion,<br>CBL      | SAQs | SAQs,<br>Viva<br>Voce | Medicine<br>Materia<br>Medica<br>Repertory               |  |
| Hom<br>UG-PB<br>5.23 | Integration<br>Of<br>Information<br>( K-1)   |  | Knows<br>How | Describe WBC<br>formation<br>(granulopoiesis           | Explain different<br>condition of<br>leucocyte count<br>in our body      | Cognitive | Level 2<br>Understand<br>/ interpret | Must know            | Lecture,<br>Small group<br>discussion              | MCQs | SAQs,<br>Viva<br>Voce | Medicine<br>Pathology                                    |  |

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| Hom UG-PB 5.24 |                                   |  | Knows How | ) and its regulation   | Classify different type of WBCs                               | Cognitive | Level 2 Understand / interpret   | Must Know         | Lecture, Small group discussion | SAQs | LAQs, Viva Voce | Pathology                  |  |
| Hom UG-PB 5.25 |                                   |  | Knows How |  | Discuss the function of WBCs as per their classification      | Cognitive | Level 2 Understand / interpret   | Must know         | Lecture, Small group discussion | SAQs | LAQs, Viva Voce | Pathology Medicine         |  |
| Hom UG-PB 5.26 |                                   |  | Knows How |  | Discuss the phagocytosis                                      | Cognitive | Level 2 Understand / interpret   | Desirable to Know | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Pathology                  |  |
| Hom UG-PB 5.27 |                                   |  | Knows How |  | Discuss the stages of leucopoiesis with its regulation        | Cognitive | Level 2 Understand / interpret   | Must Know         | Lecture, Small group discussion | SAQs | SAQs, Viva Voce |                            |  |
| Hom UG-PB 5.28 |                                   |  | Knows How |  | Discuss the conditions that cause abnormal value of leucocyte | Cognitive | Level 2 Understand / interpret   | Desirable to Know | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Medicine Surgery Pathology |  |
| Hom UG-PB 5.29 | Integration Of Information ( K-1) |  | Knows How | Describe the formation of platelets, functions and variations. | Discuss the structure & function of Platelets                 | Cognitive | Level 2 Understand / interpret   | Must Know         | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Medicine Pathology         |  |
| Hom UG-PB 5.30 |                                   |  | Knows How |  | Describe the Thrombopoiesis                                   | Cognitive | Level 2 Understand / interpret   | Must Know         | Lecture, Small group discussion | SAQs | SAQs, Viva Voce |                            |  |
| Hom UG-PB 5.31 |                                   |  | Knows How |  | Discuss its count & variation of platelets                    | Cognitive | Level 2 Understand / interpret   | Must know         | Lecture, Small group discussion | MCQs | SAQs, Viva Voce | Medicine                   |  |
| Hom UG-PB 5.32 | Integration Of                    |  | Knows How | Describe the physiological                                     | Describe the process of coagulation                           | Cognitive | Level 2 (Understand / interpret) | Must know         | Lecture, Small group discussion | SAQs | LAQs, Viva Voce | Pathology Materia Medica   |  |

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| Hom UG-PB 5.33 | Information ( K-1)                |  | Knows How | basis of haemostasis                                  | Discuss the mechanism of haemostasis        | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion      | SAQs | SAQs, Viva Voce |  |  |
| Hom UG-PB 5.34 |                                   |  | Knows How |   | Explain stages of clotting mechanism        | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs | LAQs, Viva Voce | Pathology Medicine                           |  |
| Hom UG-PB 5.35 | Integration Of Information ( K-1) |  | Knows How | Describe the clinical importance of blood coagulation | Discuss hemorrhagic disorder                | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion, CBL | MCQs | SAQs, Viva Voce | Medicine                                     |  |
| Hom UG-PB 5.36 | Integration Of Information ( K-1) |  | Knows     | Describe different blood groups                       | Classify the ABO blood group system         | Cognitive | Level 1 Recall                 | Must Know         | Lecture, Small group discussion      | SAQs | LAQs Viva Voce  | Pathology                                    |  |
| Hom UG-PB 5.37 |                                   |  | Knows How |   | Discuss Landsteiner's Law                   | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion      | SAQs | SAQs, Viva Voce | Pathology Medicine                           |  |
| Hom UG-PB 5.38 | Integration Of Information ( K-1) |  | Knows How | Discuss the clinical importance of blood grouping     | Describe Rhesus Blood Group                 | Cognitive | Level 2 Understand / interpret | Must Know         | Lecture, Small group discussion      | SAQs | SAQs, Viva Voce |  |  |
| Hom UG-PB 5.39 |                                   |  | Knows How |   | Discuss Rh Incompatibility                  | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs | SAQs, Viva Voce | Medicine, Pathology Obstetrics & Gynaecology |  |
| Hom UG-PB 5.40 | Integration Of Information ( K-1) |  | Knows How | Describe blood transfusion                            | Discuss the importance of Blood transfusion | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs | SAQs, Viva Voce | Surgery Medicine                             |  |
| Hom UG-PB 5.41 |                                   |  | Knows     |   | List causes for Blood transfusion reaction  | Cognitive | Level 1 Recall                 | Must know         | Lecture, Small group discussion      | SAQs | SAQs, Viva Voce | Pathology Medicine                           |  |

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| Hom UG-PB 5.42 | Integration Of Information ( K-1)  | Immune Mechanis m | Knows How   | Explain the role of lymphoid tissues in immune responses | Discuss Tissue Macrophage system                                   | Cognitive                       | Level 2 Understand / interpret | Desirable to Know               | Lecture, Small group discussion | SAQs            | SAQs, Viva Voce    | Pathology Medicine         |                    |  |
| Hom UG-PB 5.43 |                                    |                   | Knows How   |  | Describe the morphology and functions of Lymphocytes & Plasma cell | Cognitive                       | Level 2 Understand / interpret | Desirable to Know               | Lecture, Small group discussion | SAQs            | SAQs, Viva Voce    | Pathology                  |                    |  |
| Hom UG-PB 5.44 |                                    |                   | Knows How   |  | Explain the functions of spleen                                    | Cognitive                       | Level 2 Understand / interpret | Must know                       | Lecture, Small group discussion | SAQs            | LAQs, Viva Voce    | Medicine                   |                    |  |
| Hom UG-PB 5.45 |                                    |                   | Knows How   |  | Discuss the formation and functions of Lymph                       | Cognitive                       | Level 2 Understand / interpret | Desirable to Know               | Lecture, Small group discussion | SAQs            | SAQs, Viva Voce    | Medicine                   |                    |  |
| Hom UG-PB 5.46 | Integration Of Information ( K-1)  |                   | Knows   | Define and classify different types of immunity.         | Define Immunity  | Cognitive                       | Level 1 (Remember, recall)     | Must know                       | Lecture, Small group discussion | MCQs            | SAQs, Viva Voce    | Pathology Medicine Organon |                    |  |
| Hom UG-PB 5.47 |                                    |                   | Knows How   |  | Explain different type of immunity                                 | Cognitive                       | Level 2 Understand / interpret | Desirable to Know               | Lecture, Small group discussion | MCQs            | LAQs, Viva Voce    | Pathology Medicine         |                    |  |
| Hom UG-PB 5.48 | Knows How                          |                   | Describe the development of immunity and its regulation | Discuss development of immune response                   | Cognitive  | Level 2 Understand / interpret  | Must Know                      | Lecture, Small group discussion | SAQs                            | SAQs, Viva Voce | Pathology          |                            |                    |  |
| Hom UG-PB 5.49 | Knows How                          |                   |   | Discuss Auto - immunity & Hypersensitivity               | Cognitive  | Level 2 Understand / interpret  | Must know                      | Lecture, Small group discussion | SAQs                            | SAQs, Viva Voce | Pathology Medicine |                            |                    |  |
| Hom UG-PB 5.50 | Knows How                          |                   |   | Discuss Immunodeficiency Diseases                        | Cognitive  | Level 2 Understand / interpret  | Desirable to know              | Lecture, Small group discussion | SAQs                            | SAQs, Viva Voce | Pathology Medicine |                            |                    |  |
| Hom UG-PB 5.51 | Information Gathering ,Integration |                   | Hematology Practical                                    | Shows How  | Estimate Hb, RBC, TLC, RBC indices, DLC,                           | Estimate Hb in the given sample | Psycho Motor                   | Level 2 (Control)               | Must know                       | DOAP            | Observation        | Checklist                  | Pathology Medicine |  |

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| Hom UG-PB 5.52 | Of information , Problem Integration (K-2) |  | Knows How | Blood groups, BT/CT | Interpret results of Hb estimation                  | Cognitive    | Level 2 Understand / interpret | Must know | DOAP | Observation | Checklist | Pathology Medicine |  |
| Hom UG-PB 5.53 |  |  | Shows How |                     | Perform RBC Total Count Estimation                  | Psycho Motor | Level 2 (Control)              | Must know | DOAP | Observation | Checklist | Pathology          |  |
| Hom UG-PB 5.54 |  |  | Knows How |                     | Interpret the results of RBC Total Count Estimation | Cognitive    | Level 2 Understand / interpret | Must know | DOAP | Observation | Checklist | Pathology          |  |
| Hom UG-PB 5.55 |  |  | Shows How |                     | Perform WBC Total Count Estimation                  | Psycho Motor | Level 2 (Control)              | Must know | DOAP | Observation | Checklist | Pathology Medicine |  |
| Hom UG-PB 5.56 |  |  | Knows How |                     | Interpret the results of WBC Total Count Estimation | Cognitive    | Level 2 Understand / interpret | Must know | DOAP | Observation | Checklist | Pathology Medicine |  |
| Hom UG-PB 5.57 |  |  | Shows How |                     | Perform WBC DC estimation                           | Psycho Motor | Level 2 (Control)              | Must know | DOAP | Observation | Checklist | Pathology          |  |
| Hom UG-PB 5.58 |  |  | Knows How |                     | Interpret the results of WBC DC estimation          | Cognitive    | Level 2 Understand / interpret | Must know | DOAP | Observation | Checklist | Pathology          |  |
| Hom UG-PB 5.59 |  |  | Shows How |                     | Record RBC indices                                  | Psycho Motor | Level 2 (Control)              | Must know | DOAP | Observation | Checklist | Pathology Medicine |  |
| Hom UG-PB 5.60 |  |  | Knows How |                     | Evaluate RBC indices                                | Cognitive    | Level 2 Understand / interpret | Must know | DOAP | Observation | Checklist | Pathology Medicine |  |
| Hom UG-PB 5.61 |  |  | Shows How |                     | Perform Blood Group identification                  | Psycho Motor | Level 2 (Control)              | Must know | DOAP | Observation | Checklist | Pathology          |  |
| Hom UG-PB 5.62 |  |  | Shows How |                     | Perform BT / CT                                     | Psycho Motor | Level 2 (Control)              | Must know | DOAP | Observation | Checklist | Pathology          |  |

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|----------------|---|--|-----------|--|---|--------------|--------------------------------|--------------|---------------|-------------|-------------|--------------------|--|
| Hom UG-PB 5.63 | Information Gathering ,Integration Of information , Problem Integration (K-2) |  | Knows How |  | Interpret the results of BT / CT            | Cognitive    | Level 2 Understand / interpret | Must know    | DOAP          | Observation | Checklist   | Pathology          |  |
| Hom UG-PB 5.64 |   |  | Shows How |  | Record ESR                                  | Psycho Motor | Level 2 (Control)              | Must know    | Demonstration | Observation | Checklist   | Pathology          |  |
| Hom UG-PB 5.65 |   |  | Knows How |  | Interpret the results of ESR estimation     | Cognitive    | Level 2 Understand / interpret | Must know    | DOAP          | Observation | Checklist   | Pathology          |  |
| Hom UG-PB 5.66 |   |  | Shows How | Describe steps for reticulocyte and platelet count | Record Reticulocyte count                   | Psycho Motor | Level 1 (Observe / Imitate)    | Nice to know | Demonstration | Observation | Observation | Pathology          |  |
| Hom UG-PB 5.67 |   |  | Knows How |  | Interpret the results of Reticulocyte count | Cognitive    | Level 2 Understand / interpret | Must know    | DOAP          | Observation | Checklist   | Pathology Medicine |  |
| Hom UG-PB 5.68 |   |  | Shows How |  | Record Platelet Count                       | Psycho Motor | Level 1 (Observe / Imitate)    | Nice to know | Demonstration | Observation | Observation | Pathology          |  |
| Hom UG-PB 5.69 |   |  | Knows How |  | Interpret the results of Platelet Count     | Cognitive    | Level 2 Understand / interpret | Must know    | DOAP          | Observation | Checklist   | Pathology Medicine |  |

## SEMESTER – 2

|                            |   |
|----------------------------|---|
| <b>Topic No</b>            | <b>6</b>  |
| <b>Theory</b>              | <b>Cardio Vascular System</b>   |
| <b>Practical</b>           |   |
| <b>Clinical Physiology</b> | <b>Cardio-Vascular System – Blood Pressure Recording, Radial Pulse, ECG, Clinical Examination</b> |

### Learning Outcomes: -

At the end of chapter on Cardio Vascular System & its examination, the student must be able to –

- Describe the functional anatomy of the heart, with respect to its chambers, valves, input and output vessels, AV ring and electrical discontinuity, Conducting system, Coronary supply.
- Describe the properties of cardiac muscle including its morphology, electrical, mechanical and metabolic functions.
- Discuss the events occurring during the cardiac cycle
- Illustrate the haemo-dynamics of circulatory system
- Explain the regulation of cardiac output
- Describe the normal mode of conduction of the cardiac impulse
- Explain coronary, cerebral, capillary, pulmonary & splanchnic circulation
- List the major diseases of cardiovascular system,
- Record Pulse, blood pressure, and ECG
- Perform the clinical examination of cardiovascular system

| S.No          | Generic competency                | Subject area           | Miller's Level | Specific competency                                | Specific Learning Objectives / outcomes | Bloom's domain | Guilbert's level               | Must know / desirable to know / nice to know | TL method / media               | Formative Assessment | Summative Assessment | Integration - Horizontal / Vertical / Spiral |
|---------------|-----------------------------------|------------------------|----------------|--|---|----------------|--------------------------------|--|---------------------------------|----------------------|----------------------|--|
| Hom UG-PB 6.1 | Integration Of Information ( K-1) | Cardio Vascular System | Knows How      | Describe the functional anatomy of heart including | Describe the chambers of heart          | Cognitive      | Level 2 Understand / interpret | Must know                                    | Lecture, Small group discussion | SAQs                 | SAQs, Viva Voce      | Human Anatomy                                |
| Hom UG-PB 6.2 |                                   |                        | Knows How      | chambers, Sounds                                   | Discuss the valves & the walls of heart | Cognitive      | Level 2Understand / interpret  | Must know                                    | Lecture, Small group discussion | SAQs                 | SAQs, Viva Voce      | Human Anatomy                                |
| Hom UG-PB 6.3 | Integration Of Information ( K-1) |                        | Knows How      | Describe Pacemaker tissue and conducting system.   | Explain the pacemaker of heart.         | Cognitive      | Level 2 Understand / interpret | Desirable to know                            | Lecture, Small group discussion | SAQs                 | SAQs, Viva Voce      | Medicine – Cardiology                        |
| Hom UG-PB 6.4 |                                   |                        | Knows How      |  | Describe the conducting system          | Cognitive      | Level 2 Understand / interpret | Must Know                                    | Lecture, Small group discussion | SAQs                 | LAQs, Viva Voce      | Anatomy                                      |

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|----------------|-----------------------------------|--|-----------|--|---|-----------|--------------------------------|-------------------|---------------------------------|------|-----------------|----------|
| Hom UG-PB 6.5  | Integration Of Information ( K-1) |  | Knows How | Describe the properties of cardiac muscle including its morphology, electrical, mechanical and metabolic functions | Discuss the Morphological Properties of heart                   | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion | SAQs | LAQs, Viva Voce | Anatomy  |
| Hom UG-PB 6.6  |                                   |  | Knows How |  | Discuss the electrical properties of heart                      | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Anatomy  |
| Hom UG-PB 6.7  |                                   |  | Knows How |  | Discuss the mechanical & metabolic Properties of heart          | Cognitive | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion | SAQs | Viva Voce       | Anatomy  |
| Hom UG-PB 6.8  | Integration Of Information ( K-1) |  | Knows     | Discuss the events occurring during the cardiac cycle  | Define Cardiac cycle  | Cognitive | Level 1 (Remember / recall)    | Must know         | Lecture, Small group discussion | MCQs | SAQs, Viva Voce | Medicine |
| Hom UG-PB 6.9  |                                   |  | Knows How |  | Discuss the events of cardiac cycle                             | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs | LAQs, Viva Voce |          |
| Hom UG-PB 6.10 |                                   |  | Knows How |  | Explain the pressure changes during cardiac cycle               | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs | LAQs, Viva Voce |          |
| Hom UG-PB 6.11 |                                   |  | Knows How |  | Explain the ECG changes during each cardiac cycle               | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs | LAQs, Viva Voce | Medicine |
| Hom UG-PB 6.12 | Integration Of Information ( K-1) |  | Knows     | Discuss heart sounds   | Define Heart Sound  | Cognitive | Level 1 (Remember / recall)    | Must know         | Lecture, Small group discussion | SAQs | LAQs, Viva Voce | Medicine |
| Hom UG-PB 6.13 |                                   |  | Knows How |  | Explain different heart sounds with their measurement technique | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | MCQs | LAQs, Viva Voce |          |

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| Hom UG-PB 6.14 |   |  | Knows How |   | Discuss the clinical importance of Murmurs & Triple heart sound        | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, PBL, Small group discussion  | SAQs | SAQs, Viva Voce | Medicine Surgery                            |
| Hom UG-PB 6.15 | Integration Of Information ( K-1)   |  | Knows How | Describe the physiology of electrocardiogram (E.C.G),     | Discuss normal ECG with it's waves and intervals                       | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion       | MCQs | SAQs, Viva Voce | Medicine                                    |
| Hom UG-PB 6.16 |   |  | Knows How |   | Explain in electrocardiography with unipolar & bipolar recording.      | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion       | SAQs | SAQs, Viva Voce |   |
| Hom UG-PB 6.17 | Information Gathering ,Integration Of information Problem Integration (K-2) |  | Knows How | Discuss arrhythmia, heart block and myocardial Infarction | Classify arrhythmias   | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, PBL, Small group discussion  | SAQs | SAQs, Viva Voce | Medicine                                    |
| Hom UG-PB 6.18 |   |  | Knows How |   | Explain Different degree of heart block. Explain Myocardial Infarction | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, PBL , Small group discussion | SAQs | SAQs, Viva Voce | Medicine Pathology Materia Medica Repertory |
| Hom UG-PB 6.19 | Integration Of Information ( K-1)   |  | Knows     | Describe haemo-dynamics of circulatory system             | List the functions of circulation                                      | Cognitive | Level 1 Recall                 | Desirable to know | Lecture, Small group discussion       | SAQs | SAQs, Viva Voce | Anatomy                                     |
| Hom UG-PB 6.20 |   |  | Knows     |   | State the functions of heart   | Cognitive | Level 1 Recall                 | Desirable to know | Lecture, Small group discussion       | SAQs | SAQs, Viva Voce | Medicine                                    |
| Hom UG-PB 6.21 |   |  | Knows How |   | Discuss the pressure changes in vascular system                        | Cognitive | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion       | MCQs | Viva Voce       |   |
| Hom UG-PB 6.22 |   |  | Knows     |   | Recall the structure of the blood vessels                              | Cognitive | Level 1 Recall                 | Desirable to Know | Lecture, Small group discussion       | SAQs | SAQs, Viva Voce | Anatomy                                     |

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|----------------|-----------------------------------|--|-----------|--|--|-----------|--------------------------------|-------------------|--------------------------------------|------|-----------------|--------------------------|
| Hom UG-PB 6.23 | Integration Of Information ( K-1) |  | Knows How | Describe the factors affecting heart rate, | Identify the factors affecting heart rate and how it affects | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs | SAQs, Viva Voce | Medicine                 |
| Hom UG-PB 6.24 |                                   |  | Knows How |  | Discuss the mechanism of control of heart rate               | Cognitive | Level 2 Understand / interpret | Desirable to know | Lecture, Small group discussion      | SAQs | SAQs, Viva Voce |                          |
| Hom UG-PB 6.25 | Integration Of Information ( K-1) |  | Knows     | Describe the regulation of cardiac output  | Define cardiac output  | Cognitive | Level 1 (Remember / recall)    | Must know         | Lecture, Small group discussion      | SAQs | LAQs Viva Voce  | Materia Medica Repertory |
| Hom UG-PB 6.26 |                                   |  | Knows How |  | Discuss the distribution of cardiac output                   | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion      | SAQs | LAQs, Viva Voce | Medicine                 |
| Hom UG-PB 6.27 |                                   |  | Knows How |  | Discuss the factors affecting cardiac output                 | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs | LAQs, Viva Voce |                          |
| Hom UG-PB 6.28 |                                   |  | Knows How |  | Discuss in detail the Control mechanism of cardiac output    | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs | LAQs, Viva Voce |                          |
| Hom UG-PB 6.29 | Integration Of Information ( K-1) |  | Knows How | Understand the blood pressure regulation   | Discuss the importance of blood pressure                     | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, PBL, Small group discussion | SAQs | LAQs, Viva Voce | Medicine                 |
| Hom UG-PB 6.30 |                                   |  | Knows     |  | State the factors affecting arterial blood pressure          | Cognitive | Level 1 Recall                 | Must know         | Lecture, Small group discussion      | SAQs | LAQs, Viva Voce | Medicine                 |
| Hom UG-PB 6.31 |                                   |  | Knows How |  | Discuss the determinants of arterial blood pressure          | Cognitive | Level 2 Understand / interpret | Must Know         | Lecture, Small group discussion      | SAQs | LAQs, Viva Voce | Medicine                 |

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| Hom UG-PB 6.32 |  |  | Knows How |   | Describe regulation of arterial blood pressure                      | Cognitive    | Level 2 Understand / interpret | Must know         | PBL, Lecture, Small group discussion | SAQs        | LAQs, Viva Voce | Medicine                                  |
| Hom UG-PB 6.33 | Integration Of Information ( K-1)                          |  | Knows How | Describe coronary, cerebral, capillary, pulmonary & splenic circulation | Discuss the capillary circulation                                   | Cognitive    | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion      | SAQs        | Viva Voce       |   |
| Hom UG-PB 6.34 |  |  | Knows How |   | Discuss the Coronary circulation                                    | Cognitive    | Level 2 Understand / interpret | Desirable to know | Lecture, Small group discussion      | SAQs        | SAQs, Viva Voce | Medicine Pathology                        |
| Hom UG-PB 6.35 |  |  | Knows How |   | Discuss the Cerebral circulation                                    | Cognitive    | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion      | SAQs        | SAQs, Viva Voce | Medicine Pathology                        |
| Hom UG-PB 6.36 |  |  | Knows How |   | Discuss the Splenic circulation                                     | Cognitive    | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion      | SAQs        | Viva Voce       | Medicine                                  |
| Hom UG-PB 6.37 |  |  | Knows How |   | Discuss Pulmonary circulation                                       | Cognitive    | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion      | SAQs        | SAQs, Viva Voce | Medicine                                  |
| Hom UG-PB 6.38 |  | Information Gathering ,Integration Of information, Problem Integration (K-2) | Knows How | Describe the mechanism of shock, syncope & Hypertension                 | Explain mechanism responsible for shock & syncope                   | Cognitive    | Level 2 Understand / interpret | Must know         | CBL, Lecture, Small group discussion | SAQs        | SAQs, Viva Voce | Medicine Pathology                        |
| Hom UG-PB 6.39 |  |  | Knows How |   | Discuss the mechanism of hypertension                               | Cognitive    | Level 2 Understand / interpret | Must know         | CBL, Lecture, Small group discussion | SAQs        | SAQs, Viva Voce | Medicine Pathology Materia Medica Organon |
| Hom UG-PB 6.40 | Information Gathering ,Integration Of information, Problem |  | Shows How | Record blood pressure at rest and in different grades of                | Measure the blood pressure in resting & different grade of exercise | Psycho-motor | Level 2 (Control)              | Must know         | Demonstration                        | Observation | OSCE            | Medicine                                  |
| Hom UG-PB 6.41 |  |  | Knows How | Exercise and postures   | Discuss the variation between                                       | Cognitive    | Level 2 (Understanding)        | Must know         | CBL, Lecture,                        | Observation | OSCE            | Medicine                                  |

|                |  |  |           |  |  |              |                      |                   |                                      |             |      |               |
|----------------|--|--|-----------|--|--|--------------|----------------------|-------------------|--------------------------------------|-------------|------|---------------|
|                | Integration (K-2)  |  |           |  | different blood pressure values after measurement                              |              |                      |                   | Small group discussion               |             |      |               |
| Hom UG-PB 6.42 | Information Gathering ,Integration Of  |  | Shows How | Record pulse at rest and in different grades of                            | Measure pulse at rest and in different grades of exercise                      | Psycho-motor | Level 2 (Control)    | Must know         | Demonstration                        | Observation | OSCE | Medicine      |
| Hom UG-PB 6.43 | information, Problem Integration (K-2)                                       |  | Knows How | Exercise and postures  | Discuss the variation between different arterial pulse value after measurement | Cognitive    | Level 2 (Understand) | Must know         | CBL, Lecture, Small group discussion | Observation | OSCE | Medicine      |
| Hom UG-PB 6.44 | Information Gathering, Integration of information, Problem Integration (K-2) |  | Shows How | Record ECG   | Record ECG in a volunteer.   | Psycho-motor | Level 2 (Control)    | Desirable to know | Demonstration                        | Observation | OSCE | Medicine      |
|                |  |  | Knows     |  | Identify the features of a normal ECG.   | Cognitive    | Level 1 (Recall)     | Nice to Know      | CBL, Lecture, Small group discussion |             | OSCE |               |
| Hom UG-PB 6.45 | Information Gathering, Integration Of information, Problem Integration (K-2) |  | Shows How | Demonstrate the correct clinical examination of the cardio vascular system | Locate the Apex beat   | Psycho-motor | Level 2 (Control)    | Must know         | Demonstration                        | Observation | OSCE | Human Anatomy |
| Hom UG-PB 6.46 |  |  | Shows How |  | Auscultate for heart sound   | Psycho-motor | Level 2 (Control)    | Must know         | Demonstration                        | Observation | OSCE | Medicine      |
| Hom UG-PB 6.47 |  |  | Shows How |  | Identify different heart sounds  | Psycho-motor | Level 2 (Control)    | Must know         | Demonstration                        | Observation | OSCE | Medicine      |

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| <b>Topic No</b>            | <b>7</b>  |
| <b>Theory</b>              | <b>Respiratory &amp; Environmental Physiology</b>                         |
| <b>Practical</b>           |   |
| <b>Clinical Physiology</b> | <b>Respiratory System- Clinical Examination, Spirometry, Stethography</b> |

**Learning Outcomes: -**

At the end of the chapter of Respiratory & Environmental Physiology, the student must be able to –

- Describe the functional anatomy of respiratory tract.
- Describe the mechanics of normal respiration
- Describe pressure changes during ventilation
- Describe lung volume and capacities
- Describe the transport of respiratory gases
- Describe the regulation of respiration
- Demonstrate the correct clinical examination of the respiratory system in a normal volunteer.

| S.No          | Generic competency                | Subject area                           | Miller's Level | Specific competency                                  | Specific Learning Objectives / outcomes                               | Bloom's domain | Guilbert's level               | Must know / desirable to know / nice to know | TL method / media               | Formative Assessment | Summative Assessment | Integration - Horizontal / Vertical / Spiral |
|---------------|-----------------------------------|--|----------------|--|---|----------------|--------------------------------|--|---------------------------------|----------------------|----------------------|--|
| Hom UG-PB 7.1 | Integration Of Information ( K-1) | Respiratory & Environmental Physiology | Knows How      | Describe the functional anatomy of respiratory tract | Identify the different parts of upper respiratory tract               | Cognitive      | Level 2 Understand / interpret | Must know                                    | Lecture, Small group discussion | MCQs                 | SAQs, Viva Voce      | Anatomy                                      |
| Hom UG-PB 7.2 |                                   |  | Knows How      |  | Describe the importance of different parts of lower respiratory tract | Cognitive      | Level 2 Understand / interpret | Must know                                    | Lecture, Small group discussion | MCQs                 | SAQs, Viva Voce      | Anatomy                                      |

|                |                                    |  |           |  |   |           |                                |                   |                                 |      |                 |          |
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| Hom UG-PB 7.3  |                                    |  | Knows How |  | Identify the different parts of tracheo – bronchial tree, Respiratory membrane & pleura | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Anatomy  |
| Hom UG-PB 7.4  |                                    |  | Knows How |  | Explain the properties of Gases   | Cognitive | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion | SAQs | SAQs, Viva Voce |          |
| Hom UG-PB 7.5  |                                    |  | Knows How |  | Discuss non-respiratory function of respiratory system                                  | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Medicine |
| Hom UG-PB 7.6  | Integration Of Information ( K-1)  |  | Knows How | Describe the mechanics of normal respiration | Discuss the mechanism of Inspiration  | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Anatomy  |
| Hom UG-PB 7.7  |                                    |  | Knows How |  | Discuss the mechanism of Expiration   | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Anatomy  |
| Hom UG-PB 7.8  | Integration Of Information ( K-1)  |  | Knows How | Describe pressure changes during ventilation | Discuss intra-pulmonary pressure  | Cognitive | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Medicine |
| Hom UG-PB 7.9  |                                    |  | Knows How |  | Discuss intra pleural pressure  | Cognitive | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Medicine |
| Hom UG-PB 7.10 | Integration Of Information. ( K-1) |  | Knows How | Describe lung volume and capacities,         | Discuss static lung volume & capacities   | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion | MCQs | SAQs, Viva Voce | Medicine |
| Hom UG-PB 7.11 |                                    |  | Knows How |  | Discuss dynamic lung volume and capacities  | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion | MCQs | SAQs, Viva Voce | Medicine |
| Hom UG-PB 7.12 | Integration Of                     |  | Knows How | Describe alveolar surface tension            | Define surface tension  | Cognitive | Level 1 (Remember / recall)    | Desirable To Know | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Medicine |

|                |  |  |  |   |   |  |                                |           |                                      |            |                                      |                             |
|----------------|--|--|--|---|---|--|--------------------------------|-----------|--------------------------------------|------------|--------------------------------------|-----------------------------|
| Hom UG-PB 7.13 | Information ( K-1)   |  | Knows How  |   | Discuss the significance of lung surfactant                               | Cognitive                                      | Level 2 Understand / interpret | Must know | Lecture, Small group discussion      | SAQs       | SAQs, Viva Voce                      |                             |
| Hom UG-PB 7.14 | Integration Of Information ( K-1)  |  | Knows How  | Describe the transport of respiratory gases | Describe the Oxygen transportation  | Cognitive                                      | Level 2 Understand / interpret | Must know | Lecture, Small group discussion      | SAQs       | LAQs, Viva Voce                      |                             |
| Hom UG-PB 7.15 |  |  | Knows How  |   | Explain the carbon dioxide transportation                                 | Cognitive                                      | Level 2 Understand / interpret | Must know | Lecture, Small group discussion      | SAQs       | LAQs, Viva Voce                      |                             |
| Hom UG-PB 7.16 | Information Gathering ,Integration Of information, Problem Integration (K-2) |  | Knows How  | Describe the regulation of respiration      | Discuss the nervous regulation of respiration                             | Cognitive                                      | Level 2 Understand / interpret | Must know | Lecture, Small group discussion      | SAQs       | LAQs, Viva Voce                      |                             |
| Hom UG-PB 7.17 |  |  | Knows How  |   | Discuss the Chemical regulation of respiration                            | Cognitive                                      | Level 2 Understand / interpret | Must know | Lecture, Small group discussion      | SAQs       | LAQs, Viva Voce                      |                             |
| Hom UG-PB 7.18 |  |  | Knows How  |   | Discuss the physio clinical aspect of Apnea                               | Cognitive                                      | Level 2 Understand / interpret | Must know | PBL, Lecture, Small group discussion | SAQs       | SAQs, Viva Voce                      | Medicine                    |
| Hom UG-PB 7.19 |  |  | Knows How  |   | Discuss the physio clinical aspect of Dyspnoea, Asphyxia, Oxygen toxicity | Cognitive                                      | Level 2 Understand / interpret | Must know | PBL, Lecture, Small group discussion | MCQs       | SAQs, Viva Voce                      | Medicine FMT Materia Medica |
| Hom UG-PB 7.20 |  |  | Information Gathering ,Integration Of information, Problem Integration (K-2) |   | Know  | Describe the physio clinical aspect of hypoxia | Define Hypoxia                 | Cognitive | Level 1 (Recall)                     | Must know  | PBL, Lecture, Small group discussion | MCQs                        |
| Hom UG-PB 7.21 | Knows  |  |  | Classify hypoxia. Define Cyanosis           | Cognitive   |  | Level 1 Recall                 | Must know | PBL, Lecture, Small group discussion | MCQS, SAQs | SAQs, Viva Voce                      | Pathology Medicine          |

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|----------------|--|--|-----------|--|--|--------------|--------------------------------|-------------------|---------------------------------|-------------|-----------------|----------|
| Hom UG-PB 7.22 | Information Gathering ,Integration Of  |  | Knows How | Describe the principles and methods of artificial respiration,                   | Discuss the principles of artificial respiration   | Cognitive    | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion | SAQs        | SAQs, Viva Voce | Medicine |
| Hom UG-PB 7.23 | information, Problem Integration (K-2)                                       |  | Knows How |  | Discuss the Methods of artificial respiration  | Cognitive    | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs        | SAQs, Viva Voce | Medicine |
| Hom UG-PB 7.24 | Integration Of Information ( K-1)  |  | Knows How | Describe the physiology of high altitude and deep sea diving                     | Discuss the pressure changes during high altitude  | Cognitive    | Level 2 Understand / interpret | Desirable to know | Lecture, Small group discussion | SAQs        | SAQs, Viva Voce | Medicine |
| Hom UG-PB 7.25 |  |  | Knows How |  | Discuss the effect during Rapid & slow ascent on high altitude   | Cognitive    | Level 2 Understand / interpret | Desirable to know | Lecture, Small group discussion | SAQs        | SAQs, Viva Voce |          |
| Hom UG-PB 7.26 |  |  | Knows How |  | Discuss the pressure changes during Deep sea diving  | Cognitive    | Level 2 Understand / interpret | Desirable to know | Lecture, Small group discussion | SAQs        | SAQs, Viva Voce |          |
| Hom UG-PB 7.27 | Information Gathering ,Integration Of information, Problem Integration (K-2) |  | Shows How | Perform the clinical examination of the respiratory system in a normal volunteer | Perform the technique to assess normal respiratory rate, expansion of chest, in resting as well as exercise condition through inspection and palpation | Psycho-motor | Level 2 (Control)              | Must know         | Demonstration                   | Observation | Checklist       | Medicine |
| Hom UG-PB 7.28 |  |  | Shows How |  | Perform percussion on the chest  | Psycho-motor | Level 2 (Control)              | Must know         | Demonstration                   | Observation | Checklist       | Medicine |

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| Hom<br>UG-PB<br>7.29 |  |  | Shows<br>How |  | Perform the<br>auscultation on<br>different parts<br>of lungs. | Psycho-<br>motor | Level 2<br>(Control) | Must know | Demonstrati<br>on | Observ<br>ation | Checklist | Medicine |
|----------------------|--|--|--------------|--|--|------------------|----------------------|-----------|-------------------|-----------------|-----------|----------|

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|----------------------------|---|
| <b>Topic No</b>            | <b>8</b>                                    |
| <b>Theory</b>              | <b>Central Nervous System</b>               |
| <b>Practical</b>           |   |
| <b>Clinical Physiology</b> | <b>Nervous System- Clinical Examination</b> |

**Learning Outcomes: -**

At the end of chapter of Central Nervous System, the student must be able to –

- Map the organization of nervous system.
- State the functions and properties of synapse.
- Explain the functions and properties of receptors

- Describe the functions and properties of reflex.
- Discuss the mechanism of chemical transmission in the nervous system.
- Describe somatic sensations & sensory tracts.
- Describe and discuss motor tracts & mechanism of maintenance of muscle tone.
- Describe the physiology of vestibular apparatus, Control of body movements, posture and equilibrium.
- Describe structure and functions of autonomic nervous system
- Explain the functions, lesion & sensory disturbance of Spinal cord
- Describe functions of cerebral cortex, basal ganglia, thalamus, hypothalamus, cerebellum and limbic system
- Describe behavioural and EEG characteristic during Sleep.
- Describe the physiological basis of memory, learning and speech
- Perform the clinical examination of the nervous system in a volunteer or on a simulator.

| S.No          | Generic competency                | Subject area   | Miller's Level | Specific competency                               | Specific Learning Objectives / outcomes  | Bloom's domain | Guilbert's level               | Must know / desirable to know / nice to know | TL method / media               | Formative Assessment | Summative Assessment | Integration - Horizontal / Vertical / Spiral |
|---------------|-----------------------------------|----------------|----------------|---|--|----------------|--------------------------------|--|---------------------------------|----------------------|----------------------|--|
| Hom UG-PB 8.1 | Integration Of Information ( K-1) | Nervous System | Knows          | Describe the organization of nervous system       | Identify the parts of central nervous system – brain & spinal cord with its function | Cognitive      | Level 1 (Remember / recall)    | Must know                                    | Lecture, Small group discussion | SAQs MCQs            | SAQs, Viva Voce      | Anatomy                                      |
| Hom UG-PB 8.2 |                                   |                | Knows How      |   | Discuss the developmental aspect of central nervous system                           | Cognitive      | Level 2 Understand / interpret | Desirable to Know                            | Lecture, Small group discussion | SAQs MCQs            | SAQs, Viva Voce      | Anatomy                                      |
| Hom UG-PB 8.3 |                                   |                | Knows          |   | Classify nervous system  | Cognitive      | Level 1 (Remember / recall)    | Must know                                    | Lecture, Small group discussion | SAQs MCQs            | SAQs, Viva Voce      | Anatomy                                      |
| Hom UG-PB 8.4 | Integration Of Information ( K-1) |                | Knows How      | Describe the functions and properties of synapse. | Illustrate the physiological anatomy of synapse                                      | Cognitive      | Level 2 Understand / interpret | Must know                                    | Lecture, Small group discussion | SAQs MCQs            | SAQs, Viva Voce      | Anatomy                                      |

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| Hom UG-PB 8.5  |                                   |  | Knows How |  | Discuss the electrical events occurring at synapses | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs MCQs | SAQs, Viva Voce |          |
| HomUG -PB 8.6  |                                   |  | Knows How |  | Discuss the properties of synapse.                  | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs MCQs | SAQs, Viva Voce |          |
| HomUG -PB 8.7  | Integration Of Information ( K-1) |  | Knows     | Describe the functions and properties of receptors                     | Define receptor                                     | Cognitive | Level 1 (Remember / recall)    | Desirable to know | Lecture, Small group discussion | SAQs MCQs | SAQs Viva Voce  | Anatomy  |
| Hom UG-PB 8.8  |                                   |  | Knows     |  | Classify the sensory receptors.                     | Cognitive | Level 1 (Remember / recall)    | Desirable to Know | Lecture, Small group discussion | MCQs      | LAQs, Viva Voce | Anatomy  |
| Hom UG-PB 8.9  |                                   |  | Knows How |  | Describe the Cutaneous receptor                     | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion | SAQs MCQs | SAQs, Viva Voce |          |
| Hom UG-PB 8.10 |                                   |  | Knows How |  | explain the properties of receptor                  | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs MCQs | SAQs, Viva Voce |          |
| Hom UG-PB 8.11 |                                   |  | Knows How |  | Discuss reflex arc                                  | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs MCQs | SAQs, Viva Voce | Anatomy  |
| Hom UG-PB 8.12 | Integration Of Information ( K-1) |  | Knows     | Describe the functions and properties of reflex.                       | Classify reflexes                                   | Cognitive | Level 1 (Remember / recall)    | Must know         | Lecture, Small group discussion | SAQs MCQs | SAQs, Viva Voce | Medicine |
| Hom UG-PB 8.13 |                                   |  | Knows How |  | Discuss the properties of reflex                    | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs MCQs | SAQs, Viva Voce |          |
| Hom UG-PB 8.14 | Integration Of Information ( K-1) |  | Knows     | Describe the mechanism of chemical transmission in the nervous system. | Classify neuro-transmitters                         | Cognitive | Level 1 (Remember / recall)    | Must know         | Lecture, Small group discussion | MCQs      | SAQs, Viva Voce | Medicine |
| Hom UG-PB 8.15 |                                   |  | Knows How |  | Explain the different types of neuro-transmitter    | Cognitive | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion | SAQs MCQs | SAQs, Viva Voce |          |

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| Hom UG-PB 8.16 | Integration Of Information ( K-1)  |  | Knows     | Describe somatic sensations & sensory tracts                    | Define sensory system  | Cognitive | Level 1 (Remember / recall)    | Must know         | Lecture, Small group discussion               | SAQs MCQs | SAQs, Viva Voce |   |
| Hom UG-PB 8.17 |  |  | Knows How |   | Discuss different sensory tracts of spinal cord                                    | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion               | SAQs MCQs | LAQ, Viva Voce  | Anatomy                                   |
| Hom UG-PB 8.18 |  |  | Knows How |   | Describe the sensory tracts of spinal cord   | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion               | SAQs MCQs | LAQs, Viva Voce | Medicine                                  |
| Hom UG-PB 8.19 |  |  | Knows How |   | Explain the somato-sensory cortex  | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion               | SAQs MCQs | SAQs Viva Voce  | Anatomy Medicine                          |
| Hom UG-PB 8.20 |  |  | Knows How |   | Explain the somatic sensation – touch, pressure, pain, temperature, proprioception | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion Demonstration | SAQs MCQs | SAQs, Viva Voce | Anatomy Medicine Materia Medica Repertory |
| Hom UG-PB 8.21 | Information Gathering ,Integration Of information, Problem Integration (K-2) |  | Knows How | Describe motor tracts & mechanism of maintenance of muscle tone | Discuss motor areas  | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion               | SAQs MCQs | LAQs, Viva Voce | Anatomy                                   |
| Hom UG-PB 8.22 |  |  | Knows How |   | Discuss different motor tracts of spinal cord                                      | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion               | SAQs MCQs | LAQs, Viva Voce | Anatomy Medicine                          |
| Hom UG-PB 8.23 |  |  | Knows How |   | Discuss the motor tracts of spinal cord  | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion               | SAQs MCQs | LAQs, Viva Voce | Anatomy Medicine                          |
| Hom UG-PB 8.24 |  |  | Knows How |   | Discuss the clinical significance of Motor tracts of spinal cord                   | Cognitive | Level 2 Understand / interpret | Must know         | CBL, Lecture, Small group discussion          | SAQs MCQs | LAQs, Viva Voce | Anatomy Medicine Materia Medica           |

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| Hom UG-PB 8.25 | Information Gathering ,Integration Of information, |  | Knows How | Describe the physiology of vestibular apparatus, Control of body | Discuss the physiological anatomy of vestibular apparatus          | Cognitive | Level 2 Understand / interpret | Must know    | Lecture, Small group discussion | SAQs MCQs | SAQs, Viva Voce | Anatomy Medicine        |
| Hom UG-PB 8.26 | Problem Integration (K-2)                          |  | Knows How | movements, posture and equilibrium                               | Explain the functions of vestibular apparatus                      | Cognitive | Level 2 Understand / interpret | Must know    | Lecture, Small group discussion | SAQs MCQs | LAQs, Viva Voce | Medicine Materia Medica |
| Hom UG-PB 8.27 |  |  | Knows How |  | Discuss the common vestibular dysfunctions                         | Cognitive | Level 2 Understand / interpret | Must know    | Lecture, Small group discussion | SAQs MCQs | LAQs, Viva Voce | Medicine Materia Medica |
| Hom UG-PB 8.28 | Integration Of Information ( K-1)                  |  | Knows How | Describe structure and functions of Autonomic                    | Differentiate between somatic and autonomic nervous system         | Cognitive | Level 2 Understand / interpret | Nice to know | Lecture, Small group discussion | SAQs MCQs | Viva Voce       | Anatomy                 |
| Hom UG-PB 8.29 |  |  | Knows How | nervous system (ANS)   | Describe the divisions of Autonomic nervous system                 | Cognitive | Level 2 Understand / interpret | Must know    | Lecture, Small group discussion | SAQs      | SAQs, Viva Voce | Anatomy                 |
| Hom UG-PB 8.30 |  |  | Knows How |  | Discuss the responses of effector organ to autonomic nerve impulse | Cognitive | Level 2 Understand / interpret | Nice to know | Lecture, Small group discussion | SAQs      | Viva Voce       |                         |
| Hom UG-PB 8.31 | Information Gathering ,Integration                 |  | Knows     | Explain the functions, lesion &                                  | List the functions of Spinal cord                                  | Cognitive | Level 1 (Remember / recall)    | Must know    | Lecture, Small group discussion | SAQs      | LAQs, Viva Voce | Anatomy Medicine        |
| Hom UG-PB 8.32 | Of information, Problem                            |  | Knows How | sensory disturbance of Spinal cord                               | Illustrate the transection of spinal cord                          | Cognitive | Level 2 Understand / interpret | Must know    | Lecture, Small group discussion | SAQs      | SAQs, Viva Voce | Medicine, Surgery       |
| Hom UG-PB 8.33 | Integration (K-2)                                  |  | Knows How |  | Describe the sensory disturbances of spinal cord                   | Cognitive | Level 2 Understand / interpret | Must know    | Lecture, Small group discussion | SAQs      | SAQs, Viva Voce | Medicine                |

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| Hom UG-PB 8.34 | Information Gathering ,Integration Of information, Problem Integration (K-2) |  | Knows How | Describe functions of cerebral cortex, basal ganglia, thalamus, hypo - thalamus, cerebellum and limbic system and their abnormalities | Discuss the connections & functions of cerebral cortex | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs | LAQs, Viva Voce | Anatomy Medicine – Psychiatry Repertory                   |
| Hom UG-PB 8.35 |  |  |           |   | Discuss the connections& functions of Basal Ganglia    | Cognitive | Level 2 Understand / interpret | Desirable to know | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Anatomy Medicine – Psychiatry                             |
| Hom UG-PB 8.36 |  |  |           |   | Explain the connections & functions of Thalamus        | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Anatomy Medicine – Psychiatry Repertory                   |
| Hom UG-PB 8.37 |  |  |           |   | Explain the connections& functions of Hypothalamus     | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs | LAQs, Viva Voce | Anatomy Medicine – Psychiatry Materia Medica Repertory    |
| Hom UG-PB 8.38 |  |  |           |   | Discuss the connections & functions of Limbic system   | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Anatomy, Psychology, Medicine – Psychiatry Materia Medica |
| Hom UG-PB 8.39 |  |  |           |   | Explain the connections& functions of Cerebellum       | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs | LAQs, Viva Voce | Anatomy Medicine – Psychiatry Materia Medica              |
| Hom UG-PB 8.40 |  |  |           |   | Explain the cerebellar lesions                         | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs | LAQs, Viva Voce | Pathology Medicine – Psychiatry Materia Medica            |

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| Hom UG-PB 8.41 | Integration Of Information ( K-1)  |  | Knows How | Describe behavioral and EEG                                     | Discuss the importance of EEG                   | Cognitive | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion | SAQs | Viva Voce       |   |
| Hom UG-PB 8.42 |  |  | Knows How | characteristic during Sleep and                                 | Explain the Physiological Basis of EEG          | Cognitive | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion | SAQs | Viva Voce       |   |
| Hom UG-PB 8.43 |  |  | Knows How | mechanism responsible for its production                        | Discuss the factors affecting sleep             | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Medicine                                  |
| Hom UG-PB 8.44 |  |  | Knows How |   | Describe the Physiological changes during sleep | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Medicine                                  |
| Hom UG-PB 8.45 |  |  | Knows     |   | Classify the types of sleep                     | Cognitive | Level 1 (Remember / recall)    | Nice to know      | Lecture, Small group discussion | SAQs | Viva Voce       | Medicine                                  |
| Hom UG-PB 8.46 |  |  | Knows How |   | Discuss the factors controlling sleep cycle     | Cognitive | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion | SAQs | Viva Voce       | Anatomy Medicine                          |
| Hom UG-PB 8.47 | Information Gathering ,Integration Of information, Problem Integration (K-2) |  | Knows How | Describe the physiological basis of memory, learning And speech | Discuss the mechanism and development of speech | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Anatomy Medicine                          |
| Hom UG-PB 8.48 |  |  | Knows How |   | Describe the physiological basis of learning    | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Anatomy Medicine Materia Medica Repertory |
| Hom UG-PB 8.49 |  |  | Knows How |   | Discuss the physiological basis of memory.      | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Medicine                                  |
| Hom UG-PB 8.50 |  |  | Knows How |   | Discuss the applied physiology of memory        | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Medicine Materia Medica Repertory         |

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| Hom UG-PB 8.51 | Information Gathering ,Integration Of information, Problem Integration (K-2) |  | Shows How | Perform the clinical examination of the nervous System : Higher functions, sensory system, motor system, reflexes, cranial nerves in a normal volunteer or simulated Environment | Perform examination of cranial nerves                | Psycho-motor | Level 2 (Control) | Must know | Demonstration | Observation | Checklist OSCE | Anatomy Medicine |
| Hom UG-PB 8.52 |  |  | Shows How |  | Perform examination for speech                       | Psycho-motor | Level 2 (Control) | Must know | Demonstration | Observation | Checklist OSCE | Anatomy Medicine |
| Hom UG-PB 8.53 |  |  | Shows How |  | Conduct the assessment of muscle tone                | Psycho-motor | Level 2 (Control) | Must know | Demonstration | Observation | Checklist OSCE | Anatomy Medicine |
| Hom UG-PB 8.54 |  |  | Shows How |  | Conduct the assessment of muscle power               | Psycho-motor | Level 2 (Control) | Must know | Demonstration | Observation | Checklist OSCE | Anatomy Medicine |
| Hom UG-PB 8.55 |  |  | Shows How |  | Perform the clinical examination for reflexes        | Psycho-motor | Level 2 (Control) | Must know | Demonstration | Observation | Checklist OSCE | Anatomy Medicine |
| Hom UG-PB 8.56 |  |  | Shows How |  | Perform Cutaneous sensory examination                | Psycho-motor | Level 2 (Control) | Must know | Demonstration | Observation | Checklist OSCE | Anatomy Medicine |
| Hom UG-PB 8.57 |  |  | Shows How |  | Perform the clinical examination of gait and posture | Psycho-motor | Level 2 (Control) | Must know | Demonstration | Observation | Checklist OSCE | Anatomy Medicine |

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| <b>Topic No</b>            | <b>9</b>  |
| <b>Theory</b>              | <b>Endocrine System</b>                             |
| <b>Practical</b>           |   |
| <b>Clinical Physiology</b> | <b>Reproductive System – Diagnosis of pregnancy</b> |

#### Learning Outcomes: -

At the end of chapter of Endocrine System& Diagnosis of pregnancy, the student must be able –

- Explain the mechanism of action of steroid, protein and amine hormones.
- Describe the regulation of secretion of hormones by hypothalamus.
- Discuss the synthesis, secretion, Transport, Physiological action, regulation & effect of altered secretion of-Pituitary gland; Thyroid gland; Para Thyroid glands; Adrenal glands; and Pancreatic Gland.
- Explain the physiology of Thymus &Pineal Glands, and the local hormones.

| S.No          | Generic competency                | Subject area     | Miller's Level | Specific competency   | Specific Learning Objectives / outcomes      | Bloom's domain | Guilbert's level               | Must know / desirable to know / nice to know | TL method / media               | Formative Assessment | Summative Assessment | Integration - Horizontal / Vertical / Spiral |
|---------------|-----------------------------------|------------------|----------------|---|--|----------------|--------------------------------|--|---------------------------------|----------------------|----------------------|--|
| Hom UG-PB 9.1 | Integration Of Information ( K-1) | Endocrine system | Knows          | Describe the mechanism of action of steroid, protein And amine hormones | Define hormones                              | Cognitive      | Level 1 (Remember / recall)    | Desirable to Know                            | Lecture, Small group discussion | SAQs MCQs            | SAQs, Viva Voce      |  |
| Hom UG-PB 9.2 |                                   |                  | Knows How      |   | Discuss the characteristic of hormones       | Cognitive      | Level 2 Understand / interpret | Desirable to know                            | Lecture, Small group discussion | SAQs MCQs            | SAQs, Viva Voce      | Psychology                                   |
| Hom UG-PB 9.3 |                                   |                  | Knows How      |   | Classify the hormones as per their chemistry | Cognitive      | Level 2 Understand / interpret | Desirable to know                            | Lecture, Small group discussion | SAQs MCQs            | SAQs, Viva Voce      | Biochemistry                                 |

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| Hom UG-PB 9.4  | Integration Of Information ( K-1) |  | Knows How | Describe the regulation of secretion of hormones by hypothalamus   | Discuss the regulation of hormone from the hypothalamus                         | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs MCQs | SAQs, Viva Voce | Anatomy Medicine       |
| Hom UG-PB 9.5  |                                   |  | Knows How |  | Discuss the homoeostatic mechanism of secretion of hormone through Hypothalamus | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | MCQs      | SAQs, Viva Voce | Medicine               |
| Hom UG-PB 9.6  | Integration Of Information ( K-1) |  | Knows How | Discuss the synthesis, secretion, Transport, Physiological action, regulation & effect of altered secretion of Pituitary gland | Discuss the physiological anatomy of pituitary gland                            | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion | SAQs MCQs | SAQs, Viva Voce | Anatomy Materia Medica |
| Hom UG-PB 9.7  |                                   |  | Knows How |  | Explain the secretion of anterior pituitary hormone                             | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion | SAQs MCQs | LAQs, Viva Voce | Anatomy Materia Medica |
| Hom UG-PB 9.8  |                                   |  | Knows How |  | Explain the secretion of growth hormone   | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs MCQs | LAQs, Viva Voce |                        |
| Hom UG-PB 9.9  |                                   |  | Knows How |  | Describe the functions of growth hormone  | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs MCQs | LAQs, Viva Voce |                        |
| Hom UG-PB 9.10 |                                   |  | Knows     |  | List the factors affecting growth hormone                                       | Cognitive | Level 1 Recall                 | Nice to know      | Lecture, Small group discussion | SAQs MCQs | Viva Voce       |                        |
| Hom UG-PB 9.11 |                                   |  | Knows How |  | Discuss the effects of altered secretion of                                     | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs MCQs | LAQs, Viva Voce | Anatomy Medicine       |

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|                |                                   |  |           |  | growth hormone  |           |                                |                   |                                      |           |                 |                                   |
| Hom UG-PB 9.12 |                                   |  | Knows How |  | Explain the actions and control of secretion of prolactin | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs MCQs | SAQs, Viva Voce | Anatomy Obstetrics & Gynaecology  |
| Hom UG-PB 9.13 |                                   |  | Knows How |  | Discuss the secretion of posterior Pituitary hormones     | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion      | SAQs MCQs | SAQs, Viva Voce | Anatomy                           |
| Hom UG-PB 9.14 |                                   |  | Knows How |  | Explain the functions of ADH                              | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs MCQs | LAQs, Viva Voce |                                   |
| Hom UG-PB 9.15 |                                   |  | Knows How |  | Discuss the functions of Oxytocin                         | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs MCQs | LAQs, Viva Voce | Medicine Obstetrics & Gynaecology |
| Hom UG-PB 9.16 |                                   |  | Knows How |  | Describe pituitary insufficiency                          | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs MCQs | SAQs, Viva Voce | Anatomy Medicine                  |
| Hom UG-PB 9.17 | Integration Of Information ( K-1) |  | Knows How | Describe the synthesis, secretion, Transport,        | Discuss the physiological anatomy of Thyroid gland        | Cognitive | Level 2 Understand / interpret | Desirable to know | Lecture, Small group discussion      | SAQs      | SAQs, Viva Voce | Anatomy Materia Medica Repertory  |
| Hom UG-PB 9.18 |                                   |  | Knows How | Physiological action, regulation & effect of altered | Describe the formation & secretion of thyroid hormone     | Cognitive | Level 2 Understand / interpret | Must know         | CBL, Lecture, Small group discussion | SAQs      | LAQs, Viva Voce |                                   |

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| Hom UG-PB 9.19 | Integration Of Information ( K-1) |  | Knows How | secretion of Thyroid gland  | Explain the transport & metabolism of thyroid hormone                             | Cognitive | Level 2 Understand / interpret | Desirable to Know | CBL, Lecture, Small group discussion | SAQs      | LAQs, Viva Voce |  |
| Hom UG-PB 9.20 |                                   |  | Knows How |   | Discuss the regulation and action of thyroid hormone                              | Cognitive | Level 2 Understand / interpret | Must know         | CBL, Lecture, Small group discussion | SAQs      | LAQs, Viva Voce |  |
| Hom UG-PB 9.21 |                                   |  | Knows How |   | Explain the effect of altered secretion of Thyroid hormone                        | Cognitive | Level 2 Understand / interpret | Must know         | CBL, Lecture, Small group discussion | SAQs      | LAQs, Viva Voce | Medicine                                   |
| Hom UG-PB 9.22 |                                   |  | Knows How | Explain the synthesis, secretion, Transport,  | Discuss the calcium & phosphate metabolism  | Cognitive | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion      | SAQs      | Viva Voce       | Biochemistry<br>Medicine<br>Materia Medica |
| Hom UG-PB 9.23 |                                   |  | Knows How | Physiological action, regulation & effect of altered secretion of Para Thyroid gland. | Discuss the action of parathormone  | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion      | SAQs MCQs | SAQs, Viva Voce |  |
| Hom UG-PB 9.24 |                                   |  | Knows How |   | Describe the action of Calcitonin   | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion      | SAQs MCQs | SAQs, Viva Voce | Biochemistry                               |
| Hom UG-PB 9.25 |                                   |  | Knows How |   | Discuss the role of Calcitonin in the maintenance of calcium homoeostasis in body | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs MCQs | LAQs, Viva Voce | Biochemistry<br>Medicine<br>Materia Medica |

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| Hom<br>UG-PB<br>9.26 |                                   |  | Calcitonin |   | Discuss the effect of altered secretion of para thyroid hormone               | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs MCQs | SAQs, Viva Voce | Medicine |
| Hom<br>UG-PB<br>9.27 | Integration Of Information ( K-1) |  | Calcitonin | Describe the synthesis, secretion, Transport, Physiological action, regulation & effect of altered secretion of Adrenal gland | Discuss the physiological anatomy of Adrenal Cortex gland                     | Cognitive | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion | SAQs      | Viva Voce       | Anatomy  |
| Hom<br>UG-PB<br>9.28 |                                   |  | Calcitonin |   | Describe the formation, secretion, and functions of Glucocorticoid hormone    | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs      | LAQs, Viva Voce |          |
| Hom<br>UG-PB<br>9.29 |                                   |  | Knows How  |   | Describe the formation, secretion, and functions of Mineralocorticoid hormone | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs      | LAQs, Viva Voce |          |
| Hom<br>UG-PB<br>9.30 |                                   |  | Knows How  |   | Describe the formation, secretion, and functions of Sex hormones              | Cognitive | Level 2 Understand / interpret | Desirable to know | Lecture, Small group discussion | SAQs      | SAQs, Viva Voce |          |
| Hom<br>UG-PB<br>9.31 |                                   |  | Knows How  |   | Explain the effects of altered secretion of Adrenal cortex hormone            | Cognitive | Level 2 Understand / interpret | Desirable to know | Lecture, Small group discussion | SAQs      | SAQs, Viva Voce | Medicine |

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| Hom UG-PB 9.32 |                                   |                                   | Knows How |  | Discuss the physiological anatomy of Adrenal Medullary gland    | Cognitive | Level 2 Understand / interpret | Desirable to know | Lecture, Small group discussion      | SAQs      | SAQs, Viva Voce | Anatomy                 |
| Hom UG-PB 9.33 | Integration Of Information ( K-1) |                                   | Knows How | Describe the synthesis, secretion, Transport, Physiological action, regulation & effect of altered secretion of Pancreatic Gland | Explain the physiological anatomy of Pancreatic gland           | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion      | SAQs      | SAQs, Viva Voce | Anatomy Materia Medica  |
| Hom UG-PB 9.34 |                                   |                                   | Knows How |  | Discuss the action and regulation of Glucagon                   | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion      | SAQs      | LAQs, Viva Voce |                         |
| Hom UG-PB 9.35 |                                   |                                   | Knows How |  | Discuss the action and regulation of Insulin                    | Cognitive | Level 2 Understand / interpret | Must know         | CBL, Lecture, Small group discussion | SAQs      | LAQs, Viva Voce | Medicine Materia Medica |
| Hom UG-PB 9.36 |                                   |                                   | Knows How |  | Describe the effects of altered secretion of Pancreatic Hormone | Cognitive | Level 2 Understand / interpret | Must know         | CBL, Lecture, Small group discussion | SAQs MCQs | LAQs, Viva Voce | Pathology Medicine      |
| Hom UG-PB 9.37 |                                   | Integration Of Information ( K-1) | Knows How | Describe the physiology of Thymus & Pineal Gland   | Describe the functions of hormone of thymus gland               | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs MCQs | SAQs, Viva Voce |                         |
| Hom UG-PB 9.38 |                                   |                                   | Knows How |  | Discuss the functions of hormone of pineal gland                | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs MCQs | SAQs, Viva Voce |                         |
| Hom UG-PB 9.39 |                                   |                                   | Knows How | Describe the Physiology of Local hormones  | State the functions of Local hormones                           | Cognitive | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion      | SAQs MCQs | Viva Voce       |                         |

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| Hom<br>UG-PB<br>9.40 | Information<br>Gathering<br>,Integration<br>Of<br>information<br>, Problem<br>Integration<br>(K-2) |  | Shows<br>How | Describe the<br>diagnosis of<br>pregnancy | Demonstrate<br>the diagnosis of<br>pregnancy<br>through Urine<br>pregnancy Strip | Psycho<br>Motor | Level 2<br>(Control) | Must know | Demonstrati<br>on | Observ<br>ation | Checklist | Obs&Gynec |
|----------------------|--|--|--------------|---|--|-----------------|----------------------|-----------|-------------------|-----------------|-----------|-----------|

### **SEMESTER – 3**

|                            |                            |
|----------------------------|----------------------------|
| <b>Topic No</b>            | <b>10</b>                  |
| <b>Theory</b>              | <b>Reproductive System</b> |
| <b>Practical</b>           |                            |
| <b>Clinical Physiology</b> |                            |

#### **Learning Outcomes: -**

At the end of the chapter on Reproductive System, the student must be able to –

- Describe the onset, progression, and stages puberty.
- Describe the structure and functions of male reproductive system.
- Describe the physiological effects of male sex hormone.
- Describe female reproductive system & functions of ovary and its Control.
- Describe menstrual cycle with hormonal, uterine and ovarian changes.
- Describe the physiological effects of female sex hormones.
- Discuss the contraceptive methods for male and female.
- Discuss the physiology of pregnancy, parturition & lactation.

| S.No           | Generic competency                | Subject area        | Miller's Level | Specific competency   | Specific Learning Objectives / outcomes  | Bloom's domain | Guilbert's level               | Must know / desirable to know / nice to know | TL method / media               | Formative Assessment | Summative Assessment | Integration - Horizontal / Vertical / Spiral |
|----------------|-----------------------------------|---------------------|----------------|---|--|----------------|--------------------------------|--|---------------------------------|----------------------|----------------------|--|
| Hom UG-PB 10.1 | Integration Of Information ( K-1) | Reproductive System | Knows          | Describe the onset, progression, and stages puberty. List causes and expressions of early and delayed puberty | Define puberty   | Cognitive      | Level 1 (Remember / recall)    | Must know                                    | Lecture, Small group discussion | SAQs                 | SAQs, Viva Voce      | Psychology Obstetrics & Gynaecology          |
| Hom UG-PB 10.2 |                                   |                     | Knows How      |   | Discuss the role of LH & FSH in development of puberty   | Cognitive      | Level 2 Understand / interpret | Must know                                    | Lecture, Small group discussion | SAQs                 | LAQs, Viva Voce      | Anatomy Psychology Obstetrics & Gynaecology  |
| Hom UG-PB 10.3 |                                   |                     | Knows How      |   | Explain puberty for its onset, and stages. Describe the causes for delayed & precocious puberty. | Cognitive      | Level 2 Understand / interpret | Must know                                    | Lecture, Small group discussion | SAQs                 | SAQs, Viva Voce      | Anatomy Psychology Obstetrics & Gynaecology  |
| Hom UG-PB 10.4 | Integration Of Information ( K-1) |                     | Knows How      | Describe the structure and functions of male  | Describe the structure of male reproductive system   | Cognitive      | Level 2 Understand / interpret | Nice to know                                 | Lecture, Small group discussion | SAQs                 | Viva Voce            | Anatomy                                      |

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| Hom UG-PB 10.5  |                                   |  | Knows How | reproductive system.   | Explain the function of male reproductive system.                                     | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion | SAQs      | SAQs, Viva Voce | Medicine                          |
| Hom UG-PB 10.6  | Integration Of Information ( K-1) |  | Knows How | Describe the physiological effects of male sex hormone                                 | Explain the functions of testis as an endocrine gland.                                | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs MCQs | SAQs, Viva Voce | Psychology Medicine               |
| Hom UG-PB 10.7  |                                   |  | Knows How |  | Discuss the role of testosterone  | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs      | LAQs, Viva Voce | Medicine Obstetrics & Gynaecology |
| Hom UG-PB 10.8  | Integration Of Information ( K-1) |  | Knows How | Describe the functions of testis and control of Spermatogenesis & factors modifying it | Discuss the process of spermatogenesis  | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs      | LAQs, Viva Voce | Anatomy Medicine                  |
| Hom UG-PB 10.9  |                                   |  | Knows How |  | Discuss the factors affecting spermatogenesis   | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion | SAQs      | SAQs, Viva Voce |                                   |
| Hom UG-PB 10.10 | Integration Of Information ( K-1) |  | Knows How | Describe female reproductive system & functions of ovary and its Control.              | Describe structure the female reproductive tract                                      | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs      | SAQs, Viva Voce | Anatomy Obstetrics & Gynaecology  |
| Hom UG-PB 10.11 |                                   |  | Knows How |  | Discuss the functions of female reproductive tract                                    | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion | SAQs      | SAQs, Viva Voce | Obstetrics & Gynaecology          |
| Hom UG-PB 10.12 |                                   |  | Knows How |  | Discuss the role of ovary as an endocrine gland. List the hormones secreted by ovary. | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs MCQs | LAQs, Viva Voce | Obstetrics & Gynaecology          |

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| Hom UG-PB 10.13 | Integration Of Information ( K-1) |  | Knows How | Describe menstrual cycle with hormonal, uterine and ovarian changes | Discuss the ovarian changes during menstrual cycle                              | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs MCQs | LAQs, Viva Voce | Obstetrics & Gynaecology                    |
| Hom UG-PB 10.14 |                                   |  | Knows How |   | Discuss the Uterine changes during menstrual cycle                              | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs MCQs | LAQs, Viva Voce | Obstetrics & Gynaecology                    |
| Hom UG-PB 10.15 |                                   |  | Knows How |   | Discuss the Vaginal changes during menstrual cycle                              | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs      | LAQs, Viva Voce | Obstetrics & Gynaecology                    |
| Hom UG-PB 10.16 | Integration Of Information ( K-1) |  | Knows How | Describe the physiological effects of female sex hormones           | Discuss the Gonadotrophin changes during menstrual cycle                        | Cognitive | Level 2 Understand / interpret | Desirable to know | Lecture, Small group discussion      | SAQs      | SAQs, Viva Voce | Obstetrics & Gynaecology Materia Medica     |
| Hom UG-PB 10.17 |                                   |  | Knows How |   | Discuss the changes during menopause  | Cognitive | Level 2 Understand / interpret | Must know         | CBL, Lecture, Small group discussion | MCQs      | SAQs, Viva Voce | Obstetrics & Gynaecology                    |
| Hom UG-PB 10.18 |                                   |  | Knows How |   | Describe the contraceptive methods for male                                     | Cognitive | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion      | MCQs      | Viva Voce       | Obstetrics & Gynaecology Community Medicine |
| Hom UG-PB 10.19 |                                   |  | Knows How | Discuss the contraceptive methods for male and female.              | Describe the contraceptive methods for female                                   | Cognitive | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion      | MCQs      | Viva Voce       | Obstetrics & Gynaecology Community Medicine |
| Hom UG-PB 10.20 | Integration Of Information ( K-1) |  | Knows How | Discuss the physiology of pregnancy, parturition & lactation.       | Discuss the fertilization & implantation of ovum                                | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs      | LAQs, Viva Voce | Obstetrics & Gynaecology                    |
| Hom UG-PB 10.21 |                                   |  | Knows How |   | Explain the role of placenta as an endocrine organ. List the placental hormones | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion      | SAQs      | SAQs, Viva Voce | Obstetrics & Gynaecology                    |

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| Hom<br>UG-PB<br>10.22 |  |  | Knows<br>How |  | Discuss the<br>process of<br>parturition     | Cognitive | Level 2<br>Understand<br>/ interpret | Must know            | Lecture,<br>Small group<br>discussion | SAQs | LAQs,<br>Viva<br>Voce | Obstetrics &<br>Gynaecology<br>Materia<br>Medica                          |
| Hom<br>UG-PB<br>10.23 |  |  | Knows<br>How |  | Describe the role<br>of prolactin<br>Hormone | Cognitive | Level 2<br>Understand<br>/ interpret | Desirable to<br>Know | Lecture,<br>Small group<br>discussion | SAQs | SAQs,<br>Viva<br>Voce | Obstetrics &<br>Gynaecology   |
| Hom<br>UG-PB<br>10.24 |  |  | Knows<br>How |  | Explain the<br>process of<br>lactation       | Cognitive | Level 2<br>Understand<br>/ interpret | Desirable to<br>know | Lecture,<br>Small group<br>discussion | SAQs | SAQs,<br>Viva<br>Voce | Obstetrics &<br>Gynaecology<br>Community<br>Medicine<br>Materia<br>Medica |

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|----------------------------|--|
| <b>Topic No</b>            | <b>11</b>                                    |
| <b>Theory</b>              | <b>Special Senses</b>                        |
| <b>Practical</b>           |  |
| <b>Clinical Physiology</b> | <b>Special Senses – Clinical Examination</b> |

#### Learning Outcomes: -

At the end of the chapter on Special senses, the student must be able to –

- Discuss perception of smell and taste sensation
- Discuss patho-physiology of altered smell and taste sensation
- Discuss functional anatomy of ear and auditory pathways & physiology of hearing
- Discuss functional anatomy of eye, physiology of image formation, physiology of vision including colour vision, refractive errors, colour blindness, physiology of pupil and light reflex
- Discuss the physiological basis of lesion in visual pathway
- Demonstrate the testing of visual acuity, colour and field of vision; hearing; smell; and taste sensation in volunteer or simulated environment

| S.No           | Generic competency                | Subject area   | Miller's Level | Specific Competency                        | Specific Learning Objectives / outcomes           | Bloom's domain | Guilbert's level               | Must know / desirable to know / nice to know | TL method / media                    | Formative Assessment | Summative Assessment | Integration - Horizontal / Vertical / Spiral         |
|----------------|-----------------------------------|----------------|----------------|--|---|----------------|--------------------------------|--|--------------------------------------|----------------------|----------------------|--|
| Hom UG-PB 11.1 | Integration Of Information ( K-1) | Special Senses | Knows How      | Describe the perception of smell sensation | Discuss the sensation of olfaction                | Cognitive      | Level 2 Understand / interpret | Desirable to Know                            | Lecture, Small group discussion      | SAQs                 | SAQs, Viva Voce      | Anatomy Surgery - ENT                                |
| Hom UG-PB 11.2 |                                   |                | Knows How      |  | Discuss the olfactory receptor, olfactory pathway | Cognitive      | Level 2 Understand / interpret | Must know                                    | Lecture, Small group discussion      | SAQs                 | LAQ, Viva Voce       | Anatomy  |
| Hom UG-PB 11.3 |                                   |                | Knows How      |  | Discuss the physiology of olfaction               | Cognitive      | Level 2 Understand / interpret | Desirable to know                            | Lecture, Small group discussion      | SAQs                 | SAQs, Viva Voce      |  |
| Hom UG-PB 11.4 |                                   |                | Knows How      |  | Discuss the altered sensation of smell            | Cognitive      | Level 2 Understand / interpret | Must know                                    | CBL, Lecture, Small group discussion | MCQs                 | SAQs, Viva Voce      | Medicine   |
| Hom UG-PB 11.5 | Integration Of Information ( K-1) |                | Knows How      | Describe perception of taste sensation     | Discuss the sensation of Taste                    | Cognitive      | Level 2 Understand / interpret | Desirable to Know                            | Lecture, Small group discussion      | SAQs                 | SAQs, Viva Voce      | Anatomy Surgery – ENT<br>Materia Medica<br>Repertory |
| Hom UG-PB 11.6 |                                   |                | Knows How      |  | Discuss the taste receptor.                       | Cognitive      | Level 2 Understand / interpret | Must know                                    | Lecture, Small group discussion      | SAQs                 | LAQ, Viva Voce       | Anatomy  |
|                |                                   |                | Shows How      |  | Draw the taste pathway                            | Psycho motor   | Level 2. Control               | Must Know                                    | Demonstration                        | Observation          | DOPS                 | Anatomy  |
| Hom UG-PB 11.7 |                                   |                | Knows How      |  | Discuss the physiology of Taste                   | Cognitive      | Level 2 Understand / interpret | Must know                                    | Lecture, Small group discussion      | SAQs                 | SAQs, Viva Voce      |  |

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| Hom UG-PB 11.8  |                                       |  | Knows How |  | Discuss the altered sensation of Taste                         | Cognitive    | Level 2 Understand / interpret | Desirable to know | CBL, Lecture, Small group discussion | MCQs        | SAQs, Viva Voce | Medicine Materia Medica               |
| Hom UG-PB 11.9  | Integration Of Information ( K-1)     |  | Knows How | Describe the functional anatomy of ear & auditory pathways | Describe the physiological anatomy of ear                      | Cognitive    | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion      | SAQs        | SAQs, Viva Voce | Anatomy Surgery – ENT Materia Medica  |
| Hom UG-PB 11.10 |                                       |  | Shows How |  | Map the Auditory Pathway                                       | Psycho motor | Level 2. Control               | Must Know         | Demonstration                        | Observation | Checklist       | Anatomy ENT                           |
| Hom UG-PB 11.11 |                                       |  | Knows How |  | Describe the mechanism of hearing                              | Cognitive    | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs        | LAQs, Viva Voce | Surgery - ENT                         |
| Hom UG-PB 11.12 |                                       |  | Knows How |  | Discuss the altered sensation of Hearing                       | Cognitive    | Level 2 Understand / interpret | Must know         | CBL, Lecture, Small group discussion | MCQs        | SAQs, Viva Voce | Medicine Surgery – ENT Materia Medica |
| Hom UG-PB 11.13 |                                       |  | Knows How | Describe the functional anatomy of eye                     | Explain the structure & function of eye.                       | Cognitive    | Level 2 Understand / interpret | Must Know         | Lecture, Small group discussion      | SAQs        | SAQs, Viva Voce | Anatomy Surgery - Ophthalmology       |
| Hom UG-PB 11.14 | Integration Of Information ( K-1)     |  | Knows How | Describe the physiology of image formation                 | Describe the visual pathway                                    | Cognitive    | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs        | LAQs, Viva Voce |                                       |
| Hom UG-PB 11.15 |                                       |  | Knows How |  | Discuss the principles of optics, visual acuity, Visual reflex | Cognitive    | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | MCQs        | SAQs, Viva Voce | Surgery – Ophthalmology               |
| Hom UG-PB 11.16 | Information Gathering ,Integration Of |  | Knows How | Describe the physiology of vision including colour vision  | Discuss the photochemistry of vision                           | Cognitive    | Level 2 Understand / interpret | Desirable to know | Lecture, Small group discussion      | MCQs        | SAQs, Viva Voce | Surgery – Ophthalmology               |

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| Hom UG-PB 11.17   | information, Problem Integration (K-2)                                       |  | Knows How |   | Discuss the photopic & scotopic vision                                | Cognitive    | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion      | SAQs        | SAQs, Viva Voce | Surgery – Ophthalmology                                |
| Hom UG-PB 11.1. 8 |  |  | Knows How |   | Discuss the visual adaptation, visual accommodation & night blindness | Cognitive    | Level 2 Understand / interpret | Desirable to know | PBL, Lecture, Small group discussion | SAQs        | SAQs, Viva Voce | Surgery – Ophthalmology<br>Materia Medica              |
| Hom UG-PB 11.19   | Information Gathering ,Integration Of information, Problem Integration (K-2) |  | Knows How | Describe the refractive errors and colour blindness                             | Discuss the different types of refractive errors                      | Cognitive    | Level 2 Understand / interpret | Desirable to know | Lecture, Small group discussion      | MCQs        | LAQs, Viva Voce | Surgery – Ophthalmology<br>Materia Medica<br>Repertory |
| Hom UG-PB 11.20   |  |  | Knows How |   | Discuss the colour blindness  | Cognitive    | Level 2 Understand / interpret | Desirable to know | CBL, Lecture, Small group discussion | MCQs        | SAQs, Viva Voce | Surgery – Ophthalmology<br>Materia Medica              |
| Hom UG-PB 11.21   |  |  | Knows     |   | List the causes of Nystagmus  | Cognitive    | Level 1 Recall                 | Nice to know      | CBL, Lecture, Small group discussion | SAQs        | Viva Voce       | Surgery – Ophthalmology<br>Materia Medica              |
| Hom UG-PB 11.22   | Information Gathering ,Integration Of information, Problem Integration (K-2) |  | Shows How | Demonstrate Testing of visual acuity, colour and field of vision in a volunteer | Perform the testing of visual acuity, colour and field of vision      | Psycho Motor | Level 2 (Control)              | Desirable to know | Demonstration                        | Observation | Checklist       | Surgery – Ophthalmology                                |
| Hom UG-PB 11.23   |  |  | Knows How |   | Interpret the testing of visual acuity, colour and field of vision    | Cognitive    | Level 2 Understand / interpret | Nice to know      | CBL, Lecture, Small group discussion | SAQs        | Viva Voce       | Surgery – Ophthalmology<br>Materia Medica              |
| Hom UG-PB 11.24   | Information Gathering ,Integration   |  | Shows How | Demonstrate testing of hearing in a   | Perform the testing of hearing in a volunteer                         | Psycho Motor | Level 2 (Control)              | Desirable to know | Demonstration                        | Observation | Checklist       | Surgery – ENT  |

|                       |   |  |              |   |   |                 |                                      |                      |   |                 |                       |   |
|-----------------------|---|--|--------------|---|---|-----------------|--------------------------------------|----------------------|---|-----------------|-----------------------|---|
| Hom<br>UG-PB<br>11.25 | Of<br>information,<br>Problem<br>Integration<br>(K-2) |  | Knows<br>How | volunteer   | Interpret the<br>testing of hearing<br>in a volunteer       | Cognitive       | Level 2<br>Understand<br>/ interpret | Nice to know         | CBL,<br>Lecture,<br>Small group<br>discussion | SAQs            | SAQs,<br>Viva<br>Voce | Surgery –<br>Ophthalmolo<br>gy<br>Materia<br>Medica |
| Hom<br>UG-PB<br>11.26 | Information<br>Gathering<br>,Integration<br>Of        |  | Shows<br>How | Demonstrate<br>testing for<br>smell in a<br>volunteer         | Perform testing<br>for smell in a<br>volunteer              | Psycho<br>Motor | Level 2<br>(Control)                 | Desirable to<br>know | Demonstrat<br>ion                             | Observa<br>tion | Checklist             | Surgery – ENT                                       |
| Hom<br>UG-PB<br>11.27 | information,<br>Problem<br>Integration<br>(K-2)       |  | Knows<br>How |   | Interpret testing<br>for smell in a<br>volunteer            | Cognitive       | Level 2<br>Understand<br>/ interpret | Nice to know         | CBL,<br>Lecture,<br>Small group<br>discussion | SAQs            | SAQs,<br>Viva<br>Voce | Surgery –<br>Ophthalmolo<br>gy<br>Materia<br>Medica |
| Hom<br>UG-PB<br>11.27 | Information<br>Gathering,<br>Integration<br>Of        |  | SHOW<br>HOW  | Demonstrate<br>testing for<br>taste sensation<br>in volunteer | Perform testing<br>for taste<br>sensation in<br>volunteer   | Psycho<br>Motor | Level 2<br>(Control)                 | Must know            | Demonstrat<br>ion                             | Observa<br>tion | Checklist             | Anatomy<br>Surgery – ENT                            |
| Hom<br>UG-PB<br>11.29 | information,<br>Problem<br>Integration<br>(K-2)       |  | Knows<br>How |   | Interpret testing<br>for taste<br>sensation in<br>volunteer | Cognitive       | Level 2<br>Understand<br>/ interpret | Nice to know         | CBL,<br>Lecture,<br>Small group<br>discussion | SAQs            | SAQs,<br>Viva<br>Voce | Anatomy<br>Surgery – ENT                            |

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|----------------------------|---|
| <b>Topic No</b>            | <b>12</b>   |
| <b>Theory</b>              | <b>Digestive System &amp; Nutrition</b>             |
| <b>Practical</b>           | <b>Liver Function Test</b>                          |
| <b>Clinical Physiology</b> | <b>Gastrointestinal system clinical examination</b> |

**Learning Outcomes: -**

At the end of the chapter Digestive system & Nutrition, the student must be able to –

- Describe the structure, Function & Innervation of digestive system.
- Describe the composition, mechanism of secretion, function & regulation of saliva.
- Describe the movement of oesophagus.
- Describe the composition, mechanism of secretion, function & regulation of gastric juice.
- Describe the composition, mechanism of secretion, function & regulation of pancreatic juice.
- Describe the structure & function of liver & Gall bladder.
- Describe the composition, mechanism of secretion, function & regulation of Bile.
- Describe the composition, mechanism of secretion, function & regulation of Small Intestine.
- Describe the movement of gastrointestinal tract, it's regulation & function.
- Describe the movement of large intestine & defecation as a process.
- Describe the physiology of digestion and absorption of nutrients.
- Observe the procedure for Liver Function Test.
- Perform examination for gastrointestinal system on a volunteer.

| S.No           | Generic competency                | Subject area     | Miller's Level | Specific competency                | Specific Learning Objectives / outcomes    | Bloom's domain | Guilbert's level               | Must know / desirable to know / nice to know | TL method / media               | Formative Assessment | Summative Assessment | Integration - Horizontal / Vertical / Spiral |
|----------------|-----------------------------------|------------------|----------------|------------------------------------|--|----------------|--------------------------------|--|---------------------------------|----------------------|----------------------|--|
| Hom UG-PB 12.1 | Integration Of Information ( K-1) | Digestive System | Knows How      | Describe the structure, Function & | Discuss the importance of digestive system | Cognitive      | Level 2 Understand / interpret | Must know                                    | Lecture, Small group discussion | SAQs                 | SAQs, Viva Voce      | Anatomy                                      |

|                 |                                   |             |                                   |                                     |   |   |                |                                 |                                 |                                      |                  |                 |                         |
|-----------------|-----------------------------------|-------------|-----------------------------------|-------------------------------------|---|---|----------------|---------------------------------|---------------------------------|--------------------------------------|------------------|-----------------|-------------------------|
| Hom UG-PB 12.2  |                                   | & Nutrition | Knows                             | Innervation of digestive system     | Recall the structure of digestive system  | Cognitive   | Level 1 Recall | Must know                       | Lecture, Small group discussion | SAQs                                 | SAQs, Viva Voce  | Anatomy         |                         |
| Hom UG-PB 12.3  |                                   |             | Knows                             |                                     | Recognize the structure of small intestine  | Cognitive   | Level 1 Recall | Must know                       | Lecture, Small group discussion | SAQs                                 | SAQs, Viva Voce  | Anatomy         |                         |
| Hom UG-PB 12.4  |                                   |             | Knows                             |                                     | Identify the structure of large intestine   | Cognitive   | Level 1 Recall | Must know                       | Lecture, Small group discussion | SAQs                                 | SAQs, Viva Voce  | Anatomy         |                         |
| Hom UG-PB 12.5  |                                   |             | Integration Of Information ( K-1) | Knows                               | Describe the composition, mechanism of secretion, function & regulation of saliva | Classify salivary glands. Mention the innervation of salivary glands. | Cognitive      | Level 1 Recall                  | Desirable to know               | Lecture, Small group discussion      | SAQs             | SAQs, Viva Voce | Anatomy Materia Medica  |
| Hom UG-PB 12.6  |                                   |             |                                   | Knows How                           |   | Discuss composition of saliva   | Cognitive      | Level 2 Understand / interpret  | Must know                       | Lecture, Small group discussion      | MCQs             | LAQs, Viva Voce | Biochemistry            |
| Hom UG-PB 12.7  |                                   |             |                                   | Knows How                           |   | Discuss functions of saliva   | Cognitive      | Level 2 Understand / interpret  | Must know                       | Lecture, Small group discussion      | SAQs             | LAQs, Viva Voce | Medicine Materia Medica |
| Hom UG-PB 12.8  |                                   |             |                                   | Knows How                           |   | Describe mechanism of salivary secretion                              | Cognitive      | Level 2 Understand / interpret  | Must know                       | Lecture, Small group discussion      | SAQs             | LAQs, Viva Voce |                         |
| Hom UG-PB 12.9  |                                   |             |                                   | Knows How                           |   | Discuss the control of salivary secretion                             | Cognitive      | Level 2 Understand / interpret  | Must know                       | Lecture, Small group discussion      | SAQs             | LAQs, Viva Voce |                         |
| Hom UG-PB 12.10 |                                   |             |                                   | Knows How                           |   | Explain the clinical relevance of salivary gland & salivary secretion | Cognitive      | Level 2 Understand / interpret  | Desirable to Know               | PBL, Lecture, Small group discussion | SAQs             | SAQs, Viva Voce | Medicine Materia Medica |
| Hom UG-PB 12.11 | Integration Of Information ( K-1) | Knows How   |                                   | Describe the movement of oesophagus |   | Describe the process of mastication.                                  | Cognitive      | Level 2 Understand / interpret  | Desirable to Know               | Lecture, Small group discussion      | SAQs             | SAQs, Viva Voce |                         |
| Hom UG-PB 12.12 |                                   | Knows How   | Explain the stages of swallowing  |                                     | Cognitive   | Level 2 Understand / interpret  | Must know      | Lecture, Small group discussion | MCQs                            | LAQs, Viva Voce                      | Anatomy Medicine |                 |                         |

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| Hom UG-PB 12.13 | Integration Of Information ( K-1) |  | Knows How |  | Discuss the role of upper & lower oesophageal sphincter       | Cognitive | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion      | SAQs | Viva Voce       |                                   |
| Hom UG-PB 12.14 |                                   |  | Knows     |  | List the common oesophageal motility disorders                | Cognitive | Level 1 Recall                 | Nice to Know      | CBL, Lecture, Small group discussion | SAQs | Viva Voce       | Medicine Surgery                  |
| Hom UG-PB 12.15 |                                   |  | Knows     | Describe the composition, mechanism of secretion, function & regulation of Gastric Juice | Recall the macro and micro structure of stomach               | Cognitive | Level 1 Recall                 | Must know         | Lecture, Small group discussion      | SAQs | SAQs, Viva Voce | Anatomy                           |
| Hom UG-PB 12.16 |                                   |  | Knows How |  | Discuss the functions of stomach                              | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs | LAQs, Viva Voce | Anatomy                           |
| Hom UG-PB 12.17 |                                   |  | Knows How |  | Discuss the composition & functions of gastric juice          | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | MCQs | LAQs, Viva Voce | Biochemistry                      |
| Hom UG-PB 12.18 |                                   |  | Knows How |  | Discuss the mechanism & regulation of gastric juice secretion | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs | LAQs, Viva Voce | Medicine                          |
| Hom UG-PB 12.19 |                                   |  | Knows How |  | Discuss the process of digestion in stomach                   | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs | LAQs, Viva Voce |                                   |
| Hom UG-PB 12.20 |                                   |  | Knows How |  | Discuss the movements of stomach                              | Cognitive | Level 2 Understand / interpret | Desirable to know | Lecture, Small group discussion      | SAQs | SAQs, Viva Voce | Anatomy                           |
| Hom UG-PB 12.21 |                                   |  | Knows     |  | Mention the three phases of vomiting                          | Cognitive | Level 1 Recall                 | Nice to know      | CBL, Lecture, Small group discussion | SAQs | Viva Voce       | Medicine Materia Medica Repertory |

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| Hom UG-PB 12.22 | Integration Of Information ( K-1) |  | Knows     | Describe the composition, mechanism of secretion, function & regulation of Pancreatic Juice | Recall the macro and micro structure of Pancreas                 | Cognitive | Level 1 Recall                 | Must know         | Lecture, Small group discussion      | SAQs | SAQs, Viva Voce | Anatomy                           |
| Hom UG-PB 12.23 |                                   |  | Knows How |   | Discuss the composition & functions of pancreatic juice          | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs | LAQs, Viva Voce | Biochemistry                      |
| Hom UG-PB 12.24 |                                   |  | Knows How |   | Discuss the mechanism & regulation of pancreatic juice secretion | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs | LAQs, Viva Voce | Medicine                          |
| Hom UG-PB 12.25 |                                   |  | Knows How |   | Describe exocrine pancreatic insufficiency                       | Cognitive | Level 2 Understand / interpret | Desirable to Know | CBL, Lecture, Small group discussion | MCQs | SAQs, Viva Voce | Medicine Materia Medica Repertory |
| Hom UG-PB 12.26 | Integration Of Information ( K-1) |  | Knows How | Describe the structure & function of liver & Gall bladder                                   | Discuss the structure & functions of Liver                       | Cognitive | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion      | SAQs | SAQs, Viva Voce | Anatomy                           |
| Hom UG-PB 12.27 |                                   |  | Knows How |   | Explain the signs of liver insufficiency                         | Cognitive | Level 2 Understand / interpret | Desirable to Know | CBL, Lecture, Small group discussion | MCQs | SAQs, Viva Voce | Medicine                          |
| Hom UG-PB 12.28 |                                   |  | Knows How |   | Describe the structure & functions of gall bladder               | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs | SAQs, Viva Voce | Anatomy Repertory                 |
| Hom UG-PB 12.29 | Integration Of Information ( K-1) |  | Knows How | Describe the composition, mechanism of secretion, function & regulation of Bile             | Discuss the composition & function of liver bile                 | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | MCQs | SAQs, Viva Voce | Biochemistry                      |
| Hom UG-PB 12.30 |                                   |  | Knows How |   | Discuss the composition &  | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs | LAQs, Viva Voce | Biochemistry                      |

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|                 |                                   |  |           |  | function of gall bladder bile  |           |                                |                   |                                      |      |                 |                         |
| Hom UG-PB 12.31 |                                   |  | Knows How |  | Describe the control & mechanism of bile secretion                   | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs | LAQs, Viva Voce |                         |
| Hom UG-PB 12.32 |                                   |  | Knows How |  | Describe the clinical significance of liver functions.               | Cognitive | Level 2 Understand / interpret | Desirable to know | CBL, Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Medicine Materia Medica |
| Hom UG-PB 12.33 |                                   |  | Knows How |  | Describe the clinical significance of Gall Bladder functions         | Cognitive | Level 2 Understand / interpret | Desirable know    | CBL, Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Medicine Surgery        |
| Hom UG-PB 12.34 | Integration Of Information ( K-1) |  | Knows     | Describe the composition, mechanism of secretion, function & regulation of Small intestine | Recognise the macro and micro structure of Small intestine           | Cognitive | Level 1 Recall                 | Desirable to know | Lecture, Small group discussion      | SAQs | SAQs, Viva Voce | Anatomy Repertory       |
| Hom UG-PB 12.35 |                                   |  | Knows How |  | Discuss the composition & functions of Succus Entericus              | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | MCQs | LAQs, Viva Voce | Biochemistry            |
| Hom UG-PB 12.36 |                                   |  | Knows How |  | Discuss the mechanism & regulation of secretions of Succus Entericus | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs | LAQs, Viva Voce |                         |
| Hom UG-PB 12.37 |                                   |  | Knows How |  | Describe the process of digestion in small intestine                 | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs | LAQs, Viva Voce |                         |
| Hom UG-PB 12.37 |                                   |  | Knows How |  | Describe the Malabsorption Syndrome                                  | Cognitive | Level 2 Understand / interpret | Nice to Know      | CBL, Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Medicine Materia Medica |

|                 |                                   |  |           |  |   |           |                                |                   |                                      |           |                 |                |  |
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| Hom UG-PB 12.39 | Integration Of Information ( K-1) |  | Knows How | Describe the movement of gastrointestinal tract, it's regulation & function. | Explain peristalsis as intestinal movement                        | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs      | LAQs, Viva Voce | Materia Medica |  |
| Hom UG-PB 12.40 |                                   |  | Knows How |  | Describe segmentation as intestinal movement                      | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs      | LAQs, Viva Voce |                |  |
| Hom UG-PB 12.41 |                                   |  | Knows How |  | Discuss the clinical importance of small intestine                | Cognitive | Level 2 Understand / interpret | Desirable to Know | CBL, Lecture, Small group discussion | SAQs      | SAQs, Viva Voce | Medicine       |  |
| Hom UG-PB 12.42 | Integration Of Information ( K-1) |  | Knows How | Describe the movement of large intestine & defecation as a process.          | Discuss the movements of large intestine                          | Cognitive | Level 2 Understand / interpret | Must Know         | Lecture, Small group discussion      | SAQs      | SAQs, Viva Voce |                |  |
| Hom UG-PB 12.43 |                                   |  | Knows How |  | Describe the process of absorption & secretion in large intestine | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs      | SAQs, Viva Voce | Materia Medica |  |
| Hom UG-PB 12.44 |                                   |  | Knows How |  | Discuss the process of defecation                                 | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | SAQs      | SAQs, Viva Voce | Repertory      |  |
| Hom UG-PB 12.45 |                                   |  | Knows How |  | Discuss the clinical significance of large intestine              | Cognitive | Level 2 Understand / interpret | Desirable to know | CBL, Lecture, Small group discussion | SAQs      | SAQs, Viva Voce | Medicine       |  |
| Hom UG-PB 12.46 | Integration Of Information ( K-1) |  | Knows How | Describe the physiology of digestion and absorption of nutrients             | Discuss the digestion & absorption of carbohydrates               | Cognitive | Level 2 Understand / interpret | Must Know         | Lecture, Small group discussion      | SAQs      | LAQs, Viva Voce |                |  |
| Hom UG-PB 12.47 |                                   |  | Knows How |  | Discuss the digestion & absorption of Fats                        | Cognitive | Level 2 Understand / interpret | Must Know         | Lecture, Small group discussion      | SAQs      | LAQs, Viva Voce |                |  |
| Hom UG-PB 12.48 |                                   |  | Knows How |  | Discuss the digestion &   | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion      | MCQs SAQs | LAQs, Viva Voce |                |  |

|                 |  |  |           |   |   |              |                                |                   |                                 |             |                 |                  |
|-----------------|--|--|-----------|---|---|--------------|--------------------------------|-------------------|---------------------------------|-------------|-----------------|------------------|
|                 |  |  |           |   | absorption of Proteins  |              |                                |                   |                                 |             |                 |                  |
| Hom UG-PB 12.49 |  |  | Knows How |   | Discuss absorption of water, electrolytes   | Cognitive    | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | MCQs        | SAQs, Viva Voce |                  |
| Hom UG-PB 12.50 |  |  | Knows How |   | Describe the absorption of vitamins & minerals  | Cognitive    | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | MCQs        | SAQs, Viva Voce |                  |
| Hom UG-PB 12.51 | Information Gathering ,Integration Of information, Problem Integration (K-2) |  | Shows How | Observe the process of conducting liver function test | Observe the liver function test   | Psycho Motor | Level 1 (Observe / Imitate)    | Nice to know      | Demonstration                   | Observation | Checklist       | Medicine         |
| Hom UG-PB 12.52 | Information Gathering ,Integration Of information, Problem Integration (K-2) |  | Shows How | Demonstrate the Gastrointestinal system examination   | Perform the inspection of gastrointestinal system in the clinical examination           | Psycho Motor | Level 2 (Control)              | Desirable to know | Demonstration                   | Observation | Checklist       | Anatomy Medicine |
| Hom UG-PB 12.53 |  |  | Knows How |   | Interpret the findings of inspection of gastrointestinal system in clinical examination | Cognitive    | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion | MCQs        | SAQs, Viva Voce | Anatomy Medicine |
| Hom UG-PB 12.54 |  |  | Shows How |   | Perform the palpation of gastrointestinal system in the clinical examination            | Psycho Motor | Level 2 (Control)              | Desirable to know | Demonstration                   | Observation | Checklist       | Anatomy Medicine |

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|-----------------------|--|--|-----------|--|---|--------------|--------------------------------|-------------------|---------------------------------|-------------|-----------------|------------------|
| Hom<br>UG-PB<br>12.55 |  |  | Knows How |  | Interpret the findings of palpation of gastrointestinal system in clinical examination    | Cognitive    | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion | MCQs        | SAQs, Viva Voce | Anatomy Medicine |
| Hom<br>UG-PB<br>12.56 |  |  | Shows How |  | Perform the percussion of gastrointestinal system in the clinical examination             | Psycho Motor | Level 2 (Control)              | Desirable to know | Demonstration                   | Observation | Checklist       | Anatomy Medicine |
| Hom<br>UG-PB<br>12.57 |  |  | Knows How |  | Interpret the findings of percussion of gastrointestinal system in clinical examination   | Cognitive    | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion | MCQs        | SAQs, Viva Voce | Anatomy Medicine |
| Hom<br>UG-PB<br>12.58 |  |  | Shows How |  | Perform the auscultation of gastrointestinal system in the clinical examination           | Psycho Motor | Level 2 (Control)              | Desirable to know | Demonstration                   | Observation | Checklist       | Anatomy Medicine |
| Hom<br>UG-PB<br>12.59 |  |  | Knows How |  | Interpret the findings of auscultation of gastrointestinal system in clinical examination | Cognitive    | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion | MCQs        | SAQs, Viva Voce | Anatomy Medicine |

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|----------------------------|-----------------------------|
| <b>Topic No</b>            | <b>13</b>                   |
| <b>Theory</b>              | <b>Renal Physiology</b>     |
| <b>Practical</b>           | <b>Kidney Function Test</b> |
| <b>Clinical Physiology</b> |                             |

**Learning Outcomes: -**

At the end of the chapter Renal Physiology, the student must be able to –

- Describe structure & functions of the kidneys.
- Explain the role of renin-angiotensin system.
- Describe the mechanism of urine formation.
- Describe the process of filtration, secretion & reabsorption in kidney.
- Describe the concentration and diluting mechanism in the kidney.
- Describe the renal regulation of acid-base balance.
- Describe the physiology of micturition.
- Describe the Renal Function Tests.

| S.No           | Generic competency                | Subject area     | Miller’s Level  | Specific Competency                            | Specific Learning Objectives / outcomes                                  | Bloom’s domain                 | Guilbert’s level               | Must know / desirable to know / nice to know | TL method / media               | Formative Assessment | Summative Assessment | Integration - Horizontal / Vertical / Spiral |
|----------------|-----------------------------------|------------------|---|--|--|--------------------------------|--------------------------------|--|---------------------------------|----------------------|----------------------|--|
| Hom UG-PB 13.1 | Integration Of Information ( K-1) | Renal Physiology | Knows   | Describe structure & functions of the kidneys. | Recognize the structure of kidney & nephron                              | Cognitive                      | Level 1 Recall                 | Must Know                                    | Lecture, Small group discussion | SAQs                 | SAQs, Viva Voce      | Anatomy Materia Medica                       |
| Hom UG-PB 13.2 |                                   |                  | Knows How   |  | Discuss the functions of kidney  | Cognitive                      | Level 2 Understand / interpret | Must know                                    | Lecture, Small group discussion | SAQs                 | LAQs, Viva Voce      |  |
| Hom UG-PB 13.3 |                                   |                  | Knows How   |  | Discuss the organization and function of glomerulus                      | Cognitive                      | Level 2 Understand / interpret | Must know                                    | Lecture, Small group discussion | SAQs                 | SAQs, Viva Voce      | Anatomy Medicine                             |
| Hom UG-PB 13.4 |                                   |                  | Knows   |  | Classify the type of nephrons  | Cognitive                      | Level 1 Recall                 | Must Know                                    | Lecture, Small group discussion | MCQs                 | SAQs, Viva Voce      | Anatomy                                      |
| Hom UG-PB 13.5 |                                   |                  | Knows How   |  | Describe the structure and functions of juxtaglomerular apparatus        | Cognitive                      | Level 2 Understand / interpret | Must know                                    | Lecture, Small group discussion | SAQs                 | LAQs, Viva Voce      | Anatomy                                      |
| Hom UG-PB 13.6 | Integration Of Information ( K-1) |                  | Knows How   | Explain the role of renin – angiotensin system | Explain the secretions from juxtaglomerular apparatus & their regulation | Cognitive                      | Level 2 Understand / interpret | Must know                                    | Lecture, Small group discussion | SAQs                 | LAQs, Viva Voce      | Medicine                                     |
| Hom UG-PB 13.7 | Integration Of Information ( K-1) |                  | Knows How   | Describe the mechanism of urine formation      | Explain the process of glomerular filtration                             | Cognitive                      | Level 2 Understand / interpret | Must know                                    | Lecture, Small group discussion | SAQs                 | LAQs, Viva Voce      |  |
| Hom UG-PB 13.8 |                                   | Knows How        | Describe the regulation of Glomerular Filtration Rate |  | Cognitive  | Level 2 Understand / interpret | Must know                      | Lecture, Small group discussion              | SAQs                            | LAQs, Viva Voce      |                      |  |

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| Hom UG-PB 13.9  |                                   |  | Knows How |  | Discuss the mechanism of GFR. Explain the factors affecting GFR                       | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs | LAQs, Viva Voce |                       |
| Hom UG-PB 13.10 | Integration Of Information ( K-1) |  | Knows How | Describe the process of filtration, secretion & reabsorption in kidney | Discuss the general considerations of reabsorption & secretion                        | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | MCQs | LAQs, Viva Voce | Medicine Biochemistry |
| Hom UG-PB 13.11 |                                   |  | Knows How |  | Describe the renal transport mechanisms throughout the tubular segments               | Cognitive | Level 2 Understand / interpret | Desirable to know | Lecture, Small group discussion | MCQs | SAQs, Viva Voce | Biochemistry          |
| Hom UG-PB 13.12 |                                   |  | Knows How |  | Describe the transport of individual substances in different segments of renal tubule | Cognitive | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion | MCQs | Viva Voce       |                       |
| Hom UG-PB 13.13 | Integration Of Information ( K-1) |  | Knows How | Describe the concentration and diluting mechanism in the kidney        | Discuss the general consideration of urine concentration mechanism                    | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs | LAQs, Viva Voce | Medicine              |
| Hom UG-PB 13.14 |                                   |  | Knows How |  | Describe the counter current multipliers  | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion | MCQs | SAQs, Viva Voce | Biochemistry          |
| Hom UG-PB 13.15 |                                   |  | Knows How |  | Discuss the counter current exchangers  | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion | MCQs | SAQs, Viva Voce |                       |

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| Hom UG-PB 13.16 | Information Gathering ,Integration Of                      |  | Knows How | Describe the renal regulation of acid – base balance | Discuss the renal regulation of acid-base balance   | Cognitive    | Level 2 Understand / interpret  | Must know         | Lecture, Small group discussion | SAQs        | LAQs, Viva Voce | Biochemistry          |
| Hom UG-PB 13.17 | information, Problem Integration (K-2)                     |  | Knows How |  | Describe the buffer system in the kidney  | Cognitive    | Level 2 Understand / interpret  | Nice to know      | Lecture, Small group discussion | SAQs        | Viva Voce       | Biochemistry          |
| Hom UG-PB 13.18 | Integration Of Information ( K-1)                          |  | Knows     | Describe the physiology of micturition               | Define micturition  | Cognitive    | Level 1 (Remember / recall)     | Desirable to Know | Lecture, Small group discussion | SAQs        | LAQs, Viva Voce |                       |
| Hom UG-PB 13.19 |  |  | Knows How |  | Discuss the nerve supply of urinary bladder   | Cognitive    | Level 2 Understand / interpret  | Nice to know      | Lecture, Small group discussion | SAQs        | Viva Voce       | Anatomy               |
| Hom UG-PB 13.20 |  |  | Knows How |  | Describe the micturition reflex   | Cognitive    | Level 2 Understand / interpret  | Must know         | Lecture, Small group discussion | SAQs        | LAQs, Viva Voce | Anatomy               |
| Hom UG-PB 13.21 | Information Gathering ,Integration Of information, Problem |  | Shows How | Describe the Kidney function teste                   | Perform the physical, chemical, and microscopical examination of urine                    | Psycho Motor | Level 2 (Control)               | Must know         | Demonstration                   | Observation | OSCE            | Biochemistry          |
| Hom UG-PB 13.22 | Integration (K-2)  |  | Knows How |  | Recognize the normal values of physical, chemical, and microscopical examination of urine | Cognitive    | Level 2 Understand / interpret) | Must know         | Lecture, Small group discussion | SAQs        | LAQ, Viva Voce  | Biochemistry          |
| Hom UG-PB 13.23 |  |  | Shows How |  | Perform examination for the abnormal constituents of urine                                | Psycho Motor | Level 2 (Control)               | Must know         | Demonstration                   | Observation | Checklist       | Biochemistry Medicine |

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|-----------------------|--|--|--------------|--|---|-----------|-----------------------------------|-----------|---------------------------------|------|----------------|-----------------------|
| Hom<br>UG-PB<br>13.24 |  |  | Knows<br>How |  | Interpret the results of examination for the abnormal constituents of urine | Cognitive | Level 2<br>Understand / interpret | Must know | Lecture, Small group discussion | SAQs | LAQ, Viva Voce | Biochemistry Medicine |
| Hom<br>UG-PB<br>13.25 |  |  | Knows<br>How |  | Interpret the renal clearance test for glomerular function                  | Cognitive | Level 2<br>Understand / interpret | Must know | Lecture, Small group discussion | SAQs | LAQ, Viva Voce | Biochemistry Medicine |
| Hom<br>UG-PB<br>13.26 |  |  | Knows<br>How |  | Interpret the renal clearance test for Tubular function.                    | Cognitive | Level 2<br>Understand / interpret | Must know | Lecture, Small group discussion | SAQs | LAQ, Viva Voce | Biochemistry Medicine |

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| <b>Topic No</b>            | <b>14</b>   |
| <b>Theory</b>              | <b>Biochemistry</b>   |
| <b>Practical</b>           | <b>Biochemistry Practical of carbohydrate, lipid, protein, Urine normal &amp; abnormal constituents</b> |
| <b>Clinical Physiology</b> |   |

### Learning Outcomes: -

At the end of the chapter Biochemistry, the student must be able to –

- Describe the lipid, carbohydrate, and protein metabolisms.
- Describe the enzymes and their activities.
- Describe the role of Vitamins.
- Perform the quantitative estimation of Glucose, Total Proteins, Uric Acid in Blood.
- Perform the Lipid Profile.

| S.No           | Generic competency                | Subject area | Miller's Level | Specific Competency            | Specific Learning Objectives / outcomes         | Bloom's domain | Guilbert's level               | Must know / desirable to know / nice to know | TL method / media               | Formative Assessment | Summative Assessment | Integration - Horizontal / Vertical / Spiral |
|----------------|-----------------------------------|--------------|----------------|--------------------------------|---|----------------|--------------------------------|--|---------------------------------|----------------------|----------------------|--|
| Hom UG-PB 14.1 | Integration Of Information ( K-1) | Biochemistry | Knows How      | Describe the lipid Metabolism. | Explain the biosynthetic and catabolic pathways | Cognitive      | Level 2 Understand / interpret | Nice to know                                 | Lecture, Small group discussion | SAQs                 | Viva Voce            |  |
| Hom UG-PB 14.2 |                                   |              | Knows How      |                                | Explain the importance of lipids in the body.   | Cognitive      | Level 2 Understand / interpret | Desirable to Know                            | Lecture, Small group discussion | SAQs                 | SAQs, Viva Voce      |  |
| Hom UG-PB 14.3 |                                   |              | Knows How      |                                | Explain the different                           | Cognitive      | Level 2 Understand / interpret | Must Know                                    | Lecture, Small                  | SAQs                 | SAQs, Viva Voce      |  |

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|-----------------|-----------------------------------|--|-----------|--------------------------------------|--|-----------|--------------------------------|-------------------|---------------------------------|------|-----------------|--|
|                 |                                   |  |           |                                      | properties of lipids.  |           |                                |                   | group discussion                |      |                 |  |
| Hom UG-PB 14.4  | Integration Of Information ( K-1) |  | Knows How | Describe the Carbohydrate metabolism | Discuss different types of carbohydrates.                                | Cognitive | Level 2 Understand / interpret | Must know         | Lecture, Small group discussion | SAQs | SAQs, Viva Voce |  |
| Hom UG-PB 14.5  |                                   |  | Knows     |                                      | List major functions of carbohydrates.                                   | Cognitive | Level 1 Recall                 | Must Know         | Lecture, Small group discussion | SAQs | SAQs, Viva Voce |  |
| Hom UG-PB 14.6  |                                   |  | Knows How |                                      | Discuss the food sources of carbohydrates.                               | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion | SAQs | SAQs, Viva Voce |  |
| Hom UG-PB 14.7  |                                   |  | Knows How |                                      | Explain the processes of glycolysis                                      | Cognitive | Level 2 Understand / interpret | Must Know         | Lecture, Small group discussion | SAQs | LAQs, Viva Voce |  |
| Hom UG-PB 14.8  |                                   |  | Knows How |                                      | Explain the process of gluconeogenesis                                   | Cognitive | Level 2 Understand / interpret | Must Know         | Lecture, Small group discussion | SAQs | LAQs, Viva Voce |  |
| Hom UG-PB 14.9  |                                   |  | Knows How |                                      | Describe the process of ATP production through oxidative phosphorylation | Cognitive | Level 2 Understand / interpret | Must Know         | Lecture, Small group discussion | SAQs | SAQs, Viva Voce |  |
| Hom UG-PB 14.10 | Integration Of Information ( K-1) |  | Knows How | Describe the Protein Metabolism      | Discuss the special features of protein Metabolism                       | Cognitive | Level 2 Understand / interpret | Must Know         | Lecture, Small group discussion | SAQs | SAQs, Viva Voce |  |
| Hom UG-PB 14.11 |                                   |  | Knows How |                                      | Discuss the functions of intact amino acid                               | Cognitive | Level 2 Understand / interpret | Nice to know      | Lecture, Small group discussion | SAQs | SAQs, Viva Voce |  |

|                 |                                   |  |           |  |   |           |                                |                   |                                 |      |                 |                               |
|-----------------|-----------------------------------|--|-----------|--|---|-----------|--------------------------------|-------------------|---------------------------------|------|-----------------|-------------------------------|
| Hom UG-PB 14.12 |                                   |  | Knows How |  | Discuss the oxidation of amino acid   | Cognitive | Level 2 Understand / interpret | Must Know         | Lecture, Small group discussion | SAQs | LAQs, Viva Voce |                               |
| Hom UG-PB 14.13 |                                   |  | Knows How |  | Discuss the synthesis of proteins   | Cognitive | Level 2 Understand / interpret | Must Know         | Lecture, Small group discussion | SAQs | LAQs, Viva Voce | Physiology                    |
| Hom UG-PB 14.14 |                                   |  | Knows How |  | Discuss the function of nitrogenous part                                    | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion | SAQs | SAQs, Viva Voce |                               |
| Hom UG-PB 14.15 |                                   |  | Knows How |  | Discuss the exogenous & endogenous protein metabolism                       | Cognitive | Level 2 Understand / interpret | Must Know         | Lecture, Small group discussion | SAQs | SAQs, Viva Voce |                               |
| Hom UG-PB 14.16 | Integration Of Information ( K-1) |  | Knows How | Describe the enzymes and their activities. | Discuss the concept of enzyme, chemical reactions, catalyst and substrates. | Cognitive | Level 2 Understand / interpret | Desirable to know | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Physiology                    |
| Hom UG-PB 14.17 |                                   |  | Knows     |  | Mention the major functions of enzymes.                                     | Cognitive | Level 1 Recall                 | Must Know         | Lecture, Small group discussion | SAQs | LAQs, Viva Voce | Physiology                    |
| Hom UG-PB 14.18 |                                   |  | Knows How |  | Discuss the importance of enzymes in the body.                              | Cognitive | Level 2 Understand / interpret | Desirable to Know | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Physiology                    |
| Hom UG-PB 14.19 | Integration Of Information ( K-1) |  | Knows     | Describe the role of Vitamins              | Define vitamin  | Cognitive | Level 1 (Remember / recall)    | Desirable to Know | Lecture, Small group discussion | SAQs | SAQs, Viva Voce | Physiology Community Medicine |

|                  |  |  |           |   |   |              |                                |                   |                                 |             |                 |  |
|------------------|--|--|-----------|---|---|--------------|--------------------------------|-------------------|---------------------------------|-------------|-----------------|--|
| Hom UG-PB 14.20  | Information Gathering , Integration Of information , Problem Integration (K-2) |  | Knows     |   | Classify vitamins   | Cognitive    | Level 1 Recall                 | Desirable to Know | Lecture, Small group discussion | SAQs        | SAQs, Viva Voce |  |
| Hom UG-PB 14.21  |  |  | Knows     |   | Mention common vitamin deficiencies                               |              | Level 1 Recall                 | Desirable to Know | Lecture, Small group discussion | SAQs        | SAQs, Viva Voce | Physiology Medicine Community Medicine |
| Hom UG-PB 14.22  |  |  | Knows     | Demonstration of Uses Of Instruments Or Equipment                           | List the use of different instruments in biochemistry experiments | Cognitive    | Level 1 Recall                 | Must Know         | Lecture, Small group discussion | SAQs        | SAQs, Viva Voce |  |
| Hom UG-PB 14.23  |  |  | Shows How | Demonstrate the Qualitative Analysis of Carbohydrates , Proteins And Lipids | Perform the qualitative analysis of carbohydrate                  | Psycho Motor | Level 2 (Control)              | Must Know         | Demonstration                   | Observation | Checklist       | Pathology                              |
| Hom UG-PB 14.24  |  |  | Knows How |   | Interpret the results of Qualitative analysis of carbohydrate     | Cognitive    | Level 2 Understand / interpret | Nice to Know      | Lecture, Small group discussion | SAQs        | Viva Voce       | Pathology                              |
| Hom UG-PB 14.25  |  |  | Shows How |   | Observe the qualitative analysis of Protein                       | Psycho Motor | Level 1 (Observe / Imitate)    | Desirable to Know | Demonstration                   | Observation | Checklist       | Pathology                              |
| Hom UG-PB 14.26  |  |  | Knows How |   | Interpret the results of Qualitative analysis of Protein          | Cognitive    | Level 2 Understand / interpret | Nice to Know      | Lecture, Small group discussion | SAQs        | Viva Voce       | Pathology                              |
| Hom UG-PB 14.27  |  |  | Shows How |   | Perform the qualitative analysis of Lipid                         | Psycho Motor | Level 2 (Control)              | Nice to Know      | Demonstration                   | Observation | Checklist       | Pathology                              |
| Hom UG- PB 14.28 |  |  | Knows How |   | Interpret the results of  | Cognitive    | Level 2 Understand / interpret | Nice to Know      | Lecture, Small                  | SAQs        | Viva Voce       | Pathology                              |

|                 |   |  |           |  |  |              |                                |              |                                 |             |                 |           |  |
|-----------------|---|--|-----------|--|--|--------------|--------------------------------|--------------|---------------------------------|-------------|-----------------|-----------|--|
|                 |   |  |           |  | Qualitative analysis of Lipid                                  |              |                                |              | group discussion                |             |                 |           |  |
| Hom UG-PB 14.29 | Information Gathering ,Integration Of information , Problem Integration (K-2) |  | Shows How | Perform the quantitative estimation of Glucose, Total Proteins, Uric Acid in Blood | Perform the Quantitative estimation of glucose                 | Psycho Motor | Level 3 (Automatism)           | Must Know    | Demonstration                   | Observation | Checklist       | Pathology |  |
| Hom UG-PB 14.30 |   |  | Knows How |  | Interpret the results of Qualitative analysis of glucose       | Cognitive    | Level 2 Understand / interpret | Nice to Know | Lecture, Small group discussion | SAQs        | Viva Voce       | Pathology |  |
| Hom UG-PB 14.31 |   |  | Shows How |  | Perform the Quantitative estimation of Total proteins          | Psycho Motor | Level 3 (Automatism)           | Must Know    | Demonstration                   | Observation | Checklist       | Pathology |  |
| Hom UG-PB 14.32 |   |  | Knows How |  | Interpret the results of Qualitative analysis of total protein | Cognitive    | Level 2 Understand / interpret | Nice to Know | Lecture, Small group discussion | SAQs        | Viva Voce       | Pathology |  |
| Hom UG-PB 14.33 |   |  | Shows How |  | Observe the Quantitative estimation of Uric Acid               | Psycho Motor | Level 1 (Observe / Imitate)    | Nice to Know | Demonstration                   | Observation | Checklist       | Pathology |  |
| Hom UG-PB 14.34 |   |  | Knows How |  | Interpret the results of Quantitative estimation of Uric acid  | Cognitive    | Level 2 Understand / interpret | Nice to Know | Lecture, Small group discussion | SAQs        | SAQs, Viva Voce | Pathology |  |
| Hom UG-PB 14.35 |   |  | Shows How | Perform the Lipid Profile  | Observe the laboratory testing for Lipid profile               | Psycho Motor | Level 1 (Observe / Imitate)    | Must Know    | Demonstration                   | Observation | OSCE            | Pathology |  |
| Hom UG-PB 14.36 |   |  | Knows How |  | Interpret the results of Lipid profile testing                 | Cognitive    | Level 2 Understand / interpret | Nice to Know | Lecture, Small group discussion | SAQs        | Viva Voce       | Pathology |  |

|  |  |  |  |  |                         |  |  |  |  |  |  |  |  |
|--|--|--|--|--|-------------------------|--|--|--|--|--|--|--|--|
|  |  |  |  |  | done in a<br>laboratory |  |  |  |  |  |  |  |  |
|--|--|--|--|--|-------------------------|--|--|--|--|--|--|--|--|

## 8. PRACTICAL TOPICS

### PRACTICAL & CLINICAL PHYSIOLOGY:-

| <u>No</u>           | <u>Practical</u>   | <u>Demonstration / Performance</u> |
|---------------------|--|------------------------------------|
| <b>HAEMATOLOGY</b>  |  |                                    |
| 1                   | Study of the Compound Microscope                                       | Performance                        |
| 2.                  | Collection of Blood Samples  | Performance                        |
| 3                   | Estimation of Haemoglobin Concentration                                | Performance                        |
| 4                   | Determination of Haematocrit   | Demonstration                      |
| 5                   | Hemocytometry  | Performance                        |
| 6                   | Total RBC Count  | Performance                        |
| 7                   | Determination of RBC Indices   | Demonstration                      |
| 8                   | Total Leucocytes Count (TLC)   | Performance                        |
| 9                   | Preparation And Examination Of Blood Smear                             | Performance                        |
| 10                  | Differential Leucocyte Count (DLC)                                     | Performance                        |
| 11                  | Absolute Eosinophil Count  | Demonstration                      |
| 12                  | Determination of Erythrocyte Sedimentation Rate                        | Demonstration                      |
| 13                  | Determination of Blood Groups  | Performance                        |
| 14                  | Determination of Bleeding Time and Coagulation Time                    | Performance                        |
| <b>BIOCHEMISTRY</b> |  |                                    |
| 1                   | Demonstration of Uses Of Instruments Or Equipment                      | Demonstration                      |
| 2                   | Qualitative Analysis of Carbohydrates, Proteins And Lipids             | Performance                        |
| 3                   | Normal Characteristics of Urine  | Performance                        |
| 4                   | Abnormal Constituents of Urine   | Performance                        |
| 5                   | Quantitative Estimation of Glucose, Total Proteins, Uric Acid in Blood | Performance                        |
| 6                   | Liver Function Tests   | Demonstration                      |
| 7                   | Kidney Function Tests  | Demonstration                      |

|                                      |  |                             |
|--------------------------------------|--|-----------------------------|
| 8                                    | Lipid Profile  | Demonstration               |
| 9                                    | Interpretation and Discussion of Results of Biochemical Tests                              | Demonstration               |
| <b>CLINICAL PHYSIOLOGY &amp; OPD</b> |  |                             |
| 1                                    | Case Taking & Approach to pt   | Performance                 |
| 2                                    | General Concept Of Examination   | Performance                 |
| 3                                    | Examination of muscles, joints,  | Performance                 |
| 4                                    | Cardio-Vascular System – Blood Pressure Recording, Radial Pulse, ECG, Clinical Examination | Performance                 |
| 5                                    | Respiratory System- Clinical Examination, Spirometry, Stethography                         | Performance                 |
| 6                                    | Nervous System- Clinical Examination   | Performance                 |
| 7                                    | Special Senses- Clinical Examination   | Performance                 |
| 8                                    | Reproductive System- Diagnosis of Pregnancy  | Performance                 |
| 9                                    | Gastrointestinal System- Clinical Examination  | Performance                 |
| 10                                   | OPD (Applied Physiology)   | Demonstration & Performance |
| <b>SPOTTING</b>                      |  |                             |
| 1                                    | Haematology  |                             |
| 2                                    | Bio-Chemistry  |                             |
| 3                                    | Clinical Physiology  |                             |

## 9. ASSESSMENT

### PHYSIOLOGY THEME TABLE

#### PAPER – 1

| Theme* | Topics                          | Term | Marks | MCQ's | SAQ's | LAQ's |
|--------|---------------------------------|------|-------|-------|-------|-------|
| A      | General Physiology              | I    | 07    | Yes   | Yes   | No    |
| B      | Biophysics Science              | I    | 07    | Yes   | Yes   | No    |
| C      | Body fluids& Immune Mechanism   | I    | 26    | Yes   | Yes   | Yes   |
| D      | Cardiovascular system           | II   | 16    | Yes   | Yes   | Yes   |
| E      | Respiratory system              | II   | 16    | Yes   | Yes   | Yes   |
| F      | Excretory system                | III  | 16    | Yes   | Yes   | Yes   |
| G      | Skin & The Integumentary System | I    | 06    | Yes   | Yes   | No    |
| H      | Nerve Muscle physiology system  | I    | 06    | Yes   | Yes   | No    |

### QUESTION PAPER BLUE PRINT

#### UNIVERSITY EXAM PAPER-I – 100 MARKS

MCQs – 10 Marks.

SAQs – 40 Marks.

FAQs – 50 Marks

| Question Serial Number | Type of Question   | Question Paper Format<br>(Refer Theme table for themes)   |
|------------------------|--|---|
| Q1                     | Multiple choice Questions (MCQ)<br>All questions compulsory<br>1 mark each | 1. Theme A<br>2. Theme A<br>3. Theme B<br>4. Theme B<br>5. Theme C<br>6. Theme D<br>7. Theme E<br>8. Theme F<br>9. Theme G<br>10. Theme H |
| Q2                     | Short answer Questions(SAQ)  | 1. Theme A  |

|    |  |  |
|----|--|--|
|    | All questions compulsory<br>5 Marks Each                                 | 2. Theme B<br>3. Theme C<br>4. Theme D<br>5. Theme E<br>6. Theme F<br>7. Theme G<br>8. Theme H |
| Q3 | Long answer Questions (LAQ)<br>All questions compulsory<br>10 marks each | 1. Theme C<br>2. Theme C<br>3. Theme D<br>4. Theme E<br>5. Theme F                             |

## PAPER – 2

| Theme* | Topics                         | Term | Marks | MCQ's | SAQ's | LAQ's |
|--------|--------------------------------|------|-------|-------|-------|-------|
| A      | Endocrine system               | II   | 21    | Yes   | Yes   | Yes   |
| B      | Central Nervous System         | II   | 21    | Yes   | Yes   | Yes   |
| C      | Digestive system and Nutrition | III  | 16    | Yes   | Yes   | Yes   |
| D      | Reproductive system            | III  | 17    | Yes   | Yes   | Yes   |
| E      | Sense organs                   | III  | 17    | Yes   | Yes   | Yes   |
| F      | Biochemistry                   | III  | 08    | Yes   | Yes   | No    |

**UNIVERSITY EXAM PAPER-II – 100 MARKS****MCQs – 10 Marks.****SAQs – 40 Marks.****FAQs – 50 Marks**

| <b>Question<br/>Serial Number</b> | <b>Type of Question</b>  | <b>Question Paper Format<br/>(Refer Theme table for themes)</b>   |
|-----------------------------------|--|---|
| Q1                                | Multiple choice Questions (MCQ)<br>All questions compulsory<br>1 mark each | 1) Theme A<br>2) Theme B<br>3) Theme C<br>4) Theme D<br>5) Theme D<br>6) Theme E<br>7) Theme E<br>8) Theme F<br>9) Theme F<br>10) Theme F |
| Q2                                | Short answer Questions (SAQ)<br>All questions compulsory<br>5 Marks Each   | 1) Theme A<br>2) Theme A<br>3) Theme B<br>4) Theme B<br>5) Theme C<br>6) Theme D<br>7) Theme E<br>8) Theme F                              |
| Q3                                | Long answer Questions (LAQ)<br>All questions compulsory<br>10 marks each   | 1) Theme A<br>2) Theme B<br>3) Theme C<br>4) Theme D<br>5) Theme E  |

**Distribution of Marks for Practical Exam:**

|                                  |          |
|----------------------------------|----------|
| <b>Practical Exam: 100 Marks</b> |          |
| Haematology                      | 20 marks |
| Bio-chemistry                    | 20 marks |
| Clinical Physiology              | 20 marks |
| Spotting - 10 Spots              | 30 marks |
| Journal                          | 10 marks |
| <b>Viva: 80 Marks</b>            |          |
| Viva Voce                        | 80 marks |
| <b>Internal Assessment: 20</b>   |          |
| IA                               | 20       |

**The Pass Marks in Each Component of the Examination shall be 50%.**

**9B - Scheme of Assessment (formative and Summative)**

| Sr. No | Professional Course     | 1 <sup>st</sup> term (1-6 Months) |                    |                           | 2 <sup>nd</sup> Term (7-12 Months) |                    |                           | 3 <sup>rd</sup> Term (13-18 Months) |    |
|--------|-------------------------|-----------------------------------|--------------------|---------------------------|------------------------------------|--------------------|---------------------------|-------------------------------------|----|
|        |                         | 1 <sup>st</sup> PA                | 1 <sup>ST</sup> TT |                           | 2 <sup>nd</sup> PA                 | 2 <sup>ND</sup> TT |                           | 3 <sup>rd</sup> PA                  | UE |
| 1      | First Professional BHMS | 20 Marks Practical/Viva           | 100 Marks Theory   | 100 Marks Practical/ Viva | 20 Marks Practical/Viva            | 100 Marks Theory   | 100 Marks Practical/ Viva | 20 Marks Practical/Viva             |    |

**For Internal assessment, Only Practical/Viva marks will be considered. Theory marks will not be counted)**

**Method of Calculation of Internal Assessment Marks for Final University Examination:**

|                                     |                                     |                                     |  |  |  |   |  |
|-------------------------------------|-------------------------------------|-------------------------------------|--|--|--|---|--|
| PA1<br>Practical/Viva<br>(20 Marks) | PA2<br>Practical/Viva<br>(20 Marks) | PA3<br>Practical/Viva<br>(20 Marks) | Periodical<br>Assessment<br>Average<br>$PA1+PA2+PA3/3$ | TT1<br>Practical/<br>Viva<br>(100 Marks) | TT2<br>Practical/<br>Viva<br>(100 Marks) | Terminal<br>Test<br>Average<br>$TT1+TT2/200*20$ | Final<br>Internal<br>Assessment<br>Marks |
| <b>A</b>                            | <b>B</b>                            | <b>C</b>                            | <b>D</b>   | <b>E</b>                                 | <b>F</b>                                 | <b>G</b>  | <b><math>D+G/2</math></b>                |

**PA-** Periodical Assessment **TT-** Terminal Test **UE-** University Examination

## **10. LIST OF RECOMMENDED BOOKS**

### **THEORY**

#### **TEXT BOOKS**

1. John N A (2023) Chatterjee C C. Text Book of Physiology 14<sup>th</sup> Edition. CBS Publication. (CBDC based)
2. Tortora G (2020). Principles of Anatomy & Physiology. Wiley Publication.
3. Jain A (2021). Text Book of Physiology Vol – 1 & 2. Avichal Publishing Company.
4. Reddy L P(2023)Fundamentals of Medical Physiology. CBS Publishers and Distributors(CBDC based)

#### **REFERENCE BOOKS**

1. Hall J. (2020). Guyton & Hall Text book of Medical Physiology. Elsevier Publication.
2. Khurana I (2021). Essential Medical Physiology. Elsevier Publication.

#### **PRACTICAL & CLINICAL PHYSIOLOGY:-**

1. Varshney VP, Bedi M, (2023) Ghai's Textbook of Practical Physiology: 10th Edition. Jaypee Brothers Medical Publisher (CBDC based)
2. John N Aet al (2021) C C Chatterjee's Manual of Practical Physiology: CBS Publishers and Distributors(CBDC based)
3. Jain A. (2019) Manual of Practical Physiology. 6th ed. Arya Publications.
4. Glynn M., William D. (2017). Hutchison's Clinical methods. 24<sup>th</sup> edition Elsevier Publication

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### **Dr Ajay Chaudhary,**

## HOMOEOPATHIC REPERTORY and CASE TAKING (I PROFESSIONAL BHMS)

1. COURSE CODE: HomUG-R-I

SUBJECT NAME: HOMOEOPATHIC REPERTORY and CASE TAKING

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Principal  
Arihant Homoeopathic  
Medical College & R.I.  
Rathod, Gandhinagar

# COMPETENCY BASED DYNAMIC CURRICULUM FOR FIRST BHMS PROFESSIONAL COURSE

(Applicable from Batch 2022-2023 onwards for 5 years or until further notification by National Commission for Homoeopathy whichever is earlier)

(HOMOEOPATHIC REPERTORY and CASE TAKING)



**HOMOEOPATHY EDUCATION BOARD**  
**NATIONAL COMMISSION FOR HOMOEOPATHY**  
**MINISTRY OF AYUSH, GOVERNMENT OF INDIA**

JAWAHAR LAL NEHRU BHARTIYA CHIKITSA AVUM HOMOEOPATHY ANUSANDHAN BHAVAN

No.61-65, Institutional Area, opp. 'D' block, Janak Puri, New Delhi-110 058

## **HOMOEOPATHIC REPERTORY and CASE TAKING (I PROFESSIONAL BHMS)**

**1. COURSE CODE:** HomUG-R-I

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### **INDEX**

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## 1.PREAMBLE

The Homoeopathic Materia Medica has expanded manifold since the proving of “Cinchona Bark” by Dr. Samuel Hahnemann and today we have over five thousand remedies in the Materia Medica. It is impossible for any human mind to memorise all the symptoms of each drug and to recall those symptoms while prescribing. Therefore, the need of indexing of these symptoms along with the drugs producing those symptoms were felt by Dr. Samuel Hahnemann himself and subsequently by other homoeopaths for prescribing at the bedside of the patient.

Homoeopathic Repertory is a Dictionary or Storehouse or an index to the huge mass of symptoms of the Homoeopathic Materia Medica. The repertory is organized in a practical form indicating the relative gradation of drugs. Repertories not only contain symptoms of proving but also clinical and pathological symptoms found in the Homoeopathic Materia Medica. Repertories serve as an instrument at the disposal of the physician for sifting through the maze of symptoms of the vast Homoeopathic Materia Medica.

Repertories aim at simplifying the work of the physician to find the indicated remedy by eliminating the non-indicated remedies. Repertorisation is not the end but a means to arrive to the simillimum and reference to Homoeopathic Materia Medica based on sound principles of Philosophy is the final court of appeal.

Each repertory has been compiled on the basis of distinct philosophy, structure and utility. In order to use these instruments effectively, one must understand thoroughly its conceptual base, construction and utility and limitations. Even though there are a number of repertories, the student at the under graduate level is expected to learn the philosophy and application of basic core repertories namely Kent, Boger’s Boenninghausen Characteristics and Repertory and Boenninghausen’s Therapeutic Pocket Book. The subject of Repertory must not be taught in isolation but must be taught in horizontal integration with Anatomy, Physiology in I BHMS; Pathology, Surgery, Gynaecology and Practice of Medicine in II BHMS; Surgery, Gynaecology, Practice of Medicine in III BHMS and Practice of Medicine in IV BHMS and vertically integrated with Homoeopathic Materia Medica and Organon and Homoeopathic Philosophy in all the years. Integrated teaching in all the years will help the student to grasp and understand the subjects better and connect repertory to all other subjects.

Similarly, case taking demands virtual integration of all the subjects taught from the Ist BHMS to IV BHMS in the consulting room or at the bedside. The physician can never say that he has learnt all that is to the case taking process. Every new patient has a new lesson to teach.

The advent of computerization and resulting software has opened up vast newer avenues to collate and correlate the vast information found in the Homoeopathic Materia Medica through the repertories. Continued exploration of these connections will generate new data, newer repertories and the newer application to existing or newer illnesses.

## **2.PROGRAMME OUTCOMES:**

At the end of the course of the undergraduate studies, the homoeopathic physician must

- 1.Develop the knowledge, skills, abilities and confidence as a primary care homoeopathic practitioner to attend to the health needs of the community in a holistic manner
- 2.Correctly assess and clinically diagnose common clinical conditions prevalent in the community from time to time
- 3.Identify and incorporate the socio-demographic, psychological, cultural, environmental & economic factors affecting health and disease in clinical work
- 4.Recognize the scope and limitation of homoeopathy in order to apply Homoeopathic principles for curative, prophylactic, promotive, palliative, and rehabilitative primary health care for the benefit of the individual and community
- 5.Be willing and able to practice homoeopathy as per medical ethics and professionalism.
- 6.Discern the scope and relevance of other systems of medical practice for rational use of cross referrals and role of life saving measures to address clinical emergencies
- 7.Develop the capacity for critical thinking, self-reflection and a research orientation as required for developing evidence based homoeopathic practice.
- 8.Develop an aptitude for lifelong learning to be able to meet the changing demands of clinical practice
- 9.Develop the necessary communication skills and enabling attitudes to work as a responsible team member in various healthcare settings and contribute towards the larger goals of national health policies such as school health, community health and environmental conservation.

### **3.COURSE OUTCOMES (CO):**

At the end of course in Repertory, the Final BHMS student shall be able to

1. Describe the philosophical background, construction, utility and limitations of various repertories
2. Demonstrate case taking and show empathy with the patient and family during case taking
3. Demonstrate various steps for systematic case processing viz. analysis of case, evaluation of symptoms as per Homoeopathic principles to form Totality of symptoms
4. Choose the appropriate repertorial approach, Method and Technique to repertorize a case
5. Utilize Repertory as a tool to find out simillimum in all types of cases and in the study of Materia Medica
6. Integrate other subjects in understanding the construction and utility of repertories
7. Utilize different software for Repertorization, patient data management and record keeping.
8. Demonstrate aptitude to utilize repertory for research in Homoeopathy and lifelong learning

#### **COURSE OUTCOMES OF REPERTORY FOR I BHMS**

At the end of IBHMS, the student should be able to,

1. Define Repertory.
2. Explain the need and utility of repertory to find simillimum and in the study of Materia Medica
3. Define various terminologies used in repertory and explain their utility
4. Locate different rubrics related to anatomy, physiology and psychology in Kent's Repertory
5. Illustrate the construction of Kent's Repertory as per the Hahnemannian Anatomical schema

#### 4.TEACHING HOURS

| Total Number of Teaching Hours: 21                    |          |              |       |
|---|----------|--------------|-------|
| Course Name   | Lectures | Non-Lectures | Total |
| Homoeopathic Repertory and Case Taking<br>(HomUG-R-I) | 21       | -            | 21    |

## 5. COURSE CONTENT( HomUG-R-I)

| S. No | List of Topics  | Lecture Hours |
|-------|---|---------------|
| 1     | <b>Introduction to Repertory, Definition and Meaning of Repertory</b> <ul style="list-style-type: none"><li>❖ General Introduction to Repertory</li><li>❖ Origin of Repertory</li><li>❖ Need of Repertory</li><li>❖ Definition of Repertory</li><li>❖ Meaning of REPERTORIUM</li></ul>  | 3             |
| 2     | <b>Need and uses of repertory and repertorization</b> <ul style="list-style-type: none"><li>❖ Uses and Scopes of Repertory</li><li>❖ Limitations of Repertory</li><li>❖ Definition of Repertorization</li><li>❖ Introduction to Methods and Techniques of Repertorization</li></ul>   | 3             |
| 3     | <b>Terminologies relevant to Repertory</b> <ul style="list-style-type: none"><li>❖ Repertory</li><li>❖ Rubric</li><li>❖ Gradation</li><li>❖ Cross Reference</li><li>❖ Synonym</li><li>❖ Repertorization</li><li>❖ Totality of Symptoms</li><li>❖ Repertorial Totality</li><li>❖ Potential Differential Field</li><li>❖ Conceptual Image</li></ul> | 3             |

|   |  |   |
|---|--|---|
|   | <ul style="list-style-type: none"> <li>❖ Case taking</li> <li>❖ Analysis of a case</li> <li>❖ Evaluation of a Case</li> <li>❖ Longitudinal case Study</li> <li>❖ Cross Section Study of a case</li> <li>❖ General Repertory</li> <li>❖ Regional Repertory</li> <li>❖ Logico-Utilitarian Repertory</li> <li>❖ Puritan Repertory</li> </ul>  |   |
| 4 | <p><b>Schematic representation of chapters in Kent's repertory</b></p> <ul style="list-style-type: none"> <li>❖ Introduction to Kent's Repertory</li> <li>❖ Listing of Chapters in Kent's Repertory</li> <li>❖ Correlation of Chapters in Kent's Repertory to Hahnemannian Anatomical Schema</li> <li>❖ Chapters and Rubrics related to anatomical structures, physiological processes and psychology in Kent's Repertory</li> </ul>   | 6 |
| 5 | <p><b>Correlation of Anatomy, Physiology and Psychology with Repertory</b></p> <ul style="list-style-type: none"> <li>❖ Introduction to correlation with Anatomy, Physiology and Psychology with Repertory</li> <li>❖ Chapters and Rubrics related to Anatomical parts in Dr. Kent's Repertory</li> <li>❖ Chapters and Rubrics related to Physiology in Dr. Kent's Repertory</li> <li>❖ Rubrics related to emotions, intellect and memory in Mind chapter of Dr. Kent's Repertory</li> </ul> | 6 |

## 6. Teaching Learning Methods

| <b>Theory</b>          | <b>Practicals/ Clinics</b> |
|------------------------|----------------------------|
| Lectures               | Clinical Bedside Teaching  |
| Small Group Discussion | Integrated Clinics         |
| Integrated Lectures    | Case Study                 |
| Integrated Seminars    | Rubric Banks               |
| Assignments            |                            |
| Rubric Banks           |                            |
| Library Reference      |                            |

## 7.Content Mapping (Theory) of Course HomUG-R-I

| Thematic Competence  | Subject Area              | Millers Level:<br><br>Does/Shows how/<br>Knows how/<br>Knows | Specific Competency                                      | SLO/ Outcome  | Blooms Domain | Guilbert's Level            | Must Know/ Desirable to know/ nice to know | T-L Methods  | Formative Assessment | Summative Assessment |
|--|---------------------------|--|--|---|---------------|-----------------------------|--|--|----------------------|----------------------|
| <b>Topic 1- Introduction to Repertory, Definition and Meaning of Repertory</b> |                           |  |  |   |               |                             |  |  |                      |                      |
| Integrating Information  | Introduction to Repertory | Knows  | Get acquainted with tools required to search for remedy. | <i>Define</i> the term Repertory                          | Cognitive     | Level I (Remember / recall) | Must Know                                  | Lecture, Small Group discussion  | MCQ, SAQ, Viva Voce  | -----                |
|  |                           | Knows  |  | <i>Explain</i> the meaning of Repertory                   | Cognitive     | Level I (Remember / recall) | Desirable to know                          | Lecture, Small Group discussion  | MCQ, SAQ, Viva Voce  | -----                |
|  |                           | Knows  |  | <i>Discuss</i> the origin of the word Repertory           | Cognitive     | Level II (Understand)       | Nice to know                               | Lecture, Small Group discussion  | MCQ, SAQ, Viva Voce  | -----                |
|  |                           | Knows  |  | <i>List</i> three uses and three limitations of Repertory | Cognitive     | Level I (Remember / recall) | Must Know                                  | Lecture, Integrated teaching (with Materia Medica)<br><br>Small Group discussion | MCQ, SAQ, Viva Voce  | -----                |

| Generic Competency   | Subject Area                                   | Millers Level:<br><br>Does/Shows how/<br>Knows how/<br>Knows | Specific Competency                                      | SLO/ Outcome  | Blooms Domain | Guilbert's Level      | Must Know/<br>Desirable to know/<br>nice to know | T-L Methods                     | Formative Assessment | Summative Assessment |
|--|--|--|--|---|---------------|-----------------------|--|---------------------------------|----------------------|----------------------|
| <b>Topic 2: Need and uses of repertory and repertorisation</b> |  |  |  |   |               |                       |  |                                 |                      |                      |
| Integrating information  | Need and uses of repertory and repertorisation | Knows  | Get acquainted with tools required to search for remedy. | <i>Explain</i> the need of repertory                            | Cognitive     | Level II (Understand) | Must know  | Lecture, Small Group discussion | MCQ, SAQ, Viva Voce  | -----                |
|  |  | Knows  |  | <i>Explain</i> the need of Repertorization to find a simillimum | Cognitive     | Level II (Understand) | Desirable to know                                | Lecture, Small Group discussion | MCQ, SAQ, Viva Voce  | -----                |
|  |  | Knows  |  | <i>Describe</i> the uses of Repertory                           | Cognitive     | Level II (Understand) | Must know  | Lecture, Small Group discussion | MCQ, SAQ, Viva Voce  | -----                |
|  |  | Knows  |  | <i>Describe</i> the limitations of Repertory                    | Cognitive     | Level II (Understand) | Must know  | Lecture, Small Group discussion | MCQ, SAQ, Viva Voce  | -----                |
|  |  | Knows  |  | <i>Discuss</i> the use of Repertory as a tool to                | Cognitive     | Level II (Understand) | Desirable to know                                | Lecture, Small Group discussion | MCQ, SAQ, Viva Voce  | -----                |

| Specific Competency | Subject Area | Millers Level:<br><br>Does/Shows how/<br>Knows how/<br>Knows | Specific Competency | SLO/ Outcome                       | Blooms Domain | Guilbert's Level | Must Know/ Desirable to know/ nice to know | T-L Methods          | Formative Assessment | Summative Assessment |
|---------------------|--------------|--|---------------------|------------------------------------|---------------|------------------|--|----------------------|----------------------|----------------------|
|                     |              |  |                     | select the remedy for a given case |               |                  |  | n, Clinical Teaching |                      |                      |

**PIC 3: Terminologies relevant to Repertory**

|                                    |                                 |       |  |  |           |                                |           |  |                     |       |
|------------------------------------|---------------------------------|-------|--|--|-----------|--------------------------------|-----------|--|---------------------|-------|
| Integrating<br>of<br>Terminologies | Terminologies used in repertory | Knows | To understand the definition of various terminologies used in repertory in order to apply them for Repertorization | <i>Define</i> different terminology associated with repertory  | Cognitive | Level I<br>(Remember / recall) | Must know | Lecture, Small Group discussion,                   | MCQ, SAQ, Viva Voce | ----- |
|                                    |                                 | Knows |  | <i>Explain</i> the meaning and use of each terminology         | Cognitive | Level II<br>(Understand)       | Must know | Lecture, Small Group discussion, Clinical teaching | MCQ, SAQ, Viva Voce | ----- |
|                                    |                                 | Knows |  | <i>Apply</i> the terminology in the process of Repertorization | Cognitive | Level II<br>(Understand)       | Must know | Lecture, Small Group discussion, Clinical teaching | MCQ, SAQ, Viva Voce | ----- |

**PIC 4: Schematic representation of chapters in Kent's repertory**

| Thematic Competence                        | Subject Area   | Millers Level:<br><br>Does/Shows how/<br>Knows how/<br>Knows | Specific Competency   | SLO/ Outcome  | Blooms Domain | Guilbert's Level            | Must Know/ Desirable to know/ nice to know | T-L Methods  | Formative Assessment      | Summative Assessment |
|--|--|--|---|---|---------------|-----------------------------|--|--|---------------------------|----------------------|
| Integrating information to solve a problem | Schematic representation of chapters in Kent's repertory | Knows  | To understand the arrangement of Chapters in Dr. Kent's Repertory | List the 37 chapters of Kent's Repertory in the proper order  | Cognitive     | Level I (Remember / recall) | Must know                                  | Lecture, Small Group discussion, Clinical teaching | MCQ, SAQ, Viva Voce, OSPE | -----                |
|  |  | Shows how  |   | Demonstrate the relation of chapters in Kent's Repertory to Anatomy and Physiology and mental rubrics to Psychology | Cognitive     | Level II (Understand)       | Must know                                  | Lecture, Small Group discussion, Clinical teaching | MCQ, SAQ, Viva Voce, OSPE | -----                |
|  |  | Knows  |   | Discuss the correlation of chapters in Kent's Repertory to the schematic representation of remedies in              | Cognitive     | Level II (Understand)       | Desirable to know                          | Lecture, Small Group discussion, Clinical teaching | MCQ, SAQ, Viva Voce, OSPE | -----                |

| Thematic Competence  | Subject Area   | Millers Level:<br><br>Does/Shows how/<br>Knows how/<br>Knows | Specific Competency   | SLO/<br>Outcome  | Blooms Domain | Guilbert's Level      | Must Know/<br>Desirable to know/<br>nice to know | T-L Methods  | Formative Assessment      | Summative Assessment |
|--|--|--|---|--|---------------|-----------------------|--|--|---------------------------|----------------------|
|  |  |  |   | Materia Medica   |               |                       |  |  |                           |                      |
| <b>Integration of Anatomy, Physiology and Psychology with Repertory</b>      |  |  |   |  |               |                       |  |  |                           |                      |
| Integrating information of anatomy, physiology and psychology with Repertory | Correlation of Anatomy, Physiology and Psychology with Repertory | Knows  | To correlate the knowledge of Anatomy, physiology And Psychology in construction of Repertory and Rubrics | Apply the correlation of Anatomical Structures to Chapters and Rubrics in Kent's Repertory | Cognitive     | Level II (Understand) | Must know  | Lecture, Small Group discussion, Clinical teaching | MCQ, SAQ, Viva Voce, OSPE | -----                |
|  |  | Knows  |   | Relate physiological Processes to the Chapters and Rubrics in Kent's Repertory             | Cognitive     | Level II (Understand) | Must know  | Lecture, Small Group discussion, Clinical teaching | MCQ, SAQ, Viva Voce, OSPE | -----                |
|  |  | Knows  |   | Apply the correlation of psychology in Mind Chapter and Rubrics in                         | Cognitive     | Level II (Understand) | Must know  | Lecture, Small Group discussion, Clinical teaching | MCQ, SAQ, Viva Voce, OSPE | -----                |

| Generic Competency | Subject Area | Millers Level:<br><br>Does/Shows how/<br>Knows how/<br>Knows | Specific Competency | SLO/<br>Outcome   | Blooms Domain | Guilbert's Level      | Must Know/<br>Desirable to know/<br>nice to know | T-L Methods  | Formative Assessment      | Summative Assessment |
|--------------------|--------------|--|---------------------|---|---------------|-----------------------|--|--|---------------------------|----------------------|
|                    |              |  |                     | Kent's Repertory  |               |                       |  |  |                           |                      |
|                    |              | Shows how  |                     | Locate rubrics related to Anatomy, Physiology and Psychology in Kent's repertory                                      | Psychomotor   | Level II (Control)    | Must know  | Lecture, Small Group discussion, Clinical teaching | MCQ, SAQ, Viva Voce, OSPE | -----                |
|                    |              | Knows  |                     | Apply rubrics related to Anatomy, Physiology and Psychology in understanding remedies in Materia Medica and Repertory | Cognitive     | Level II (Understand) | Must know  | Lecture, Small Group discussion, Clinical teaching | MCQ, SAQ, Viva Voce, OSPE | -----                |

### 8.List of Practical Topics

| S. No | Name of Topic  | Activity/ Practical   | TL Method       |
|-------|--|---|-----------------|
| 1     | Basic Structure of Repertory showing arrangement of rubric of anatomy, physiology and psychology | Arrangement of Chapters and rubrics related to anatomical structures, physiology and psychology (Emotions, intellect and behaviour) in Kent's Repertory | Integrated BHMS |

## 9. List of Recommended Books

- ❖ Dhawale ML (2000) - Principles and Practice of Homoeopathy
- ❖ Hahnemann S (2017). Organon of Medicine 6<sup>th</sup> Edition
- ❖ Kent, JT- Repertory of the Homoeopathic Materia Medica (Sixth American Edition)
- ❖ Kishore, Jugal (2004) -Evolution of Homoeopathic Repertories and Repertorization
- ❖ Munir Ahmed R (2016). Fundamentals of Repertories: Alchemy of homeopathic methodology
- ❖ Patel, R.P (1998): The Art of Case Taking and Practical Repertorization
- ❖ Tiwari, Shashikant (2005) - Essentials of Repertorisation

**List of contributors:**

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- 4. Dr. Hema Parikh**  
Prof, MKSH, Karjan
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HOD, Dr. R A Patel HMC, Mehsana
- 6. Dr. Uttara Agale**  
Reader, YMT, Kharghar

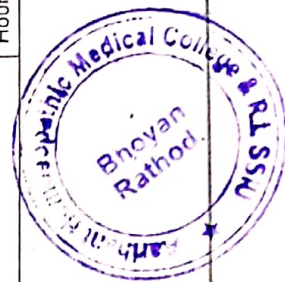
**Subject Code: HomUG-Yoga I**

**Subject: Yoga for Health Promotion**

The syllabus of Yoga for the 1st BHMS students should include the basic concept of Yoga and its philosophy, with a clear idea of the different section of asana, pranayama, kriya and meditation. Total 30 hours of class will include practical training. The students will be trained in understanding the relationship between Yoga and Homoeopathy in a wholistic approach, and the point of application of yoga in part of treatment.

The topic and respective allotted hours are as follows-

| Sr.no.1 | TOPIC   | CLASS   |
|---------|---|---------|
| 1.      | Yoga definition, concept, types, benefits, and origin.  | Hours 1 |
| 2.      | History and patanjali, yoga philosophy and development of yoga.   | Hours 1 |
| 3.      | Astanga, yoga, hathayoga.   | Hours 1 |
| 4.      | Asana-types, examples, benefits.  | Hours 1 |
| 5.      | Corelation of vital force and prana.  | Hours 1 |
| 6.      | Meditation-types, methods, benefits.  | Hours 1 |
| 7.      | Kriya-types, methods, benefits.   | Hours 1 |
| 8.      | Relationship of yoga and homoeopathy on wholistic plane.  | Hours 1 |
| 9.      | Application of yoga in terms of hahnemann's accessory circumtanses.   | Hours 1 |
| 10.     | Pranayanam, types, benefits.  | Hours 1 |
| 11.     | Practical learning about asanas (postures)-pawanmuktasna, backstreching, sunsalutation, classical sequences.                  | Hours 5 |
| 12.     | Practical learning about Breathing, pranyama including abdominal, thoracic, clavicular, hasthamudra, vilom, lung sensitising. | Hours 5 |
| 13.     | Practice of relaxation, tense and relax, short yoganidra, extended, savasana, yoganidra, sankalpa.                            | Hours 5 |
| 14.     | Meditation practice, sitting posture, kaya sthairam, omchanting, trataka.   | Hours 5 |



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*[Signature]*

**Principal**  
**Ardhant Homoeopathic**  
**Medical College & R.I.**

*[Signature]*  
Bhojan Rathod, Gandhinagar

**Subject Code: HomUG-Yoga I****Subject: Yoga for Health Promotion**

The syllabus of Yoga for the 1st BHMS students should include the basic concept of Yoga and its philosophy, with a clear idea of the different section of asana, pranayama, kriya and meditation. Total 30 hours of class will include practical training. The students will be trained in understanding the relationship between Yoga and Homoeopathy in a wholistic approach, and the point of application of yoga in part of treatment.

The topic and respective allotted hours are as follows-

| Sr.no.1 | TOPIC   | CLASS   |
|---------|---|---------|
| 1.      | Yoga definition, concept, types, benefits, and origin.  | Hours 1 |
| 2.      | History and patanjali, yoga philosophy and development of yoga.   | Hours 1 |
| 3.      | Astanga, yoga, hathayoga.   | Hours 1 |
| 4.      | Asana-types, examples, benefits.  | Hours 1 |
| 5       | Corelation of vital force and prana.  | Hours 1 |
| 6       | Meditation-types, methods, benefits.  | Hours 1 |
| 7       | Kriya-types, methods, benefits.   | Hours 1 |
| 8       | Relationship of yoga and homoeopathy on wholistic plane.  | Hours 1 |
| 9       | Application of yoga in terms of hahnemann's accessory circumtanses.   | Hours 1 |
| 10      | Pranayanam, types, benefits.  | Hours 1 |
| 11      | Practical learning about asanas (postures)-pawanmuktasna, backstreching, sunsalutation, classical sequences.                  | Hours 5 |
| 12      | Practical learning about Breathing, pranyama including abdominal, thoracic, clavicular, hasthamudra, vilom, lung sensitising. | Hours 5 |
| 13      | Practice of relaxation, tense and relax, short yoganidra, extended, savasana, yoganidra, sankalpa.                            | Hours 5 |
| 14      | Meditation practice, sitting posture, kaya sthairam, omchanting, trataka.   | Hours 5 |

**CENTRAL COUNCIL OF INDIAN MEDICINE**  
**NEW DELHI**

**SYLLABUS OF AYURVEDACHARYA (BAMS) COURSE**

**INDEX**

**4<sup>TH</sup> PROFESSIONAL**

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|---|-------|
| 4.1 KAYACHIKITSA                                | 02-04 |
| 4.2 PANCHKARMA                                  | 05-10 |
| 4.3 SHALYA TANTRA                               | 11-20 |
| 4.4 SHALAKYA TANTRA                             | 21-26 |
| 4.5 RESEARCH METHODOLOGY AND MEDICAL STATISTICS | 27-28 |

## **4.1 KAYACHIKITSA**

**Theory Two Papers – 100 Marks Each**  
**Practical/Viva voce – 100 Marks**

**Paper I**

**100 Marks**

**Part - A**

**50 Marks**

- 1 Derivation of the terms 'Kaya', 'Chikitsa' and their definitions and synonyms. Definition of 'Kayachikitsa, Definition of 'Bheshaja'. Types and detailed description of Bheshaja and Chikitsa, Knowledge about Chikitsa Chatushpada, Rogi Roga Pariksha Siddhantha, Astasthan Pariksha.
- 2 Importance of Kriya Kaala according to stages of Dosha and their management.
- 3 Chikitsa sutra and Management of vriddhi (increased) and kshaya (decreased) of Dosha, Dhatu and Mala, Ojo Vyapat (Kshaya, Visramsa and Vyapat) and its management. Chikitsasutra and Management of Sama-Nirama states, Roga-Anutpattikara Chikitsa, Roga Prashamana Chikitsa (Doshapratyanika, Vyadhipratyanika, Ubhayapratyanika), Doshopakrama, Chikitsa sutra and Management of Sthanantara Dosha (Ashayapakarsha, Anuloma/Pratiloma gati of Dosha, Vimarga gamana of Dosha), Knowledge of Lina Dosha & its management, Diagnosis, Chikitsa Sutra and Management of Avarana and of Dhatu Pradoshaja diseases, Importance of Dosha, Dushya, Bala, Kaala, Agni, Prakriti, Vaya, Sattva Satmya, Desha, Ahara and stage of diseases in treating them. Chikitsa Sutra and Management of 'Samanyaja and Nanatmaja' diseases.
- 4 Detailed description of Dvidividhopakrama (Santarpana and Apatarpana) and Shadavidhopakrama (Rookshana, Snehana, Swedana, Sthambhana, Langhana and Brimhana). Detailed description of Shodhana, Shamana and Nidana Parivarjana. Knowledge of Aushadha matra, Sevan kaala and Anupana, Definition and Knowledge of Pathya-Apathya with examples of diseases of various systems.
- 5 Derivation of the term 'Manas', its sthana (place), Guna (qualities) and Karma (functions). Samanya Chikitsa Siddhanta of Manasa Roga.
- 6 Principles & Management of Nutritional deficiency disorders.
- 7 Management of Vardhakyajanita vikara, Indriyapradoshjoa vikara, Alzhiemer's Disease, Sleep disorders, General debility.

- 8 General introduction and principles of Management of diseases produced by Genetic, Environmental and Iatrogenic factors. Disorders due to drug and Food allergy and their management and other allergic conditions.

**Part B**

**50 Marks**

1. Detailed description of Chikitsa Sutra and Management of Jwara and its types. Etiopathogenesis & relevant Ayurvedic and Modern management of following types of Fevers-Typhoid, Pneumonia, Pleurisy, Influenza, Mumps, Meningitis, Encephalitis, Tetanus, Yellow fever, Plague, Dengue Fever, Chikun Guniya, Leptospirosis, Viral Fever, Anthrax, Masurika (Small pox), Laghu Masurika (Chicken pox), Romantika (Measles).
1. Chikitsa sutra and Management of the diseases of Rasavaha Srotas such as – Pandu, Amavata, Madatyaya, Hridroga, Hridshoola, Hypotension, Hypertension, Anaemia, Rheumatoid arthritis.
2. Chikitsa sutra and Management of the diseases of Raktavaha Srotas such as - Raktapitta, Kamala, Kumbhakamala, Halimaka, Daha, Mada, Murcha, Sanyasa, Vatarakta, Plihadosh, Yakrut dosha, Haemolytic disorders, Hepatitis, Cirrhosis of Liver, Leukaemia, Kushta, Shvitra, Visarpa, Sheetapitta, Udara, Kotha and Kshudra Roga.
3. Knowledge of National Health Programmes and the relevant Ayurvedic Management of the following diseases enlisted by World Health Organisation- Malaria, Filariasis, Kala Azar, Leprosy, Tuberculosis, AIDS.
4. Introduction of general principles of maintenance of health and management of diseases of following systems of Medicine- Yoga, Naturopathy, Unani, Siddha, Physiotherapy and Rehabilitation.
5. Diseases of different Endocrine Glands- such as Thyroid, Parathyroid, Pituitary, Pancreas and Adrenal glands and their management.
6. General introduction, types and Management of diseases caused by Vyadhi Kshamatwa Hinata (Immuno deficiency disorders), Auto Immune Disorders.
7. Description and Management of following Emergency Conditions- Acute Haemorrhage, Hypertensive Emergencies, Acute abdominal pain (Renal colic, Biliary colic, Gastritis, Pancreatitis, Peritonitis and Appendicitis), Acute Abdomen, Anuria/ Oliguria, Congestive Heart Failure, Myocardial Infarction/Angina, Shock, Syncope, Convulsions, Hyperpyrexia, Hyperglycaemia, Hypoglycaemia, Status Asthmaticus, Acute Respiratory distress Syndrome, Drowning and Electric shock.

**PAPER II**

**100 Marks**

**Part A**

**50 Marks**

1. Chikitsa sutra and Management of the diseases of Pranavaha Srotas such as - Kasa, Shwasa, Hikka, Rajayakshma, Urakshata, Parshwashoola, Bronchitis, Bronchiectasis, Emphysema and COPDs.
2. Chikitsa sutra and Management of the diseases of Udakavaha Srotas such as- Shotha, Jalodara, Trishna, Water & Electrolyte Imbalance.
3. Chikitsa sutra and Management of the diseases of Annavaha Srotas such as – Agnimandya, Aruchi, Ajirna, Anaha, Atopa, Adhmana, Alasaka, Vilambika, Visuchika, Chardi, Grahani, Amlapitta, Gulma, Shoola, Bhasmaka, Acid peptic disorders.
4. Principles of treatment and management of Vata Vyadhi such as - Pakshavadh, Ekangavata, Sarvangavata, Ardita, Avbahuka, Kati Graha, Manyastambha, Gridhrasi, Vishwachi, Khalli, Khanja, Pangu, Padaharsha, Padadaha, Vatakantaka, Kroshtukashirsha, Udavarta, Kampavata, Dhatugata and Ashayagata Avarana Vata, other Vata Rogas, Parkinsonism.
5. Nidana and Chikitsa of Urusthambha, Guillain Barrie syndrome, Muscular Dystrophy, Myasthenia Gravis, Motor Neuron Diseases and Neuralgia.

**Part B****50 Marks**

1. Chikitsa Sutra and Management of Mamsavaha Srotas and Medovaha Srotas such as- Gandamala, Galaganda, Mamsashosha, Arbuda, Apachi, Prameha, Sthaulya, Karshya, Diabetes Mellitus, Dyslipidaemia.
2. Chikitsa Sutra and Management of 'Asthi and Majjavaha Srotas such as Asthimajja Vidradhi, Asthisoushriya, Asthi kshaya, Sandhigata Vata, Osteo Arthritis, Osteomyelitis, Osteoporosis, Osteopenia.
3. Chikitsa sutra and management of Shukravaha srotas such as Klaibya, shukralpata, shukradosha, kshina shukra, dhvajabhanga.
4. Chikitsa Sutra and Management of diseases of Mutravaha Srotas such as -Mutrakricha, Mutraghata, Ashmari, Cystitis, Nephritis, Nephrotic Syndrome, BPH, Renal Failure.
5. Chikitsa Sutra and Management of diseases of Purishavaha Srotas such as - Atisara, Pravahika, Arsha, Purishaj Krimi, IBS and Ulcerative Colitis.
6. Chikitsa Sutra and Management of Sexually Transmitted Diseases such as - Phiranga, Puyameha, Upadamsha, lymphogranuloma inguinale, Syphilis, Gonorrhoea.
7. Introduction, Definition and Management of Kama, Krodha, Lobha, Moha, Mada, Matsarya, Shoka, Bhaya, Vishada, Dainya, Harsha and Pragyaparadha.
8. Manas and Manovahasrotas, Nidana and Chikitsa of the following disorders - Unmada- Apasmara-Atattvabhinivesha, Chittodvega, Vishada, Anxiety disorders, Depression, Somatoform and Mood disorders, Stress induced disorders, Psychosexual Disorders. Importance of Daivavyapashraya, Sattwavajaya, Adravayabhuta Chikitsa. Medhya Rasayana in the management of Manasa Roga. Bhuta Vidya diagnosis and management of graha disorders.
9. Derivation, definition and synonyms of Rasayana, importance of Rasayana and its benefits. Indications of Rasayana therapy. Classification of Rasayana. Kutipravesika and Vatatapika Rasayana. Indications of Vatatapika Rasayana. Knowledge of Kayakalpa, Achara Rasayana. Procedures of Kutipravesika, Poorvakarma and specific schedules to be followed after Kutipravesha, benefits of Kutipravesika Rasayana, duration of process, Rasayana yoga and directions for their use. Determination of dose of Rasayana according to age. Rules and regulation after Rasayana therapy, Importance of Immunomodulators and antioxidants in Rasayana therapy.
10. Vajikarana- Derivation, definition, synonyms, necessity, benefits, importance of fertility, Symptoms of Shûkra (Semen), Vajikaran Dravya and Aushadhi. Properties, doses, methods of administration, ingredients and methods of formation of Rasayana & Vajikarana formulation. Classification and importance of Vajikarana Dravya

**Distribution of practical Marks 100**

- |                                |            |
|--------------------------------|------------|
| 1) Daily case record/ 20 cases | - 20 marks |
| 2) Patient examination         |            |
| a) 1 Long case                 | - 20 marks |
| b) 1 short case                | - 10 marks |
| 3) Viva –voice                 |            |
| a) Paper I                     | - 25 marks |
| b) Paper II                    | - 25 marks |

**Reference books:**

1. Charak Samhita, Sushrut Samhita, Ashtanga Samgraha and Ashtanga Hridaya with their commentaries. Madhav Nidana with Madhukosha Commentary.
2. Ayurvediya Vyadhi Vigyana - Yadavji Trikamji
3. Roga Pariksha Vidhi - Priyavrat Sharma

- |   |                               |
|---|-------------------------------|
| 4. Panchakarma Vigyan                                 | -Haridasa Sridhar Kasture     |
| 5. Cikitsadarsha                                      | -Pandit Rajesvardutta Shastri |
| 6. Kayachikitsa I-IV                                  | -Ramaraksha Pathaka           |
| 7. Ayurved Nidan Chikitsa Siddhanta                   | -Prof. R.H.Singh.             |
| 8. Kayachikitsa Vol. I-IV.                            | -Prof. Ajay Kumar             |
| 9. Davidson's Principles and Practice of Medicine.    |                               |
| 10. API Text Book of Medicine.                        |                               |
| 11. Harrison's Text Bok of Medicine.                  |                               |
| 12. Cecil Text Book of Medicine.                      |                               |
| 13. Panchkarma Illustrated by Dr. G.Srinivasacharya.  |                               |
| 14. Other relevant publications on subjects concerned |                               |

## **4.2. PANCHAKARMA**

**Theory One Paper – 100 Marks**

**Practical Viva-voce – 50 Marks**

**Hours of teaching Theory – 100**

**Clinical training: 3 months**

### **I. Introduction**

1. Introduction to Panchakarma, Panchakarma and Shodhana, its importance for promotion of health, prevention and treatment of diseases.
2. Trividha Karma- Purva, Pradhana and Pashchat Karma in relation to Shodhana and their importance.
3. Indications of Shodhana, Shodhana according to Ritu
4. General Principles of doshagati from Koshta to Shaka and vice versa
5. General precautions (Pariharya Vishaya) for Panchakarma
6. Specifications of Panchakarma theatre and necessary equipments
7. Importance of Koshta and Agni Parikshan

### **II. Snehana**

1. Etymology and Definition of Sneha and Snehana
2. Snehayoni- Sthavara and Jangama: Properties of Sneha dravyas, Snehopag Dravyas
3. General knowledge of Ghrita, Taila, Vasa and Majja with their specific utility and actions ,Yamaka, Trivrit and Maha Sneha
4. Metabolism of fat
5. Achcha and Pravicharana of Sneha
6. Snehapaka and its importance in Panchakarma
7. **Types of Snehana:** i) Bahya and ii) Abhyantara Snehana

#### **i) Bāhya Snehana :**

Methods, indications and contraindications of the following types of Bahyasnehana; Mardana, Unmardana, Pādāghāta, Samvāhana, Karna Purana & Akshi Tarpan, Lepa, Talam,

**Murdhni Taila:** Siro-Abhyanga, Shiro Seka/dhārā, Siro Pichu and Siro-Basti

#### **ii) Ābhyantara Snehana**

Three Types of Ābhyantara Snehana: Shodhanārtha, Shamanārtha and Brimhanārtha Snehana, Indications and contraindications for Snehana

### **Shodhanārtha Snehana**

- a. Importance and method of Deepan Pāchan and Rookshana in Shodhanārtha Snehana. Properties of Rookshana Dravya. Samyak Rookshana Lakshana
- b. Consideration of Agni and Koshta in Snehana
- c. Indication of Different Matra, Various dose schedules for Shodhanārtha Snehana; Hraseeyasi, Hrasva, Madhyama and Uttama Mātrā, Ārohana Mātrā
- d. Methods of Shodhanārtha Snehana,
- e. Anupāna of Sneha

- f. Jeerna and Jeeryaman Lakshana
- g. Samyak Yoga, Ayoga and Atiyoga of Snehana, Sneh Vyāpat & their management according to Ayurveda & Modern Medicine
- h. Diet and regimen during Snehana

**Sadyo Sneh:** Method of administration, dose fixation and utility

**Shamanārtha Snehana,** Method of administration, dose fixation and utility

**Bronhanarth Senhana:** Method of administration, dose fixation and utility

**Avapeedak Sneh:** Method of administration, dose fixation and utility

8. Snehana Kārmukata (mode of action)

### 9. Special Procedures:

Takradhara, Udvartanam, Putpāka, Aschotana, Anjana, Gandusha, Kavala, Dhoompāna, Udvartana, Utsādana, Udgharshana, Talapothichil

## III. Svedana

1. Etymology and Definition of Sveda and Svedana
2. Classifications of Sveda/Svedana
3. General Sweda dravya, Properties of Sweda dravyas, Swedaopag dravyas ,
4. Indications and contraindications of Svedana
5. Ten Types of Niragni Svedana
6. Knowledge of 13 types of Sagni Svedana and Chaturvidh Svedan
7. Detailed Knowledge with their Utility of the following Svedana procedures:  
Sankara/Pinda Sveda-Ruksha and Snigdha Sveda  
Patrapinda Sveda, Jambir Pinda Sveda, Vāluka Sveda, Churna Pinda Sveda, Kukkutand Pinda Sveda, Shashtika Shalipinda Sveda, Nadi Sveda, Bashpa Sveda Ksheer dhooma ,Ksheer Seka, Kwath Seka, Avagaha Sveda, Dhanymla Dhara  
Parisheka Sveda, Pizichil, Upanaha Sveda, Annalepa
8. Local Basti such as Kati Basti, Janu Basti, Greeva Basti and Urobasti
9. General precautions during Sagni Svedana and Methods to protect vital during svedana
10. Samyak Yoga, Ayoga and Atiyoga of Svedana
11. Complications of Svedana and their Management according to Ayurveda & Modern Medicine
12. Diet and management during and after Svedana
13. Parihār Vishaya
14. Svedana Kārmukata (Mode of action)
15. General Knowledge about current Sudation techniques like Sauna bath, Steam bath

## IV. Vamana Karma

1. Etymology, definition and importance of Vamana Karma
2. Utility of Vamana Karma in health and disease
3. Indications and Contraindications for Vamana
4. Knowledge of Koshta and Agni
5. General knowledge of Vamana and Vamanopaga drugs; properties, actions, preparations, preservation with special reference to Madanphala, Kutaj, Nimba, Yashti, Vacha
6. Purva Karma of Vamana: Deepan-Pāchana, Abhyantara Snehana and diet

7. Management of one gap day-Abhyanga & Svedana, diet, special Kapha increasing diet
8. Preparation of the patient on Morning of Vamana day
9. Vamaka Yoga, Anupana, fixation of dose and method of administration
10. Administration of Vamanopaga Dravya such as milk, sugarcane juice, Yashtimadhu decoction
11. Lakshana indicating Doshagati during the process
12. Management during Vamana Karma & observations
13. Symptoms of Samyak Yoga, Ayoga and Atiyoga of Vamana Karma
14. Post Vamana management
15. Types of Shuddhi-Hina, Madhya and Pravara
16. Peyadi Samsarjana Karma and Tarpanadi Karma with their specific indications
17. Complication of Vamana and their management with Ayurveda and modern drugs
18. Pariharya Vishaya
19. Vamana Karmukata (Mode of action).

## **V. Virechana Karma**

1. Etymology, definition and importance of Virechana Karma
2. Utility of Virechana Karma in health and disease
3. Indications and Contraindications for Virechana
4. Knowledge of Koshta and Agni
5. Classification of Virechana Drugs, General properties of Virechana dravya
6. General knowledge of single and compound Virechan drugs; properties, actions, preparations, preservation with special reference to Trivrutta, Aragvadha, Eranda, Katuki, Jaipal
7. Purva Karma of Virechana: Deepan- Pachana, Abhyantara Snehana and diet
8. Management of 3 gap days-Abhyanga, Svedana & diet
9. Management on Morning of Virechana day
10. Preparation of Virechana Kalpa, Anupana, dose and method of its administration
11. Method of Virechana Karma and management during Virechana Karma & observations
12. Symptoms of Samyak Yoga, Ayoga and Atiyoga of Virechana Karma
13. Post Virechana management
14. Types of Shuddhi-Hina, Madhya and Pravara and accordingly Samsarjana Karma
15. Complications of Virechana and their management with Ayurveda and modern drugs
16. Pariharya Vishaya
17. Virechana Karmukata (Mode of action)

## **VI. Basti Karma**

1. Etymology, definition and importance of Basti as Ardha-Chikitsa
2. Utility of Basti Karma in health and disease
3. Basti Yantra- Putaka & Netra, Detailed study of traditional Basti Yantra and their Doshas  
Knowledge of alternative Basti Yantra-enema can, enema syringe, modified plastic/rubber bag for Putaka, modified plastic netra.
4. Classifications of Basti

5. Karma, Kāla and Yoga Basti schedules along with their utility.
6. **Niruha Basti:** Its etymology, synonyms, definition, classifications, sub-classifications & indications and contraindications.
  - a. Dose fixation of Niruha Basti according to age
  - b. Contents and Method of preparation of Niruha Basti dravya
  - c. Diet
  - d. Administration of Niruha Basti
  - e. Pratyāgamana Kāla, Post Niruha Basti management
  - f. Samyak Yoga, Ayoga and Atiyoga of Niruha.
  - g. Complication of Niruha Basti and its management according to Ayurved and Modern Medicines
  - h. Pariharya Vishaya and kala
7. **Anuvasana Basti:** Its etymology, synonyms, definition, classifications, sub-classifications & indications and contraindications.
  - a. Dose fixation of Anuvasan Basti according to age
  - b. Contents and Method of preparation of Anuvasan Basti dravya
  - c. Diet
  - d. Administration of Anuvasan Basti
  - e. Pratyāgamana Kāla, Post Anuvasan Basti management
  - f. Samyak Yoga, Ayoga and Atiyoga of Anuvasana.
  - g. Complication of Anuvasan and its management according to Ayurved and Modern Medicines
  - h. Pariharya Vishaya and kala
8. Basti Kārmukatā (Mode of action).
9. Knowledge of following types of Basti:  
Madhutailika Basti, Erandmuladi Basti, Yāpana Basti, Pichchha Basti, Kshira Basti, Kshara Basti, Vaitarana Basti, Panchaprasutik Basti, Lekhan Basti, Krumighna Basti, Tiktashir Basti, Ardhamātrika Basti
10. **Uttara Basti:** its definition, indications and contraindications, Detailed study of traditional Basti Yantra and their Doshas Knowledge of alternative Basti Yantra
  - a. Preparation of patient,
  - b. Preparation of Trolley for Uttarbasti,
  - c. drug preparation and Fixation of dose,
  - d. method of administration in male and females,
  - e. observations,
  - f. complications and their management

## VII. Nasya

1. Etymology, definition, Significance of Nasya Karma.
2. Classifications and sub-classifications
3. Knowledge of general Dravya used for Nasya Karma, Shirovirechan Gana, Shirovirechanopag dravyas
4. Indications and contraindications of Nasya
5. Time of administration of Nasya
6. Dose fixation of different types of Nasya
7. Diet and regimen before and after Nasya Karma
8. Administration of Marsha, Pratimarsha, Avapeedaka, Dhoomapana and Dhuma Nasya
9. Symptoms of Samyak-yoga of Nasya,

10. Complication of Nasya and their management
11. Parihār Vishaya
12. Nasya Karmukata (mode of action)

### VIII. Raktamokshana

1. Definition, importance and Types of Raktamokshana
2. General Principles and rules of Raktamokshana
3. Classification of Raktamokshan
4. General Indication and Contra indication of Raktamokshan
5. **Jalaukavacharana:** Knowledge of different types of Jalauka (Leech) , Indications and contraindications of Jalaukavacharana, various types of Jalauka. Method of Application, Samyak Lakshan, Complication of Jalaukavacharana and their management with Ayurveda and Modern medicines.
6. **Pracchāna:** Indications and contraindications of Pracchana. Method of Application, Samyak Lakshan, Complication of Pracchana and their management with Ayurveda and Modern medicines
7. **Sirāvedha:** Indications and contraindications of Siravedha. Method of Application, Samyak Lakshan, Complication of Siravedha and their management with Ayurveda and Modern medicines
8. Knowledge of emergency management of complications such as water & electrolyte imbalance, shock, bleeding per rectal, hematemesis, epistaxis

### IX. Physiotherapy

1. Definition, Utility and Importance of Physiotherapy.
2. Basic Knowledge of Static exercise, Infrared, Short wave diathermy, Electromagnetic therapy, Wax bath therapy, Ultrasonic therapy.

### PRACTICALS / CLINICAL TRAINING –

Total Duration of 3 Months posting

OPD (for 1-Month): observation of OPD patients, selection of the patients, observation of OPD base Panchakarma procedures

IPD (Panchkarma) and Panchakarma Unit – Observation of different procedures of Panchakarma, Assistance to the procedure under guidance of Panchakarma specialist  
Under clinical posting, each student has to study and write 15-long Cases and 10 short cases in prescribed format

Long case Paper- minimum 1 Vaman , 1 Virechan, 1Niruha & Anuvasan Basti, 1Nasya, 1 Raktamokshan

Short case paper –Minimum one each of Pinda sweda, Shirodhara, Abhyanga, Netra Tarpan, Bahya Basti, Nadi Sweda etc.

### Distribution of Marks

- |                                      |          |
|--------------------------------------|----------|
| 1. Practical Record of 25 procedures | 05 Marks |
| 2. Long Procedure                    | 10 Marks |

|                            |          |
|----------------------------|----------|
| 3. Long Procedure Viva     | 05 Marks |
| 4. Short Procedure         | 08 Marks |
| 5. Viva on Short Procedure | 02 Marks |
| 6. General Viva-voce       | 20 Marks |

**Total** **50 Marks**

### Reference Books

1. Charak Samhita with Commentary of Ayurveda Dipika by Chakrapanidatta & Jalpakalpataru by Gangadhara
2. Sushrut Samhita with the Sushruta Nibhandha Samgraha Commentary of Dalhana & Nyayachandrika Panjika of Gayadasa on Nidana Sthana
3. Ashtanga Hridaya with Sarvanga Sundara & Ayurveda Rasayana Commentaries
4. Ashtanga Sangraha with Shashilekha Commentaries
5. Ayurvediya Panchakarma Chikitsa Dr Mukundilal Dwivedi
6. Panchakarma Vigyan Dr Haridas Shreedhar Kasture
7. Illustrated Panchakarma Dr.G Srinivasa Acharya
8. Clinical Panchkarma (English) Dr. P.Yadaiah
9. Prayogika Panchkarma (Hindi) Dr. P. Yadaiah
10. Vivida Vyadhiyome Panchkarma (Hindi) Dr. P. Yadaiah
11. The Panchkarma Treatment of Ayurveda with Kerala Specialtie Dr. T.L. Devaraj
12. Panchkarma Therapy Dr. R.H. Singh
13. Ayurveda-Principles and Panchakarma Practice Dr Mandip R. G. & Prof. Gurdip Singh
14. Principles and Practice of Basti Dr. Vasudevan & Dr. L. Mahadevan
15. Panchakarma Sangraha Dr. Manoj Shamkuwar
16. Essential of Panchakarma Therapy Dr.Pulak Kanti Kaur
17. Principles and Practice of Panchakarma Vaidya Vasant Patil
18. Harrison's Principle of Internal Medicine
19. Guyton's Physiology

## **4.3 SHALYA TANTRA**

Theory Two Papers – 100 Marks Each  
Practical - Viva voce – 100 Marks

### **PAPER –I**

**100 Marks**

#### **Part – A**

**50 Marks**

#### **Definition of Shalya, Shalya Tantra and its importance. Introduction to Shalya**

**Tantra:** Historical background and progress made.

- **Target** - Fluency in textual reading and comprehension.
- Preferable targets - Know recent developments and controversies.

#### **Description of Yantra, Shastra, Anushastra: Definition, number, types, uses, Dosha, Guna, Karma. Relevant modern instruments.**

- Target - Basic understanding of the concepts of Yantra and Shastra. Acquaintance with commonly used surgical instruments. Knowledge of textual descriptions.
- Preferable targets - Knowledge about currently used surgical instruments, their specifications, procurement sources etc.

#### **Nirjantukarana / Sterilization: Methods, types and its role in surgical practice.**

- Target - Basic surgical discipline of maintaining asepsis.
- Preferable targets- Knowledge of recently developed chemicals, instruments for sterilization.

#### **Sangyahan / Anaesthesia: Definition and Types.**

- Local anaesthesia** – Drugs, Techniques, Indications, Contraindications, Complications and their Management.
  - Regional and General anaesthesia**- Drugs, Techniques, Indications, Contraindications, Complications and their Management.
- Target-Basic knowledge of the drugs and instruments of anaesthesia. To observe the process of induction, monitoring and recovery.
  - Preferable targets- Assisting and handling anaesthesia.

#### **Trividha Karma – Purva Karma, Pradhana Karma and Paschat Karma.**

- Target- Capability to identify conditions which can affect the outcome of surgery in pre, intra and post- operative period.
- Preferable targets- Experience of handling incidents.

#### **Ashtavidha Shastra Karma - Surgical procedures.**

- Targets- Appreciation and comprehension of concepts and indications of different procedures.
- Preferable targets –Hands on experience of surgical procedures.

**Yogya - Experimental Surgery.**

- Target –Appreciation and comprehension of concepts of Yogya. Idea of patient's safety in experimental training.
- Preferable targets- Hands on training on mannequins.

**Marma: Nirukti, types, description and importance.**

- Target –Clinical application of concepts of marma.
- Preferable targets- Study of relevance of marma in the light of current anatomical and surgical knowledge.

**Kshara and Kshara Karma:**

- Nirukti, Pradhanyata, Guna, Dosha, Karma, Prakara, Yogya, Ayogya, Procedure, Upadrava and Chikitsa.**
- Kshara nirmana vidhi, knowledge of Kshara Varti, Taila and Pichu.
- Kshara Sutra – Preparation, Indications, Contraindications and Method of application, Complications and their Management.**
  - Target – Capability to identify and practice the use of kshara, kshara sutra in common clinical conditions.
  - Preferable targets – Broader knowledge of current trends and ongoing researches in kshara application.

**Agnikarma: Mahatva, Upakarana, Vidhi, Akruti bheda, Yogya, Ayogya and Upadrava Chikitsa.**

Contemporary techniques and tools of Agnikarma.

- Target - Capability to appreciate the clinical indications and comprehend Agnikarma procedure.
- Preferable targets - Hands on experience of use of cautery in surgical practice.

**Raktamokshana: Mahatva, Prakara - Siravyadha, Pracchanna, Shringa, Alabu, Jaloukavacharana – Yogya, Ayogya, Procedure, Upadrava and Chikitsa.**

- Target- Capability to appreciate and comprehend clinical indications of Jaloukavacharana and other Raktamokshana procedures.
- Preferable targets - Uses of bloodletting in current therapy.

**Bandha Vidhi – Prayojana, Dravya, Indications, Contraindications, Prakara, Upadrava, Pichu, Plota, Kavalika and Vikeshika.**

- Target- Hands on experience of techniques of bandaging.
- Preferable targets - New generation of bandaging and splintage tools.

**Pranasta Shalya and Nirharana Upaya.**

- Target – Importance of concepts of Sushruta in the management of Shalya and concerns of patient safety. Identification and management of foreign bodies.
- Preferable targets - Current concepts and diagnostic tools of dealing with foreign bodies.

**Fluid, Electrolyte, Acid Base Balance and Nutrition:**

- i. Introduction of physiology of fluids and electrolytes.
- ii. Dehydration and over hydration.
- iii. Specific electrolyte loss, Acidosis, Alkalosis, Symptomatology and Management.
- iv. Electrolyte changes in specific diseases like pyloric stenosis, intestinal obstruction and anuria.
- v. Various replacement fluids in surgery, mode of administration and complications.
- vi. Nutrition.
  - Target – Capability to identify and manage fluid and electrolyte imbalance. Ability to administer parenteral fluid.
  - Preferable targets - Advanced techniques of fluid and electrolyte assessment and management.

**Rakta Mahatwa, Raktasrava / Haemorrhage: Prakara and Lakshana.**

- i. Raktastambhana – Haemostasis.
- ii. Blood Transfusion –Blood groups, Compatibility, Indications, Contraindications and Complications with Management.
- iii. Component therapy.
  - Target-Knowledge of achieving haemostasis in haemorrhage.
  - Preferable targets - Detailed knowledge of blood bank techniques.

**Antibiotics, analgesics, anti-inflammatory and emergency drugs in surgical practice.**

- Target – Working knowledge of commonly used drugs.
- Preferable targets - Advanced pharmacological study of the above drugs.

**Diagnostic techniques** – X-ray, Imaging techniques, Ultrasonography, CAT Scan, MRI, Biopsy / Cytological study.

- Target- Knowledge of proper indications for optimum investigational tools and their interpretation.
- Preferable targets - Capability to work independently in the field of diagnostic techniques.

**Part - B****50 Marks****Shat Kriyakala in surgical practice.**

- Target- Clinical utility of the concepts.
- Preferable targets - Applied aspects of Kriyakalas in the light of current concepts of pathogenesis.

**Nirukti, Nidana, Samprapti, Prakara, Lakshana, Sadhya-asadhyata, Upadrava and Chikitsa of the following disorders.**

- i. Vranashotha - Inflammation
- ii. Vidhradi - Abscess
- iii. Pidika - Boils
- iv. Nadi Vrana - Sinus / Fistulae
- v. Vrana Granthi - Keloid / Hypertrophic scar

- vi. Marmagata - Shock
- vii. Kotha – Gangrene and Principles of Amputation.
- viii. Granthi - Cyst
- ix. Arbuda - Tumour
  - Target-Clinical application of the concepts.
  - Preferable targets - Hands on experience of management of different conditions.

#### **Vrana – Nirukti and Prakara**

- i. Nija Vrana – Nidana, Samprapti, Vrana Vasthu, Prakara, Lakshana, Vrana Pariksha – Sthana, Vrana Akruti, Srava, Gandha, Vedana. Vrana Avastha- Dustavrana, Shuddha Vrana, Ruhyamana Vrana, Samyak Roodha Vrana, Vrana Sadhya-asadhyatha and Vrana Upadrava.
- ii. Vrana Chikitsa – Pathya-apathya and Shashti Upakrama, Vranitagara and Rakshakarma.
- iii. Agantuja Vrana :
  - a. Sadyo Vrana - Traumatic wounds – Nidana, Prakara, Lakshana, Upadrava and Chikitsa.
  - b. Management of bites and stings.
- iv. Dagdha Vrana – Burns and scalds.
- v. Ulcer - Types and their management.
- vi. Wound healing stages and their management.
- vii. Pramehapidaka - Diabetic carbuncle and wounds.
  - Target - Clinical application of the concepts.
  - Preferable targets - Hands on experience of management of different conditions.

#### **Twak Vikara - Nidana, Samprapti, Lakshana and Chikitsa of Chippa – Paronychia, Kadara – Corn and Kshudra rogas.**

- Target - Clinical application of the concepts.
- Preferable targets - Hands on experience of management of different conditions.

#### **Manya Vikara – Nidana, Samprapti, Lakshana and Chikitsa of Galaganda – Goitre, Gandamala, Apachi –Lymphadenitis, Pashanagardhabha – diseases of parotid gland.**

- Target-Clinical application of the concepts.
- Preferable targets - Hands on experience of management of different conditions.

#### **Sira Vikara - Venous disorders – Superficial and Deep venous thrombosis, Haemangioma, Varicose veins - Diagnosis and their Management.**

- Target - Clinical application of the concepts.
- Preferable targets - Hands on experience of management of different conditions.

#### **Dhamani Vikara - Arterial disorders – Nidana, Samprapti, Lakshana and Chikitsa of Aneurysm, Buerger's disease, Atherosclerosis, Raynaud's disease.**

- Target - Clinical application of the concepts.
- Preferable targets - Hands on experience of management of different conditions.

#### **Snayu Vikara - Diseases of tendons and ligaments – Tennis elbow, Ganglion and their Management.**

- Target - Clinical application of the concepts.

- Preferable targets - Hands on experience of management of different conditions.

### **Care of AIDS - HIV and hepatitis infected patients.**

- Target - *Knowledge of safety precautions.*

## **PAPER - II**

**100 Marks**

### **Part - A**

**50 Marks**

### **Bhagna – Skeletal injuries: Prakara including pathological fracture, Samanya Lakshana, Upadrava and Chikitsa.**

Description of fracture of following bones with Clinical features, Diagnosis, Complications and Management – scapula, clavicle, humerus, radius, ulna, femur, patella, tibia and pelvis bones.

Sandimoksha - Dislocation: Dislocation of following joints with Clinical features, Diagnosis, Complications and Management of shoulder, elbow and hip.

- Target - Clinical utility of the concepts.
- Preferable targets - Hands on experience of management of different conditions.

**Diseases of bone:** Aetiopathogenesis, Classification, Clinical features, Diagnosis, Complications and Management of Congenital anomalies, Osteomyelitis, Cysts, Tumours and Tuberculosis.

- Target - Clinical utility of the concepts.
- Preferable targets - Hands on experience of management of different conditions.

**Cranio-cerebral injuries:** Mechanism, Pathology, Classification, Investigations, Complications and primary management.

- Target - Clinical utility of the concepts.
- Preferable targets - Hands on experience of management of different conditions.

**Diseases of Spine:** Mechanism, Pathology, Classification, Investigations, Complications and primary management of Tuberculosis, Ankylosing Spondylitis and Disc prolapse.

- Target - Clinical utility of the concepts.
- Preferable targets - Hands on experience of management of different conditions.

**Diseases of breast:** Aetiopathogenesis, Classification, Clinical features, Diagnosis, Complications and Management of Sthana Vidradhi - Breast abscess and Sthana Arbuda - Breast tumours.

- Target - Clinical utility of the concepts.
- Preferable targets - Hands on experience of management of different conditions.

**Diseases of chest:** Aetiopathogenesis, Classification, Clinical features, Diagnosis, Complications and Management of Chest injury, Pleural effusion, Pleurisy and Tumours.

- Target - Clinical utility of the concepts.
- Preferable targets - Hands on experience of management of different conditions.

**Diseases of esophagus:** Aetiopathogenesis, Classification, Clinical features, Diagnosis, Complications and Management of Congenital anomalies, Oesophagitis, Varices, Ulcer and Tumours.

- Target - Clinical utility of the concepts.
- Preferable targets - Hands on experience of management of different conditions.

**Gulma Roga** - Nidana, Prakara, Lakshana, Upadrava and Chikitsa.

**Shoola vyadhi** - Nidana, Prakara, Lakshana, Upadrava and Chikitsa.

- Target - Clinical utility of the concepts.
- Preferable targets - Hands on experience of management of acute abdomen.

**Udara Roga:** Aetiopathogenesis, Classification, Clinical features, Diagnosis, Complications and Management of Jalodara - Ascites, Chidrodara – Perforation, Peritonitis and Badhagudodara-Intestinal obstruction.

- Target - Clinical utility of the concepts.
- Preferable targets - Hands on experience of management of different conditions.

**Diseases of stomach and duodenum:** Aetiopathogenesis, Classification, Clinical features, Diagnosis, Complications and Management of Pyloric Stenosis, Peptic Ulcer and Tumours.

- Target - Clinical utility of the concepts.
- Preferable targets - Hands on experience of management of different conditions.

**Diseases of small intestine:** Aetiopathogenesis, Classification, Clinical features, Diagnosis, Complications and Management of Tuberculosis, Obstruction and Perforation.

- Target - Clinical utility of the concepts.
- Preferable targets - Hands on experience of management of different conditions.

**Diseases of large intestine** - Aetiopathogenesis, Classification, Clinical features, Diagnosis, Complications and Management of Tuberculosis, Obstruction, Perforation, Tumours, Appendicitis, Crohn's disease and Ulcerative Colitis.

- Target - Clinical utility of the concept.
- Preferable targets - Hands on experience of management of different conditions.

**Diseases of Rectum and Anal Canal** – Aetiopathogenesis, Classification, Clinical features, Diagnosis, Complications and Management of Congenital disorders, Arshas - Haemorrhoids, Parikartika - Fissure-in-ano, Bhagandara - Fistula-in-ano, Guda Vidradi - Anorectal abscesses, Gudabhramsa - Rectal prolapse, Sanniruddaguda - Anal stricture, Incontinence, Rectal Polyp and Tumours.

- Target - Clinical utility of the concepts.
- Preferable targets - Hands on experience of management of different conditions.

**Abdominal injuries and their management.**

- Target - Clinical utility of the concepts.
- Preferable targets - Hands on experience of management of different conditions.

## **Part – B**

**50 Marks**

**Diseases of Liver:** Aetiopathogenesis, Classification, Clinical features, Diagnosis, Complications and Management of Yakrit Vidhradi - Abscess, Neoplasia, Portal hypertension and Yakritdalyodar –Hepatomegaly.

- Target - Clinical utility of the concepts.
- Preferable targets - Hands on experience of management of different conditions.

**Diseases of Gallbladder:** Aetiopathogenesis, Classification, Clinical features, Diagnosis, Complications and Management of Cholecystitis, Cholelithiasis, Obstructive jaundice and Tumours.

- Target - Clinical utility of the concepts.
- Preferable targets - Hands on experience of management of different conditions.

**Diseases of Pancreas:** Aetiopathogenesis, Classification, Clinical features, Diagnosis, Complications and Management of Pancreatitis, Cysts of Pancreas and Tumours.

- Target - Clinical utility of the concepts.
- Preferable targets - Hands on experience of management of different conditions.

**Diseases of Spleen** – Aetiopathogenesis, Classification, Clinical features, Diagnosis, Complications and Management of Pleehodara – Splenomegaly and Splenic rupture.

- Target - Clinical utility of the concepts.
- Preferable targets - Hands on experience of management of different conditions.

**Diseases of Kidney and Ureters** - Aetiopathogenesis, Classification, Clinical features, Diagnosis, Complications and Management of Congenital anomalies, Polycystic kidney, Injuries, Perinephric abscess, Calculus and Neoplasms.

- Target - Clinical utility of the concepts.
- Preferable targets - Hands on experience of management of different conditions.

**Diseases of Urinary bladder** – Aetiopathogenesis, Classification, Clinical features, Diagnosis, Complications and Management of Congenital anomalies, Injuries, Ashmari - Vesical Calculus, Cystitis and Neoplasms.

- Target - Clinical utility of the concepts.
- Preferable targets - Hands on experience of management of different conditions.

**Mutraghata and Mutrakrichra** - Aetiopathogenesis, Classification, Clinical features, Diagnosis, Complications and Management. Retention of urine.

- Target - Clinical utility of the concepts.
- Preferable targets - Hands on experience of management of different conditions.

**Diseases of Prostate** - Aetiopathogenesis, Classification, Clinical features, Diagnosis, Complications and Management of Prostatitis, Prostatic abscess, Benign Enlargement of Prostate and Carcinoma of Prostate.

- Target - Clinical utility of the concepts.
- Preferable targets - Hands on experience of management of different conditions.

**Diseases of Urethra** – Aetiopathogenesis, Classification, Clinical features, Diagnosis, Complications and Management of Urethritis, Stricture and Rupture.

- Target - Clinical utility of the concepts.
- Preferable targets - Hands on experience of management of different conditions.

**Diseases of Penis:** Aetiopathogenesis, Classification, Clinical features, Diagnosis, Complications and Management of Congenital anomalies, Niruddhaprakasha -Phimosis, Parivartika -Paraphimosis, Avapatika - Prepuceal ulcer, Arbuda- Tumours and Lingarsha - Penile Warts.

- Target - Clinical utility of the concepts.
- Preferable targets - Hands on experience of management of different conditions.

**Diseases of Scrotum and Testis:** Aetiopathogenesis, Classification, Clinical features, Diagnosis, Complications and Management of Epididymo-orchitis, Epididymal cyst, Scrotal filariasis, Shukrashmari - Seminal calculus, Torsion of testis, Ectopic testis, Undescended testis and Tumours.

**Vridddhi Roga:** Aetiopathogenesis, Classification, Clinical features, Diagnosis, Complications and Management of Mutravridddhi – Hydrocele.

- Target - Clinical utility of the concepts.
- Preferable targets - Hands on experience of management of different conditions.

**Antra Vridddhi** – Aetiopathogenesis, Classification, Clinical features, Diagnosis, Complications and Management of Hernia - Inguinal, Femoral, Epigastric, Umbilical, Incisional and rare forms of Hernia.

- Target - Clinical utility of the concepts.
- Preferable targets - Hands on experience of management of different conditions.

## **PRACTICALS**

### **Content of Practicals:**

1. Identification, uses, demonstration of surgical instruments and methods of sterilization.
2. Training of case taking, bed side clinicals and case presentation.
3. Demonstration and Practical training in Anaesthesia.
4. Training to develop skills in following Parasurgical and other procedures
  - i. Kshara Karma
  - ii. Agnikarma
  - iii. Kshara Sutra
  - iv. Raktamokshana
  - v. Application of bandages and splints
  - vi. Catheterization
  - vii. Wound management procedures like Parisheka and Patradana
  - viii. Ryle's tube aspiration
  - ix. Injections -Intramuscular / Intravenous / Subcutaneous / Intradermal
  - x. Incision and drainage of abscess
  - xi. Suturing of open wounds

### **5. Observation of following procedures**

- i. Circumcision
- ii. Hydrocele
- iii. Hernial repair
- iv. Vasectomy
- v. Haemorrhoidectomy
- vi. Fistulectomy
- vii. Fissurectomy
- viii. Appendectomy
- ix. Cholecystectomy

## 6. Training of Surgical Emergencies and Management.

### Clinical Training (Indoor and Outdoor)

- Shalya (Samanya)
- Shalya (Kshara and Anushastra Karma)
- Asthi and Sandhi Chikitsa (Orthopaedics and Trauma)
- Anaesthesia
- Radiology

### 09 Months

03 Months (atleast one month in OT)  
 03 Months (atleast one month in OT)  
 02 Months  
 15 days  
 15 days

### Distribution of Marks

- |                  |                    |
|------------------|--------------------|
| 1) Daily records | - 10 Marks         |
| 2) Instruments   | - 20 Marks         |
| 3) Short case    | - 10 Marks         |
| 4) Long case     | - 20 Marks         |
| 5) Viva – voce   | - 40 Marks         |
| <b>Total</b>     | <b>- 100 Marks</b> |

### Reference Books

- |  |  |
|--|--|
| 1. Sushruta Samhita  |  |
| 2. Ashtanga Sangraha   |  |
| 3. Ashtanga Hridaya  |  |
| 4. Charaka Samhita   |  |
| 5. The Surgical instruments of the Hindus                      | - Girindranath Mukhopadhyaya                             |
| 6. Shalya Tantra Samuchchaya                                   | - Pandit Ramadesh Sharma                                 |
| 7. Shalya Vigyan (Part 1-2)                                    | - Dr. Surendra Kumar Sharma                              |
| 8. Shalya Samanvaya (Part 1-2)                                 | - Vd. Anantaram Sharma                                   |
| 9. Shalya Pradeepika   | - Dr. Mukund Swaroop Verma                               |
| 10. Sushruti   | - Dr. Ram Nath Dwivedi                                   |
| 11. Clinical Shalya Vigyan                                     | - Dr. Akhilanand Sharma                                  |
| 12. Bhagna Chikitsa  | - Dr. Prabhakar Janardhan Deshpande                      |
| 13. Kshara sutra management in anorectal ailments              | - Dr. S.K. Sharma, Dr. K.R.Sharma and Dr. Kulwant Singh. |
| 14. Anorectal diseases in Ayurveda                             | - Dr. Sijoria and Dr. Praveen Kumar Chowdary.            |
| 15. Adhunik Shalya Chikitsa Siddhanta                          | - Dr. Katil Narshingham Udupa                            |
| 16. Agnikarma Technology Innovation                            | - Dr. P.D. Gupta   |
| 17. Shalya Tantra Ke Siddhant                                  | - Dr. K.K.Takral   |
| 18. Recent advances in the management of Arshas / Haemorrhoids | - Dr. P. Hemantha  |

- |  |  |
|--|--|
| 19. Arsha Evum Bhagander Mein sutra Avacharan                      | Kumar  |
| 20. Kshara Sutra   | - Vd. Kanak Prasad Vyas                                  |
| 21. Surgical ethics of Ayurveda                                    | - Dr. S.N.Pathak   |
| 22. Bailey and Love's Short Practice of Surgery                    | - Dr. D.N. Pande   |
|  | - Norman.S. Williams, Charles.V. Mann and R.C.G. Russell |
| 23. Clinical methods in surgery                                    | - S. Das   |
| 24. Textbook of Operative Surgery                                  | - S. Das   |
| 25. Shalya Vigyan (Sachitra)                                       | - Anantram Sharma  |
| 26. Anushastra Karma   | - Dr. D.N. Pande   |
| 27. Concept of Vrana is Ayurveda                                   | - Dr. Lakshman Singh                                     |
| 28. Significance for Poorva Karma in Surgical Patient              | - Dr. Lakshman Singh                                     |
| 29. Sangyahan Prakash  | - Dr. D.N. Pande   |
| 30. A concise Text Book of Surgery                                 | - S. Das   |
| 31. A manual on Clinical Surgery                                   | - S. Das   |
| 32. A System of Surgical Diagnosis                                 | - T.N. Patel   |
| 33. A Practical Guide to Operative Surgery                         | - S. Das   |
| 34. Drugs and Equipment for Anaesthesia                            | - Arun kumar   |
| 35. Manual of Surgical Instruments                                 | - M.M. Kapur   |
| 36. Ward Procedures  | - Patel Mansukh. B                                       |
| 37. Recent trends in the management of Arshas / Haemorrhoids       | - Dr. P. Hemantha Kumar                                  |
| 38. Primary Anaesthesia  | - Maurice King   |
| 39. Synopsis of Anaesthesia  | - Lee  |
| 40. Clinical Anatomy/ Surgical Anatomy                             | - John E.Skandalakis                                     |
| 41. Surgical Instruments of the Hindus                             | - Girindharnath Mukopadyay                               |
| 42. Outline of Orthopedics   | - John Crawford Adams and David Hamblen. L               |
| 43. Outline of Fracture  | - John Crawford Adams                                    |
| 44. Recent trends in the management of Bhagandara / Fistula-in-ano | - Dr. P. Hemantha Kumar                                  |
| 45. Principles and Practice of Agnikarma                           | - Dr. Anand Kumar and Dr. Kanchan Shekokar               |
| 46. Manipal Manual of Surgery                                      | - Dr. Rajgopal Shenoy                                    |

**Theory Two Papers – 100 Marks Each**  
**Practical/Viva voce – 100 Marks**

**NETRA ROGA VIGYAN****Paper I****Marks****100****I. Introduction**

- Shalakyatantra nirukti, Parichayam, Ithihasam
- Netra rachana shariram (Mandala, Patala, Sandhi, Drushti Vichara) and Netra Kriya Sharira alongwith modern anatomy of Eye.
- Eye examination and knowledge of basic instruments/equipments required for examination of Eye.
- Netrarognanam – Samanya Hetu (Nija and agantuja), Purvarupa, Samprapti, Rupa and Chikitsa.
- Classification of Netraroga and its importance.

**II. Netra Samanya and Vishishta Chikitsa - Kriya Kalpa**

- Netra and Chakshu swasthya hitkara Dinacharya, Ritucharya, Aahara evam Vihara.
- Kriya-kalpa-Seka, Aschyotana, Pindi, Vidalaka, Tarpana, Putapaka, Anjana and importance of Panchkarma in Netra Chikitsa.
- Basic fundamentals of Netra Shastra Chikitsa e.g. Purva – Pradhana - Paschat karma, Ama-Pachyaman-Pakva Vrana shotha, Vranitopasana, Pranashtashalya, & Vranbandhana. Methods and concepts of sterilization, asepsis and antisepsis as per ancient and modern point of view.
- Basic applied knowledge of Ashtavidha shastrakarma, agni, kshara, raktamokshana in Netra rogas.
- Essential diagnostic and therapeutic modern pharmacological agents required in Netra Chikitsa

**III. Sandhigata Roga(Diseases of junctional areas of eye)**

- Number of sandhigata rogas, detailed etiology, pathology, clinical features and management of Pooyalasa and Srava Rogas.
- Brief Study of krimi granthi, Parvani and Alaji Rogas.
- Study of Acute and Chronic Dacryocystitis, Epiphora, Blepharitis including their aetiology, pathology, signs & symptoms, differential diagnosis and medical & surgical management.

**IV. Vartmagata Roga(Diseases of Lids)**

- Number of vartmagata rogas, and detailed knowledge of etiology, pathology, clinical features and management of Anjananamika, Utsangini, Lagana, Vatahata vartma, Pakshma kopa, Sikta vartma, Pothaki, Klinna vartma, Krichhronmeelana and Kukunaka diseases of Vartma.
- Brief Knowledge of Vartmarbuda, Utklishta vartma, Nimesh, Pakshmashata, Vartmarsha
- Knowledge of Hordeolum, Ptosis, Trachoma, Trichiasis, Entropion, Ectropion including their Etiology, signs and symptoms differential diagnosis and medical & surgical management.

**V. Shuklagata Roga(Diseases of sclera and conjunctiva)**

- Number of Shuklagata rogas, detailed knowledge of etiology, pathology, clinical features

- and management of Arma, Arjuna and Shuktika
- b) Brief Knowledge of Sira pidika, Sira jala, Pishtaka, Balasgrathita.
- c) Study of Pterygium, Scleritis, Episcleritis, Sub-Conjunctival Hemorrhage including their Etiology, signs and symptoms, differential diagnosis and medical & surgical management.

#### **VI. Krishnagata Roga (Diseases of cornea and uvea)**

- a) Number of krishnagata rogas, detailed knowledge of Etiology, Pathology, Clinical features, differential diagnosis, complications and Management of Savrana /kshata Shukla (Shukra), Avrana shukra (Shukla)
- b) Brief knowledge of Sira shukla, Akshipakatyaya and Ajakajata.
- c) Knowledge of Corneal ulcer, Corneal Opacity, Uveitis, Acute Iridocyclitis, Staphyloma, their aetiology, pathology, symptoms, differential diagnosis, complications and management.

#### **VII. Sarvagata Roga (Diseases effecting all parts of eye)**

- a) Number of Sarvagata rogas, detailed knowledge of etiology, pathology, clinical features, complications, differential diagnosis and Management of Abhishyanda, Adhimantha, Hatadhimantha and Shushkakshipaka.
- b) Brief Knowledge of Amloshit, Vata paryaya, Anyato vata, Sashopha & Ashophakshipaka- Pilla roga, Sirotpata and Siraharsha.
- c) Knowledge of Conjunctivitis, Glaucoma, Dry Eye Syndrome including their etiology, pathology, clinical features, differential diagnosis, complications and their management.

#### **VIII. Drishtigata Roga (vision disorders)**

- a) Number of Drishtigata rogas detailed knowledge of - etiology, pathology, clinical features, differential diagnosis and management of Timira, Kacha and Linga nasha.
- b) Brief Knowledge of Abhighataja lingnasha, sanimittaja & Annimittaja Lingnasha Doshandhya/Kaphavidagdha drishti, Naktandhya, Ushna vidagdha drishti, Pittavidagdha drishti, Dhumadarshi, Hriswajadya, Gambhirika, Nakulandhya, Nayanabhighata.
- c) Knowledge of Refractive errors, Cataract including their etiology, pathology, clinical features, differential diagnosis, complications and their management.
- d) Study of Eale's disease, Hypertensive & Diabetic Retinopathies, Age related Macular degeneration, Strabismus, Retinitis pigmentosa, Night blindness, Amblyopia, Central serous retinopathy, Optic Neuritis and Optic atrophy

#### **IX. Miscellaneous Diseases**

- a) Xerophthalmia and other malnutritional eye disorders.
- b) Knowledge of ocular trauma and their management.
- c) Introduction to Eye bank, Eye donation, Corneal Transplantation
- d) Preventive Ophthalmology and Community Ophthalmology

## **SHIRA - KARNA- NASA- MUKHA ROGAS**

### **PAPER II**

**100 Marks**

#### **I Samanya Chikitsa**

- Study of therapeutic procedures like Sveda, Kavala, Gandusa, Dhuma, Murdhni Taila, Nasya, Pratisarana, Karna Purana, karna prakshalana, nasa prakshalana Mukha Lepa.
- Ashtavidha shastrakarma and anushastrakarma used in the treatment of Shira, Karna, Nasa, and Mukha Rogas.

#### **II Shiro Roga**

- Importance and Superiority of Shira.
- Number, general etiology, pathology and cardinal features of shiro rogas and kapalgata rogas along with their common line of management/treatment.
- Detailed study of Vataja, Pittaja, Kaphaja shirashoola, Suryavarta, Ardhavabhedaka, Khalitya, Palitya.
- Brief Knowledge of Raktaja shiraha shoola, Krimija shiraha shoola, Kshayaja shiraha shoola & Sannipataja shiraha shoola, Ananta vata, Indralupta, Darunaka.
- Detailed study of Headache, Migraine its differential diagnosis and treatment.

#### **III Karna Roga**

- Detailed study of Rachana and Kriyasharir of Karna (Ear) & Shravanendriya as per Ayurvedic and modern view, Examination of Ear along with instruments/equipments required in Ear examination.
- Detailed study of etiology, pathology, classification, clinical features and management of diseases of Karna – karna shool, karna nada & shweda, Badhira, karnastrava, karna pratinaha, pootikarna, karnagoothaka, karnavidradhi.
- Brief Knowledge of karna kandu, karnapaka, karnarsha, karnarbuda, krimikaran & karnapali rogas, Karna sandhana (Auroplasty), fundamentals, method and Vaikritpaham
- Detailed study of Otagia, ASOM, CSOM, Deafness, wax including their etiology, pathology, clinical features, differential diagnosis, complications and medical & surgical management
- Brief Knowledge of Otomycosis, Otosclerosis, Tinnitus, Vertigo, Foreign body in ear and Noise pollution.

#### **IV Nasa Roga**

- Detailed study of Rachana and Kriyasharir of Nasa (Nose and paranasal sinuses) & Ghranendriya as per Ayurvedic and modern view, Examination of Nose along with instruments/equipments required in Nose examination.
- Detailed study of Pratishyaya, Dushta pratishyaya, Nasanaha, Kshavathu, Nasagata raktapitta & Nasarsha.
- Brief Knowledge of Putinasa, Bhransathu, Peenasa, Apeenasa, Nasarbuda, Nasashotha, Dipta, Nasa Sandhana.
- Detailed study of Rhinitis & Sinusitis Epistaxis, Nasal Polyp, DNS, Foreign body including their Etiology, pathology, clinical features differential diagnosis and medical & surgical management.
- Brief Knowledge of Nasal trauma, Tumours of nose and Para nasal sinuses.

## **V Mukha Roga (Diseases of Oral Cavity)**

- a) Detailed study of Rachana and Kriyasharir of Mukha Rogaadhisthana– oshtha, dantamoola, danta, jivha, talu, gal, sarvasara (Oral cavity ) as per Ayurvedic and modern view along with their Basic examination including instruments/equipments required for the examination
- b) Mukha and Danta Swasthya as per ancient and modern concepts including prevention of malignancy of oral cavity.
- c) Number and general aetiology, pathology, cardinal features of Mukha rogas along with their common line of management/treatment.

## **Oshtha Roga (Diseases of Lips)**

- a) Detailed study of Etiology, pathology, classification, clinical features and management of - Oshtha prakopa, khandoshtha
- b) Brief Knowledge of Gandalaji, Jalarbuda, Kshataja Oshthaprakopa
- c) Knowledge of cleft lip.

## **Dant Mula Gata Roga (Diseases of Periodontia)**

- a) Detailed study of Etiology, pathology, classification, clinical features and management of - Shitada, Dantaveshta, Upakush, Danta Nadi, Danta Vidradhi, Adhimansa
- b) Brief Knowledge of dantapupputaka, Saushira, Mahasaushira, Danta Vaidarbha , Paridara, Vardhana.
- c) Detailed study of Etiology, pathology, classification, clinical features and management of Gingivitis, Apical abscess, Periodontitis (Pyorrhoea).

## **Danta Roga (Dental Diseases)**

- a) Detailed study of Etiology, pathology, classification, clinical features and management of Daalan, Krimidanta, Dantaharsha, Danta sharkara, Hanumoksha
- b) Brief Knowledge of karala, Bhanjanak , Kapalika, Shyava Danta, Danta bheda,
- c) Danta chaal, Adhidanta, Danta Utpatana including Jalandhar bandha method and Danta Purna.
- d) Knowledge of Dental Caries, Dental Tartar & Tooth extraction.

## **Jihwa Gata Roga (Diseases of Tongue)**

- a) Detailed study of Etiology, pathology, classification, clinical features and management of - jivha kantaka (vataja, pittaja and kaphaja)
- b) Brief Knowledge of Upajihva, Adhijihva, Alasa.
- c) Knowledge of Glossitis, Tongue Tie, Ranula, Benign and Malignant Tumors of tongue.

## **Talu Roga (Diseases of Palate)**

- a) Detailed study of Etiology, pathology, classification, clinical features and management of - Gala shundika, Talushosha, Talupaka
- b) Brief Knowledge of Talupupputa, Adhrusha, Kacchapa, Talvarbuda, Mamsasanghata.
- c) Knowledge of Cleft palate, palatitis, uvulitis and tumours of the palate.

## **Kantha and Gala gata Roga (Diseases of Pharynx & Larynx)**

- a) Detailed study of Etiology, pathology, classification, clinical features and management of - Tundikeri, Kantha shaluka, Gilayu, Galaganda,

- Swrabhedha , Galavidradhi.
- Brief Knowledge of Rohini, Galashotha, Kantharbuda, Kanthavidradhi, Galarbuda Galaugham, Vrindam, Ekavrindam, Valaya, balasa , Shataghni, Swaraghna.
  - Detailed study of Etiology, pathology, classification, clinical features and management of - Pharyngitis, Laryngitis, Tonsillitis & Adenoiditis
  - Brief Knowledge of foreign body in the throat, Carcinoma of Larynx & Pharynx, Dysphagia Diphtheria & diseases of salivary glands.

### **Sarvasara Mukha Roga (Generalised mucosal affections of the oral cavity)**

- Detailed study of Etiology, pathology, classification, clinical features and management of Sarvasar mukhapaka
- Brief Knowledge of urdhvaguda, putivaktrata, mukharbuda
- Detailed Knowledge of Stomatitis.

### **VI Miscellaneous Diseases**

National Programme for Prevention and Control of Deafness.

## **PRACTICAL**

### **Content of Practical**

Identification, Uses, Demonstration of surgical/non-surgical equipment/ instruments, materials used in shalakya chikitsa. Method of sterilization. Training of case taking, bedside clinics and case presentation.

Training in para- surgical procedures-

- 1) Kshara karma
- 2) Agnikarma
- 3) Raktamokshana
- 4) Training of ward procedures. Application of bandages, wound management
- 5) Training of minor procedures (ashtavidha)
- 6) Observation of surgical procedures in Shalakya

#### **Clinical Training**

04 Months (OPD, IPD OT and kriya kalpa)

#### **Distribution of marks**

|   |                  |
|---|------------------|
| 1) Long Case  | 30 Marks         |
| 2) Short Case   | 20 Marks         |
| 3) Identification of instruments<br>quipments,medicines,etc | 10Marks          |
| 4) Viva – voce  | 30 Marks         |
| 5) Daily Record (Case record)                               | 10 Marks         |
| <b>Total</b>  | <b>100 Marks</b> |

### **Reference Books:-**

- |                    |                                |
|--------------------|--------------------------------|
| 1. Shalakya Tantra | Dr. Rama Nath Dwivedi          |
| 2. Shalakya Vigyan | Dr. Ravindra Chandra Choudhary |

3. Abhinava Netra Chikitsa
  4. Netra Chikitsa Vigyan
  5. Netra Roga Chikitsa
  6. Netra Roga Vigyan
  7. Parson's Diseases of Eye
  8. Diseases of ENT Log and Turner
  9. Shalakya Tantra
  10. A text book of ophthalmology in Ayurveda
  11. Shalakya Kriya Kalpa Vigyan
- Useful portions of Charak, Sushrut, Vagbhata

Acharya Vishva Nath Dwivedi  
Dr. Ravindra Chandra Choudhary  
Dr. Munje  
Dr. Hans Raj

Shiv Nath Khanna  
Dr. P.K.Shantha kumara  
Prof. K. S. Dhiman

**Total Marks 50 (Part A-30 and Part B- 20)****PART – A –Research Methodology**

1. Brief historical background of research in Ayurved and contemporary medical science  
Evidences of researches in ayurvedic classics
2. Etymology, definitions and synonyms (Anveshana, Gaveshana, Prayeshana, Anusandhan and Shodha) of the word Research
3. Research in Ayurved - Scope, need, importance, utility
4. Types of Research (familiarization of the terms)
  - a) Pure and Applied
  - b) Qualitative , Quantitative and Mixed  
Observational and interventional.
5. Research process (Importance of each steps in brief)
  - a. Selection of the topic
  - b. Review of the literature
  - c. Formulation of Hypothesis
  - d. Aims and Objectives
  - e. Materials and methods
  - f. Observations and results
  - g. Methods of communication of Research
6. Research tools – Role of the pramanas as research tools
7. The concept and importance of ethics in research
8. Concept of Evidence Based Medicine and Scientific Writing
9. Importance of IT in data mining and important research data portals concerned with Ayurved and contemporary medical science (DHARA , PubMed, Ayush Research Portal, Bioinformatics Center, Research Management Informatic System etc.)

**Part – B Medical-Statistics**

1. Definition, scope and importance of the Medical statistics
2. Common statistical terms and notations
  - a. Population
  - b. Sample
  - c. Data
  - d. Variable
  - e. Normal distribution
3. Collection and Presentation of data
  - a. Tabular
  - b. Graphical
  - c. Diagrammatical
4. Measures of location
  - a. Average
  - b. Percentile

Measures of Central Tendency

  - a. Arithmetic mean
  - b. Median

- c. Mode
- 5. Variability and its measurement
  - a. Range
  - b. Standard deviation
  - c. Standard error
- 6. Introduction to probability and test of significance
- 7. Parametric and non parametric tests
- 8. Introduction to commonly used statistical soft-wares.

#### **Reference books for Research methodology :**

1. Dawson, Catherine, 2002, Practical Research Methods, New Delhi, UBS Publishers' Distributors
2. Kothari, C.R., 1985, Research Methodology-Methods and Techniques, New Delhi, Wiley Eastern Limited.
3. Kumar, Ranjit, 2005, Research Methodology-A Step-by-Step Guide for Beginners, (2nd.ed), Singapore, Pearson Education
4. Students guide to research methodology – Undergraduates. Alexandria Medical Students Association.
5. Health research methodology. A guide for training in research methods. 2nd edition. Manila, World Health Organization Regional Office for the Western Pacific, 2001.

#### **Reference Books for statistics :**

1. Health research methodology. A guide for training in research methods. 2nd edition. Manila, World Health Organization Regional Office for the Western Pacific, 2001.
2. Statistical methods in medical research. P.Armitage (Ed) Oxford Blackwell
3. Statistical methods . Snedecor GW and Cochran, WG
4. Altman, D. G. (1991). Practical statistics for medical research. London: Chapman Principles of Medical Statistics by A. Bradford Hill
5. Interpretation and Uses of Medical Statistics by Leslie E Daly, Geoffrey J Bourke, James MC Gilvray.
6. Research in Ayurveda-M S Baghel
7. research methodology in ayurveda-V.J.Thakar,Gujarat Ayurved University
8. Ayurveda anusandhan paddhati-P.V.Sharma
9. Research methodology methods and statistical techniques- Santosh Gupta. Greenhouse SW.
10. The growth and future of biostatistics: (A view from the 1980s). Statistics in Medicine 2003; 22:3323–3335.
11. Knapp GR & Miller MC. Clinical epidemiology and Biostatistics, NMS series Antonisamy B, Christopher S & Samuel PP. Biostatistics : Principles and practice
12. Sundara Rao PSS & Richard J. An introduction to Biostatistics, PHI
13. Senn S (1997). Statistical Issues in Drug Development. Chichester: John Wiley & Sons.
14. Methods in Bio-statistics for Medical Students- BK Mahajan
15. Vaidyakeeya Sankhiki Shastra- Dr.S.S.Savrikar



## 1. PROGRAM STRUCTURE

## B.Sc. Nursing Program Structure

| I Semester  | III Semester  | V Semester   | VII Semester   |
|---|---|--|--|
| 1. Communicative English<br>2. Applied Anatomy<br>3. Applied Physiology<br>4. Applied Sociology<br>5. Applied Psychology<br>6. *Nursing Foundations I<br><br><b>Mandatory Module</b><br>*First Aid as part of Nursing Foundation I Course | 1. Applied Microbiology and Infection Control including Safety<br>2. Pharmacology I<br>3. Pathology I<br>4. *Adult Health (Medical Surgical) Nursing I with integrated pathophysiology<br><br><b>Mandatory Module</b><br>*BCLS as part of Adult Health Nursing I  | 1. *Child Health Nursing I<br>2. Mental Health Nursing I<br>3. Community Health Nursing I (including Environmental Science & Epidemiology)<br>4. Educational Technology/Nursing Education<br>5. Introduction to Forensic Nursing and Indian Laws<br><br><b>Mandatory Modules</b><br>*Essential Newborn Care (ENBC), Facility Based Newborn Care (FBNBC), IMNCI and PLS as part of Child Health Nursing | 1. Community Health Nursing II<br>2. Nursing Research & Statistics<br>3. Midwifery/Obstetrics and Gynecology (OBG) Nursing II<br><br><b>Mandatory Modules</b><br>*Safe delivery app under OBG Nursing I/II (VI/VII Semester) |
| II Semester   | IV Semester   | VI Semester  | VIII Semester  |
| 1. Applied Biochemistry<br>2. Applied Nutrition and Dietetics<br>3. *Nursing Foundations II<br>4. Health/Nursing Informatics & Technology<br><br><b>Mandatory Module</b><br>*Health Assessment as part of Nursing Foundation II Course    | 1. *Pharmacology II<br>2. Pathology II & Genetics<br>3. Adult Health Nursing II with integrated pathophysiology including Geriatric Nursing<br>4. Professionalism, Professional Values & Ethics including Bioethics<br><br><b>Mandatory Module</b><br>*Fundamentals of Prescribing under Pharmacology II<br>*Palliative care module under Adult Health Nursing II | 1. Child Health Nursing II<br>2. Mental Health Nursing II<br>3. Nursing Management & Leadership<br>4. *Midwifery/Obstetrics and Gynecology (OBG) Nursing I<br><br><b>Mandatory Module</b><br>*SBA Module under OBG Nursing I/II (VI/VII Semester)  | Internship (Intensive Practicum/Residency Posting)   |

Note: No institute/University will modify the curriculum. However they can add units/subject in the syllabus as deemed necessary.

#Modules both mandatory and elective shall be certified by the institution/external agency.

**MANDATORY MODULES**

The prepared modules/modules outlined by the Council such as Health Assessment & Fundamentals of Prescribing and available modules as National Guidelines (First Aid – NDMA, IMNCI, ENBC, FBNBC), Palliative Care, Safe Delivery App and SBA module will be provided in separate learning resource package.

For BCLS, PLS – Standard national/international modules can be used.

**ELECTIVE MODULES**

Number of electives to be completed: 3 (Every module = 1 credit = 20 hours)

**III & IV Semesters:** To complete any one elective by end of 4<sup>th</sup> semester across 1<sup>st</sup> to 4<sup>th</sup> semesters

- Human values
- Diabetes care
- Soft skills

**V & VI Semesters:** To complete any one of the following before end of 6<sup>th</sup> semester

- CBT
- Personality development
- Addiction psychiatry
- Adolescent health
- Sports health
- Accreditation and practice standards
- Developmental psychology
- Menopausal health
- Health Economics

**VII & VIII Semesters:** To complete any one of the following before end of 8<sup>th</sup> semester

- Scientific writing skills
- Lactation management
- Sexuality & Health
- Stress management
- Job readiness and employability in health care setting

**2. CURRICULUM IMPLEMENTATION: OVERALL PLAN**

**Duration of the program: 8 semesters**

**1-7 Semesters****One Semester Plan for the first 7 Semesters**

Total Weeks per Semester: 26 weeks per semester

Number of Weeks per Semester for instruction: 20 weeks (40 hours per week × 20 weeks = 800 hours)

Number of Working Days: Minimum of 100 working days (5 days per week × 20 weeks)

Vacation, Holidays, Examination and Preparatory Holidays: 6 weeks

Vacation: 3 weeks

Holidays: 1 week

Examination and Preparatory Holidays: 2 weeks

**8<sup>th</sup> Semester**

One semester: 22 weeks

Vacation: 1 week

Holidays: 1 week

Examination and Preparatory Holidays: 2 weeks



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## 3. COURSES OF INSTRUCTION WITH CREDIT STRUCTURE

| S.No | Semester | Course Code    | Course/Subject Title   | Theor y credits | Theor y Conta ct hours | Lab/ Skill Lab credits | Lab/ Skill Lab Conta ct hours | Clinical credits | Clinic al Conta ct hours | Total credits    | Total (hours)     |
|------|----------|----------------|--|-----------------|------------------------|------------------------|-------------------------------|------------------|--------------------------|------------------|-------------------|
| 1    | First    | ENGL 101       | Communicative English  | 2               | 40                     |                        |                               |                  |                          |                  | 40                |
|      |          | ANAT 105       | Applied Anatomy  | 3               | 60                     |                        |                               |                  |                          |                  | 60                |
|      |          | PHYS 110       | Applied Physiology   | 3               | 60                     |                        |                               |                  |                          |                  | 60                |
|      |          | SOCI 115       | Applied Sociology  | 3               | 60                     |                        |                               |                  |                          |                  | 60                |
|      |          | PSYC 120       | Applied Psychology   | 3               | 60                     |                        |                               |                  |                          |                  | 60                |
|      |          | N-NF (I) 125   | Nursing Foundation I including First Aid module  | 6               | 120                    | 2                      | 80                            | 2                | 160                      | 10               | 360               |
|      |          | SSCC (I) 130   | Self-study/Co-curricular   |                 |                        |                        |                               |                  |                          |                  | 40+40             |
|      |          |                | <b>TOTAL</b>   | <b>20</b>       | <b>400</b>             | <b>2</b>               | <b>80</b>                     | <b>2</b>         | <b>160</b>               | <b>20+2+2=24</b> | <b>640+80=720</b> |
| 2    | Second   | BIOC 135       | Applied Biochemistry   | 2               | 40                     |                        |                               |                  |                          |                  | 40                |
|      |          | NUTR 140       | Applied Nutrition and Dietetics  | 3               | 60                     |                        |                               |                  |                          |                  | 60                |
|      |          | N-NF (II) 125  | Nursing Foundation II including Health Assessment module   | 6               | 120                    | 3                      | 120                           | 4                | 320                      |                  | 560               |
|      |          | HNIT 145       | Health/Nursing Informatics & Technology  | 2               | 40                     | 1                      | 40                            |                  |                          |                  | 80                |
|      |          | SSCC (II) 130  | Self-study/Co-curricular   |                 |                        |                        |                               |                  |                          |                  | 40+20             |
|      |          |                | <b>TOTAL</b>   | <b>13</b>       | <b>260</b>             | <b>4</b>               | <b>160</b>                    | <b>4</b>         | <b>320</b>               | <b>13+4+4=21</b> | <b>740+60=800</b> |
| 3    | Third    | MICR 201       | Applied Microbiology and Infection Control including Safety  | 2               | 40                     | 1                      | 40                            |                  |                          |                  | 80                |
|      |          | PHAR (I) 205   | Pharmacology I   | 1               | 20                     |                        |                               |                  |                          |                  | 20                |
|      |          | PATH (I) 210   | Pathology I  | 1               | 20                     |                        |                               |                  |                          |                  | 20                |
|      |          | N-AHN (I) 215  | Adult Health Nursing I with integrated pathophysiology including BCLS module                               | 7               | 140                    | 1                      | 40                            | 6                | 480                      |                  | 660               |
|      |          | SSCC (I) 220   | Self-study/Co-curricular   |                 |                        |                        |                               |                  |                          |                  | 20                |
|      |          |                | <b>TOTAL</b>   | <b>11</b>       | <b>220</b>             | <b>2</b>               | <b>80</b>                     | <b>6</b>         | <b>480</b>               | <b>11+2+6=19</b> | <b>780+20=800</b> |
| 4    | Fourth   | PHAR (II) 205  | Pharmacology II including Fundamentals of prescribing module   | 3               | 60                     |                        |                               |                  |                          |                  | 60                |
|      |          | PATH (II) 210  | Pathology II and Genetics  | 1               | 20                     |                        |                               |                  |                          |                  | 20                |
|      |          | N-AHN (II) 225 | Adult Health Nursing II with integrated pathophysiology including Geriatric Nursing Palliative care module | 7               | 140                    | 1                      | 40                            | 6                | 480                      |                  | 660               |

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| S.No | Semester       | Course Code          | Course/Subject Title   | Theor y credits | Theor y Conta ct hours | Lab/ Skill Lab credits | Lab/ Skill Lab Conta ct hours | Clinical credits | Clinic al Conta ct hours | Total credits    | Total (hours)     |
|------|----------------|----------------------|--|-----------------|------------------------|------------------------|-------------------------------|------------------|--------------------------|------------------|-------------------|
|      |                | PROF 230             | Professionalism, Professional Values and Ethics including bioethics                          | 1               | 20                     |                        |                               |                  |                          |                  | 20                |
|      |                | SSCC(II) 220         | Self-study/Co-curricular   |                 |                        |                        |                               |                  |                          |                  | 40                |
|      |                |                      | <b>TOTAL</b>   | <b>12</b>       | <b>240</b>             | <b>1</b>               | <b>40</b>                     | <b>6</b>         | <b>480</b>               | <b>12+1+6=19</b> | <b>760+40=800</b> |
| 5    | <b>Fifth</b>   | N-CHN(I) 301         | Child Health Nursing I including Essential Newborn Care (ENBC), FBNC, IMNCI and PLS, modules | 3               | 60                     | 1                      | 40                            | 2                | 160                      |                  | 260               |
|      |                | N-MHN(I) 305         | Mental Health Nursing I  | 3               | 60                     |                        |                               | 1                | 80                       |                  | 140               |
|      |                | N-COMH(I) 310        | Community Health Nursing I including Environmental Science & Epidemiology                    | 5               | 100                    |                        |                               | 2                | 160                      |                  | 260               |
|      |                | EDUC 315             | Educational Technology/Nursing Education   | 2               | 40                     | 1                      | 40                            |                  |                          |                  | 80                |
|      |                | N-FORN 320           | Introduction to Forensic Nursing and Indian laws   | 1               | 20                     |                        |                               |                  |                          |                  | 20                |
|      |                | SSCC(I) 325          | Self-study/Co-curricular   |                 |                        |                        |                               |                  |                          |                  | 20+20             |
|      |                |                      | <b>TOTAL</b>   | <b>14</b>       | <b>280</b>             | <b>2</b>               | <b>80</b>                     | <b>5</b>         | <b>400</b>               | <b>14+2+5=21</b> | <b>760+40=800</b> |
| 6    | <b>Sixth</b>   | N-CHN(II) 301        | Child Health Nursing II  | 2               | 40                     |                        |                               | 1                | 80                       |                  | 120               |
|      |                | N-MHN(II) 305        | Mental Health Nursing II   | 2               | 40                     |                        |                               | 2                | 160                      |                  | 200               |
|      |                | NMLE 330             | Nursing Management & Leadership  | 3               | 60                     |                        |                               | 1                | 80                       |                  | 140               |
|      |                | N-MIDW(I) / OBGN 335 | Midwifery/Obstetrics and Gynaecology (OBG) Nursing I including SBA module                    | 3               | 60                     | 1                      | 40                            | 3                | 240                      |                  | 340               |
|      |                | SSCC(II) 325         | Self-study/Co-curricular   |                 |                        |                        |                               |                  |                          |                  | -                 |
|      |                |                      | <b>TOTAL</b>   | <b>10</b>       | <b>200</b>             | <b>1</b>               | <b>40</b>                     | <b>7</b>         | <b>560</b>               | <b>10+1+7=18</b> | <b>800</b>        |
| 7    | <b>Seventh</b> | N-COMH(II) 401       | Community Health Nursing II  | 5               | 100                    |                        |                               | 2                | 160                      |                  | 260               |
|      |                | NRST 405             | Nursing Research & Statistics  | 2               | 40                     | 2                      | 80                            |                  |                          |                  | 120               |
|      |                | N-MIDW(II)/ OBGN 410 | Midwifery/Obstetrics and Gynaecology (OBG) Nursing II including Safe delivery app module     | 3               | 60                     | 1                      | 40                            | 4                | 320                      |                  | 420               |

| S.No | Semester           | Course Code | Course/Subject Title               | Theor y credits | Theor y Conta ct hours | Lab/ Skill Lab credits | Lab/ Skill Lab Conta ct hours | Clinical credits                                 | Clinic al Conta ct hours | Total credits | Total (hours)   |
|------|--------------------|-------------|------------------------------------|-----------------|------------------------|------------------------|-------------------------------|--|--------------------------|---------------|---|
|      |                    |             | Self-study/Co-curricular           |                 |                        |                        |                               |  |                          |               |   |
|      |                    |             | <b>TOTAL</b>                       | 10              | 200                    | 3                      | 120                           | 6  | 480                      | 10+3+6=19     | 800   |
| 8    | Eight (Internship) | INTE 415    | Community Health Nursing – 4 weeks |                 |                        |                        |                               |  |                          |               |   |
|      |                    | INTE 420    | Adult Health Nursing – 6 weeks     |                 |                        |                        |                               |  |                          |               |   |
|      |                    | INTE 425    | Child Health Nursing – 4 weeks     |                 |                        |                        |                               |  |                          |               |   |
|      |                    | INTE 430    | Mental Health Nursing – 4 weeks    |                 |                        |                        |                               |  |                          |               |   |
|      |                    | INTE 435    | Midwifery – 4 weeks                |                 |                        |                        |                               |  |                          |               |   |
|      |                    |             | <b>TOTAL = 22 weeks</b>            |                 |                        |                        |                               | 12<br>(1 credit = 4 hours per week per semester) |                          |               | 1056<br>{4 hours × 22 weeks = 88 hours × 12 credits = 1056 hours}<br>(48 hours per week × 22 weeks) |

1 credit theory – 1 hour per week per semester

1 credit practical/lab/skill lab/simulation lab – 2 hours per week per semester

1 credit clinical – 4 hours per week per semester

1 credit elective course – 1 hour per week per semester

Total Semesters = 8

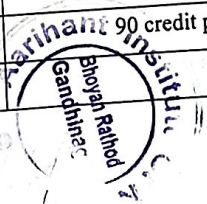
(Seven semesters: One semester = 20 weeks × 40 hours per week = 800 hours)

(Eighth semester – Internship: One semester = 22 weeks × 48 hours per week = 1056 hours)

Total number of course credits including internship and electives – 156 (141+12+3)

Distribution of credits and hours by courses, internship and electives

| S.No. | Credits        | Theory (Cr/Hrs)          | Lab (Cr/Hrs) | Clinical (Cr/Hrs) | Total credits | Hours |
|-------|----------------|--------------------------|--------------|-------------------|---------------|-------|
| 1     | Course credits | 90 credit per 1800 hours | 15/600       | 36/2880           | 141           | 5280  |
| 2     | Internship     |                          |              |                   | 12            | 1056  |



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|   |                              |  |  |  |     |      |
|---|------------------------------|--|--|--|-----|------|
| 3 | Electives                    |  |  |  | 3   | 60   |
|   | <b>TOTAL</b>                 |  |  |  | 156 | 6396 |
| 4 | Self-study and Co-curricular | Saturdays (one semester = 5 hours per week × 20 weeks × 7 semesters = 700 hours) |  |  | 12  | 240  |
|   |                              |  |  |  | 35  | 700  |
|   |                              |  |  |  | 47  | 940  |

Distribution of credits, hours and percentage for theory and practicum (Skill Lab & Clinical) across eight semesters

| S.No. | Theory & Practicum (Skill Lab & Clinical) | Credits    | Hours             | Percentage |
|-------|---|------------|-------------------|------------|
| 1     | Theory                                    | 90         | 1800              | 28         |
| 2     | Lab/Skill Lab                             | 15         | 600               | 10         |
| 3     | Clinical                                  | 36         | 3936              | 62         |
|       | <b>Total</b>                              | <b>141</b> | <b>6336 hours</b> | <b>100</b> |

#### Practicum (7 semesters) excluding internship

Lab/skill lab/simulation lab – 600 (17%)

Clinical – 2880 (83%)

Total – 3480

Lab/skill lab/simulation lab = 17% of the total practicum planned

**Note:** Besides the stipulated lab and clinical hours, a maximum of 13% (400-450 hours) from the clinical hours can be used in simulation lab/skill lab for skill lab/simulation learning and not to exceed 30% of total hours.

#### 4. SCHEME OF EXAMINATION

The distribution of marks in internal assessment, End Semester College Exam, and End Semester University Exam for each course is shown below.

##### I SEMESTER

| S.No. | Course                                 | Assessment (Marks) |                           |                              |       | Total Marks |
|-------|--|--------------------|---------------------------|------------------------------|-------|-------------|
|       |  | Internal           | End Semester College Exam | End Semester University Exam | Hours |             |
|       | <b>Theory</b>                          |                    |                           |                              |       |             |
| 1     | Communicative English                  | 25                 | 25                        |                              | 2     | 50          |
| 2     | Applied Anatomy & Applied Physiology   | 25                 |                           | 75                           | 3     | 100         |
| 3     | Applied Sociology & Applied Psychology | 25                 |                           | 75                           | 3     | 100         |
| 4     | Nursing Foundations I                  | *25                |                           |                              |       |             |
|       | <b>Practical</b>                       |                    |                           |                              |       |             |
| 5     | Nursing Foundations I                  | *25                |                           |                              |       |             |

\*Will be added to the internal marks of Nursing Foundations II Theory and Practical respectively in the next semester (Total weightage remains the same)

##### Example:

**Nursing Foundations I Theory:** Nursing Foundations I Theory Internal marks in 1<sup>st</sup> semester will be added to Nursing Foundations II Theory Internal in the 2<sup>nd</sup> semester and average of the two semesters will be taken.

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| II SEMESTER |  | Assessment (Marks)   |                           |                              |       |             |
|-------------|--|--|---------------------------|------------------------------|-------|-------------|
| S.No.       | Course   | Internal   | End Semester College Exam | End Semester University Exam | Hours | Total Marks |
|             | <b>Theory</b>  |  |                           |                              |       |             |
| 1           | Applied Biochemistry and Applied Nutrition & Dietetics | 25   |                           | 75                           | 3     | 100         |
| 2           | Nursing Foundations (I & II)                           | 25<br>I Sem-25<br>&<br>II Sem-25<br>(with<br>average of<br>both) |                           | 75                           | 3     | 100         |
| 3           | Health/Nursing Informatics & Technology                | 25   | 25                        |                              | 2     | 50          |
|             | <b>Practical</b>                                       |  |                           |                              |       |             |
| 4           | Nursing Foundations (I & II)                           | 50<br>I Sem-25<br>&<br>II Sem-25                                 |                           | 50                           |       | 100         |

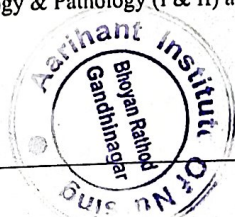
## III SEMESTER

| III SEMESTER |   | Assessment (Marks) |                           |                              |       |             |
|--------------|---|--------------------|---------------------------|------------------------------|-------|-------------|
| S.No.        | Course  | Internal           | End Semester College exam | End Semester University Exam | Hours | Total marks |
|              | <b>Theory</b>   |                    |                           |                              |       |             |
| 1            | Applied Microbiology and Infection Control including Safety | 25                 |                           | 75                           | 3     | 100         |
| 2            | Pharmacology I and Pathology I                              | *25                |                           |                              |       |             |
| 3            | Adult Health Nursing I                                      | 25                 |                           | 75                           | 3     | 100         |
|              | <b>Practical</b>  |                    |                           |                              |       |             |
| 4            | Adult Health Nursing I                                      | 50                 |                           | 50                           |       | 100         |

\*Will be added to the internal marks of Pharmacology II and Pathology II & Genetics in the next semester (Total weightage remains the same).

## IV SEMESTER

| IV SEMESTER |  | Assessment (Marks)  |                           |                              |       |             |
|-------------|--|---|---------------------------|------------------------------|-------|-------------|
| S.No.       | Course   | Internal  | End Semester College exam | End Semester University Exam | Hours | Total marks |
|             | <b>Theory</b>                                  |   |                           |                              |       |             |
| 1           | Pharmacology & Pathology (I & II) and Genetics | 25<br>III Sem-25<br>&<br>IV Sem-25<br>(with<br>average of |                           | 75                           | 3     | 100         |



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|---|---|-------|----|----|---|-----|
|   |   | both) |    |    |   |     |
| 2 | Adult Health Nursing II                         | 25    |    | 75 | 3 | 100 |
| 3 | Professionalism, Ethics and Professional Values | 25    | 25 |    | 2 | 50  |
|   | <b>Practical</b>                                |       |    |    |   |     |
| 4 | Adult Health Nursing II                         | 50    |    | 50 |   | 100 |

**V SEMESTER**

| S.No. | Course  | Assessment (Marks) |                           |                              |       |             |
|-------|---|--------------------|---------------------------|------------------------------|-------|-------------|
|       |   | Internal           | End Semester College exam | End Semester University Exam | Hours | Total marks |
|       | <b>Theory</b>   |                    |                           |                              |       |             |
| 1     | Child Health Nursing I  | *25                |                           |                              |       |             |
| 2     | Mental Health Nursing I   | *25                |                           |                              |       |             |
| 3     | Community Health Nursing I including Environmental Science & Epidemiology | 25                 |                           | 75                           | 3     | 100         |
| 4     | Educational Technology/Nursing Education                                  | 25                 |                           | 75                           | 3     | 100         |
| 5     | Introduction to Forensic Nursing and Indian Laws                          | 25                 | 25                        |                              | 2     | 50          |
|       | <b>Practical</b>  |                    |                           |                              |       |             |
| 6     | Child Health Nursing I  | *25                |                           |                              |       |             |
| 7     | Mental Health Nursing I   | *25                |                           |                              |       |             |
| 8     | Community Health Nursing I  | 50                 |                           | 50                           |       | 100         |

\*Will be added to the internal marks of Child Health Nursing II and Mental Health Nursing II in both theory and practical respectively in the next semester (Total weightage remains same).

**VI SEMESTER**

| S.No. | Course                         | Assessment (Marks)   |                           |                              |       |             |
|-------|--------------------------------|--|---------------------------|------------------------------|-------|-------------|
|       |                                | Internal   | End Semester College exam | End Semester University Exam | Hours | Total marks |
|       | <b>Theory</b>                  |  |                           |                              |       |             |
| 1     | Child Health Nursing (I & II)  | 25<br>Sem V-25<br>&<br>Sem VI-25<br>(with<br>average of<br>both) |                           | 75                           | 3     | 100         |
| 2     | Mental Health Nursing (I & II) | 25<br>Sem V-25<br>&<br>Sem VI-25<br>(with<br>average of<br>both) |                           | 75                           | 3     | 100         |



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## 5. EXAMINATION REGULATIONS

## Note:

1. Applied Anatomy and Applied Physiology: Question paper will consist of Section-A Applied Anatomy of 37 marks and Section-B Applied Physiology of 38 marks.
2. Applied Sociology and Applied Psychology: Question paper will consist of Section-A Applied Sociology of 37 marks and Section-B Applied Psychology of 38 marks.
3. Applied Microbiology and Infection Control including Safety: Question paper will consist of Section-A Applied Microbiology of 37 marks and Section-B Infection Control including Safety of 38 marks.
4. Applied Nutrition and Dietetics and Applied Biochemistry: Question paper will consist of Section-A Applied Nutrition and Dietetics of 50 marks and Section-B Biochemistry of 25 marks.
5. Pharmacology, Genetics and Pathology: Question paper will consist of Section-A of Pharmacology with 38 marks, Section-B of Pathology with 25 marks and Genetics with 12 marks.
6. Nursing Research and Statistics: Nursing Research should be of 55 marks and Statistics of 20 marks.
7. A candidate must have minimum of 80% attendance (irrespective of the kind of absence) in theory and practical in each course/subject for appearing for examination.
8. A candidate must have 100% attendance in each of the practical areas before award of degree.
9. Following exams shall be conducted as College exam and minimum pass is 50% (C Grade) and to be sent to the University for inclusion in the marks sheet and shall be considered for calculating aggregate.
  - i. Communicative English
  - ii. Health/Nursing Informatics and Technology
  - iii. Professionalism, Professional Values and Ethics including Bioethics
  - iv. Introduction to Forensic Nursing & Indian Laws
10. Minimum pass marks shall be 40% (P grade/4 point) for English only and elective modules.
11. Minimum pass marks shall be 50% in each of the Theory and practical papers separately except in English.
12. The student has to pass in all **mandatory modules** placed within courses and the pass mark for each module is 50% (C Grade). The allotted percentage of marks will be included in the internal assessment of College/University Examination (Refer Appendix 2).
13. A candidate has to pass in theory and practical exam separately in each of the paper.
14. If a candidate fails in either theory or practical, he/she has to re-appear for both the papers (Theory and Practical).
15. If the student has failed in only one subject and has passed in all the other subjects of a particular semester and Grace marks of up to 5 marks to theory marks can be added for one course/subject only, provided that by such an addition the student passes the semester examination.
16. The candidate shall appear for exams in each semester:
  - i. The candidate shall have cleared all the previous examinations before appearing for fifth semester examination. However, the candidates shall be permitted to attend the consecutive semesters.
  - ii. The candidate shall have cleared all the previous examinations before appearing for seventh semester examination. However, the candidates shall be permitted to attend the consecutive semesters.
  - iii. The candidate shall have cleared all the previous examination before appearing for final year examination.
  - iv. The maximum period to complete the course successfully should not exceed 8 years.
17. The candidate has to pass separately in internal and external examination (shall be reflected in the marks sheet). No institution shall submit average internal marks of the students not more than 75% (i.e. if 40 students are admitted in a course the average score of the 40 students shall not exceed 75% of total internal marks).
18. At least 50% of the Non-nursing subjects like Applied Anatomy & Physiology, Applied Biochemistry, Applied Psychology & Sociology, Applied Microbiology, Pharmacology, Genetics, Nutrition & Dietetics, Communicative English and Health/Nursing Informatics & Technology should be taught by the Nursing teachers. Teachers who are involved in teaching non-nursing subjects can be the examiners for the program.
19. Maximum number of candidates for practical examination should not exceed 20 per day. Particular year and of same institution batch shall be examined by the same set of examiners.
20. All practical examinations must be held in the respective clinical areas.

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Chairman  
Examination

P.R.

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[भाग III—खण्ड 4]

21. One internal and one external examiner should jointly conduct practical examination for each student.
22. An examiner for theory and practical/OSCE examination should be an Assistant Professor or above in a College of Nursing with M.Sc. (Nursing) in concerned subject and minimum 3 years of teaching experience. To be an examiner for Nursing Foundations course, the faculty having M.Sc. (Nursing) with any specialty shall be considered.

## VII. ASSESSMENT GUIDELINES

### 1. Grading of Performance

Based on the performance, each student shall be awarded a final grade at the end of the semester for each course. Absolute grading is used by converting the marks to grade, based on predetermined class intervals.

UGC 10 point grading system is used with pass grade modified.

| Letter grade      | Grade point | Percentage of marks |
|-------------------|-------------|---------------------|
| O (Outstanding)   | 10          | 100%                |
| A+ (Excellent)    | 9           | 90-99.99%           |
| A (Very Good)     | 8           | 80-89.99%           |
| B+ (Good)         | 7           | 70-79.99%           |
| B (Above Average) | 6           | 60-69.99%           |
| C (Average)       | 5           | 50-59.99%           |
| P (Pass)          | 4           | 40-49.99%           |
| F (Fail)          | 0           |                     |

For Nursing Courses and all other courses – Pass is at C Grade (5 grade point) 50% and above

For English and electives – Pass is at P Grade (4 grade point) 40% and above

### Computation of Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA)

SPGA is the weighted average of the grade points obtained in all courses by the student during the semester (All courses excluding English and electives)

#### Ex. SGPA Computation

| Course Number | Credit/s | Letter grade | Grade point | Credit point (Credit × grade) |
|---------------|----------|--------------|-------------|-------------------------------|
| 1             | 3 (C1)   | A            | 8 (G1)      | 3 × 8 = 24                    |
| 2             | 4 (C2)   | B+           | 7 (G2)      | 4 × 7 = 28                    |
| 3             | 3 (C3)   | B            | 6 (G3)      | 3 × 6 = 18                    |

$$SGPA = \frac{C1G1 + C2G2 + C3G3}{C1 + C2 + C3}$$

$$= \frac{70}{10} = 7 \text{ (rounded off to two decimal points)}$$



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**Computation of CGPA**

CGPA is calculated with SGPA of all semesters to two decimal points and is indicated in final grade in mark card/transcript showing grades of all 8 semesters and their courses/subjects.

CGPA reflects the failed status in case of fail till the course/s are passed.

| Semester 1            | Semester 2 | Semester 3 | Semester 4 |
|-----------------------|------------|------------|------------|
| Credit – Cr<br>Cr: 20 | Cr: 22     | Cr: 25     | Cr: 26     |
| SGPA: 6.5             | SGPA: 7.0  | SGPA: 5.5  | SGPA: 6.0  |
| Cr × SGPA = 20 × 6.5  |            |            |            |

$$\text{CGPA} = \frac{20 \times 6.5 + 22 \times 7 + 25 \times 5.5 + 26 \times 6}{93}$$

$$= \frac{577.5}{93} = 6.2$$

**Transcript Format**

Based on the above recommendation on letter grades, grade points, SPGA and CGPA, the transcript shall be issued for each semester with a consolidated transcript indicating the performance in all semesters.

**Declaration of Pass**

First Class with Distinction – CGPA of 7.5 and above

First Class – CGPA of 6.00-7.49

Second Class – CGPA of 5.00-5.99

**2. Internal Assessment and Guidelines**

The marks distribution of internal assessment is shown in Appendix 1 and the specific guidelines in Appendix 2.

**3. University Theory and Practical Examination Pattern**

The theory question paper pattern and practical exam pattern are shown in Appendix 3.

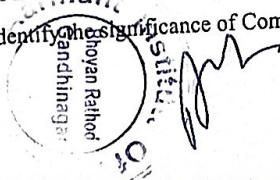
**SYLLABUS****COMMUNICATIVE ENGLISH****PLACEMENT: I SEMESTER**

**THEORY:** 2 Credits (40 hours)

**DESCRIPTION:** The course is designed to enable students to enhance their ability to speak and write the language (and use English) required for effective communication in their professional work. Students will practice their skills in verbal and written English during clinical and classroom experience.

**COMPETENCIES:** On completion of the course, the students will be able to

1. Identify the significance of Communicative English for healthcare professionals.



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[भाग III—खण्ड 4]

|   |                                     |                                    |    |   |     |
|---|-------------------------------------|------------------------------------|----|---|-----|
|   |                                     |                                    | 75 | 3 | 100 |
| 3 | Nursing Management & Leadership     | 25                                 |    |   |     |
| 4 | Midwifery/Obstetrics & Gynecology I | *25                                |    |   |     |
|   | <b>Practical</b>                    |                                    |    |   |     |
| 5 | Child Health Nursing (I & II)       | 50<br>(Sem V-25<br>&<br>Sem VI-25) | 50 |   | 100 |
| 6 | Mental Health Nursing (I & II)      | 50<br>(Sem V-25<br>&<br>Sem VI-25) | 50 |   | 100 |
| 7 | Midwifery/Obstetrics & Gynecology I | *25                                |    |   |     |

\*Will be added to Internal marks of Midwifery II theory and practical respectively in the next semester (Total weightage remains the same)

## VII SEMESTER

| S.No. | Course   | Assessment (Marks)   |                           |                              |       |             |
|-------|--|--|---------------------------|------------------------------|-------|-------------|
|       |  | Internal   | End Semester College Exam | End Semester University Exam | Hours | Total marks |
|       | <b>Theory</b>  |  |                           |                              |       |             |
| 1     | Community Health Nursing II                                | 25   |                           | 75                           | 3     | 100         |
| 2     | Nursing Research & Statistics                              | 25   |                           | 75                           | 3     | 100         |
| 2     | Midwifery/Obstetrics and Gynecology (OBG) Nursing (I & II) | 25<br>Sem VI-25<br>&<br>Sem VII-25<br>(with<br>average of<br>both) |                           | 75                           | 3     | 100         |
|       | <b>Practical</b>   |  |                           |                              |       |             |
| 3     | Community Health Nursing II                                | 50   |                           | 50                           |       | 100         |
| 4     | Midwifery/Obstetrics and Gynecology (OBG) Nursing (I & II) | 50<br>(Sem VI-25<br>&<br>Sem VII-25)                               |                           | 50                           |       | 100         |

## VIII SEMESTER

| S.No. | Course                | Assessment (Marks) |                           |                              |       |             |
|-------|-----------------------|--------------------|---------------------------|------------------------------|-------|-------------|
|       |                       | Internal           | End Semester College Exam | End Semester University Exam | Hours | Total marks |
|       | <b>Practical</b>      |                    |                           |                              |       |             |
| 1     | Competency Assessment | 100                |                           | 100                          |       | 200         |



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2. Apply the concepts and principles of English Language use in professional development such as pronunciation, vocabulary, grammar, paraphrasing, voice modulation, Spelling, pause and silence.
3. Demonstrate attentive listening in different hypothetical situations.
4. Converse effectively, appropriately and timely within the given context and the individual or team they are communicating with either face to face or by other means.
5. Read, interpret and comprehend content in text, flow sheet, framework, figures, tables, reports, anecdotes etc.
6. Analyse the situation and apply critical thinking strategies.
7. Enhance expressions through writing skills.
8. Apply LSRW (Listening, Speaking, Reading and Writing) Skill in combination to learn, teach, educate and share information, ideas and results.

## COURSE OUTLINE

## T – Theory

| Unit | Time (Hrs) | Learning Outcomes  | Content  | Teaching/ Learning Activities   | Assessment Methods   |
|------|------------|--|--|---|--|
| I    | 3 (T)      | Identify the significance of communicative English   | <b>Communication</b> <ul style="list-style-type: none"> <li>What is communication?</li> <li>What are communication roles of listeners, speakers, readers and writers as healthcare professionals?</li> </ul>   | <ul style="list-style-type: none"> <li>Definitions with examples, illustrations and explanations</li> <li>Identifying competencies/ communicative strategies in LSRW</li> <li>Reading excerpts on the above and interpreting them through tasks</li> </ul>  | <ul style="list-style-type: none"> <li>Checking for understanding through tasks</li> </ul>     |
| II   | 5 (T)      | Describe concepts and principles of Language (English) use in professional development such as pronunciation, vocabulary, grammar, paraphrasing, voice modulation, spelling, pause and silence | <b>Introduction to LSRGW</b> <ul style="list-style-type: none"> <li>L – Listening: Different types of listening</li> <li>S – Speaking: Understanding Consonants, Vowels, Word and Sentence Stress, Intonation</li> <li>R – Reading: Medical vocabulary, linkers</li> <li>Gr – Grammar: Understanding tenses, linkers</li> <li>W – Writing simple sentences and short paragraphs – emphasis on correct grammar</li> </ul> | <ul style="list-style-type: none"> <li>Exercises on listening to news, announcements, telephone conversations and instructions from others</li> <li>Information on fundamentals of Speech – Consonant, Vowel, Stress and Intonation with tasks based on these through audio/video and texts</li> <li>Reading a medical dictionary/ glossary of medical terms with matching exercises</li> <li>Information on tenses and basic concepts of correct grammar through fill in the blanks, true/false questions</li> </ul> | <ul style="list-style-type: none"> <li>Through 'check your understanding' exercises</li> </ul> |

| Unit | Time (Hrs) | Learning Outcomes   | Content  | Teaching/ Learning Activities   | Assessment Methods  |
|------|------------|---|--|---|---|
| III  | 5 (T)      | Demonstrate attentive listening in different hypothetical situations  | <b>Attentive Listening</b> <ul style="list-style-type: none"> <li>Focusing on listening in different situations – announcements, descriptions, narratives, instructions, discussions, demonstrations</li> <li>Reproducing Verbatim</li> <li>Listening to academic talks/ lectures</li> <li>Listening to presentation</li> </ul>  | <ul style="list-style-type: none"> <li>Listening to announcements, news, documentaries with tasks based on listening</li> <li>With multiple choice, Yes/No and fill in the blank activities</li> </ul>  | <ul style="list-style-type: none"> <li>Checking individually against correct answers</li> <li>Listening for specific information</li> <li>Listening for overall meaning and instructions</li> <li>Listening to attitudes and opinions</li> <li>Listening to audio, video and identify key points</li> </ul>   |
| IV   | 9 (T)      | Converse effectively, appropriately and timely within the given context and the individual or team they are communicating with either face to face or other means | <b>Speaking – Effective Conversation</b> <ul style="list-style-type: none"> <li>Conversation situations – informal, formal and neutral</li> <li>Factors influencing way of speaking – setting, topic, social relationship, attitude and language</li> <li>Greetings, introductions, requesting, asking for and giving permission, speaking personally and casual conversations</li> <li>Asking for information, giving instructions and directions</li> <li>Agreeing and disagreeing, giving opinions</li> <li>Describing people, places, events and things, narrating, reporting &amp; reaching conclusions</li> <li>Evaluating and comparing</li> <li>Complaints and suggestions</li> <li>Telephone conversations</li> <li>Delivering presentations</li> </ul> | <ul style="list-style-type: none"> <li>Different types of speaking activities related to the content</li> <li>Guided with prompts and free discussions</li> <li>Presentation techniques</li> <li>Talking to peers and other adults.</li> <li>Talking to patients and Patient attenders</li> <li>Talking to other healthcare professionals</li> <li>Classroom conversation</li> <li>Scenario based learning tasks</li> </ul> | <ul style="list-style-type: none"> <li>Individual and group/peer assessment through live speaking tests</li> <li>Presentation of situation in emergency and routine</li> <li>Handoff</li> <li>Reporting in doctors/nurses' rounds</li> <li>Case presentation</li> <li>Face to face oral communication</li> <li>Speaking individually (Nurse to nurse/patient/ doctor) and to others in the group</li> <li>Telephonic talking</li> </ul> |
| V    | 5 (T)      | Read, interpret and comprehend content in text, flow sheet, framework, figures, tables, reports, anecdotes  | <b>Reading</b> <ul style="list-style-type: none"> <li>Reading strategies, reading notes and messages</li> <li>Reading relevant articles and news items</li> <li>Vocabulary for everyday activities, abbreviations and medical vocabulary</li> <li>Understanding visuals, graphs, figures and notes on instructions</li> </ul>  | <ul style="list-style-type: none"> <li>Detailed tasks and exercises on reading for information, inference and evaluation</li> <li>Vocabulary games and puzzles for medical lexis</li> </ul>   | <ul style="list-style-type: none"> <li>Reading/ summarizing/ justifying answers orally</li> <li>Patient document</li> <li>Doctor's prescription of care</li> <li>Journal/news</li> </ul>  |

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| Unit | Time (Hrs) | Learning Outcomes   | Content   | Teaching/ Learning Activities  | Assessment Methods   |
|------|------------|---|---|--|--|
|      |            |   | <ul style="list-style-type: none"> <li>• Reading reports and interpreting them</li> <li>• Using idioms and phrases, spotting errors, vocabulary for presentations</li> <li>• Remedial Grammar</li> </ul>  | <ul style="list-style-type: none"> <li>• Grammar activities</li> </ul>   | <ul style="list-style-type: none"> <li>• reading and interpretation</li> <li>• Notes/Reports</li> </ul>  |
| VI   | 5 (T)      | Enhance expressions through writing skills  | <b>Writing Skills</b> <ul style="list-style-type: none"> <li>• Writing patient history</li> <li>• Note taking</li> <li>• Summarising</li> <li>• Anecdotal records</li> <li>• Letter writing</li> <li>• Diary/Journal writing</li> <li>• Report writing</li> <li>• Paper writing skills</li> <li>• Abstract writing</li> </ul> | <ul style="list-style-type: none"> <li>• Writing tasks with focus on task fulfilment, coherence and cohesion, appropriate vocabulary and correct grammar</li> <li>• Guided and free tasks</li> <li>• Different kinds of letter writing tasks</li> </ul>  | <ul style="list-style-type: none"> <li>• Paper based assessment by the teacher/ trainer against set band descriptors</li> <li>• Presentation of situation</li> <li>• Documentation</li> <li>• Report writing</li> <li>• Paper writing skills</li> <li>• Verbatim reproducing</li> <li>• Letter writing</li> <li>• Resume/CV</li> </ul> |
| VII  | 8 (T)      | Apply LSRW Skill in combination to learn, teach, educate and share information, ideas and results | <b>LSRW Skills</b> <ul style="list-style-type: none"> <li>• Critical thinking strategies for listening and reading</li> <li>• Oral reports, presentations</li> <li>• Writing instructions, letters and reports</li> <li>• Error analysis regarding LSRW</li> </ul>  | <ul style="list-style-type: none"> <li>• Valuating different options/multiple answers and interpreting decisions through situational activities</li> <li>• Demonstration – individually and in groups</li> <li>• Group Discussion</li> <li>• Presentation</li> <li>• Role Play</li> <li>• Writing reports</li> </ul> | <ul style="list-style-type: none"> <li>• Consolidated assessment orally and through written tasks/exercises</li> </ul>   |

### APPLIED ANATOMY

**PLACEMENT: 1 SEMESTER**

**THEORY: 3 Credits (60 hours)**

**DESCRIPTION:** The course is designed to assist student to recall and further acquire the knowledge of the normal structure of human body, identify alteration in anatomical structure with emphasis on clinical application to practice nursing.

**COMPETENCIES:** On completion of the course, the students will be able to

1. Describe anatomical terms.
2. Explain the general and microscopic structure of each system of the body.
3. Identify relative positions of the major body organs as well as their general anatomic locations.
4. Explore the effect of alterations in structure.
5. Apply knowledge of anatomical structures to analyze clinical situations and therapeutic applications.

## COURSE OUTLINE

## T – Theory

| Unit | Time (Hrs) | Learning Outcomes  | Content  | Teaching/ Learning Activities   | Assessment Methods  |
|------|------------|--|--|---|---|
| I    | 8 (T)      | <p>Define the terms relative to the anatomical position</p> <p>Describe the anatomical planes</p> <p>Define and describe the terms used to describe movements</p> <p>Organization of human body and structure of cell, tissues membranes and glands</p> <p>Describe the types of cartilage</p> <p>Compare and contrast the features of skeletal, smooth and cardiac muscle</p> | <p><b>Introduction to anatomical terms and organization of the human body</b></p> <ul style="list-style-type: none"> <li>• Introduction to anatomical terms relative to position – anterior, ventral, posterior dorsal, superior, inferior, median, lateral, proximal, distal, superficial, deep, prone, supine, palmar and plantar</li> <li>• Anatomical planes (axial/ transverse/ horizontal, sagittal/vertical plane and coronal/frontal/oblique plane)</li> <li>• Movements (flexion, extension, abduction, adduction, medial rotation, lateral rotation, inversion, eversion, supination, pronation, plantar flexion, dorsal flexion and circumduction)</li> <li>• Cell structure, Cell division</li> <li>• Tissue – definition, types, characteristics, classification, location</li> <li>• Membrane, glands – classification and structure</li> <li>• Identify major surface and bony landmarks in each body region, Organization of human body</li> <li>• Hyaline, fibro cartilage, elastic cartilage</li> <li>• Features of skeletal, smooth and cardiac muscle</li> <li>• Application and implication in nursing</li> </ul> | <ul style="list-style-type: none"> <li>• Lecture cum Discussion</li> <li>• Use of models</li> <li>• Video demonstration</li> <li>• Use of microscopic slides</li> <li>• Lecture cum Discussion</li> <li>• Video/Slides</li> <li>• Anatomical Torso</li> </ul> | <ul style="list-style-type: none"> <li>• Quiz</li> <li>• MCQ</li> <li>• Short answer</li> </ul> |
| II   | 6 (T)      | <p>Describe the structure of respiratory system</p> <p>Identify the muscles of respiration and examine their contribution to the mechanism of breathing</p>  | <p><b>The Respiratory system</b></p> <ul style="list-style-type: none"> <li>• Structure of the organs of respiration</li> <li>• Muscles of respiration</li> <li>• Application and implication in nursing</li> </ul>  | <ul style="list-style-type: none"> <li>• Lecture cum Discussion</li> <li>• Models</li> <li>• Video/Slides</li> </ul>  | <ul style="list-style-type: none"> <li>• Short answer</li> <li>• Objective type</li> </ul>      |

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| Unit | Time (Hrs) | Learning Outcomes  | Content   | Teaching/Learning Activities   | Assessment Methods  |
|------|------------|--|---|--|---|
|      |            | Apply the knowledge in performing nursing procedures/skills  | <b>The Muscular system</b> <ul style="list-style-type: none"> <li>• Types and structure of muscles</li> <li>• Muscle groups – muscles of the head, neck, thorax, abdomen, pelvis, upper limb and lower limbs</li> <li>• Principal muscles – deltoid, biceps, triceps, respiratory, abdominal, pelvic floor, pelvic floor muscles, gluteal muscles and vastus lateralis</li> <li>• Major muscles involved in nursing procedures</li> </ul> |  |   |
| VIII | 5 (T)      | Describe the structure of renal system   | <b>The Renal system</b> <ul style="list-style-type: none"> <li>• Structure of kidney, ureters, bladder, urethra</li> <li>• Application and implication in nursing</li> </ul>  | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Models/charts</li> </ul>                               | <ul style="list-style-type: none"> <li>• MCQ</li> <li>• Short answer</li> </ul> |
| IX   | 5 (T)      | Describe the structure of reproductive system  | <b>The Reproductive system</b> <ul style="list-style-type: none"> <li>• Structure of male reproductive organs</li> <li>• Structure of female reproductive organs</li> <li>• Structure of breast</li> </ul>  | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Models/charts</li> </ul>                               | <ul style="list-style-type: none"> <li>• MCQ</li> <li>• Short answer</li> </ul> |
| X    | 6 (T)      | Describe the structure of nervous system including the distribution of the nerves, nerve plexuses<br><br>Describe the ventricular system | <b>The Nervous system</b> <ul style="list-style-type: none"> <li>• Review Structure of neurons</li> <li>• CNS, ANS and PNS (Central, autonomic and peripheral)</li> <li>• Structure of brain, spinal cord, cranial nerves, spinal nerves, peripheral nerves, functional areas of cerebral cortex</li> <li>• Ventricular system – formation, circulation, and drainage</li> <li>• Application and implication in nursing</li> </ul>        | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Explain with models</li> <li>• Video slides</li> </ul> | <ul style="list-style-type: none"> <li>• MCQ</li> <li>• Short answer</li> </ul> |

Note: Few lab hours can be planned for visits, observation and handling  
(less than 1 credit lab hours are not specified separately)

### APPLIED PHYSIOLOGY

**PLACEMENT: 1 SEMESTER**

**THEORY: 3 Credits (60 hours)**

**DESCRIPTION:** The course is designed to assist student to acquire comprehensive knowledge of the normal functions of the organ systems of the human body to facilitate understanding of physiological basis of health, identify alteration in functions and provide the student with the necessary physiological knowledge to practice nursing.

**COMPETENCIES:** On completion of the course, the students will be able to

1. Develop understanding of the normal functioning of various organ systems of the body.
2. Identify the relative contribution of each organ system towards maintenance of homeostasis.
3. Describe the effect of alterations in functions.
4. Apply knowledge of physiological basis to analyze clinical situations and therapeutic applications.

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Gandhinagar

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## COURSE OUTLINE

## T – Theory

| Unit | Time (Hrs) | Learning Outcomes  | Content   | Teaching/ Learning Activities   | Assessment Methods   |
|------|------------|--|---|---|--|
| I    | 4 (T)      | Describe the physiology of cell, tissues, membranes and glands   | <b>General Physiology – Basic concepts</b> <ul style="list-style-type: none"> <li>Cell physiology including transportation across cell membrane</li> <li>Body fluid compartments, Distribution of total body fluid, intracellular and extracellular compartments, major electrolytes and maintenance of homeostasis</li> <li>Cell cycle</li> <li>Tissue – formation, repair</li> <li>Membranes and glands – functions</li> <li>Application and implication in nursing</li> </ul>  | <ul style="list-style-type: none"> <li>Review – discussion</li> <li>Lecture cum Discussion</li> <li>Video demonstrations</li> </ul> | <ul style="list-style-type: none"> <li>Quiz</li> <li>MCQ</li> <li>Short answer</li> </ul>  |
| II   | 6 (T)      | Describe the physiology and mechanism of respiration<br><br>Identify the muscles of respiration and examine their contribution to the mechanism of breathing | <b>Respiratory system</b> <ul style="list-style-type: none"> <li>Functions of respiratory organs</li> <li>Physiology of respiration</li> <li>Pulmonary circulation – functional features</li> <li>Pulmonary ventilation, exchange of gases</li> <li>Carriage of oxygen and carbon-dioxide, Exchange of gases in tissue</li> <li>Regulation of respiration</li> <li>Hypoxia, cyanosis, dyspnea, periodic breathing</li> <li>Respiratory changes during exercise</li> <li>Application and implication in nursing</li> </ul>   | <ul style="list-style-type: none"> <li>Lecture</li> <li>Video slides</li> </ul>   | <ul style="list-style-type: none"> <li>Essay</li> <li>Short answer</li> <li>MCQ</li> </ul> |
| III  | 8 (T)      | Describe the functions of digestive system   | <b>Digestive system</b> <ul style="list-style-type: none"> <li>Functions of the organs of digestive tract</li> <li>Saliva – composition, regulation of secretion and functions of saliva</li> <li>Composition and function of gastric juice, mechanism and regulation of gastric secretion</li> <li>Composition of pancreatic juice, function, regulation of pancreatic secretion</li> <li>Functions of liver, gall bladder and pancreas</li> <li>Composition of bile and function</li> <li>Secretion and function of small and large intestine</li> <li>Movements of alimentary tract</li> <li>Digestion in mouth, stomach, small intestine, large intestine, absorption of food</li> <li>Application and implications in nursing</li> </ul> | <ul style="list-style-type: none"> <li>Lecture cum Discussion</li> <li>Video slides</li> </ul>                                      | <ul style="list-style-type: none"> <li>Essay</li> <li>Short answer</li> <li>MCQ</li> </ul> |
| IV   | 6 (T)      | Explain the functions of the   | <b>Circulatory and Lymphatic system</b> <ul style="list-style-type: none"> <li>Functions of heart, conduction system,</li> </ul>  | <ul style="list-style-type: none"> <li>Lecture</li> </ul>   | <ul style="list-style-type: none"> <li>Short answer</li> </ul>                             |

| Unit | Time (Hrs) | Learning Outcomes  | Content   | Teaching/ Learning Activities         | Assessment Methods                 |
|------|------------|--|---|---------------------------------------|------------------------------------|
|      |            | heart, and physiology of circulation                             | cardiac cycle, Stroke volume and cardiac output<br>• Blood pressure and Pulse<br>• Circulation – principles, factors influencing blood pressure, pulse<br>• Coronary circulation, Pulmonary and systemic circulation<br>• Heart rate – regulation of heart rate<br>• Normal value and variations<br>• Cardiovascular homeostasis in exercise and posture<br>• Application and implication in nursing  | • Discussion<br>• Video/Slides        | • MCQ                              |
| V    | 5 (T)      | Describe the composition and functions of blood                  | <b>Blood</b><br>• Blood – Functions, Physical characteristics<br>• Formation of blood cells<br>• Erythropoiesis – Functions of RBC, RBC life cycle<br>• WBC – types, functions<br>• Platelets – Function and production of platelets<br>• Clotting mechanism of blood, clotting time, bleeding time, PTT<br>• Hemostasis – role of vasoconstriction, platelet plug formation in hemostasis, coagulation factors, intrinsic and extrinsic pathways of coagulation<br>• Blood groups and types<br>• Functions of reticuloendothelial system, immunity<br>• Application in nursing | • Lecture<br>• Discussion<br>• Videos | • Essay<br>• Short answer<br>• MCQ |
| VI   | 5 (T)      | Identify the major endocrine glands and describe their functions | <b>The Endocrine system</b><br>• Functions and hormones of Pineal Gland, Pituitary gland, Thyroid, Parathyroid, Thymus, Pancreas and Adrenal glands.<br>• Other hormones<br>• Alterations in disease<br>• Application and implication in nursing  | • Lecture<br>• Explain using charts   | • Short answer<br>• MCQ            |
| VII  | 4 (T)      | Describe the structure of various sensory organs                 | <b>The Sensory Organs</b><br>• Functions of skin<br>• Vision, hearing, taste and smell<br>• Errors of refraction, aging changes<br>• Application and implications in nursing  | • Lecture<br>• Video                  | • Short answer<br>• MCQ            |
| VIII | 6 (T)      | Describe the functions of  | <b>Musculoskeletal system</b>   | • Lecture                             | • Structured essay                 |

| Unit | Time (Hrs) | Learning Outcomes  | Content  | Teaching/ Learning Activities  | Assessment Methods   |
|------|------------|--|--|--|--|
| III  | 6 (T)      | Describe the structure of digestive system   | <b>The Digestive system</b> <ul style="list-style-type: none"> <li>• Structure of alimentary canal and accessory organs of digestion</li> <li>• Application and implications in nursing</li> </ul>   | <ul style="list-style-type: none"> <li>• Lecture cum Discussion</li> <li>• Video/Slides</li> <li>• Anatomical Torso</li> </ul>   | <ul style="list-style-type: none"> <li>• Short answer</li> <li>• Objective type</li> </ul> |
| IV   | 6 (T)      | Describe the structure of circulatory and lymphatic system.  | <b>The Circulatory and Lymphatic system</b> <ul style="list-style-type: none"> <li>• Structure of blood components, blood vessels – Arterial and Venous system</li> <li>• Position of heart relative to the associated structures</li> <li>• Chambers of heart, layers of heart</li> <li>• Heart valves, coronary arteries</li> <li>• Nerve and blood supply to heart</li> <li>• Lymphatic tissue</li> <li>• Veins used for IV injections</li> <li>• Application and implication in nursing</li> </ul> | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Models</li> <li>• Video/Slides</li> </ul>  | <ul style="list-style-type: none"> <li>• Short answer</li> <li>• MCQ</li> </ul>            |
| V    | 4 (T)      | Identify the major endocrine glands and describe the structure of endocrine Glands   | <b>The Endocrine system</b> <ul style="list-style-type: none"> <li>• Structure of Hypothalamus, Pineal Gland, Pituitary gland, Thyroid, Parathyroid, Thymus, Pancreas and Adrenal glands</li> </ul>  | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Models/charts</li> </ul>   | <ul style="list-style-type: none"> <li>• Short answer</li> <li>• Objective type</li> </ul> |
| VI   | 4 (T)      | Describe the structure of various sensory organs   | <b>The Sensory organs</b> <ul style="list-style-type: none"> <li>• Structure of skin, eye, ear, nose and tongue</li> <li>• Application and implications in nursing</li> </ul>  | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Explain with Video/ models/charts</li> </ul>   | <ul style="list-style-type: none"> <li>• Short answer</li> <li>• MCQ</li> </ul>            |
| VII  | 10 (T)     | Describe anatomical position and structure of bones and joints<br><br>Identify major bones that make up the axial and appendicular skeleton<br><br>Classify the joints<br><br>Identify the application and implications in nursing<br><br>Describe the structure of muscle | <b>The Musculoskeletal system:</b><br><br><b>The Skeletal system</b> <ul style="list-style-type: none"> <li>• Anatomical positions</li> <li>• Bones – types, structure, growth and ossification</li> <li>• Axial and appendicular skeleton</li> <li>• Joints – classification, major joints and structure</li> <li>• Application and implications in nursing</li> </ul>  | <ul style="list-style-type: none"> <li>• Review – discussion</li> <li>• Lecture</li> <li>• Discussions</li> <li>• Explain using charts, skeleton and loose bones and torso</li> <li>• Identifying muscles involved in nursing procedures in lab</li> </ul> | <ul style="list-style-type: none"> <li>• Short answer</li> <li>• Objective type</li> </ul> |



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| Unit | Time (Hrs) | Learning Outcomes  | Content   | Teaching/ Learning Activities  | Assessment Methods  |
|------|------------|--|---|--|---|
|      |            | bones, joints, various types of muscles, its special properties and nerves supplying them          | <ul style="list-style-type: none"> <li>Bones – Functions, movements of bones of axial and appendicular skeleton, Bone healing</li> <li>Joints and joint movements</li> <li>Alteration of joint disease</li> <li>Properties and Functions of skeletal muscles – mechanism of muscle contraction</li> <li>Structure and properties of cardiac muscles and smooth muscles</li> <li>Application and implication in nursing</li> </ul>   | <ul style="list-style-type: none"> <li>Discussion</li> <li>Video presentation</li> </ul>                   | <ul style="list-style-type: none"> <li>Short answer</li> <li>MCQ</li> </ul>   |
| IX   | 4 (T)      | Describe the physiology of renal system  | <b>Renal system</b> <ul style="list-style-type: none"> <li>Functions of kidney in maintaining homeostasis</li> <li>GFR</li> <li>Functions of ureters, bladder and urethra</li> <li>Micturition</li> <li>Regulation of renal function</li> <li>Application and implication in nursing</li> </ul>   | <ul style="list-style-type: none"> <li>Lecture</li> <li>Charts and models</li> </ul>                       | <ul style="list-style-type: none"> <li>Short answer</li> <li>MCQ</li> </ul>   |
| X    | 4 (T)      | Describe the structure of reproductive system  | <b>The Reproductive system</b> <ul style="list-style-type: none"> <li>Female reproductive system – Menstrual cycle, function and hormones of ovary, oogenesis, fertilization, implantation, Functions of breast</li> <li>Male reproductive system – Spermatogenesis, hormones and its functions, semen</li> <li>Application and implication in providing nursing care</li> </ul>  | <ul style="list-style-type: none"> <li>Lecture</li> <li>Explain using charts, models, specimens</li> </ul> | <ul style="list-style-type: none"> <li>Short answer</li> <li>MCQ</li> </ul>   |
| XI   | 8 (T)      | Describe the functions of brain, physiology of nerve stimulus, reflexes, cranial and spinal nerves | <ul style="list-style-type: none"> <li><b>Nervous system</b></li> <li>Overview of nervous system</li> <li>Review of types, structure and functions of neurons</li> <li>Nerve impulse</li> <li>Review functions of Brain-Medulla, Pons, Cerebrum, Cerebellum</li> <li>Sensory and Motor Nervous system</li> <li>Peripheral Nervous system</li> <li>Autonomic Nervous system</li> <li>Limbic system and higher mental Functions- Hippocampus, Thalamus, Hypothalamus</li> <li>Vestibular apparatus</li> <li>Functions of cranial nerves</li> <li>Autonomic functions</li> <li>Physiology of Pain-somatic, visceral and</li> </ul> | <ul style="list-style-type: none"> <li>Lecture cum Discussion</li> <li>Video slides</li> </ul>             | <ul style="list-style-type: none"> <li>Brief structured essays</li> <li>Short answer</li> <li>MCQ</li> <li>Critical reflection</li> </ul> |

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| Unit | Time (Hrs) | Learning Outcomes | Content   | Teaching/ Learning Activities | Assessment Methods |
|------|------------|-------------------|---|-------------------------------|--------------------|
|      |            |                   | <ul style="list-style-type: none"> <li>• Reflexes</li> <li>• CSF formation, composition, circulation of CSF, blood brain barrier and blood CSF barrier</li> <li>• Application and implication in nursing</li> </ul> |                               |                    |

Note: Few lab hours can be planned for visits, observation and handling  
(less than 1 credit lab hours are not specified separately)

### APPLIED SOCIOLOGY

**PLACEMENT: I SEMESTER**

**THEORY: 3 Credits (60 hours)**

**DESCRIPTION:** This course is designed to enable the students to develop understanding about basic concepts of sociology and its application in personal and community life, health, illness and nursing.

**COMPETENCIES:** On completion of the course, the students will be able to

1. Identify the scope and significance of sociology in nursing.
2. Apply the knowledge of social structure and different culture in a society in identifying social needs of sick clients.
3. Identify the impact of culture on health and illness.
4. Develop understanding about types of family, marriage and its legislation.
5. Identify different types of caste, class, social change and its influence on health and health practices.
6. Develop understanding about social organization and disorganization and social problems in India.
7. Integrate the knowledge of clinical sociology and its uses in crisis intervention.

### COURSE OUTLINE

#### T – Theory

| Unit | Time (Hrs) | Learning Outcomes  | Content   | Teaching/ Learning Activities   | Assessment Methods  |
|------|------------|--|---|---|---|
| I    | 1 (T)      | Describe the scope and significance of sociology in nursing  | <b>Introduction</b> <ul style="list-style-type: none"> <li>• Definition, nature and scope of sociology</li> <li>• Significance of sociology in nursing</li> </ul>   | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> </ul> | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> </ul>                           |
| II   | 15 (T)     | Describe the individualization, Groups, processes of Socialization, social change and its importance | <b>Social structure</b> <ul style="list-style-type: none"> <li>• Basic concept of society, community, association and institution</li> <li>• Individual and society</li> <li>• Personal disorganization</li> <li>• Social group – meaning, characteristics, and classification.</li> <li>• Social processes – definition and forms, Co-operation, competition, conflict, accommodation, assimilation, isolation</li> <li>• Socialization – characteristics, process, agencies of socialization</li> <li>• Social change – nature, process, and role of nurse</li> </ul> | <ul style="list-style-type: none"> <li>• Lecture cum Discussion</li> </ul>        | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Objective type</li> </ul> |

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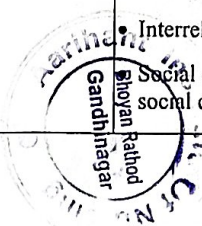
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| Unit | Time (Hrs) | Learning Outcomes   | Content   | Teaching/ Learning Activities  | Assessment Methods  |
|------|------------|---|---|--|---|
|      |            |   | <ul style="list-style-type: none"> <li>• Structure and characteristics of urban, rural and tribal community.</li> <li>• Major health problems in urban, rural and tribal communities</li> <li>• Importance of social structure in nursing profession</li> </ul>   |  |   |
| III  | 8 (T)      | Describe culture and its impact on health and disease   | <b>Culture</b> <ul style="list-style-type: none"> <li>• Nature, characteristic and evolution of culture</li> <li>• Diversity and uniformity of culture</li> <li>• Difference between culture and civilization</li> <li>• Culture and socialization</li> <li>• Transcultural society</li> <li>• Culture, Modernization and its impact on health and disease</li> </ul>   | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Panel discussion</li> </ul>                                | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> </ul>   |
| IV   | 8 (T)      | Explain family, marriage and legislation related to marriage  | <b>Family and Marriage</b> <ul style="list-style-type: none"> <li>• Family – characteristics, basic need, types and functions of family</li> <li>• Marriage – forms of marriage, social custom relating to marriage and importance of marriage</li> <li>• Legislation on Indian marriage and family.</li> <li>• Influence of marriage and family on health and health practices</li> </ul>  | <ul style="list-style-type: none"> <li>• Lecture</li> </ul>  | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Case study report</li> </ul>                      |
| V    | 8 (T)      | Explain different types of caste and classes in society and its influence on health                         | <b>Social stratification</b> <ul style="list-style-type: none"> <li>• Introduction – Characteristics &amp; forms of stratification</li> <li>• Function of stratification</li> <li>• Indian caste system – origin and characteristics</li> <li>• Positive and negative impact of caste in society.</li> <li>• Class system and status</li> <li>• Social mobility-meaning and types</li> <li>• Race – concept, criteria of racial classification</li> <li>• Influence of class, caste and race system on health.</li> </ul> | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Panel discussion</li> </ul>                                | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Objective type</li> </ul>                         |
| VI   | 15 (T)     | Explain social organization, disorganization, social problems and role of nurse in reducing social problems | <b>Social organization and disorganization</b> <ul style="list-style-type: none"> <li>• Social organization – meaning, elements and types</li> <li>• Voluntary associations</li> <li>• Social system – definition, types, role and status as structural element of social system.</li> <li>• Interrelationship of institutions</li> <li>• Social control – meaning, aims and process of social control</li> </ul>   | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Group discussion</li> <li>• Observational visit</li> </ul> | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Objective type</li> <li>• Visit report</li> </ul> |



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| Unit | Time (Hrs) | Learning Outcomes  | Content   | Teaching/ Learning Activities   | Assessment Methods  |
|------|------------|--|---|---|---|
|      |            |  | <ul style="list-style-type: none"> <li>• Social norms, moral and values</li> <li>• Social disorganization – definition, causes, Control and planning</li> <li>• Major social problems – poverty, housing, food supplies, illiteracy, prostitution, dowry, Child labour, child abuse, delinquency, crime, substance abuse, HIV/AIDS, COVID-19</li> <li>• Vulnerable group – elderly, handicapped, minority and other marginal group.</li> <li>• Fundamental rights of individual, women and children</li> <li>• Role of nurse in reducing social problem and enhance coping</li> <li>• Social welfare programs in India</li> </ul> |   |   |
| VII  | 5 (T)      | Explain clinical sociology and its application in the hospital and community | <b>Clinical sociology</b> <ul style="list-style-type: none"> <li>• Introduction to clinical sociology</li> <li>• Sociological strategies for developing services for the abused</li> <li>• Use of clinical sociology in crisis intervention</li> </ul>  | <ul style="list-style-type: none"> <li>• Lecture,</li> <li>• Group discussion</li> <li>• Role play</li> </ul> | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> </ul> |

### APPLIED PSYCHOLOGY

#### PLACEMENT: I SEMESTER

#### THEORY: 3 Credits (60 Hours)

**DESCRIPTION:** This course is designed to enable the students to develop understanding about basic concepts of psychology and its application in personal and community life, health, illness and nursing. It further provides students opportunity to recognize the significance and application of soft skills and self-empowerment in the practice of nursing.

**COMPETENCIES:** On completion of the course, the students will be able to

1. Identify the importance of psychology in individual and professional life.
2. Develop understanding of the biological and psychological basis of human behaviour.
3. Identify the role of nurse in promoting mental health and dealing with altered personality.
4. Perform the role of nurses applicable to the psychology of different age groups.
5. Identify the cognitive and affective needs of clients.
6. Integrate the principles of motivation and emotion in performing the role of nurse in caring for emotionally sick client.
7. Demonstrate basic understanding of psychological assessment and nurse's role.
8. Apply the knowledge of soft skills in workplace and society.
9. Apply the knowledge of self-empowerment in workplace, society and personal life.



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## COURSE OUTLINE

## T – Theory

| Unit | Time (Hrs) | Learning Outcomes   | Content   | Teaching/ Learning Activities   | Assessment Methods  |
|------|------------|---|---|---|---|
| I    | 2 (T)      | Describe scope, branches and significance of psychology in nursing      | <b>Introduction</b> <ul style="list-style-type: none"> <li>• Meaning of Psychology</li> <li>• Development of psychology – Scope, branches and methods of psychology</li> <li>• Relationship with other subjects</li> <li>• Significance of psychology in nursing</li> <li>• Applied psychology to solve everyday issues</li> </ul>  | <ul style="list-style-type: none"> <li>• Lecture cum Discussion</li> </ul>                                  | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> </ul>                           |
| II   | 4 (T)      | Describe biology of human behaviour                                     | <b>Biological basis of behavior –Introduction</b> <ul style="list-style-type: none"> <li>• Body mind relationship</li> <li>• Genetics and behaviour</li> <li>• Inheritance of behaviour</li> <li>• Brain and behaviour.</li> <li>• Psychology and sensation – sensory process – normal and abnormal</li> </ul>  | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> </ul>                           | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> </ul>                           |
| III  | 5 (T)      | Describe mentally healthy person and defense mechanisms                 | <b>Mental health and mental hygiene</b> <ul style="list-style-type: none"> <li>• Concept of mental health and mental hygiene</li> <li>• Characteristic of mentally healthy person</li> <li>• Warning signs of poor mental health</li> <li>• Promotive and preventive mental health strategies and services</li> <li>• Defense mechanism and its implication</li> <li>• Frustration and conflict – types of conflicts and measurements to overcome</li> <li>• Role of nurse in reducing frustration and conflict and enhancing coping</li> <li>• Dealing with ego</li> </ul>   | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Case discussion</li> <li>• Role play</li> </ul> | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Objective type</li> </ul> |
| IV   | 7 (T)      | Describe psychology of people in different age groups and role of nurse | <b>Developmental psychology</b> <ul style="list-style-type: none"> <li>• Physical, psychosocial and cognitive development across life span – Prenatal through early childhood, middle to late childhood through adolescence, early and mid-adulthood, late adulthood, death and dying</li> <li>• Role of nurse in supporting normal growth and development across the life span</li> <li>• Psychological needs of various groups in health and sickness – Infancy, childhood, adolescence, adulthood and older adult</li> <li>• Introduction to child psychology and role of nurse in meeting the psychological needs of</li> </ul> | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Group discussion</li> </ul>                     | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> </ul>                           |

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| Unit | Time (Hrs) | Learning Outcomes  | Content   | Teaching/ Learning Activities  | Assessment Methods   |
|------|------------|--|---|--|--|
|      |            |  | children <ul style="list-style-type: none"> <li>• Psychology of vulnerable individuals – challenged, women, sick etc.</li> <li>• Role of nurse with vulnerable groups</li> </ul>  |  |  |
| V    | 4 (T)      | Explain personality and role of nurse in identification and improvement in altered personality | <b>Personality</b> <ul style="list-style-type: none"> <li>• Meaning, definition of personality</li> <li>• Classification of personality</li> <li>• Measurement and evaluation of personality – Introduction</li> <li>• Alteration in personality</li> <li>• Role of nurse in identification of individual personality and improvement in altered personality</li> </ul>   | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> <li>• Demonstration</li> </ul> | <ul style="list-style-type: none"> <li>• Essay and short answer</li> <li>• Objective type</li> </ul> |
| VI   | 16 (T)     | Explain cognitive process and their applications   | <b>Cognitive process</b> <ul style="list-style-type: none"> <li>• <b>Attention</b> – definition, types, determinants, duration, degree and alteration in attention</li> <li>• <b>Perception</b> – Meaning of Perception, principles, factor affecting perception,</li> <li>• <b>Intelligence</b> – Meaning of intelligence – Effect of heredity and environment in intelligence, classification, Introduction to measurement of intelligence tests – Mental deficiencies</li> <li>• <b>Learning</b> – Definition of learning, types of learning, Factors influencing learning – Learning process, Habit formation</li> <li>• <b>Memory</b>—meaning and nature of memory, factors influencing memory, methods to improve memory, forgetting</li> <li>• <b>Thinking</b> – types, level, reasoning and problem solving.</li> <li>• <b>Aptitude</b> – concept, types, individual differences and variability</li> <li>• Psychometric assessment of cognitive processes – Introduction</li> <li>• Alteration in cognitive processes</li> </ul> | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> </ul>                          | <ul style="list-style-type: none"> <li>• Essay and short answer</li> <li>• Objective type</li> </ul> |
| VII  | 6 (T)      | Describe motivation, emotion, attitude and role of nurse in emotionally sick client            | <b>Motivation and emotional processes</b> <ul style="list-style-type: none"> <li>• <b>Motivation</b> – meaning, concept, types, theories of motivation, motivation cycle, biological and special motives</li> <li>• <b>Emotions</b> – Meaning of emotions, development of emotions, alteration of emotion, emotions in sickness – handling emotions in self and other</li> <li>• Stress and adaptation – stress, stressor, cycle, effect, adaptation and coping</li> </ul>  | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Group discussion</li> </ul>                    | <ul style="list-style-type: none"> <li>• Essay and short answer</li> <li>• Objective type</li> </ul> |

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| Unit | Time (Hrs) | Learning Outcomes   | Content  | Teaching/ Learning Activities   | Assessment Methods   |
|------|------------|---|--|---|--|
|      |            |   | <ul style="list-style-type: none"> <li>• <b>Attitudes</b> – Meaning of attitudes, nature, factor affecting attitude, attitudinal change, Role of attitude in health and sickness</li> <li>• Psychometric assessment of emotions and attitude – Introduction</li> <li>• Role of nurse in caring for emotionally sick client</li> </ul>  |   |  |
| VIII | 4 (T)      | Explain psychological assessment and tests and role of nurse                | <b>Psychological assessment and tests – introduction</b> <ul style="list-style-type: none"> <li>• Types, development, characteristics, principles, uses, interpretation</li> <li>• Role of nurse in psychological assessment</li> </ul>  | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> <li>• Demonstration</li> </ul>  | <ul style="list-style-type: none"> <li>• Short answer</li> <li>• Assessment of practice</li> </ul> |
| IX   | 10 (T)     | Explain concept of soft skill and its application in work place and society | <b>Application of soft skill</b> <ul style="list-style-type: none"> <li>• Concept of soft skill</li> <li>• Types of soft skill – visual, aural and communication skill</li> <li>• The way of communication</li> <li>• Building relationship with client and society</li> <li>• <b>Interpersonal Relationships (IPR):</b> Definition, Types, and Purposes, Interpersonal skills, Barriers, Strategies to overcome barriers</li> <li>• Survival strategies – managing time, coping stress, resilience, work – life balance</li> <li>• Applying soft skill to workplace and society – Presentation skills, social etiquette, telephone etiquette, motivational skills, teamwork etc.</li> <li>• Use of soft skill in nursing</li> </ul> | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Group discussion</li> <li>• Role play</li> <li>• Refer/Complete Soft skills module</li> </ul> | <ul style="list-style-type: none"> <li>• Essay and short answer</li> </ul>                         |
| X    | 2 (T)      | Explain self-empowerment  | <b>Self-empowerment</b> <ul style="list-style-type: none"> <li>• Dimensions of self-empowerment</li> <li>• Self-empowerment development</li> <li>• Importance of women's empowerment in society</li> <li>• Professional etiquette and personal grooming</li> <li>• Role of nurse in empowering others</li> </ul>   | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> </ul>   | <ul style="list-style-type: none"> <li>• Short answer</li> <li>• Objective type</li> </ul>         |

### NURSING FOUNDATION - I (including First Aid module)

**PLACEMENT: I SEMESTER**

**THEORY: 6 Credits (120 hours)**

**PRACTICUM: Skill Lab: 2 Credits (80 hours) and Clinical: 2 Credits (160 hours)**



**DESCRIPTION:** This course is designed to help novice nursing students develop knowledge and competencies required to provide evidence-based, comprehensive basic nursing care for adult patients, using nursing process approach.

**COMPETENCIES:** On completion of the course, the students will be able to

1. Develop understanding about the concept of health, illness and scope of nursing within health care services.
2. Apply values, code of ethics and professional conduct in professional life.
3. Apply the principles and methods of effective communication in establishing communication links with patients, families and other health team members.
4. Develop skill in recording and reporting.
5. Demonstrate competency in monitoring and documenting vital signs.
6. Describe the fundamental principles and techniques of infection control and biomedical waste management.
7. Identify and meet the comfort needs of the patients.
8. Perform admission, transfer, and discharge of a patient under supervision applying the knowledge.
9. Demonstrate understanding and application of knowledge in caring for patients with restricted mobility.
10. Perform first aid measures during emergencies.
11. Identify the educational needs of patients and demonstrate basic skills of patient education.

**\*Mandatory Module used in Teaching/Learning:**

First Aid: 40 Hours (including Basic CPR)

### COURSE OUTLINE

T – Theory, SL – Skill Lab

| Unit | Time (Hrs) | Learning Outcomes  | Content   | Teaching/ Learning Activities   | Assessment Methods  |
|------|------------|--|---|---|---|
| I    | 5 (T)      | Describe the concept of health and illness                               | <b>Introduction to health and illness</b> <ul style="list-style-type: none"> <li>• Concept of Health – Definitions (WHO), Dimensions</li> <li>• Maslow's hierarchy of needs</li> <li>• Health – Illness continuum</li> <li>• Factors influencing health</li> <li>• Causes and risk factors for developing illnesses</li> <li>• Illness – Types, illness behavior</li> <li>• Impact of illness on patient and family</li> </ul>  | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> </ul> | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Objective type</li> </ul> |
| II   | 5 (T)      | Describe the levels of illness prevention and care, health care services | <b>Health Care Delivery Systems – Introduction of Basic Concepts &amp; Meanings</b> <ul style="list-style-type: none"> <li>• Levels of Illness Prevention – Primary (Health Promotion), Secondary and Tertiary</li> <li>• Levels of Care – Primary, Secondary and Tertiary</li> <li>• Types of health care agencies/ services – Hospitals, clinics, Hospice, rehabilitation centres, extended care facilities</li> <li>• Hospitals – Types, Organization and</li> </ul> | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> </ul> | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Objective type</li> </ul> |

| Unit | Time (Hrs)      | Learning Outcomes  | Content  | Teaching/ Learning Activities  | Assessment Methods   |
|------|-----------------|--|--|--|--|
|      |                 |  | <p>Functions</p> <ul style="list-style-type: none"> <li>Health care teams in hospitals – members and their role</li> </ul>   |  |  |
| III  | 12 (T)          | <p>Trace the history of Nursing</p> <p>Explain the concept, nature and scope of nursing</p> <p>Describe values, code of ethics and professional conduct for nurses in India</p>  | <p><b>History of Nursing and Nursing as a profession</b></p> <ul style="list-style-type: none"> <li>History of Nursing, History of Nursing in India</li> <li>Contributions of Florence Nightingale</li> <li>Nursing – Definition – Nurse, Nursing, Concepts, philosophy, objectives, Characteristics, nature and Scope of Nursing/ Nursing practice, Functions of nurse, Qualities of a nurse, Categories of nursing personnel</li> <li>Nursing as a profession – definition and characteristics/criteria of profession</li> <li>Values – Introduction – meaning and importance</li> <li>Code of ethics and professional conduct for nurses – Introduction</li> </ul>  | <ul style="list-style-type: none"> <li>Lecture</li> <li>Discussion</li> <li>Case discussion</li> <li>Role plays</li> </ul>                   | <ul style="list-style-type: none"> <li>Essay</li> <li>Short answers</li> <li>Objective type</li> </ul> |
| IV   | 8 (T)<br>3 (SL) | <p>Describe the process, principles, and types of communication</p> <p>Explain therapeutic, non-therapeutic and professional communication</p> <p>Communicate effectively with patients, their families and team members</p> | <p><b>Communication and Nurse Patient Relationship</b></p> <ul style="list-style-type: none"> <li>Communication – Levels, Elements and Process, Types, Modes, Factors influencing communication</li> <li>Methods of effective communication/therapeutic communication techniques</li> <li>Barriers to effective communication/non-therapeutic communication techniques</li> <li>Professional communication</li> <li>Helping Relationships (Nurse Patient Relationship) – Purposes and Phases</li> <li>Communicating effectively with patient, families and team members</li> <li>Maintaining effective human relations and communication with vulnerable groups (children, women, physically and mentally challenged and elderly)</li> </ul> | <ul style="list-style-type: none"> <li>Lecture</li> <li>Discussion</li> <li>Role play and video film on Therapeutic Communication</li> </ul> | <ul style="list-style-type: none"> <li>Essay</li> <li>Short answer</li> <li>Objective type</li> </ul>  |
| V    | 4 (T)<br>2 (SL) | <p>Describe the purposes, types and techniques of recording and reporting</p> <p>Maintain records and reports accurately</p>   | <p><b>Documentation and Reporting</b></p> <ul style="list-style-type: none"> <li>Documentation – Purposes of Reports and Records</li> <li>Confidentiality</li> <li>Types of Client records/Common Record-keeping forms</li> <li>Methods/Systems of documentation/Recording</li> </ul>  | <ul style="list-style-type: none"> <li>Lecture</li> <li>Discussion</li> <li>Demonstration</li> </ul>   | <ul style="list-style-type: none"> <li>Essay</li> <li>Short answer</li> <li>Objective type</li> </ul>  |

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| Unit | Time (Hrs)        | Learning Outcomes   | Content   | Teaching/ Learning Activities   | Assessment Methods   |
|------|-------------------|---|---|---|--|
|      |                   |   | <ul style="list-style-type: none"> <li>Guidelines for documentation</li> <li>Do's and Don'ts of documentation/Legal guidelines for Documentation/Recording</li> <li>Reporting – Change of shift reports, Transfer reports, Incident reports</li> </ul>  |   |  |
| VI   | 15 (T)<br>20 (SL) | <p>Describe principles and techniques of monitoring and maintaining vital signs</p> <p>Assess and record vital signs accurately</p> | <p><b>Vital signs</b></p> <ul style="list-style-type: none"> <li>Guidelines for taking vital signs</li> <li><i>Body temperature</i> –               <ul style="list-style-type: none"> <li>Definition, Physiology, Regulation, Factors affecting body temperature</li> <li>Assessment of body temperature – sites, equipment and technique</li> <li>Temperature alterations – Hyperthermia, Heat Cramps, Heat Exhaustion, Heatstroke, Hypothermia</li> <li>Fever/Pyrexia – Definition, Causes, Stages, Types</li> </ul> </li> <li>Nursing Management               <ul style="list-style-type: none"> <li>Hot and Cold applications</li> </ul> </li> <li><i>Pulse:</i> <ul style="list-style-type: none"> <li>Definition, Physiology and Regulation, Characteristics, Factors affecting pulse</li> <li>Assessment of pulse – sites, equipment and technique</li> <li>Alterations in pulse</li> </ul> </li> <li><i>Respiration:</i> <ul style="list-style-type: none"> <li>Definition, Physiology and Regulation, Mechanics of breathing, Characteristics, Factors affecting respiration</li> <li>Assessment of respirations – technique</li> <li>Arterial Oxygen saturation</li> <li>Alterations in respiration</li> </ul> </li> <li><i>Blood pressure:</i> <ul style="list-style-type: none"> <li>Definition, Physiology and Regulation, Characteristics, Factors affecting BP</li> <li>Assessment of BP – sites, equipment and technique, Common Errors in BP Assessment</li> <li>Alterations in Blood Pressure</li> </ul> </li> <li>Documenting Vital Signs</li> </ul> | <ul style="list-style-type: none"> <li>Lecture</li> <li>Discussion</li> <li>Demonstration &amp; Re-demonstration</li> </ul> | <ul style="list-style-type: none"> <li>Essay</li> <li>Short answer</li> <li>Objective type</li> <li>Document the given values of temperature, pulse, and respiration in the graphic sheet</li> <li>OSCE</li> </ul> |
| VII  | 3 (T)             | Maintain equipment and linen  | <p><b>Equipment and Linen</b></p> <ul style="list-style-type: none"> <li>Types – Disposables and reusable               <ul style="list-style-type: none"> <li>Linen, rubber goods, glassware, metal, plastics, furniture</li> </ul> </li> <li>Introduction – Indent, maintenance, Inventory</li> </ul>   |   |  |

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| Unit | Time (Hrs)        | Learning Outcomes   | Content  | Teaching/ Learning Activities   | Assessment Methods  |
|------|-------------------|---|--|---|---|
| VIII | 10 (T)<br>3 (SL)  | Describe the basic principles and techniques of infection control and biomedical waste management | <b>Introduction to Infection Control in Clinical setting Infection</b> <ul style="list-style-type: none"> <li>• Nature of infection</li> <li>• Chain of infection</li> <li>• Types of infection</li> <li>• Stages of infection</li> <li>• Factors increasing susceptibility to infection</li> <li>• Body defenses against infection – Inflammatory response &amp; Immune response</li> <li>• Health care associated infection (Nosocomial infection)</li> </ul> <b>Introductory concept of Asepsis – Medical &amp; Surgical asepsis</b> <p><i>Precautions</i></p> <ul style="list-style-type: none"> <li>• Hand Hygiene</li> <li>• (Hand washing and use of hand Rub)</li> <li>• Use of Personal Protective Equipment (PPE)</li> <li>• Standard precautions</li> </ul> <p><i>Biomedical Waste management</i></p> <ul style="list-style-type: none"> <li>• Types of hospital waste, waste segregation and hazards – Introduction</li> </ul> | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> <li>• Demonstration</li> <li>• Observation of autoclaving and other sterilization techniques</li> <li>• Video presentation on medical &amp; surgical asepsis</li> </ul> | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Objective type</li> </ul>                 |
| IX   | 15 (T)<br>15 (SL) | Identify and meet the comfort needs of the patients   | <b>Comfort, Rest &amp; Sleep and Pain</b> <ul style="list-style-type: none"> <li>• Comfort <ul style="list-style-type: none"> <li>◦ Factors Influencing Comfort</li> <li>◦ Types of beds including latest beds, purposes &amp; bed making</li> <li>◦ Therapeutic positions</li> <li>◦ Comfort devices</li> </ul> </li> <li>• Sleep and Rest <ul style="list-style-type: none"> <li>◦ Physiology of sleep</li> <li>◦ Factors affecting sleep</li> <li>◦ Promoting Rest and sleep</li> <li>◦ Sleep Disorders</li> </ul> </li> <li>• Pain (Discomfort) <ul style="list-style-type: none"> <li>◦ Physiology</li> <li>◦ Common cause of pain</li> <li>◦ Types</li> <li>◦ Assessment – pain scales and narcotic scales</li> </ul> </li> </ul>  | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> <li>• Demonstration &amp; Re-demonstration</li> </ul>   | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Objective type</li> <li>• OSCE</li> </ul> |

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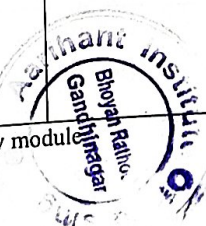
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| Unit | Time (Hrs)       | Learning Outcomes   | Content  | Teaching/ Learning Activities  | Assessment Methods  |
|------|------------------|---|--|--|---|
|      |                  |   | <ul style="list-style-type: none"> <li>○ Pharmacological and Non-pharmacological pain relieving measures – Use of narcotics, TENS devices, PCA</li> <li>○ Invasive techniques of pain management</li> <li>○ Any other newer measures</li> <li>○ CAM (Complementary &amp; Alternative healing Modalities)</li> </ul>  |  |   |
| X    | 5 (T)<br>3 (SL)  | Describe the concept of patient environment                         | <b>Promoting Safety in Health Care Environment</b> <ul style="list-style-type: none"> <li>• Physical environment – Temperature, Humidity, Noise, Ventilation, Light, Odor, Pest control</li> <li>• Reduction of Physical hazards – fire, accidents</li> <li>• Fall Risk Assessment</li> <li>• Role of nurse in providing safe and clean environment</li> <li>• Safety devices – <ul style="list-style-type: none"> <li>○ Restraints – Types, Purposes, Indications, Legal Implications and Consent, Application of Restraints-Skill and Practice guidelines</li> <li>○ Other Safety Devices – Side rails, Grab bars, Ambu alarms, non-skid slippers etc.</li> </ul> </li> </ul>                    | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> <li>• Demonstration</li> </ul>       | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Objective type</li> </ul> |
| XI   | 6 (T)<br>2 (SL)  | Explain and perform admission, transfer, and discharge of a patient | <b>Hospital Admission and discharge</b> <ul style="list-style-type: none"> <li>• Admission to the hospital Unit and preparation of unit <ul style="list-style-type: none"> <li>○ Admission bed</li> <li>○ Admission procedure</li> <li>○ Medico-legal issues</li> <li>○ Roles and Responsibilities of the nurse</li> </ul> </li> <li>• Discharge from the hospital <ul style="list-style-type: none"> <li>○ Types – Planned discharge, LAMA and Abscond, Referrals and transfers</li> <li>○ Discharge Planning</li> <li>○ Discharge procedure</li> <li>○ Medico-legal issues</li> <li>○ Roles and Responsibilities of the nurse</li> <li>○ Care of the unit after discharge</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> <li>• Demonstration</li> </ul>       | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Objective type</li> </ul> |
| XII  | 8 (T)<br>10 (SL) | Demonstrate skill in caring for patients with restricted mobility   | <b>Mobility and Immobility</b> <ul style="list-style-type: none"> <li>• Elements of Normal Movement, Alignment &amp; Posture, Joint Mobility, Balance, Coordinated Movement</li> </ul>   | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> <li>• Demonstration &amp;</li> </ul> | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Objective</li> </ul>      |

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| Unit | Time (Hrs)        | Learning Outcomes  | Content   | Teaching/ Learning Activities  | Assessment Methods  |
|------|-------------------|--|---|--|---|
|      |                   |  | <ul style="list-style-type: none"> <li>Principles of body mechanics</li> <li>Factors affecting Body Alignment and activity</li> <li>Exercise – Types and benefits</li> <li>Effects of Immobility</li> <li>Maintenance of normal Body Alignment and Activity</li> <li>Alteration in Body Alignment and mobility</li> <li>Nursing interventions for impaired Body Alignment and Mobility – assessment, types, devices used, method               <ul style="list-style-type: none"> <li>Range of motion exercises</li> <li>Muscle strengthening exercises</li> <li>Maintaining body alignment – positions</li> <li>Moving</li> <li>Lifting</li> <li>Transferring</li> <li>Walking</li> </ul> </li> <li>Assisting clients with ambulation</li> <li>Care of patients with Immobility using Nursing process approach</li> <li>Care of patients with casts and splints</li> </ul> | Re-demonstration   | type<br>• OSCE  |
| XIII | 4 (T)<br>2 (SL)   | Describe the principles and practice of patient education    | <b>Patient education</b> <ul style="list-style-type: none"> <li>Patient Teaching – Importance, Purposes, Process</li> <li>Integrating nursing process in patient teaching</li> </ul>  | <ul style="list-style-type: none"> <li>Discussion</li> <li>Role plays</li> </ul>   | <ul style="list-style-type: none"> <li>Essay</li> <li>Short answer</li> <li>Objective type</li> </ul>               |
| XIV  | 20 (T)<br>20 (SL) | Explain and apply principles of First Aid during emergencies | <b>First Aid*</b> <ul style="list-style-type: none"> <li>Definition, Basic Principles, Scope &amp; Rules</li> <li>First Aid Management               <ul style="list-style-type: none"> <li>Wounds, Hemorrhage &amp; Shock</li> <li>Musculoskeletal Injuries – Fractures, Dislocation, Muscle injuries</li> <li>Transportation of Injured persons</li> <li>Respiratory Emergencies &amp; Basic CPR</li> <li>Unconsciousness</li> <li>Foreign Bodies – Skin, Eye, Ear, Nose, Throat &amp; Stomach</li> <li>Burns &amp; Scalds</li> <li>Poisoning, Bites &amp; Stings</li> <li>Frostbite &amp; Effects of Heat</li> <li>Community Emergencies</li> </ul> </li> </ul>  | <ul style="list-style-type: none"> <li>Lecture</li> <li>Discussion</li> <li>Demonstration &amp; Re-demonstration</li> <li>Module completion</li> <li>National Disaster Management Authority (NDMA) / Indian Red Cross Society (IRCS) First Aid module</li> </ul> | <ul style="list-style-type: none"> <li>Essay</li> <li>Short answer</li> <li>Objective type</li> <li>OSCE</li> </ul> |

\*Mandatory module



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**CLINICAL PRACTICUM**

**Clinical Practicum:** 2 Credits (160 hours), 10 weeks × 16 hours per week

**PRACTICE COMPETENCIES:** On completion of the clinical practicum, the students will be able to

1. Maintain effective human relations (projecting professional image)
2. Communicate effectively with patient, families and team members
3. Demonstrate skills in techniques of recording and reporting
4. Demonstrate skill in monitoring vital signs
5. Care for patients with altered vital signs
6. Demonstrate skill in implementing standard precautions and use of PPE
7. Demonstrate skill in meeting the comfort needs of the patients
8. Provide safe and clean environment
9. Demonstrate skill in admission, transfer, and discharge of a patient
10. Demonstrate skill in caring for patients with restricted mobility
11. Plan and provide appropriate health teaching following the principles
12. Acquire skills in assessing and performing First Aid during emergencies.

**SKILL LAB****Use of Mannequins and Simulators**

| S.No. | Competencies                                       | Mode of Teaching               |
|-------|--|--------------------------------|
| 1.    | Therapeutic Communication and Documentation        | Role Play                      |
| 2.    | Vital signs  | Simulator/Standardized patient |
| 3.    | Medical and Surgical Asepsis                       | Videos/Mannequin               |
| 4.    | Pain Assessment                                    | Standardized patient           |
| 5.    | Comfort Devices                                    | Mannequin                      |
| 6.    | Therapeutic Positions                              | Mannequin                      |
| 7.    | Physical Restraints and Side rails                 | Mannequin                      |
| 8.    | ROM Exercises                                      | Standardized patient           |
| 9.    | Ambulation   | Standardized patient           |
| 10.   | Moving and Turning patients in bed                 | Mannequin                      |
| 11.   | Changing position of helpless patients             | Mannequin/Standardized patient |
| 12.   | Transferring patients bed to stretcher/wheel chair | Mannequin/Standardized patient |
| 13.   | Admission, Transfer, Discharge & Health Teaching   | Role Play                      |



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## CLINICAL POSTINGS – General Medical/Surgical Wards

10 weeks × 16 hours/week = 160 Hours

| Clinical Unit                   | Duration (in Weeks) | Learning Outcomes  | Procedural Competencies/ Clinical Skills (Supervised Clinical Practice)  | Clinical Requirements                                 | Assessment Methods  |
|---------------------------------|---------------------|--|--|---|---|
| General Medical/ Surgical wards | 2                   | Maintain effective human relations (projecting professional image)<br><br>Communicate effectively with patient, families and team members<br><br>Demonstrate skills in techniques of recording and reporting | <b>Communication and Nurse patient relationship</b><br>• Maintaining Communication with patient and family and interpersonal relationship<br>• Documentation and Reporting<br>○ Documenting patient care and procedures<br>○ Verbal report<br>○ Written report   |   | • OSCE  |
|                                 | 2                   | Demonstrate skill in monitoring vital signs<br><br>Care for patients with altered vital signs<br><br>Demonstrate skill in implementing standard precautions and use of PPE                                   | <b>Vital signs</b><br>• Monitor/measure and document vital signs in a graphic sheet<br>○ Temperature (oral, tympanic, axillary)<br>○ Pulse (Apical and peripheral pulses)<br>○ Respiration<br>○ Blood pressure<br>○ Pulse oximetry<br>• Interpret and report alteration<br>• Cold Applications – Cold Compress, Ice cap, Tepid Sponging<br>• Care of equipment – thermometer, BP apparatus, Stethoscope, Pulse oximeter<br><b>Infection control in Clinical settings</b><br>• Hand hygiene<br>• Use of PPE | • Care of patients with alterations in vital signs- 1 | • Assessment of clinical skills using checklist<br>• OSCE |
|                                 | 3                   | Demonstrate skill in meeting the comfort needs of the patients   | <b>Comfort, Rest &amp; Sleep, Pain and Promoting Safety in Health Care Environment</b><br><b>Comfort, Rest &amp; Sleep</b><br>• Bed making-<br>○ Open<br>○ Closed<br>○ Occupied<br>○ Post-operative  |   | • Assessment of clinical skills using checklist<br>• OSCE |


  
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| Clinical Unit | Duration (in Weeks) | Learning Outcomes  | Procedural Competencies/ Clinical Skills (Supervised Clinical Practice)   | Clinical Requirements  | Assessment Methods  |
|---------------|---------------------|--|---|--|---|
|               |                     |  | <ul style="list-style-type: none"> <li>o Cardiac bed</li> <li>o Fracture bed</li> <li>• Comfort devices               <ul style="list-style-type: none"> <li>o Pillows</li> <li>o Over bed table/cardiac table</li> <li>o Back rest</li> <li>o Bed Cradle</li> </ul> </li> <li>• Therapeutic Positions               <ul style="list-style-type: none"> <li>o Supine</li> <li>o Fowlers (low, semi, high)</li> <li>o Lateral</li> <li>o Prone</li> <li>o Sim's</li> <li>o Trendelenburg</li> <li>o Dorsal recumbent</li> <li>o Lithotomy</li> <li>o Knee chest</li> </ul> </li> </ul> <p><i>Pain</i></p> <ul style="list-style-type: none"> <li>• Pain assessment and provision for comfort</li> </ul> <p><i>Promoting Safety in Health Care Environment</i></p> <ul style="list-style-type: none"> <li>• Care of Patient's Unit</li> <li>• Use of Safety devices:               <ul style="list-style-type: none"> <li>o Side Rails</li> </ul> </li> <li>• Restraints (Physical)</li> <li>• Fall risk assessment and Post Fall Assessment</li> </ul> | <ul style="list-style-type: none"> <li>• Fall risk assessment-1</li> </ul> |   |
|               | 2                   | Demonstrate skill in admission, transfer, and discharge of a patient | <b>Hospital Admission and discharge, Mobility and Immobility and Patient education</b><br><i>Hospital Admission and discharge</i><br>Perform & Document: <ul style="list-style-type: none"> <li>• Admission</li> <li>• Transfer</li> <li>• Planned Discharge</li> </ul>   |  | <ul style="list-style-type: none"> <li>• Assessment of clinical skills using checklist</li> <li>• OSCE</li> </ul> |
|               |                     | Demonstrate skill in caring for patients with restricted mobility    | <b>Mobility and Immobility</b> <ul style="list-style-type: none"> <li>• Range of Motion Exercises</li> <li>• Assist patient in:               <ul style="list-style-type: none"> <li>o Moving</li> </ul> </li> </ul>  | <ul style="list-style-type: none"> <li>• Individual teaching-1</li> </ul>  | <ul style="list-style-type: none"> <li>• Assessment of clinical skills using checklist</li> <li>• OSCE</li> </ul> |

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Gandhinagar

Dr. [Signature]

Dr. [Signature]

Dr. [Signature]

Dr. [Signature]

Dr. [Signature]

| Clinical Unit | Duration (in Weeks) | Learning Outcomes   | Procedural Competencies/ Clinical Skills (Supervised Clinical Practice)   | Clinical Requirements  | Assessment Methods   |
|---------------|---------------------|---|---|--|--|
|               |                     | Plan and provide appropriate health teaching following the principles       | <ul style="list-style-type: none"> <li>○ Turning</li> <li>○ Logrolling</li> <li>• Changing position of helpless patient</li> <li>• Transferring (Bed to and from chair/wheelchair/ stretcher)</li> </ul> <i>Patient education</i>   |  |  |
|               | 1                   | Demonstrate skills in assessing and performing First Aid during emergencies | <b>First aid and Emergencies</b> <ul style="list-style-type: none"> <li>• Bandaging Techniques               <ul style="list-style-type: none"> <li>○ Basic Bandages:                   <ul style="list-style-type: none"> <li>▪ Circular</li> <li>▪ Spiral</li> <li>▪ Reverse-Spiral</li> <li>▪ Recurrent</li> <li>▪ Figure of Eight</li> </ul> </li> <li>○ Special Bandages:                   <ul style="list-style-type: none"> <li>▪ Caplin</li> <li>▪ Eye/Ear Bandage</li> <li>▪ Jaw Bandage</li> <li>▪ Shoulder Spica</li> <li>▪ Thumb spica</li> <li>▪ Triangular Bandage/ Sling (Head &amp; limbs)</li> <li>▪ Binders</li> </ul> </li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Module completion National Disaster Management Authority (NDMA) First Aid module (To complete it in clinicals if not completed during lab)</li> </ul> | <ul style="list-style-type: none"> <li>• Assessment of clinical skills using checklist</li> <li>• OSCE (first aid competencies)</li> </ul> |

### APPLIED BIOCHEMISTRY

#### PLACEMENT: II SEMESTER

**THEORY:** 2 credits (40 hours) (includes lab hours also)

**DESCRIPTION:** The course is designed to assist the students to acquire knowledge of the normal biochemical composition and functioning of human body, its alterations in disease conditions and to apply this knowledge in the practice of nursing.

**COMPETENCIES:** On completion of the course, the students will be able to

1. Describe the metabolism of carbohydrates and its alterations.
2. Explain the metabolism of lipids and its alterations.
3. Explain the metabolism of proteins and amino acids and its alterations.
4. Explain clinical enzymology in various disease conditions.
5. Explain acid base balance, imbalance and its clinical significance.
6. Describe the metabolism of hemoglobin and its clinical significance.
7. Explain different function tests and interpret the findings.
8. Illustrate the immunohistochemistry.

## COURSE OUTLINE

## T – Theory

| Unit | Time (Hrs) | Learning Outcomes  | Content   | Teaching/ Learning Activities  | Assessment Methods   |
|------|------------|--|---|--|--|
| I    | 8 (T)      | Describe the metabolism of carbohydrates and its alterations   | <b>Carbohydrates</b> <ul style="list-style-type: none"> <li>• Digestion, absorption and metabolism of carbohydrates and related disorders</li> <li>• Regulation of blood glucose</li> <li>• Diabetes Mellitus – type 1 and type 2, symptoms, complications &amp; management in brief</li> <li>• Investigations of Diabetes Mellitus               <ul style="list-style-type: none"> <li>◦ OGTT – Indications, Procedure, Interpretation and types of GTT curve</li> <li>◦ Mini GTT, extended GTT, GCT, IV GTT</li> <li>◦ HbA1c (Only definition)</li> </ul> </li> <li>• Hypoglycemia – Definition &amp; causes</li> </ul>  | <ul style="list-style-type: none"> <li>• Lecture cum Discussion</li> <li>• Explain using charts and slides</li> <li>• Demonstration of laboratory tests</li> </ul> | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Very short answer</li> </ul> |
| II   | 8 (T)      | Explain the metabolism of lipids and its alterations   | <b>Lipids</b> <ul style="list-style-type: none"> <li>• Fatty acids – Definition, classification</li> <li>• Definition &amp; Clinical significance of MUFA &amp; PUFA, Essential fatty acids, Trans fatty acids</li> <li>• Digestion, absorption &amp; metabolism of lipids &amp; related disorders</li> <li>• Compounds formed from cholesterol</li> <li>• Ketone bodies (name, types &amp; significance only)</li> <li>• Lipoproteins – types &amp; functions (metabolism not required)</li> <li>• Lipid profile</li> <li>• Atherosclerosis (in brief)</li> </ul>  | <ul style="list-style-type: none"> <li>• Lecture cum Discussion</li> <li>• Explain using charts and slides</li> <li>• Demonstration of laboratory tests</li> </ul> | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Very short answer</li> </ul> |
| III  | 9 (T)      | Explain the metabolism of amino acids and proteins<br><br>Identify alterations in disease conditions | <b>Proteins</b> <ul style="list-style-type: none"> <li>• Classification of amino acids based on nutrition, metabolic rate with examples</li> <li>• Digestion, absorption &amp; metabolism of protein &amp; related disorders</li> <li>• Biologically important compounds synthesized from various amino acids (only names)</li> <li>• In born errors of amino acid metabolism – only aromatic amino acids (in brief)</li> <li>• Plasma protein – types, function &amp; normal values</li> <li>• Causes of proteinuria, hypoproteinemia, hyper-gamma globulinemia</li> <li>• Principle of electrophoresis, normal &amp; abnormal electrophoretic patterns (in</li> </ul> | <ul style="list-style-type: none"> <li>• Lecture cum Discussion</li> <li>• Explain using charts, models and slides</li> </ul>                                      | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Very short answer</li> </ul> |

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| Unit | Time (Hrs) | Learning Outcomes   | Content   | Teaching/ Learning Activities  | Assessment Methods   |
|------|------------|---|---|--|--|
|      |            |   | brief)  |  |  |
| IV   | 4 (T)      | Explain clinical enzymology in various disease conditions           | <b>Clinical Enzymology</b> <ul style="list-style-type: none"> <li>• Isoenzymes – Definition &amp; properties</li> <li>• Enzymes of diagnostic importance in               <ul style="list-style-type: none"> <li>◦ Liver Diseases – ALT, AST, ALP, GGT</li> <li>◦ Myocardial infarction – CK, cardiac troponins, AST, LDH</li> <li>◦ Muscle diseases – CK, Aldolase</li> <li>◦ Bone diseases – ALP</li> <li>◦ Prostate cancer – PSA, ACP</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Lecture cum Discussion</li> <li>• Explain using charts and slides</li> </ul>  | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Very short answer</li> </ul> |
| V    | 3 (T)      | Explain acid base balance, imbalance and its clinical significance  | <b>Acid base maintenance</b> <ul style="list-style-type: none"> <li>• pH – definition, normal value</li> <li>• Regulation of blood pH – blood buffer, respiratory &amp; renal</li> <li>• ABG – normal values</li> <li>• Acid base disorders – types, definition &amp; causes</li> </ul>   | <ul style="list-style-type: none"> <li>• Lecture cum Discussion</li> <li>• Explain using charts and slides</li> </ul>  | <ul style="list-style-type: none"> <li>• Short answer</li> <li>• Very short answer</li> </ul>                  |
| VI   | 2 (T)      | Describe the metabolism of hemoglobin and its clinical significance | <b>Heme catabolism</b> <ul style="list-style-type: none"> <li>• Heme degradation pathway</li> <li>• Jaundice – type, causes, urine &amp; blood investigations (van den berg test)</li> </ul>  | <ul style="list-style-type: none"> <li>• Lecture cum Discussion</li> <li>• Explain using charts and slides</li> </ul>  | <ul style="list-style-type: none"> <li>• Short answer</li> <li>• Very short answer</li> </ul>                  |
| VII  | 3 (T)      | Explain different function tests and interpret the findings         | <b>Organ function tests (biochemical parameters &amp; normal values only)</b> <ul style="list-style-type: none"> <li>• Renal</li> <li>• Liver</li> <li>• Thyroid</li> </ul>   | <ul style="list-style-type: none"> <li>• Lecture cum Discussion</li> <li>• Visit to Lab</li> <li>• Explain using charts and slides</li> </ul>                      | <ul style="list-style-type: none"> <li>• Short answer</li> <li>• Very short answer</li> </ul>                  |
| VIII | 3 (T)      | Illustrate the immunochemistry                                      | <b>Immunochemistry</b> <ul style="list-style-type: none"> <li>• Structure &amp; functions of immunoglobulin</li> <li>• Investigations &amp; interpretation – ELISA</li> </ul>   | <ul style="list-style-type: none"> <li>• Lecture cum Discussion</li> <li>• Explain using charts and slides</li> <li>• Demonstration of laboratory tests</li> </ul> | <ul style="list-style-type: none"> <li>• Short answer</li> <li>• Very short answer</li> </ul>                  |

Note: Few lab hours can be planned for observation and visits (Less than 1 credit, lab hours are not specified separately).

### APPLIED NUTRITION AND DIETETICS

PLACEMENT: II SEMESTER

THEORY: 3 credits (60 hours)

Theory : 45 hours

Lab : 15 hours



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**DESCRIPTION:** The course is designed to assist the students to acquire basic knowledge and understanding of the principles of Nutrition and Dietetics and apply this knowledge in the practice of Nursing.

**COMPETENCIES:** On completion of the course, the students will be able to

1. Identify the importance of nutrition in health and wellness.
2. Apply nutrient and dietary modifications in caring patients.
3. Explain the principles and practices of Nutrition and Dietetics.
4. Identify nutritional needs of different age groups and plan a balanced diet for them.
5. Identify the dietary principles for different diseases.
6. Plan therapeutic diet for patients suffering from various disease conditions.
7. Prepare meals using different methods and cookery rules.

### COURSE OUTLINE

#### T – Theory

| Unit | Time (Hrs) | Learning Outcomes  | Content   | Teaching/ Learning Activities  | Assessment Methods   |
|------|------------|--|---|--|--|
| I    | 2 (T)      | Define nutrition and its relationship to Health  | <b>Introduction to Nutrition</b><br><i>Concepts</i> <ul style="list-style-type: none"> <li>• Definition of Nutrition &amp; Health</li> <li>• Malnutrition – Under Nutrition &amp; Over Nutrition</li> <li>• Role of Nutrition in maintaining health</li> <li>• Factors affecting food and nutrition</li> </ul> <i>Nutrients</i> <ul style="list-style-type: none"> <li>• Classification</li> <li>• Macro &amp; Micronutrients</li> <li>• Organic &amp; Inorganic</li> <li>• Energy Yielding &amp; Non-Energy Yielding</li> </ul> <i>Food</i> <ul style="list-style-type: none"> <li>• Classification – Food groups</li> <li>• Origin</li> </ul> | <ul style="list-style-type: none"> <li>• Lecture cum Discussion</li> <li>• Charts/Slides</li> </ul>  | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Very short answer</li> </ul> |
| II   | 3 (T)      | Describe the classification, functions, sources and recommended daily allowances (RDA) of carbohydrates<br><br>Explain BMR and factors affecting BMR | <b>Carbohydrates</b> <ul style="list-style-type: none"> <li>• Composition – Starches, sugar and cellulose</li> <li>• Recommended Daily Allowance (RDA)</li> <li>• Dietary sources</li> <li>• Functions</li> </ul> <b>Energy</b> <ul style="list-style-type: none"> <li>• Unit of energy – Kcal</li> <li>• Basal Metabolic Rate (BMR)</li> <li>• Factors affecting BMR</li> </ul>  | <ul style="list-style-type: none"> <li>• Lecture cum Discussion</li> <li>• Charts/Slides</li> <li>• Models</li> <li>• Display of food items</li> </ul> | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Very short answer</li> </ul> |
| III  | 3 (T)      | Describe the classification, Functions, sources  | <b>Proteins</b> <ul style="list-style-type: none"> <li>• Composition</li> </ul>   | <ul style="list-style-type: none"> <li>• Lecture cum Discussion</li> <li>• Charts/Slides</li> </ul>  | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Very short</li> </ul>        |

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| Unit | Time (Hrs)     | Learning Outcomes  | Content   | Teaching/ Learning Activities  | Assessment Methods   |
|------|----------------|--|---|--|--|
|      |                | and RDA of proteins.   | <ul style="list-style-type: none"> <li>• Eight essential amino acids</li> <li>• Functions</li> <li>• Dietary sources</li> <li>• Protein requirements – RDA</li> </ul>   | <ul style="list-style-type: none"> <li>• Models</li> <li>• Display of food items</li> </ul>  | answer   |
| IV   | 2 (T)          | Describe the classification, Functions, sources and RDA of fats                    | <b>Fats</b> <ul style="list-style-type: none"> <li>• Classification – Saturated &amp; unsaturated</li> <li>• Calorie value</li> <li>• Functions</li> <li>• Dietary sources of fats and fatty acids</li> <li>• Fat requirements – RDA</li> </ul>   | <ul style="list-style-type: none"> <li>• Lecture cum Discussion</li> <li>• Charts/Slides</li> <li>• Models</li> <li>• Display of food items</li> </ul>   | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Very short answer</li> </ul> |
| V    | 3 (T)          | Describe the classification, functions, sources and RDA of vitamins                | <b>Vitamins</b> <ul style="list-style-type: none"> <li>• Classification – fat soluble &amp; water soluble</li> <li>• Fat soluble – Vitamins A, D, E, and K</li> <li>• Water soluble – Thiamine (vitamin B1), Riboflavin (vitamin B2), Nicotinic acid, Pyridoxine (vitamin B6), Pantothenic acid, Folic acid, Vitamin B12, Ascorbic acid (vitamin C)</li> <li>• Functions, Dietary Sources &amp; Requirements – RDA of every vitamin</li> </ul>  | <ul style="list-style-type: none"> <li>• Lecture cum Discussion</li> <li>• Charts/Slides</li> <li>• Models</li> <li>• Display of food items</li> </ul>   | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Very short answer</li> </ul> |
| VI   | 3 (T)          | Describe the classification, functions, sources and RDA of minerals                | <b>Minerals</b> <ul style="list-style-type: none"> <li>• Classification – Major minerals (Calcium, phosphorus, sodium, potassium and magnesium) and Trace elements</li> <li>• Functions</li> <li>• Dietary Sources</li> <li>• Requirements – RDA</li> </ul>   | <ul style="list-style-type: none"> <li>• Lecture cum Discussion</li> <li>• Charts/Slides</li> <li>• Models</li> <li>• Display of food items</li> </ul>   | <ul style="list-style-type: none"> <li>• Short answer</li> <li>• Very short answer</li> </ul>                  |
| VII  | 7 (T)<br>8 (L) | Describe and plan balanced diet for different age groups, pregnancy, and lactation | <b>Balanced diet</b> <ul style="list-style-type: none"> <li>• Definition, principles, steps</li> <li>• Food guides – Basic Four Food Groups</li> <li>• RDA – Definition, limitations, uses</li> <li>• Food Exchange System</li> <li>• Calculation of nutritive value of foods</li> <li>• Dietary fibre</li> </ul> <b>Nutrition across life cycle</b> <ul style="list-style-type: none"> <li>• Meal planning/Menu planning – Definition, principles, steps</li> <li>• Infant and Young Child Feeding (IYCF) guidelines – breast feeding, infant foods</li> <li>• Diet plan for different age groups –</li> </ul> | <ul style="list-style-type: none"> <li>• Lecture cum Discussion</li> <li>• Meal planning</li> <li>• Lab session on               <ul style="list-style-type: none"> <li>◦ Preparation of balanced diet for different categories</li> <li>◦ Low cost nutritious dishes</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Short answer</li> <li>• Very short answer</li> </ul>                  |

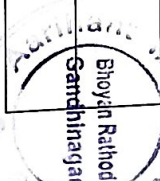


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| Unit | Time (Hrs)     | Learning Outcomes  | Content   | Teaching/ Learning Activities  | Assessment Methods   |
|------|----------------|--|---|--|--|
|      |                |  | Children, adolescents and elderly <ul style="list-style-type: none"> <li>• Diet in pregnancy – nutritional requirements and balanced diet plan</li> <li>• Anemia in pregnancy – diagnosis, diet for anemic pregnant women, iron &amp; folic acid supplementation and counseling</li> <li>• Nutrition in lactation – nutritional requirements, diet for lactating mothers, complementary feeding/ weaning</li> </ul>   |  |  |
| VIII | 6 (T)          | Classify and describe the common nutritional deficiency disorders and identify nurses' role in assessment, management and prevention | <b>Nutritional deficiency disorders</b> <ul style="list-style-type: none"> <li>• Protein energy malnutrition – magnitude of the problem, causes, classification, signs &amp; symptoms, Severe acute malnutrition (SAM), management &amp; prevention and nurses' role</li> <li>• Childhood obesity – signs &amp; symptoms, assessment, management &amp; prevention and nurses' role</li> <li>• Vitamin deficiency disorders – vitamin A, B, C &amp; D deficiency disorders – causes, signs &amp; symptoms, management &amp; prevention and nurses' role</li> <li>• Mineral deficiency diseases – iron, iodine and calcium deficiencies – causes, signs &amp; symptoms, management &amp; prevention and nurses' role</li> </ul> | <ul style="list-style-type: none"> <li>• Lecture cum Discussion</li> <li>• Charts/Slides</li> <li>• Models</li> </ul>  | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Very short answer</li> </ul> |
| IX   | 4 (T)<br>7 (L) | Principles of diets in various diseases  | <b>Therapeutic diets</b> <ul style="list-style-type: none"> <li>• Definition, Objectives, Principles</li> <li>• Modifications – Consistency, Nutrients, Feeding techniques.</li> <li>• Diet in Diseases – Obesity, Diabetes Mellitus, CVD, Underweight, Renal diseases, Hepatic disorders Constipation, Diarrhea, Pre and Post-operative period</li> </ul>  | <ul style="list-style-type: none"> <li>• Lecture cum Discussion</li> <li>• Meal planning</li> <li>• Lab session on preparation of therapeutic diets</li> </ul> | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Very short answer</li> </ul> |
| X    | 3 (T)          | Describe the rules and preservation of nutrients   | <b>Cookery rules and preservation of nutrients</b> <ul style="list-style-type: none"> <li>• Cooking – Methods, Advantages and Disadvantages</li> <li>• Preservation of nutrients</li> <li>• Measures to prevent loss of nutrients during preparation</li> <li>• Safe food handling and Storage of foods</li> <li>• Food preservation</li> <li>• Food additives and food adulteration</li> <li>• Prevention of Food Adulteration Act (PFA)</li> <li>• Food standards</li> </ul>  | <ul style="list-style-type: none"> <li>• Lecture cum Discussion</li> <li>• Charts/Slides</li> </ul>  | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Very short answer</li> </ul> |


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| Unit | Time (Hrs) | Learning Outcomes   | Content  | Teaching/ Learning Activities  | Assessment Methods   |
|------|------------|---|--|--|--|
| XI   | 4 (T)      | Explain the methods of nutritional assessment and nutrition education                                 | <b>Nutrition assessment and nutrition education</b> <ul style="list-style-type: none"> <li>Objectives of nutritional assessment</li> <li>Methods of assessment – clinical examination, anthropometry, laboratory &amp; biochemical assessment, assessment of dietary intake including Food frequency questionnaire (FFQ) method</li> <li>Nutrition education – purposes, principles and methods</li> </ul>   | <ul style="list-style-type: none"> <li>Lecture cum Discussion</li> <li>Demonstration</li> <li>Writing nutritional assessment report</li> </ul> | <ul style="list-style-type: none"> <li>Essay</li> <li>Short answer</li> <li>Evaluation of Nutritional assessment report</li> </ul> |
| XII  | 3 (T)      | Describe nutritional problems in India and nutritional programs                                       | <b>National Nutritional Programs and role of nurse</b> <ul style="list-style-type: none"> <li>Nutritional problems in India</li> <li>National nutritional policy</li> <li><i>National nutritional programs</i> – Vitamin A Supplementation, Anemia Mukh Bharat Program, Integrated Child Development Services (ICDS), Mid-day Meal Scheme (MDMS), National Iodine Deficiency Disorders Control Program (NIDDCP), Weekly Iron Folic Acid Supplementation (WIFS) and others as introduced</li> <li>Role of nurse in every program</li> </ul> | <ul style="list-style-type: none"> <li>Lecture cum Discussion</li> </ul>   | <ul style="list-style-type: none"> <li>Essay</li> <li>Short answer</li> <li>Very short answer</li> </ul>                           |
| XIII | 2 (T)      | Discuss the importance of food hygiene and food safety<br><br>Explain the Acts related to food safety | <b>Food safety</b> <ul style="list-style-type: none"> <li>Definition, Food safety considerations &amp; measures</li> <li>Food safety regulatory measures in India – Relevant Acts</li> <li>Five keys to safer food</li> <li>Food storage, food handling and cooking</li> <li>General principles of food storage of food items (ex. milk, meat)</li> <li>Role of food handlers in food borne diseases</li> <li>Essential steps in safe cooking practices</li> </ul>   | <ul style="list-style-type: none"> <li>Guided reading on related acts</li> </ul>   | <ul style="list-style-type: none"> <li>Quiz</li> <li>Short answer</li> </ul>   |

Food born diseases and food poisoning are dealt in Community Health Nursing I.

### NURSING FOUNDATION - II (including Health Assessment Module)

**PLACEMENT:** II SEMESTER

**THEORY:** 6 Credits (120 hours)

**PRACTICUM:** Skill Lab: 3 Credits (120 hours), Clinical: 4 Credits (320 hours)

**DESCRIPTION:** This course is designed to help novice nursing students develop knowledge and competencies required to provide evidence-based, comprehensive basic nursing care for adult patients, using nursing process approach.

**COMPETENCIES:** On completion of the course, the students will be able to

1. Develop understanding about fundamentals of health assessment and perform health assessment in supervised clinical settings

2. Demonstrate fundamental skills of assessment, planning, implementation and evaluation of nursing care using Nursing process approach in supervised clinical settings
3. Assess the Nutritional needs of patients and provide relevant care under supervision
4. Identify and meet the hygienic needs of patients
5. Identify and meet the elimination needs of patient
6. Interpret findings of specimen testing applying the knowledge of normal values
7. Promote oxygenation based on identified oxygenation needs of patients under supervision
8. Review the concept of fluid, electrolyte balance integrating the knowledge of applied physiology
9. Apply the knowledge of the principles, routes, effects of administration of medications in administering medication
10. Calculate conversions of drugs and dosages within and between systems of measurements
11. Demonstrate knowledge and understanding in caring for patients with altered functioning of sense organs and unconsciousness
12. Explain loss, death and grief
13. Describe sexual development and sexuality
14. Identify stressors and stress adaptation modes
15. Integrate the knowledge of culture and cultural differences in meeting the spiritual needs
16. Explain the introductory concepts relevant to models of health and illness in patient care

**\*Mandatory Module used in Teaching/Learning:**

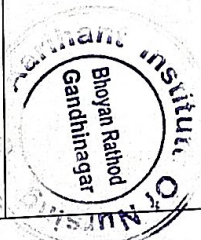
Health Assessment Module: 40 hours

### COURSE OUTLINE

T – Theory, SL – Skill Lab

| Unit | Time (Hrs)        | Learning Outcomes   | Content   | Teaching/ Learning Activities   | Assessment Methods   |
|------|-------------------|---|---|---|--|
| I    | 20 (T)<br>20 (SL) | Describe the purpose and process of health assessment and perform assessment under supervised clinical practice | <b>Health Assessment</b> <ul style="list-style-type: none"> <li>• Interview techniques</li> <li>• Observation techniques</li> <li>• Purposes of health assessment</li> <li>• Process of Health assessment               <ul style="list-style-type: none"> <li>o Health history</li> <li>o Physical examination:                   <ul style="list-style-type: none"> <li>▪ Methods: Inspection, Palpation, Percussion, Auscultation, Olfaction</li> <li>▪ Preparation for examination: patient and unit</li> <li>▪ General assessment</li> <li>▪ Assessment of each body system</li> <li>▪ Documenting health assessment findings</li> </ul> </li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Modular Learning</li> <li>• <b>*Health Assessment Module</b></li> <li>• Lecture cum Discussion</li> <li>• Demonstration</li> </ul> | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Objective type</li> <li>• OSCE</li> </ul>                    |
| II   | 13 (T)<br>8 (SL)  | Describe assessment, planning, implementation and evaluation of nursing care using Nursing process              | <b>The Nursing Process</b> <ul style="list-style-type: none"> <li>• Critical Thinking Competencies, Attitudes for Critical Thinking, Levels of critical thinking in Nursing</li> <li>• Nursing Process Overview</li> </ul>  | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> <li>• Demonstration</li> <li>• Supervised Clinical Practice</li> </ul>                          | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Objective type</li> <li>• Evaluation of care plan</li> </ul> |

| Unit | Time (Hrs)      | Learning Outcomes                                   | Content   | Teaching/ Learning Activities  | Assessment Methods  |
|------|-----------------|---|---|--|---|
|      |                 | approach  | <ul style="list-style-type: none"> <li>○ Assessment <ul style="list-style-type: none"> <li>▪ Collection of Data: Types, Sources, Methods</li> <li>▪ Organizing Data</li> <li>▪ Validating Data</li> <li>▪ Documenting Data</li> </ul> </li> <li>○ Nursing Diagnosis <ul style="list-style-type: none"> <li>▪ Identification of client problems, risks and strengths</li> <li>▪ Nursing diagnosis statement – parts, Types, Formulating, Guidelines for formulating Nursing Diagnosis</li> <li>▪ NANDA approved diagnoses</li> <li>▪ Difference between medical and nursing diagnosis</li> </ul> </li> <li>○ Planning <ul style="list-style-type: none"> <li>▪ Types of planning</li> <li>▪ Establishing Priorities</li> <li>▪ Establishing Goals and Expected Outcomes – Purposes, types, guidelines, Components of goals and outcome statements</li> <li>▪ Types of Nursing Interventions, Selecting interventions: Protocols and Standing Orders</li> <li>▪ Introduction to Nursing Intervention Classification and Nursing Outcome Classification</li> <li>▪ Guidelines for writing care plan</li> </ul> </li> <li>○ Implementation <ul style="list-style-type: none"> <li>▪ Process of Implementing the plan of care</li> <li>▪ Types of care – Direct and Indirect</li> </ul> </li> <li>○ Evaluation <ul style="list-style-type: none"> <li>▪ Evaluation Process, Documentation and Reporting</li> </ul> </li> </ul> |  |   |
| III  | 5 (T)<br>5 (SL) | Identify and meet the Nutritional needs of patients | <b>Nutritional needs</b> <ul style="list-style-type: none"> <li>• Importance</li> <li>• Factors affecting nutritional needs</li> <li>• Assessment of nutritional status</li> <li>• Review: special diets – Solid, Liquid, Soft</li> <li>• Review on therapeutic diets</li> <li>• Care of patient with Dysphagia,</li> </ul>   | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> <li>• Demonstration</li> <li>• Exercise</li> <li>• Supervised Clinical practice</li> </ul> | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Objective type</li> <li>• Evaluation of nutritional assessment &amp; diet planning</li> </ul> |



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| Unit | Time (Hrs)        | Learning Outcomes                                  | Content  | Teaching/ Learning Activities  | Assessment Methods  |
|------|-------------------|--|--|--|---|
|      |                   |  | Anorexia, Nausea, Vomiting<br>• Meeting Nutritional needs: Principles, equipment, procedure, indications <ul style="list-style-type: none"> <li>○ Oral</li> <li>○ Enteral: Nasogastric/ Orogastric</li> <li>○ Introduction to other enteral feeds – types, indications, Gastrostomy, Jejunostomy</li> <li>○ Parenteral – TPN (Total Parenteral Nutrition)</li> </ul>   |  |   |
| IV   | 5 (T)<br>15 (SL)  | Identify and meet the hygienic needs of patients   | <b>Hygiene</b> <ul style="list-style-type: none"> <li>• Factors Influencing Hygienic Practice</li> <li>• Hygienic care: Indications and purposes, effects of neglected care               <ul style="list-style-type: none"> <li>○ Care of the Skin – (Bath, feet and nail, Hair Care)</li> <li>○ Care of pressure points</li> <li>○ Assessment of Pressure Ulcers using Braden Scale and Norton Scale</li> <li>○ Pressure ulcers – causes, stages and manifestations, care and prevention</li> <li>○ Perineal care/Meatal care</li> <li>○ Oral care, Care of Eyes, Ears and Nose including assistive devices (eye glasses, contact lens, dentures, hearing aid)</li> </ul> </li> </ul>  | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> <li>• Demonstration</li> </ul> | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Objective type</li> <li>• OSCE</li> </ul> |
| V    | 10 (T)<br>10 (SL) | Identify and meet the elimination needs of patient | <b>Elimination needs</b> <ul style="list-style-type: none"> <li>• Urinary Elimination               <ul style="list-style-type: none"> <li>○ Review of Physiology of Urine Elimination, Composition and characteristics of urine</li> <li>○ Factors Influencing Urination</li> <li>○ Alteration in Urinary Elimination</li> <li>○ Facilitating urine elimination: assessment, types, equipment, procedures and special considerations</li> <li>○ Providing urinal/bed pan</li> <li>○ Care of patients with                   <ul style="list-style-type: none"> <li>▪ Condom drainage</li> <li>▪ Intermittent Catheterization</li> <li>▪ Indwelling Urinary catheter and urinary drainage</li> <li>▪ Urinary diversions</li> <li>▪ Bladder irrigation</li> </ul> </li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> <li>• Demonstration</li> </ul> | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Objective type</li> <li>• OSCE</li> </ul> |

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| Unit | Time (Hrs)        | Learning Outcomes   | Content  | Teaching/ Learning Activities   | Assessment Methods  |
|------|-------------------|---|--|---|---|
|      |                   |   | <ul style="list-style-type: none"> <li>Bowel Elimination               <ul style="list-style-type: none"> <li>Review of Physiology of Bowel Elimination, Composition and characteristics of feces</li> <li>Factors affecting Bowel elimination</li> <li>Alteration in Bowel Elimination</li> <li>Facilitating bowel elimination: Assessment, equipment, procedures                   <ul style="list-style-type: none"> <li>Enemas</li> <li>Suppository</li> <li>Bowel wash</li> <li>Digital Evacuation of impacted feces</li> <li>Care of patients with Ostomies (Bowel Diversion Procedures)</li> </ul> </li> </ul> </li> </ul>  |   |   |
| VI   | 3 (T)<br>4 (SL)   | <p>Explain various types of specimens and identify normal values of tests</p> <p>Develop skill in specimen collection, handling and transport</p> | <p><b>Diagnostic testing</b></p> <ul style="list-style-type: none"> <li>Phases of diagnostic testing (pre-test, intra-test &amp; post-test) in Common investigations and clinical implications               <ul style="list-style-type: none"> <li>Complete Blood Count</li> <li>Serum Electrolytes</li> <li>LFT</li> <li>Lipid/Lipoprotein profile</li> <li>Serum Glucose – AC, PC, HbA1c</li> <li>Monitoring Capillary Blood Glucose (Glucometer Random Blood Sugar – GRBS)</li> <li>Stool Routine Examination</li> <li>Urine Testing – Albumin, Acetone, pH, Specific Gravity</li> <li>Urine Culture, Routine, Timed Urine Specimen</li> <li>Sputum culture</li> <li>Overview of Radiologic &amp; Endoscopic Procedures</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>Lecture</li> <li>Discussion</li> <li>Demonstration</li> </ul>                        | <ul style="list-style-type: none"> <li>Essay</li> <li>Short answer</li> <li>Objective type</li> </ul> |
| VII  | 11 (T)<br>10 (SL) | Assess patients for oxygenation needs, promote oxygenation and provide care during oxygen therapy   | <p><b>Oxygenation needs</b></p> <ul style="list-style-type: none"> <li>Review of Cardiovascular and Respiratory Physiology</li> <li>Factors affecting respiratory functioning</li> <li>Alterations in Respiratory Functioning               <ul style="list-style-type: none"> <li>Conditions affecting                   <ul style="list-style-type: none"> <li>Airway</li> <li>Movement of air</li> </ul> </li> </ul> </li> </ul>  | <ul style="list-style-type: none"> <li>Lecture</li> <li>Discussion</li> <li>Demonstration &amp; Re-demonstration</li> </ul> | <ul style="list-style-type: none"> <li>Essay</li> <li>Short answer</li> <li>Objective type</li> </ul> |

| Unit | Time (Hrs)       | Learning Outcomes                                  | Content   | Teaching/ Learning Activities  | Assessment Methods  |
|------|------------------|--|---|--|---|
|      |                  |  | <ul style="list-style-type: none"> <li>○ Diffusion</li> <li>○ Oxygen transport</li> <li>• Alterations in oxygenation</li> <li>• Nursing interventions to promote oxygenation: assessment, types, equipment used &amp; procedure</li> <li>○ Maintenance of patent airway</li> <li>○ Oxygen administration</li> <li>○ Suctioning – oral, tracheal</li> <li>○ Chest physiotherapy – Percussion, Vibration &amp; Postural drainage</li> <li>○ Care of Chest drainage – principles &amp; purposes</li> <li>○ Pulse Oximetry – Factors affecting measurement of oxygen saturation using pulse oximeter, Interpretation</li> <li>• Restorative &amp; continuing care</li> <li>○ Hydration</li> <li>○ Humidification</li> <li>○ Coughing techniques</li> <li>○ Breathing exercises</li> <li>○ Incentive spirometry</li> </ul>   |  |   |
| VIII | 5 (T)<br>10 (SL) | Describe the concept of fluid, electrolyte balance | <b>Fluid, Electrolyte, and Acid – Base Balances</b> <ul style="list-style-type: none"> <li>• Review of Physiological Regulation of Fluid, Electrolyte and Acid-Base Balances</li> <li>• Factors Affecting Fluid, Electrolyte and Acid-Base Balances</li> <li>• Disturbances in fluid volume:               <ul style="list-style-type: none"> <li>○ Deficit                   <ul style="list-style-type: none"> <li>▪ Hypovolemia</li> <li>▪ Dehydration</li> </ul> </li> <li>○ Excess                   <ul style="list-style-type: none"> <li>▪ Fluid overload</li> <li>▪ Edema</li> </ul> </li> </ul> </li> <li>• Electrolyte imbalances (hypo and hyper)               <ul style="list-style-type: none"> <li>○ Acid-base imbalances                   <ul style="list-style-type: none"> <li>▪ Metabolic – acidosis &amp; alkalosis</li> <li>▪ Respiratory – acidosis &amp; alkalosis</li> </ul> </li> <li>○ Intravenous therapy</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> <li>• Demonstration</li> </ul> | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Objective type</li> <li>• Problem solving – calculations</li> </ul> |

| Unit | Time (Hrs)        | Learning Outcomes  | Content  | Teaching/ Learning Activities   | Assessment Methods  |
|------|-------------------|--|--|---|---|
|      |                   |  | <ul style="list-style-type: none"> <li>Peripheral venipuncture sites</li> <li>Types of IV fluids</li> <li>Calculation for making IV fluid plan</li> <li>Complications of IV fluid therapy</li> <li>Measuring fluid intake and output</li> <li>Administering Blood and Blood components</li> <li>Restricting fluid intake</li> <li>Enhancing Fluid intake</li> </ul>  |   |   |
| IX   | 20 (T)<br>22 (SL) | <p>Explain the principles, routes, effects of administration of medications</p> <p>Calculate conversions of drugs and dosages within and between systems of measurements</p> <p>Administer oral and topical medication and document accurately under supervision</p> | <p><b>Administration of Medications</b></p> <ul style="list-style-type: none"> <li>Introduction – Definition of Medication, Administration of Medication, Drug Nomenclature, Effects of Drugs, Forms of Medications, Purposes, Pharmacodynamics and Pharmacokinetics</li> <li>Factors influencing Medication Action</li> <li>Medication orders and Prescriptions</li> <li>Systems of measurement</li> <li>Medication dose calculation</li> <li>Principles, 10 rights of Medication Administration</li> <li>Errors in Medication administration</li> <li>Routes of administration</li> <li>Storage and maintenance of drugs and Nurses responsibility</li> <li>Terminologies and abbreviations used in prescriptions and medications orders</li> <li>Developmental considerations</li> <li>Oral, Sublingual and Buccal routes: Equipment, procedure</li> <li>Introduction to Parenteral Administration of Drugs – Intramuscular, Intravenous, Subcutaneous, Intradermal: Location of site, Advantages and disadvantages of the specific sites, Indication and contraindications for the different routes and sites.</li> <li>Equipment – Syringes &amp; needles, cannulas, Infusion sets – parts, types, sizes</li> <li>Types of vials and ampoules, Preparing Injectable medicines from vials and ampoules</li> <li>Care of equipment: decontamination and disposal of syringes, needles,</li> </ul> | <ul style="list-style-type: none"> <li>Lecture</li> <li>Discussion</li> <li>Demonstration &amp; Re-demonstration</li> </ul> | <ul style="list-style-type: none"> <li>Essay</li> <li>Short answer</li> <li>Objective type</li> <li>OSCE</li> </ul> |



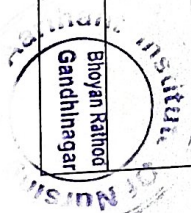
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| Unit | Time (Hrs)      | Learning Outcomes   | Content  | Teaching/ Learning Activities  | Assessment Methods  |
|------|-----------------|---|--|--|---|
|      |                 |   | <ul style="list-style-type: none"> <li>infusion sets</li> <li>o Prevention of Needle-Stick Injuries</li> <li>• Topical Administration: Types, purposes, site, equipment, procedure</li> <li>o Application to skin &amp; mucous membrane</li> <li>o Direct application of liquids, Gargle and swabbing the throat</li> <li>o Insertion of Drug into body cavity: Suppository/ medicated packing in rectum/vagina</li> <li>o Instillations: Ear, Eye, Nasal, Bladder, and Rectal</li> <li>o Irrigations: Eye, Ear, Bladder, Vaginal and Rectal</li> <li>o Spraying: Nose and throat</li> <li>• Inhalation: Nasal, oral, endotracheal/tracheal (steam, oxygen and medications) – purposes, types, equipment, procedure, recording and reporting of medications administered</li> <li>• Other Parenteral Routes: Meaning of epidural, intrathecal, intraosseous, intraperitoneal, intra-pleural, intra-arterial</li> </ul> |  |   |
| X    | 5 (T)<br>6 (SL) | Provide care to patients with altered functioning of sense organs and unconsciousness in supervised clinical practice | <p><b>Sensory needs</b></p> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Components of sensory experience – Reception, Perception &amp; Reaction</li> <li>• Arousal Mechanism</li> <li>• Factors affecting sensory function</li> <li>• Assessment of Sensory alterations – sensory deficit, deprivation, overload &amp; sensory poverty</li> <li>• Management               <ul style="list-style-type: none"> <li>o Promoting meaningful communication (patients with Aphasia, artificial airway &amp; Visual and Hearing impairment)</li> </ul> </li> </ul> <p><b>Care of Unconscious Patients</b></p> <ul style="list-style-type: none"> <li>• Unconsciousness: Definition, causes &amp; risk factors, pathophysiology, stages of Unconsciousness, Clinical Manifestations</li> <li>• Assessment and nursing management of patient with unconsciousness, complications</li> </ul>               | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> <li>• Demonstration</li> </ul> | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Objective type</li> </ul> |



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| Unit | Time (Hrs)      | Learning Outcomes                           | Content  | Teaching/ Learning Activities  | Assessment Methods  |
|------|-----------------|---|--|--|---|
| XI   | 4 (T)<br>6 (SL) | Explain loss, death and grief               | <b>Care of Terminally ill, death and dying</b> <ul style="list-style-type: none"> <li>• Loss – Types</li> <li>• Grief, Bereavement &amp; Mourning</li> <li>• Types of Grief responses</li> <li>• Manifestations of Grief</li> <li>• Factors influencing Loss &amp; Grief Responses</li> <li>• Theories of Grief &amp; Loss – Kubler Ross</li> <li>• 5 Stages of Dying</li> <li>• The R Process model (Rando's)</li> <li>• Death – Definition, Meaning, Types (Brain &amp; Circulatory Deaths)</li> <li>• Signs of Impending Death</li> <li>• Dying patient's Bill of Rights</li> <li>• Care of Dying Patient</li> <li>• Physiological changes occurring after Death</li> <li>• Death Declaration, Certification</li> <li>• Autopsy</li> <li>• Embalming</li> <li>• Last office/Death Care</li> <li>• Counseling &amp; supporting grieving relatives</li> <li>• Placing body in the Mortuary</li> <li>• Releasing body from Mortuary</li> <li>• Overview – Medico-legal Cases, Advance directives, DNI/DNR, Organ Donation, Euthanasia</li> </ul> | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> <li>• Case discussions</li> <li>• Death care/last office</li> </ul>  | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Objective type</li> </ul> |
|      |                 |   | <b>PSYCHOSOCIAL NEEDS (A-D)</b>  |  |   |
| XII  | 3 (T)           | Develop basic understanding of self-concept | <b>A. Self-concept</b> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Components (Personal Identity, Body Image, Role Performance, Self Esteem)</li> <li>• Factors affecting Self Concept</li> <li>• Nursing Management</li> </ul>   | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> <li>• Demonstration</li> <li>• Case Discussion/ Role play</li> </ul> | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Objective type</li> </ul> |
| XIII | 2 (T)           | Describe sexual development and sexuality   | <b>B. Sexuality</b> <ul style="list-style-type: none"> <li>• Sexual development throughout life</li> <li>• Sexual health</li> <li>• Sexual orientation</li> <li>• Factors affecting sexuality</li> </ul>   | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> </ul>  | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Objective type</li> </ul> |

| Unit | Time (Hrs)      | Learning Outcomes  | Content   | Teaching/ Learning Activities   | Assessment Methods  |
|------|-----------------|--|---|---|---|
|      |                 |  | <ul style="list-style-type: none"> <li>Prevention of STIs, unwanted pregnancy, avoiding sexual harassment and abuse</li> <li>Dealing with inappropriate sexual behavior</li> </ul>  |   |   |
| XIV  | 2 (T)<br>4 (SL) | Describe stress and adaptation   | <b>C. Stress and Adaptation – Introductory concepts</b> <ul style="list-style-type: none"> <li>Introduction</li> <li>Sources, Effects, Indicators &amp; Types of Stress</li> <li>Types of stressors</li> <li>Stress Adaptation – General Adaptation Syndrome (GAS), Local Adaptation Syndrome (LAS)</li> <li>Manifestation of stress – Physical &amp; psychological</li> <li>Coping strategies/ Mechanisms</li> <li>Stress Management               <ul style="list-style-type: none"> <li>Assist with coping and adaptation</li> <li>Creating therapeutic environment</li> </ul> </li> <li>Recreational and diversion therapies</li> </ul>   | <ul style="list-style-type: none"> <li>Lecture</li> <li>Discussion</li> </ul> | <ul style="list-style-type: none"> <li>Essay</li> <li>Short answer</li> <li>Objective type</li> </ul> |
| XV   | 6 (T)           | Explain culture and cultural norms<br><br>Integrate cultural differences and spiritual needs in providing care to patients under supervision | <b>D. Concepts of Cultural Diversity and Spirituality</b> <ul style="list-style-type: none"> <li>Cultural diversity               <ul style="list-style-type: none"> <li>Cultural Concepts – Culture, Subculture, Multicultural, Diversity, Race, Acculturation, Assimilation</li> <li>Transcultural Nursing</li> <li>Cultural Competence</li> <li>Providing Culturally Responsive Care</li> </ul> </li> <li>Spirituality               <ul style="list-style-type: none"> <li>Concepts – Faith, Hope, Religion, Spirituality, Spiritual Wellbeing</li> <li>Factors affecting Spirituality</li> <li>Spiritual Problems in Acute, Chronic, Terminal illnesses &amp; Near-Death Experience</li> <li>Dealing with Spiritual Distress/Problems</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>Lecture</li> <li>Discussion</li> </ul> | <ul style="list-style-type: none"> <li>Essay</li> <li>Short answer</li> <li>Objective type</li> </ul> |
| XVI  | 6 (T)           | Explain the significance of nursing theories   | <b>Nursing Theories: Introduction</b> <ul style="list-style-type: none"> <li>Meaning &amp; Definition, Purposes, Types of theories with examples, Overview of selected nursing theories – Nightingale, Orem, Roy</li> <li>Use of theories in nursing practice</li> </ul>  | <ul style="list-style-type: none"> <li>Lecture</li> <li>Discussion</li> </ul> | <ul style="list-style-type: none"> <li>Essay</li> <li>Short answer</li> <li>Objective type</li> </ul> |

Shyama Ratna  
Gandhinagar

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## CLINICAL PRACTICUM

Clinical: 4 Credits (320 hours)

**PRACTICE COMPETENCIES:** On completion of the course, the student will be able to

1. Perform health assessment of each body system
2. Develop skills in assessment, planning, implementation and evaluation of nursing care using Nursing process approach
3. Identify and meet the Nutritional needs of patients
4. Implement basic nursing techniques in meeting hygienic needs of patients
5. Plan and Implement care to meet the elimination needs of patient
6. Develop skills in instructing and collecting samples for investigation.
7. Perform simple lab tests and analyze & interpret common diagnostic values
8. Identify patients with impaired oxygenation and demonstrate skill in caring for patients with impaired oxygenation
9. Identify and demonstrate skill in caring for patients with fluid, electrolyte and acid – base imbalances
10. Assess, plan, implement & evaluate the basic care needs of patients with altered functioning of sense organs and unconsciousness
11. Care for terminally ill and dying patients

## SKILL LAB

## Use of Mannequins and Simulators

| S.No. | Competencies   | Mode of Teaching   |
|-------|--|--|
| 1.    | Health Assessment  | Standardized Patient   |
| 2.    | Nutritional Assessment   | Standardized Patient   |
| 3.    | Sponge bath, oral hygiene, perineal care                               | Mannequin  |
| 4.    | Nasogastric tube feeding   | Trainer/ Simulator   |
| 5.    | Providing bed pan & urinal   | Mannequin  |
| 6.    | Catheter care  | Catheterization Trainer                                      |
| 7.    | Bowel wash, enema, insertion of suppository                            | Simulator/ Mannequin   |
| 8.    | Oxygen administration – face mask, venture mask, nasal prongs          | Mannequin  |
| 9.    | Administration of medication through Parenteral route – IM, SC, ID, IV | IM injection trainer, ID injection trainer, IV arm (Trainer) |
| 10.   | Last Office  | Mannequin  |

## CLINICAL POSTINGS – General Medical/Surgical Wards

(16 weeks × 20 hours per week = 320 hours)

| Clinical Unit                   | Duration (Weeks) | Learning Outcomes  | Procedural Competencies/ Clinical Skills (Supervised Clinical Practice)  | Clinical Requirements  | Assessment Methods  |
|---------------------------------|------------------|--|--|--|---|
| General Medical/ Surgical wards | 3                | Perform health assessment of each body system<br><i>(Circular stamp: Dr. Anurag Singh, Head of Department, PGIMER, Chandigarh)</i> | <b>Health Assessment</b> <ul style="list-style-type: none"> <li>• Nursing/Health history taking</li> <li>• Perform physical examination: <ul style="list-style-type: none"> <li>○ General</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• History Taking – 2</li> <li>• Physical examination – 2</li> </ul> | <ul style="list-style-type: none"> <li>• Assessment of clinical skills using checklist</li> <li>• OSCE</li> </ul> |

| Clinical Unit | Duration (Weeks) | Learning Outcomes   | Procedural Competencies/ Clinical Skills (Supervised Clinical Practice)  | Clinical Requirements  | Assessment Methods  |
|---------------|------------------|---|--|--|---|
|               |                  |   | <ul style="list-style-type: none"> <li>Body systems</li> <li>Use various methods of physical examination – Inspection, Palpation, Percussion, Auscultation, Olfaction</li> <li>Identification of system wise deviations</li> <li>Documentation of findings</li> </ul>  |  |   |
|               | 1                | Develop skills in assessment, planning, implementation and evaluation of nursing care using Nursing process approach                            | <b>The Nursing Process</b> <ul style="list-style-type: none"> <li>Prepare Nursing care plan for the patient based on the given case scenario</li> </ul>  | <ul style="list-style-type: none"> <li>Nursing process – 1</li> </ul>  | <ul style="list-style-type: none"> <li>Evaluation of Nursing process with criteria</li> </ul>                 |
|               | 2                | Identify and meet the Nutritional needs of patients<br><br>Implement basic nursing techniques in meeting hygienic needs of patients             | <b>Nutritional needs, Elimination needs &amp; Diagnostic testing</b><br><i>Nutritional needs</i> <ul style="list-style-type: none"> <li>Nutritional Assessment</li> <li>Preparation of Nasogastric tube feed</li> <li>Nasogastric tube feeding</li> </ul> <i>Hygiene</i> <ul style="list-style-type: none"> <li>Care of Skin &amp; Hair:               <ul style="list-style-type: none"> <li>Sponge Bath/ Bed bath</li> <li>Care of pressure points &amp; back massage</li> </ul> </li> <li>Pressure sore risk assessment using Braden/Norton scale               <ul style="list-style-type: none"> <li>Hair wash</li> <li>Pediculosis treatment</li> </ul> </li> <li>Oral Hygiene</li> <li>Perineal Hygiene</li> <li>Catheter care</li> </ul> | <ul style="list-style-type: none"> <li>Nutritional Assessment and Clinical Presentation – 1</li> <li>Pressure sore assessment – 1</li> </ul>           | <ul style="list-style-type: none"> <li>Assessment of clinical skills using checklist</li> <li>OSCE</li> </ul> |
|               | 2                | Plan and Implement care to meet the elimination needs of patient<br><br>Develop skills in instructing and collecting samples for investigation. | <b>Elimination needs</b> <ul style="list-style-type: none"> <li>Providing               <ul style="list-style-type: none"> <li>Urinal</li> <li>Bedpan</li> </ul> </li> <li>Insertion of Suppository</li> <li>Enema</li> <li>Urinary Catheter care</li> <li>Care of urinary drainage</li> </ul> <b>Diagnostic testing</b>   | <ul style="list-style-type: none"> <li>Clinical Presentation on Care of patient with Constipation – 1</li> <li>Lab values – inter-pretation</li> </ul> | <ul style="list-style-type: none"> <li>Assessment of clinical skills using checklist</li> <li>OSCE</li> </ul> |

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| Clinical Unit | Duration (Weeks) | Learning Outcomes   | Procedural Competencies/ Clinical Skills (Supervised Clinical Practice)   | Clinical Requirements | Assessment Methods   |
|---------------|------------------|---|---|-----------------------|--|
|               |                  | Perform simple lab tests and analyze & interpret common diagnostic values   | <ul style="list-style-type: none"> <li>Specimen Collection               <ul style="list-style-type: none"> <li>Urine routine and culture</li> <li>Stool routine</li> <li>Sputum Culture</li> </ul> </li> <li>Perform simple Lab Tests using reagent strips               <ul style="list-style-type: none"> <li>Urine – Glucose, Albumin, Acetone, pH, Specific gravity</li> </ul> </li> <li>Blood – GRBS Monitoring</li> </ul>  |                       |  |
|               | 3                | <p>Identify patients with impaired oxygenation and demonstrate skill in caring for patients with impaired oxygenation</p> <p>Identify and demonstrate skill in caring for patients with fluid, electrolyte and acid – base imbalances</p>       | <p><b>Oxygenation needs, Fluid, Electrolyte, and Acid – Base Balances</b></p> <p><i>Oxygenation needs</i></p> <ul style="list-style-type: none"> <li>Oxygen administration methods               <ul style="list-style-type: none"> <li>Nasal Prongs</li> <li>Face Mask/Venturi Mask</li> </ul> </li> <li>Steam inhalation</li> <li>Chest Physiotherapy</li> <li>Deep Breathing &amp; Coughing Exercises</li> <li>Oral Suctioning</li> </ul> <p><i>Fluid, Electrolyte, and Acid – Base Balances</i></p> <ul style="list-style-type: none"> <li>Maintaining intake output chart</li> <li>Identify &amp; report complications of IV therapy</li> <li>Observe Blood &amp; Blood Component therapy</li> <li>Identify &amp; Report Complications of Blood &amp; Blood Component therapy</li> </ul> |                       | <ul style="list-style-type: none"> <li>Assessment of clinical skills using checklist</li> <li>OSCE</li> <li>Assessment of clinical skills using checklist</li> <li>OSCE</li> </ul> |
|               | 3                | <p>Explain the principles, routes, effects of administration of medications</p> <p>Calculate conversions of drugs and dosages within and between systems of Measurements</p> <p>Administer drugs by the following routes- Oral, Intradermal</p> | <p><b>Administration of Medications</b></p> <ul style="list-style-type: none"> <li>Calculate Drug Dosages</li> <li>Preparation of lotions &amp; solutions</li> <li>Administer Medications               <ul style="list-style-type: none"> <li>Oral</li> <li>Topical</li> <li>Inhalations</li> <li>Parenteral                   <ul style="list-style-type: none"> <li>Intradermal</li> <li>Subcutaneous</li> </ul> </li> </ul> </li> </ul>   |                       | <ul style="list-style-type: none"> <li>Assessment of clinical skills using checklist</li> <li>OSCE</li> </ul>  |

| Clinical Unit | Duration (Weeks) | Learning Outcomes   | Procedural Competencies/ Clinical Skills (Supervised Clinical Practice)  | Clinical Requirements  | Assessment Methods   |
|---------------|------------------|---|--|--|--|
|               |                  | Subcutaneous, Intramuscular, Intra Venous Topical, inhalation   | <ul style="list-style-type: none"> <li>-Intramuscular</li> <li>Instillations</li> <li>o Eye, Ear, Nose –instillation of medicated drops, nasal sprays, irrigations</li> </ul>  |  |  |
|               | 2                | <p>Assess, plan, implement &amp; evaluate the basic care needs of patients with altered functioning of sense organs and unconsciousness</p> <p>Care for terminally ill and dying patients</p> | <p><b>Sensory Needs and Care of Unconscious patients, Care of Terminally ill, death and dying</b></p> <p><i>Sensory Needs and Care of Unconscious patients</i></p> <ul style="list-style-type: none"> <li>Assessment of Level of Consciousness using Glasgow Coma Scale</li> <li><i>Terminally ill, death and dying</i></li> <li>Death Care</li> </ul> | <ul style="list-style-type: none"> <li>Nursing rounds on care of patient with altered sensorium</li> </ul> | <ul style="list-style-type: none"> <li>Assessment of clinical skills using checklist</li> <li>OSCE</li> <li>Assessment of clinical skills using checklist</li> </ul> |

### HEALTH/NURSING INFORMATICS AND TECHNOLOGY

**PLACEMENT: II SEMESTER**

**THEORY: 2 Credits (40 hours)**

**PRACTICAL/LAB: 1 Credit (40 hours)**

**DESCRIPTION:** This course is designed to equip novice nursing students with knowledge and skills necessary to deliver efficient informatics-led health care services.

**COMPETENCIES:** On completion of the course, the students will be able to

1. Develop a basic understanding of computer application in patient care and nursing practice.
2. Apply the knowledge of computer and information technology in patient care and nursing education, practice, administration and research.
3. Describe the principles of health informatics and its use in developing efficient healthcare.
4. Demonstrate the use of information system in healthcare for patient care and utilization of nursing data.
5. Demonstrate the knowledge of using Electronic Health Records (EHR) system in clinical practice.
6. Apply the knowledge of interoperability standards in clinical setting.
7. Apply the knowledge of information and communication technology in public health promotion.
8. Utilize the functionalities of Nursing Information System (NIS) system in nursing.
9. Demonstrate the skills of using data in management of health care.
10. Apply the knowledge of the principles of digital ethical and legal issues in clinical practice.
11. Utilize evidence-based practices in informatics and technology for providing quality patient care.
12. Update and utilize evidence-based practices in nursing education, administration, and practice.



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## COURSE OUTLINE

T – Theory, P/L – Lab

| Unit | Time (Hrs) |     | Learning Outcomes   | Content   | Teaching/ Learning Activities   | Assessment Methods   |
|------|------------|-----|---|---|---|--|
|      | T          | P/L |   |   |   |  |
| I    | 10         | 15  | Describe the importance of computer and technology in patient care and nursing practice                                   | <b>Introduction to computer applications for patient care delivery system and nursing practice</b> <ul style="list-style-type: none"> <li>• Use of computers in teaching, learning, research and nursing practice</li> </ul>  | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> <li>• Practice session</li> <li>• Supervised clinical practice on EHR use</li> <li>• Participate in data analysis using statistical package with statistician</li> </ul>                        | (T) <ul style="list-style-type: none"> <li>• Short answer</li> <li>• Objective type</li> <li>• Visit reports</li> <li>• Assessment of assignments</li> </ul> |
|      |            |     | Demonstrate the use of computer and technology in patient care, nursing education, practice, administration and research. | <ul style="list-style-type: none"> <li>• Windows, MS office: Word, Excel, Power Point</li> <li>• Internet</li> <li>• Literature search</li> <li>• Statistical packages</li> <li>• Hospital management information system</li> </ul>   | <ul style="list-style-type: none"> <li>• Visit to hospitals with different hospital management systems</li> </ul>   | (P) <ul style="list-style-type: none"> <li>• Assessment of skills using checklist</li> </ul>   |
| II   | 4          | 5   | Describe the principles of health informatics   | <b>Principles of Health Informatics</b> <ul style="list-style-type: none"> <li>• Health informatics – needs, objectives and limitations</li> <li>• Use of data, information and knowledge for more effective healthcare and better health</li> </ul>  | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> <li>• Practical session</li> <li>• Work in groups with health informatics team in a hospital to extract nursing data and prepare a report</li> </ul>  | (T) <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Objective type questions</li> <li>• Assessment of report</li> </ul>    |
|      |            |     | Explain the ways data, knowledge and information can be used for effective healthcare                                     |   |   |  |
| III  | 3          | 5   | Describe the concepts of information system in health   | <b>Information Systems in Healthcare</b> <ul style="list-style-type: none"> <li>• Introduction to the role and architecture of information systems in modern healthcare environments</li> <li>• Clinical Information System (CIS)/Hospital information System (HIS)</li> </ul>                                      | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> <li>• Demonstration</li> <li>• Practical session</li> <li>• Work in groups with nurse leaders to understand the hospital information system</li> </ul>  | (T) <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Objective type</li> </ul>  |
|      |            |     | Demonstrate the use of health information system in hospital setting  |   |   |  |
| IV   | 4          | 4   | Explain the use of electronic health records in nursing practice  | <b>Shared Care &amp; Electronic Health Records</b> <ul style="list-style-type: none"> <li>• Challenges of capturing rich patient histories in a computable form</li> <li>• Latest global developments and standards to enable lifelong electronic health records to be integrated from disparate systems</li> </ul> | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> <li>• Practice on Simulated EHR system</li> <li>• Practical session</li> <li>• Visit to health informatics department of a hospital to understand the use of EHR in nursing practice</li> </ul> | (T) <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Objective type</li> </ul>  |
|      |            |     | Describe the latest trend in electronic health records standards and interoperability                                     |   |   | (P) <ul style="list-style-type: none"> <li>• Assessment of skills using checklist</li> </ul>   |

| Unit | Time (Hrs) |     | Learning Outcomes  | Content  | Teaching/ Learning Activities  | Assessment Methods  |
|------|------------|-----|--|--|--|---|
|      | T          | P/L |  |  |  |   |
|      |            |     |  |  | <ul style="list-style-type: none"> <li>• Prepare a report on current EHR standards in Indian setting</li> </ul>  |   |
| V    | 3          |     | Describe the advantages and limitations of health informatics in maintaining patient safety and risk management                          | <u><b>Patient Safety &amp; Clinical Risk</b></u> <ul style="list-style-type: none"> <li>• Relationship between patient safety and informatics</li> <li>• Function and application of the risk management process</li> </ul>  | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> </ul>  | (T) <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Objective type</li> </ul>                       |
| VI   | 3          | 6   | Explain the importance of knowledge management<br><br>Describe the standardized languages used in health informatics                     | <u><b>Clinical Knowledge &amp; Decision Making</b></u> <ul style="list-style-type: none"> <li>• Role of knowledge management in improving decision-making in both the clinical and policy contexts</li> <li>• Systematized Nomenclature of Medicine, Clinical Terms, SNOMED CT to ICD-10-CM Map, standardized nursing terminologies (NANDA, NOC), Omaha system.</li> </ul> | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> <li>• Demonstration</li> <li>• Practical session</li> <li>• Work in groups to prepare a report on standardized languages used in health informatics.</li> <li>• Visit health informatics department to understand the standardized languages used in hospital setting</li> </ul> | (T) <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Objective type</li> </ul>                       |
| VII  | 3          |     | Explain the use of information and communication technology in patient care<br><br>Explain the application of public health informatics  | <u><b>eHealth: Patients and the Internet</b></u> <ul style="list-style-type: none"> <li>• Use of information and communication technology to improve or enable personal and public healthcare</li> <li>• Introduction to public health informatics and role of nurses</li> </ul>   | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> <li>• Demonstration</li> </ul>   | <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Objective type</li> <li>• Practical exam</li> </ul> |
| VIII | 3          | 5   | Describe the functions of nursing information system<br><br>Explain the use of healthcare data in management of health care organization | <u><b>Using Information in Healthcare Management</b></u> <ul style="list-style-type: none"> <li>• Components of Nursing Information system(NIS)</li> <li>• Evaluation, analysis and presentation of healthcare data to inform decisions in the management of health-care organizations</li> </ul>  | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> <li>• Demonstration on simulated NIS software</li> <li>• Visit to health informatics department of the hospital to understand use of healthcare data in decision making</li> </ul>   | (T) <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Objective type</li> </ul>                       |
| IX   | 4          |     | Describe the ethical and legal issues in healthcare informatics<br><br>Explains the ethical and legal issues                             | <u><b>Information Law &amp; Governance in Clinical Practice</b></u> <ul style="list-style-type: none"> <li>• Ethical-legal issues pertaining to healthcare information in contemporary clinical practice</li> <li>• Ethical-legal issues related to</li> </ul>   | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Discussion</li> <li>• Case discussion</li> <li>• Role play</li> </ul>  | (T) <ul style="list-style-type: none"> <li>• Essay</li> <li>• Short answer</li> <li>• Objective type</li> </ul>                       |

| Unit | Time (Hrs) |     | Learning Outcomes   | Content  | Teaching/ Learning Activities   | Assessment Methods  |
|------|------------|-----|---|--|---|---|
|      | T          | P/L |   |  |   |   |
|      |            |     | related to nursing informatics  | digital health applied to nursing  |   |   |
| X    | 3          |     | Explain the relevance of evidence-based practices in providing quality healthcare | <b>Healthcare Quality &amp; Evidence Based Practice</b> <ul style="list-style-type: none"> <li>Use of scientific evidence in improving the quality of healthcare and technical and professional informatics standards</li> </ul> | <ul style="list-style-type: none"> <li>Lecture</li> <li>Discussion</li> <li>Case study</li> </ul> | (T) <ul style="list-style-type: none"> <li>Essay</li> <li>Short answer</li> <li>Objective type</li> </ul> |

**SKILLS**

- Utilize computer in improving various aspects of nursing practice.
- Use technology in patient care and professional advancement.
- Use data in professional development and efficient patient care.
- Use information system in providing quality patient care.
- Use the information system to extract nursing data.

Develop skill in conducting literature review.

**APPLIED MICROBIOLOGY AND INFECTION CONTROL INCLUDING SAFETY**

**PLACEMENT:** III SEMESTER

**THEORY:** 2 Credits (40 hours)

**PRACTICAL:** 1 Credit (40 hours) (Lab/Experiential Learning – L/E)

**SECTION A: APPLIED MICROBIOLOGY**

**THEORY:** 20 hours

**PRACTICAL:** 20 hours (Lab/Experiential Learning – L/E)

**DESCRIPTION:** This course is designed to enable students to acquire understanding of fundamentals of Microbiology, compare and contrast different microbes and comprehend the means of transmission and control of spread by various microorganisms. It also provides opportunities for practicing infection control measures in hospital and community settings.

**COMPETENCIES:** On completion of the course, the students will be able to:

- Identify the ubiquity and diversity of microorganisms in the human body and the environment.
- Classify and explain the morphology and growth of microbes.
- Identify various types of microorganisms.
- Explore mechanisms by which microorganisms cause disease.
- Develop understanding of how the human immune system counteracts infection by specific and non-specific mechanisms.
- Apply the principles of preparation and use of vaccines in immunization.
- Identify the contribution of the microbiologist and the microbiology laboratory to the diagnosis of infection.



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## COURSE OUTLINE

T – Theory, L/E – Lab/Experiential Learning

| Unit | Time (Hrs) |          | Learning Outcomes   | Content  | Teaching/ Learning Activities   | Assessment Methods   |
|------|------------|----------|---|--|---|--|
|      | T          | P        |   |  |   |  |
| I    | 3          |          | Explain concepts and principles of microbiology and its importance in nursing                       | <b>Introduction:</b> <ul style="list-style-type: none"> <li>Importance and relevance to nursing</li> <li>Historical perspective</li> <li>Concepts and terminology</li> <li>Principles of microbiology</li> </ul>   | <ul style="list-style-type: none"> <li>Lecture cum Discussion</li> </ul>  | <ul style="list-style-type: none"> <li>Short answer</li> <li>Objective type</li> </ul> |
| II   | 10         | 10 (L/E) | Describe structure, classification morphology and growth of bacteria<br><br>Identify Microorganisms | <b>General characteristics of Microbes:</b> <ul style="list-style-type: none"> <li>Structure and classification of Microbes</li> <li>Morphological types</li> <li>Size and form of bacteria</li> <li>Motility</li> <li>Colonization</li> <li>Growth and nutrition of microbes</li> <li>Temperature</li> <li>Moisture</li> <li>Blood and body fluids</li> <li>Laboratory methods for Identification of Microorganisms</li> <li>Types of Staining – simple, differential (Gram's, AFB), special – capsular staining (negative), spore, LPCB, KOH mount.</li> <li>Culture and media preparation – solid and liquid. Types of media – semi synthetic, synthetic, enriched, enrichment, selective and differential media. Pure culture techniques – tube dilution, pour, spread, streak plate. Anaerobic cultivation of bacteria</li> </ul> | <ul style="list-style-type: none"> <li>Lecture cum Discussion</li> <li>Demonstration</li> <li>Experiential Learning through visual</li> </ul> | <ul style="list-style-type: none"> <li>Short answer</li> <li>Objective type</li> </ul> |
| III  | 4          | 6 (L/E)  | Describe the different disease producing organisms  | <b>Pathogenic organisms</b> <ul style="list-style-type: none"> <li>Micro-organisms: Cocci – gram positive and gram negative; Bacilli – gram positive and gram negative</li> <li>Viruses</li> <li>Fungi: Superficial and Deep mycoses</li> <li>Parasites</li> <li>Rodents &amp; Vectors               <ul style="list-style-type: none"> <li>Characteristics, Source, portal of entry, transmission of infection, Identification of disease producing micro-organisms</li> </ul> </li> </ul>  | <ul style="list-style-type: none"> <li>Lecture cum Discussion</li> <li>Demonstration</li> <li>Experiential learning through visual</li> </ul> | <ul style="list-style-type: none"> <li>Short answer</li> <li>Objective type</li> </ul> |
|      | 3          | 4 (L/E)  | Explain the concepts of   | <b>Immunity</b>  | <ul style="list-style-type: none"> <li>Lecture</li> </ul>   | <ul style="list-style-type: none"> <li>Short answer</li> <li>Objective</li> </ul>      |

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| Unit | Time (Hrs) |   | Learning Outcomes                            | Content   | Teaching/ Learning Activities  | Assessment Methods   |
|------|------------|---|--|---|--|--|
|      | T          | P |  |   |  |  |
|      |            |   | immunity, hyper sensitivity and immunization | <ul style="list-style-type: none"> <li>• Immunity: Types, classification</li> <li>• Antigen and antibody reaction</li> <li>• Hypersensitivity reactions</li> <li>• Serological tests</li> <li>• Immunoglobulins: Structure, types &amp; properties</li> <li>• Vaccines: Types &amp; classification, storage and handling, cold chain, Immunization for various diseases</li> <li>• Immunization Schedule</li> </ul> | <ul style="list-style-type: none"> <li>• Discussion</li> <li>• Demonstration</li> <li>• Visit to observe vaccine storage</li> <li>• Clinical practice</li> </ul> | type<br><ul style="list-style-type: none"> <li>• Visit report</li> </ul> |

**SECTION B: INFECTION CONTROL & SAFETY****THEORY:** 20 hours**PRACTICAL/LAB:** 20 hours (Lab/Experiential Learning – L/E)

**DESCRIPTION:** This course is designed to help students to acquire knowledge and develop competencies required for fundamental patient safety and infection control in delivering patient care. It also focuses on identifying patient safety indicators, preventing and managing hospital acquired infections, and in following universal precautions.

**COMPETENCIES:** The students will be able to:

1. Develop knowledge and understanding of Hospital acquired Infections (HAI) and effective practices for prevention.
2. Integrate the knowledge of isolation (Barrier and reverse barrier) techniques in implementing various precautions.
3. Demonstrate and practice steps in Hand washing and appropriate use of different types of PPE.
4. Illustrate various disinfection and sterilization methods and techniques.
5. Demonstrate knowledge and skill in specimen collection, handling and transport to optimize the diagnosis for treatment.
6. Incorporate the principles and guidelines of Bio Medical waste management.
7. Apply the principles of Antibiotic stewardship in performing the nurses' role.
8. Identify patient safety indicators and perform the role of nurse in the patient safety audit process.
9. Apply the knowledge of International Patient Safety Goals (IPSG) in the patient care settings.
10. Identify employee safety indicators and risk of occupational hazards.
11. Develop understanding of the various safety protocols and adhere to those protocols.

**COURSE OUTLINE****T – Theory, L/E – Lab/Experiential Learning**

| Unit | Time (Hrs) |       | Learning Outcomes   | Content   | Teaching/ Learning Activities   | Assessment Methods  |
|------|------------|-------|---|---|---|---|
|      | T          | P     |   |   |   |   |
| I    | 2          | 2 (E) | Summarize the evidence based and effective patient care practices for the prevention of common healthcare associated infections in the healthcare | <b>HAI (Hospital acquired Infection)</b> <ul style="list-style-type: none"> <li>• Hospital acquired infection</li> <li>• Bundle approach               <ul style="list-style-type: none"> <li>- Prevention of Urinary Tract Infection (UTI)</li> <li>- Prevention of Surgical Site Infection (SSI)</li> <li>- Prevention of Ventilator</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Lecture &amp; Discussion</li> <li>• Experiential learning</li> </ul> | <ul style="list-style-type: none"> <li>• Knowledge assessment</li> <li>• MCQ</li> <li>• Short answer</li> </ul> |

| Unit | Time (Hrs) |   | Learning Outcomes                            | Content   | Teaching/ Learning Activities  | Assessment Methods   |
|------|------------|---|--|---|--|--|
|      | T          | P |  |   |  |  |
|      |            |   | immunity, hyper sensitivity and immunization | <ul style="list-style-type: none"> <li>• Immunity: Types, classification</li> <li>• Antigen and antibody reaction</li> <li>• Hypersensitivity reactions</li> <li>• Serological tests</li> <li>• Immunoglobulins: Structure, types &amp; properties</li> <li>• Vaccines: Types &amp; classification, storage and handling, cold chain, Immunization for various diseases</li> <li>• Immunization Schedule</li> </ul> | <ul style="list-style-type: none"> <li>• Discussion</li> <li>• Demonstration</li> <li>• Visit to observe vaccine storage</li> <li>• Clinical practice</li> </ul> | type<br><ul style="list-style-type: none"> <li>• Visit report</li> </ul> |

**SECTION B: INFECTION CONTROL & SAFETY****THEORY:** 20 hours**PRACTICAL/LAB:** 20 hours (Lab/Experiential Learning – L/E)

**DESCRIPTION:** This course is designed to help students to acquire knowledge and develop competencies required for fundamental patient safety and infection control in delivering patient care. It also focuses on identifying patient safety indicators, preventing and managing hospital acquired infections, and in following universal precautions.

**COMPETENCIES:** The students will be able to:

1. Develop knowledge and understanding of Hospital acquired Infections (HAI) and effective practices for prevention.
2. Integrate the knowledge of isolation (Barrier and reverse barrier) techniques in implementing various precautions.
3. Demonstrate and practice steps in Hand washing and appropriate use of different types of PPE.
4. Illustrate various disinfection and sterilization methods and techniques.
5. Demonstrate knowledge and skill in specimen collection, handling and transport to optimize the diagnosis for treatment.
6. Incorporate the principles and guidelines of Bio Medical waste management.
7. Apply the principles of Antibiotic stewardship in performing the nurses' role.
8. Identify patient safety indicators and perform the role of nurse in the patient safety audit process.
9. Apply the knowledge of International Patient Safety Goals (IPSG) in the patient care settings.
10. Identify employee safety indicators and risk of occupational hazards.
11. Develop understanding of the various safety protocols and adhere to those protocols.

**COURSE OUTLINE****T – Theory, L/E – Lab/Experiential Learning**

| Unit | Time (Hrs) |       | Learning Outcomes   | Content   | Teaching/ Learning Activities   | Assessment Methods  |
|------|------------|-------|---|---|---|---|
|      | T          | P     |   |   |   |   |
| I    | 2          | 2 (E) | Summarize the evidence based and effective patient care practices for the prevention of common healthcare associated infections in the healthcare | <b>HAI (Hospital acquired Infection)</b> <ul style="list-style-type: none"> <li>• Hospital acquired infection</li> <li>• Bundle approach               <ul style="list-style-type: none"> <li>- Prevention of Urinary Tract Infection (UTI)</li> <li>- Prevention of Surgical Site Infection (SSI)</li> <li>- Prevention of Ventilator</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Lecture &amp; Discussion</li> <li>• Experiential learning</li> </ul> | <ul style="list-style-type: none"> <li>• Knowledge assessment</li> <li>• MCQ</li> <li>• Short answer</li> </ul> |



**SWARNNIM**  
STARTUP & INNOVATION  
UNIVERSITY  
WHERE IDEAS COME ALIVE.

## SYLLABUS FOR POST BASIC B.Sc. NURSING

### Section - I

#### PREAMBLE

Nursing encompasses autonomous and collaborative care of individuals of all ages, families, groups and communities, sick or well and in all settings. Nursing includes the promotion of health, prevention of illness, and the care of ill, disabled and dying people. Advocacy, promotion of a safe environment, research, participation in shaping health policy and in patient and health systems management, and education are also key nursing roles.

The authority for the practice of nursing is based upon a social contract that delineates professional rights and responsibilities as well as mechanisms for public accountability. In almost all countries, nursing practice is defined and governed by law, and entrance to the profession is regulated at national or state level.

The aim of the nursing community worldwide is for its professionals to ensure quality care for all, while maintaining their credentials, code of ethics, standards, and competencies, and continuing their education. There are a number of educational paths to becoming a professional nurse, which vary greatly worldwide, but all involve extensive study of nursing theory and practice and training in clinical skills.

Nurses care for individuals who are healthy and ill, of all ages and cultural backgrounds, and who have physical, emotional, psychological, intellectual, social, and spiritual needs. The profession combines physical science, social science, nursing theory, and technology in caring for those individuals.

The role of the nurse is evolving, as the mode of delivery of health care services has undergone major changes both locally and internationally in the past decades. In line with international trends, we are developing a health care system that provides lifelong holistic care, promotes health, enhances the quality of life and enables human development. The availability of qualified and competent health care professional is the key to the delivery of quality health care services. As nurses play a pivotal role in the promotion, maintenance and restoration of health, we need to develop competent nurses who are able to take up extended and expanded roles in the delivery of primary, secondary and tertiary care. Thus, apart from the roles of a caregiver, the nurse needs to develop competence to take up the roles of health promoter, educator, counselor, care coordinator, case manager, researcher as well as that the students acquire the essential competence that enables them to fulfill these roles competently and ethically.



## Philosophy

We believe the philosophy of Indian nursing council:

Health is a state of well-being that enables a person to lead a psychologically, socially and economically productive life. Health is not a privilege but a right of all the people. Individuals, families and communities have a responsibility towards maintaining their health.

Nursing contributes to the health services in a vital and significant way in the health care delivery system. It recognizes national health goals and is committed to participate in the implementation of National Health policies and programmes. It aims at identifying health needs of the people, planning and providing quality care in collaboration with other health professionals and community groups.

Scope of nursing practice encompasses provision of promotive, preventive, curative and rehabilitative aspects of care to people across their life span in wide variety of health care settings. Practice of nursing is based upon application of basic concepts and principles derived from the physical, biological, behavioral sciences.

Nursing is based on values of caring, and aims to help individuals to attain independence in self-care. It necessitates development of compassion and understanding of human behavior among its practitioners to provide care with respect and dignity and protect the rights of individuals & groups. Undergraduate nursing program at the post basic level is a broad based education within an academic framework, which builds upon the skills and competencies acquired at the diploma level. It is specifically directed to the upgrading of critical thinking skills, competencies & standards required for practice of professional nursing and midwifery as envisaged in National Health Policy 2002.

The teachers have the responsibility to be role models and create learning environment that enables students to acquire inquiry driven, self-directed learning and foster an attitude of lifelong learning. Under graduate nursing education program at the post basic level prepares its graduates to become exemplary citizen by adhering to code of ethics and professional conduct at all times in fulfilling personal, social and professional obligations so as to respond to national aspirations.



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## Aims

The aim of the undergraduate nursing program at the post basic level is to upgrade the diploma (GNM) nurses to:

- Assume responsibilities as professional, competent nurses and midwives at basic level in providing promotive, preventive, curative, and rehabilitative services.
- Make independent decisions in nursing situations, protect the rights of and facilitate individuals and groups in pursuit of health, function in the hospital, community nursing services, and conduct research studies in the areas of nursing practice. They are also expected to assume the role of teacher, supervisor, and manager in clinical/public health settings.

## Objectives

On completion of B.Sc. Nursing (Post-Basic) degree programme the graduates will be able to:

1. Assess health status, identify nursing needs, plan, implement and evaluate nursing care for patients/clients that contribute to health of individuals, families and communities.
2. Demonstrate competency in techniques of nursing based on concepts and principles from selected areas of nursing, physical, biological and behavioral sciences.
3. Participate as members of health team in the promotive, preventive, curative and restorative health care delivery system of the country.
4. Demonstrate skills in communication and interpersonal relationship.
5. Demonstrate leadership qualities and decision-making abilities in various situations.
6. Demonstrate skills in teaching to individuals and groups in community health settings.
7. Demonstrate managerial skills in community health settings.
8. Practice ethical values in their personal and professional life.
9. Participate in research activities and utilize research findings in improving nursing practice.
10. Recognize-the need for continued learning for their personal and professional development.



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# SUBJECT AND TEACHING SCHEDULE

## COURSE OF STUDY

| S.NO   | SUBJECT                                       | HOURS<br>THEORY | HOURS<br>PRACTICAL |
|--|---|-----------------|--------------------|
|  | <b>1 Year</b>                                 |                 |                    |
| 1  | Nursing Foundation                            | 45              | -                  |
| 2  | Nutrition & dietetics                         | 30              | 15                 |
| 3  | Biochemistry & Biophysics                     | 60              | -                  |
| 4  | Psychology                                    | 60              | 15                 |
| 5  | Maternal Nursing                              | 60              | 240                |
| 6  | Child Health Nursing                          | 60              | 240                |
| 7  | Microbiology                                  | 60              | 30                 |
| 8  | Medical & Surgical Nursing                    | 90              | 270                |
| 9  | English (Qualifying)                          | 60              | -                  |
|  | <b>Total</b>                                  | <b>525</b>      | <b>810</b>         |
| Note: Hindi /Local Language as per the need of institution |   |                 |                    |
|  | <b>2<sup>nd</sup> Year</b>                    |                 |                    |
| 10   | Sociology                                     | 60              | -                  |
| 11   | Community Health Nursing                      | 60              | 240                |
| 12   | Mental Health Nursing                         | 60              | 240                |
| 13   | Introduction to Nursing Education             | 60              | 75                 |
| 14   | Introduction to Nursing Administration        | 60              | 180                |
| 15   | Introduction to Nursing Research & Statistics | 45              | 120                |
| 16.  | Environmental Science                         | 50              | -                  |
|  | <b>Total</b>                                  | <b>395</b>      | <b>855</b>         |



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### SCHEME OF EXAMINATION

| Paper            | Subject   | Duration | Int. Asst | Ext. Asst | Total Marks |
|------------------|---|----------|-----------|-----------|-------------|
| <b>Theory</b>    | <b>1<sup>st</sup> Year</b>                      |          |           |           |             |
| 1                | Nursing Foundation                              | 2        | 15        | 35        | 50          |
| 2                | Nutrition & Dietetics                           | 2        | 15        | 35        | 50          |
| 3                | Biochemistry & Biophysics                       | 3        | 25        | 75        | 100         |
| 4                | Psychology                                      | 3        | 25        | 75        | 100         |
| 5                | Maternal Nursing                                | 3        | 25        | 75        | 100         |
| 6                | Child Health Nursing                            | 3        | 25        | 75        | 100         |
| 7                | Microbiology                                    | 3        | 25        | 75        | 100         |
| 8                | Medical & Surgical Nursing                      | 3        | 25        | 75        | 100         |
| 9                | English (Qualifying)*                           | 3        | 25        | 75        | 100         |
|                  | Practical                                       |          | 50        | 50        | 100         |
| 1                | Medical & Surgical Nursing                      |          | 50        | 50        | 100         |
| 2                | Maternal Nursing                                |          | 50        | 50        | 100         |
| 3                | Child Health Nursing                            |          |           |           |             |
|                  | <b>2<sup>nd</sup> Year</b>                      |          |           |           |             |
|                  |   | 3        | 25        | 75        | 100         |
| 10               | Sociology                                       | 3        | 25        | 75        | 100         |
| 11               | Community Health Nursing                        | 3        | 25        | 75        | 100         |
| 12               | Mental Health Nursing                           | 3        | 25        | 75        | 100         |
| 13               | Introduction To Nursing Education               | 3        | 25        | 75        | 100         |
| 14               | Introduction To Nursing Administration          | 3        | 25        | 75        | 100         |
| 15               | Introduction To Nursing Research & Statistics** | 2        | 50        | 50        | 100         |
| 16.              | Environmental science**                         | 2        | 25        | 75        | 100         |
| <b>Practical</b> |   |          |           |           |             |
| 1                | Community Health Nursing                        | 3        | 50        | 50        | 100         |
| 2                | Mental Health Nursing                           | 3        | 50        | 50        | 100         |

**Note:** \* Qualifying Examination

\*\* College Examination (not University Examination)

**N.B:**

- Teaching of Anatomy, Physiology, Pharmacology and Pathology will be integrated with clinical subjects
- A minimum of 80% Attendance in theory and Practical in each subject is essential for appearing in the examination.
- 100% attendance in practical in each clinical area is essential before award of degree.
- 50% of minimum marks in each theory and practical paper separately is required for passing.
- A candidate has to secure minimum of 33% in qualifying subject for passing.



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**II YEAR**  
**SOCIOLOGY**

**Placement: Second Year Time**

**Allotted :Theory -60 hrs**

**COURSE DESCRIPTION**

This course it reorient students to sociology related to community and social institution in India and its relationship with health, illness and nursing.

**OBJECTIVES**

At the end of the course, the student will

1. Describe sociological concepts that are applicable to nursing.
2. Determine role of sociology in nursing as related to social institutions in India
3. Develop positive attitudes towards individual, family and community.

| UNIT NO | HOURS | Learning Objective   | COURSE CONTENT   | TEACHING LEARNING ACTIVITIES               | ASSESSMENT                                |
|---------|-------|--|--|--|---|
| I       | 1     | Describe the importance of sociology in Nursing                        | <b>Introduction</b><br>Importance of study of sociology in nursing, relationship of anthropology, sociology, etc.                      | Chalk board<br>power point<br>Transparency | Essay type<br>Short answers               |
| II      | 3     | Describe the inter-relationship of individual in society and community | <b>Individual and the society</b><br>* Socialization<br>* Interdependence of the individual and society<br>* Personal disorganization. | Chalk board<br>power point<br>Transparency | Essay type<br>Short answers<br>Assignment |
| III     | 3     | Describe the influence of culture and on health and disease            | <b>Culture</b><br>* Nature of culture<br>* Evolution of culture<br>* Diversity and uniformity of culture                               | Chalk board<br>power point<br>Transparency | Essay type<br>Short answers<br>Assignment |

|     |   |   |   |  |   |
|-----|---|---|---|--|---|
| IV  | 4 | Identify various social groups and Their interactions     | <b>Social organization</b><br>* Social groups, crowds and public groups, nations, race.<br>* Social institutions: The family marriage, education, religion, arts, economic organization, political organization.<br>* The urban and rural community in India: Ecology, characteristics of the village, characteristics of the town and city.<br>* Social stratification: Class and caste. | Chalk board<br>power point<br>Transparency | Essay type<br>Short answers<br>Assignment                                       |
| V   | 6 | Explain the Social process                                | <b>Social process</b><br>*process of social interaction : competition, conflict war, cooperation, accommodation, and assimilation.  | Chalk board<br>power point<br>Transparency | Essay type<br>Short answers<br>Assessment of report on community Identification |
| VI  | 4 | Explain the Social change                                 | <b>Social change</b><br>Nature and process of social change: Factors influencing cultural change.Cultural lag.  |  |   |
| VII | 6 | Describe the institutions of family and marriage in India | <b>Social problems</b><br>* Social disorganization, control and planning: poverty, population, housing, illiteracy, food supplies, growth of urbanization, prostitution, minority groups, rights of women and children, child labour, child abuse, delinquency and crime, substance abuse.  | Chalk board<br>power point<br>Transparency | Essay type<br>Short answers   |

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### References :

1. Sachadeva Y.V., An introduction to sociology, kithabmahal : Allahabad
2. R.K.Manekar, Sociology for Nurses, Sivosankar T.P., Vora Medical Publications
3. K.P.Pothen, S.Pothen, Sociology for Nurses, 3rd Edition, N.R.Brothers, Indore.  
C.N. Shankar Rao Principals of sociology with introduction to social thoughts, S Chand E Company Publishers
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5. Dr.N.H.Groenman, Dr.OD'aslevin, M ABockenham, Social and Behvioural sciences for Nurses, 1st edition, Campanion Press Ltd.
6. Dr.AjithkumarSinha, Principles of Sociology, Lakshmi NarainAgarwal educational publishers.
7. T.B.Bottomore, Sociology A guide to problem and literature, 2nd edition, Blockie& Sons Publishers Pvt. Ltd.

### DISTRIBUTION OF TYPE OF QUESTION AND MARKS FOR THE SUBJECT SOCIOLOGY

| Q. No. | Question description                                       | Division of marks | Total marks |
|--------|--|-------------------|-------------|
| 1.     | Total MCQs:- 15  | 15 x 1            | 15          |
| 2.     | Long Answer Questions (LAQ) (Any2 out of 3)                | 2 x 10            | 20          |
| 3.     | Short Notes (8 out of 10)<br>a) b) c) d) e) f) g) h) i) j) | 8x5               | 40          |

### Note :

1. MCQ : Each MCQ carries 1 mark.
2. Long Answer Questions : 3 questions will be given out of which , 2 have to be answered.
3. Short Notes : 10 questions will be given out of which, 8 have to be answered.



## COMMUNITY HEALTH NURSING

Placement: Second Year Time

Allotted: Theory – 60hrs

Practical -240 hrs

### COURSE DESCRIPTION

The course enables the students to understand the national health care delivery system and to participate in the delivery of community health nursing.

### OBJECTIVES

At the end of the course, the student will

1. Explain the concept of various factors contributing to health of individual, family and community.
2. Identify the role of community health nurse.
3. Describe national health care delivery system.
4. Describe epidemiological methods and principles of prevention and control of illness in the community.
5. Identify the role of personnel working in the community health set up.
6. Plan the work of community health nurse and supervise and train health workers.

| UNIT NO | HOURS | Learning Objective                                | COURSE CONTENT   | TEACHING LEARNING ACTIVITIES               | ASSESSMENT                                |
|---------|-------|---|--|--|---|
| I       | 6     | Describe the Concepts of community health nursing | <b>Introduction</b><br>* Introduction to community health –Concepts, Principles and elements of primary health care.<br>* Introduction to community health nursing.<br>* Concepts of community health nursing –community nursing process.<br>* Objectives, scope and principles of community health nursing. | Chalk board<br>power point<br>Transparency | Essay type<br>Short answers               |
| II      | 8     | Describe the Family health services               | <b>Family health services</b><br>* Concept, objectives, scope and principles.<br>* Individual family and community as a unit of service<br>* Principles and techniques of home visiting<br>* Establishing working relationship with the family   | Chalk board<br>power point<br>Transparency | Essay type<br>Short answers<br>Assignment |



|     |    |  |  |  |   |
|-----|----|--|--|--|---|
| VI  | 10 | Describe Epidemiology                            | <b>Epidemiology</b><br>* Definition-concepts, aims, objectives, methods, principles<br>* Epidemiology – Theories and models<br>* Application of Epidemiology, principles and concepts in community health.   | Chalk board<br>power point<br>Transparency | Essay type<br>Short answers               |
| VII | 10 | Explains the Bio statistics and vital statistics | <b>Bio statistics and vital statistics</b><br>* Introduction, definition and scope, legislation<br>* Report, recording and compiling of vital statistics at the local, state, national and international level.<br>* Definitions and methods of computing vital statistics<br>* Methods of presenting data<br>* Management information system. | Chalk board<br>power point                 | Essay type<br>Short answers<br>Assignment |

### PRACTICUM

Each student will prepare a community profile.

The students will be allotted families for gaining experience in identifying family health needs, health counseling and guidance and family budgeting for optimum health.

The students will participate in the activities of primary health centre, Sub-centre, MCH Centre.

Visits will be made to selected health and welfare agencies, water purification plant and sewage disposal plant, infectious disease hospital.

Conduct health educational programmes for individual/groups/community.

### References :

1. K.Park, Textbook of Preventive & Social Medicine- current edition
2. K.Park, Essentials of Community Health Nursing
3. Raokasturi, An Introduction to Community Health Nursing, I publications.
4. Freeman Ruth, Community Health Nursing Practice.
5. Stanthope Lancaster, Community Health Nursing Process & Practice, Popular publication.
6. BasavantappaB.T.,Community Health Nursing
7. Sathe , Epidemiology & management of Heath Care , Popular publication
8. Mahajan Gupta, Textbook of Preventive & Social Medicine, Jaypee Publications

Lancaster, Community Health Nursing Process and Practice for Promoting Health, Mosby Publications.



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**DISTRIBUTION OF TYPE OF QUESTION AND MARKS  
FOR THE SUBJECT COMMUNITY HEALTH NURSING**

| Question No. | Question description                                       | Division of marks | Total marks |
|--------------|--|-------------------|-------------|
| 1.           | Total MCQs:- 15  | 15 x 1            | 15          |
| 2.           | Long Answer Questions (LAQ)<br>(Any 2 out of 3)            | 2 x 10            | 20          |
| 3.           | Short Notes (8 out of 10)<br>a) b) c) d) e) f) g) h) i) j) | 8x5               | 40          |

**Note :**

1. MCQ : Each MCQ carries 1 mark.
2. Long Answer Questions : 3 questions will be given out of which , 2 have to be answered.
3. Short Notes : 10 questions will be given out of which, 8 have to be answered.



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**MENTAL HEALTH NURSING**  
**PLACEMENT :SECOND YEAR TIME** **ALLOTTED: Theory : -60 hrs**  
**Practical – 240 hrs**

**COURSE DESCRIPTION**

This course enable the students to recognize and appreciate the causes, symptoms and process of abnormal human behaviour. It also introduces the student to the present day treatment modalities in the light of psychological, social and cultural factors affecting human behaviour. This course helps the student to learn principles of mental health and psychiatric nursing and to develop beginning skills in the management of the mentally ill in hospital and community.

**OBJECTIVES**

At the end of course, the student will

1. Identify and describe the philosophy and principles of mental health nursing
2. Describe the historical development of mental health and psychiatric nursing
3. Classify mental disorders
4. Develop skill in history taking and performing mental status examination.
5. Describe etiological factors, psycho-pathology, clinical features, diagnostic criterial and treatment methods used for mental disorders.
6. Manage the patients with various mental disorders.
7. Communicate therapeutically with patients and their families.
8. Identify role of the nurse in preventive psychiatry.
9. Identify the legal aspects in practice of mental health and psychiatric nursing.

| UNIT NO | HOURS | Learning Objective   | COURSE CONTENT   | TEACHING LEARNING ACTIVITIES                                | ASSESSMENT  |
|---------|-------|--|--|---|---|
| I       | 5     | Discuss the historical development of psychiatry and psychiatric development | <b>Introduction and historical development</b><br>* History of psychiatry<br>* Historical development of mental health nursing<br>* Philosophy, principles of mental health and psychiatric nursing<br>* Concept of normal and abnormal behaviour<br>* Role and qualities of mental health and psychiatric nursing<br>* Mental health team and functions of team members<br>* Legal aspects in psychiatry and mental health services | • Chalkboard<br>• Transparency<br>• Power Point<br>• Charts | ➤ Assignments<br>➤ Unit tests,<br>➤ Essay type<br>➤ Short Answers<br>➤ Objectives<br>➤ Type |

|     |    |   |  |   |   |
|-----|----|---|--|---|---|
| II  | 5  | Discuss history taking.<br><br>Describe mental status examination   | <b>Classification and assessment of mental disorders</b><br>* Terminologies used in psychiatry<br>* Classification of mental disorders<br>* Etiological factors and psychopathology of mental disorders<br>* History taking and assessment methods for mental disorders.   | Chalkboard<br>• Transparency<br>• Power Point<br>• Charts | > Assignments<br>> Unit tests,<br>> Essay type<br>> Short Answers<br>> Objectives<br>> Type |
| III | 4  | Enlist various types of therapeutic techniques.<br><br>Explain the elements of nurse patient contract.            | <b>Therapeutic communication</b><br>* Communication process<br>* Interview skills, therapeutic communication techniques.<br>Nurse patient Relationship, therapeutic impasse and its management process recording.  | Chalkboard<br>• Transparency<br>• Power Point<br>• Charts | > Assignments<br>> Unit tests,<br>> Essay type<br>> Short Answers<br>> Objectives<br>> Type |
| IV  | 20 | Write the management of patient with Schizophrenia.<br><br>Discuss the management of patient with mood disorders. | <b>Management of mental disorders.</b><br>* Etiological factors, psychopathology, types, clinical features, diagnostic criteria, treatment and nursing management of patient with following disorders:<br>* Neurotic Disorders: Anxiety Neurosis, Depressive Neurosis, Obsessive compulsive Neurosis, phobic Neurosis and Hypochondriacal Neurosis, Stress related and somatoform disorders.<br>* Psychotic Disorders: Schizophrenic form, affective and organic psychosis.<br>* Organic Brain syndromes | Chalkboard<br>• Transparency<br>• Power Point<br>• Charts | > Assignments<br>> Unit tests,<br>> Essay type<br>> Short Answers<br>> Objectives<br>> Type |



|     |   |   |  |   |   |
|-----|---|---|--|---|---|
|     |   | Explain the management of patient with neurotic disorder.               | * Psychosomatic disorders<br>* Personality disorders<br>* Disorders of childhood and adolescence.  |   |   |
| V   | 3 | Discuss the management of patient with substance use disorder.          | <b>Management of patients with substance use disorders</b><br>* Substance use and misuse.<br>* Dependence, intoxication and withdrawal<br>* Classification of psychoactive substances<br>* Etiological and contributory factors<br>* Psychopathology<br>* Clinical features<br>* Diagnostic criteria<br>* Treatment and nursing management of patient with substance use disorders.<br>* Preventive and rehabilitative aspects in substance abuse. | <ul style="list-style-type: none"> <li>• Chalkboard</li> <li>• Transparency</li> <li>• Power Point</li> <li>• Charts</li> </ul> | <ul style="list-style-type: none"> <li>➤ Assignments</li> <li>➤ Unit tests,</li> <li>➤ Essay type</li> <li>➤ Short Answers</li> <li>➤ Objectives</li> <li>➤ Type</li> </ul> |
| VI  | 2 | Discuss the nursing management of patient with mental deficiency.       | <b>Management of mental sub-normality</b><br>* Classification of mental sub-normality<br>* Etiological factors, psychopathology, psychometric assessment, diagnostic criteria and management of sub-normality.   | <ul style="list-style-type: none"> <li>• Chalkboard</li> <li>• Transparency</li> <li>• Power Point</li> <li>• Charts</li> </ul> | <ul style="list-style-type: none"> <li>➤ Assignments</li> <li>➤ Unit tests,</li> <li>➤ Essay type</li> <li>➤ Short Answers</li> <li>➤ Objectives</li> <li>➤ Type</li> </ul> |
| VII | 4 | Enlist the psychiatric emergencies.<br><br>Discuss crisis intervention. | <b>Psychiatric Emergencies</b><br>* Types of emergencies, psychopathology, clinical features, assessment and diagnosis, treatment and nursing management of patient with psychiatric emergencies.<br>* Crisis intervention therapy.  | <ul style="list-style-type: none"> <li>• Chalkboard</li> <li>• Transparency</li> <li>• Power Point</li> <li>• Charts</li> </ul> | <ul style="list-style-type: none"> <li>➤ Assignments</li> <li>➤ Unit tests,</li> <li>➤ Essay type</li> <li>➤ Short Answers</li> <li>➤ Objective</li> <li>➤ Type</li> </ul>  |

|      |    |   |  |   |   |
|------|----|---|--|---|---|
| VIII | 12 | Discuss Psychopharmacology in mental disorders.<br><br>Explore psychological therapies used in mental disorder. | <b>Therapeutic Modalities</b><br>Principles, indication, contraindications and role of nurse in various treatment methods:<br>* Therapeutic community and Milieu therapy<br>* Occupational therapy<br>* Psychotherapy<br>* Behaviour therapy<br>* Group therapy<br>* Family therapy<br>* Pharmacotherapy<br>* Electro convulsive therapy<br>* Other miscellaneous therapies. | <ul style="list-style-type: none"> <li>• Chalkboard</li> <li>• Transparency</li> <li>• Power Point</li> <li>• Charts</li> </ul> | <ul style="list-style-type: none"> <li>➤ Assignments</li> <li>➤ Unit tests,</li> <li>➤ Essay type</li> <li>➤ Short Answers</li> <li>➤ Objectives</li> <li>➤ Type</li> </ul> |
| IX   | 5  | Discuss the levels of prevention in psychiatry.<br><br>Explain national mental health programme                 | <b>Preventive Psychiatry</b><br>* Model of prevention<br>* Role of nurse in preventive psychiatry<br>* Psychiatric social work<br>* Community mental health nursing<br>* Community mental health agencies<br>* National mental health programmes   | <ul style="list-style-type: none"> <li>• Chalkboard</li> <li>• Transparency</li> <li>• Power Point</li> <li>• Charts</li> </ul> | <ul style="list-style-type: none"> <li>➤ Assignments</li> <li>➤ Unit tests,</li> <li>➤ Essay type</li> <li>➤ Short Answers</li> <li>➤ Objectives</li> <li>➤ Type</li> </ul> |

### PRACTICUM

The student will be provided opportunity to:

- Observe, record and report the behavior of their selected patients.
- Record the process of interaction
- Assess the nursing needs of their selected patients, plan and implement the nursing intervention.
- Counsel the attendant and family members of patient.
- Participate in the activities of psychiatric team
- Write observation report after a field visit to the following places:
- Child guidance clinic,
- School/Special Schools (For Mentally subnormal)
- Mental Hospital
- Community mental health centres,
- De-addiction centre.



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## References:

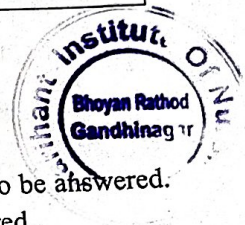
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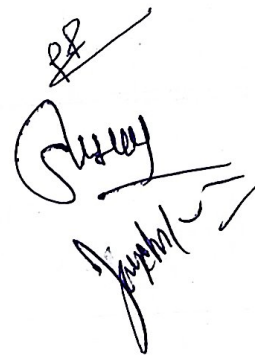

**DISTRIBUTION OF TYPE OF QUESTION AND MARKS FOR THE SUBJECT  
MENTAL HEALTH NURSING**

| Question No. | Question description  | Division of marks | Total marks |
|--------------|---|-------------------|-------------|
| 1.           | <b>Total MCQs:- 15</b>  | 15 x 1            | 15          |
| 2.           | <b>Long Answer Questions (LAQ) (Any 2 out of 3)</b>               | 2 x 10            | 20          |
| 3.           | <b>Short Notes (8 out of 10)</b><br>a) b) c) d) e) f) g) h) i) j) | 8x5               | 40          |

**Note :**

1. MCQ : Each MCQ carries 1 mark.
2. Long Answer Questions : 3 questions will be given out of which , 2 have to be answered.
3. Short Notes : 10 questions will be given out of which, 8 have to be answered.



# INTRODUCTION TO NURSING EDUCATION

Placement : Second year Time

Allotted: Theory -60 hrs

Practical -75 hrs

## COURSE DESCRIPTION

This course introduced the students to principles and concepts of education, curriculum development and methods and media of teaching. It also describes the steps in curriculum development and implementation of educational programmes in nursing.

## OBJECTIVES

At the end of the course, the students will

1. Describe the philosophy and principles of education.
2. Explain the teaching – learning process
3. Develop the ability to teach, using various methods and media.
4. Describe the process of assessment.
5. Describe the administrative aspects of school of nursing
6. Participate in planning and organizing an in-service education programme.
7. Develop basic skill of counseling and guidance.

| UNIT NO | HOURS | Learning Objective   | COURSE CONTENT  | TEACHING LEARNING ACTIVITIES   | ASSESSMENT   |
|---------|-------|--|---|--|--|
| I       | 2     | Discuss the Meaning of education, aims, function and principles. Philosophy of education | <b>Introduction to education</b><br>Meaning of education, aims, function and principles.<br>Philosophy of education | <ul style="list-style-type: none"><li>• Chalkboard</li><li>• Transparency</li><li>• Power Point</li><li>• Charts</li></ul> | <ul style="list-style-type: none"><li>➤ Assignments</li><li>➤ Unit tests,</li><li>➤ Essay type</li><li>➤ Short Answers</li><li>➤ Objectives</li><li>➤ Type</li></ul> |

|     |    |   |   |  |   |
|-----|----|---|---|--|---|
| II  | 4  | Discuss Teaching learning process           | <b>Teaching learning process</b><br>* Nature and characteristics of learning<br>* Principles and maxims of teaching<br>* Formulating objectives<br>* Lesson planning.   | <b>Chalkboard</b><br>• Transparency<br>• Power Point<br>• Charts | > Assignments<br>> Unit tests,<br>> Essay type<br>> Short Answers<br>> Objectives<br>> Type |
| III | 10 | Enlist various types of Methods of teaching | <b>Methods of teaching</b><br>* Teaching methods<br>* Lecture<br>* Discussion<br>* Demonstration<br>* Group discussion<br>* Project<br>* Role play<br>* Panel discussion<br>* Symposium<br>* Seminar<br>* Field trip<br>* Workshop<br>* Exhibition<br>* Programmed instruction<br>* Computer assisted learning<br>* Clinical teaching methods:<br>* Case methods<br>* Case presentation<br>* Nursing rounds and reports<br>* Bedside clinic<br>* Conference(individual and group)<br>* Recording of interaction process | • Chalkboard<br>• Transparency<br>• Power Point<br>• Charts      | > Assignments<br>> Unit tests,<br>> Essay type<br>> Short Answers<br>> Objectives<br>> Type |



|    |    |                                   |   |   |   |
|----|----|-----------------------------------|---|---|---|
| IV | 10 | Explain the Educational media     | <b>Educational media</b><br>* The communication process: factors affecting communication<br>* Purposes and types of audio-visual aids<br>* Graphics aid: Chalk-board, charts, graphs, posters, flash cards, flannel graph/khadigraph, bulletin, cartoon.<br>* Three dimensional aids: Objects, specimen, models, puppets.<br>* Printed aids: pamphlets and leaflets<br>* Projected aids: slides, films and televisions, VCR, VCP, Overhead projector, camera, microscope.<br>* Audio – Aids: Tape-recorder, public address system, computer | <ul style="list-style-type: none"> <li>• Chalkboard</li> <li>• Transparency</li> <li>• Power Point</li> <li>• Charts</li> </ul> | <ul style="list-style-type: none"> <li>➤ Assignments</li> <li>➤ Unit tests,</li> <li>➤ Essay type</li> <li>➤ Short Answers</li> <li>➤ Objectives</li> <li>➤ Type</li> </ul> |
| V  | 10 | Discuss the Methods of assessment | <b>Methods of assessment</b><br>* Purpose and scope of evaluation and assessment<br>* Criteria for selection of assessment techniques and methods<br>* Assessment of knowledge: essay type Question, SAQ(Short Answer Questions)<br>* MCQ(multiple choice Questions)<br>* Assessment of skills: Observation, check list. Practical examination, Viva, objective structured clinical examination.<br>* Assessment of attitude: Attitude scale.   | <ul style="list-style-type: none"> <li>• Chalkboard</li> <li>• Transparency</li> <li>• Power Point</li> <li>• Charts</li> </ul> | <ul style="list-style-type: none"> <li>➤ Assignments</li> <li>➤ Unit tests,</li> <li>➤ Essay type</li> <li>➤ Short Answers</li> <li>➤ Objectives</li> <li>➤ Type</li> </ul> |

|      |    |   |   |   |   |
|------|----|---|---|---|---|
| VI   | 10 | Discuss the Management of school of Nursing | <b>Management of school of Nursing</b><br>* Planning of school of nursing, organization<br>* Recruitment of teaching staff, budget, facilities for the school, student selection and admission procedure, administrative planning for students, welfare services for students, maintenance of school records, preparation of annual reports. INC guidelines for school of nursing | <ul style="list-style-type: none"> <li>• Chalkboard</li> <li>• Transparency</li> <li>• Power Point</li> <li>• Charts</li> </ul> | <ul style="list-style-type: none"> <li>➤ Assignments</li> <li>➤ Unit tests,</li> <li>➤ Essay type</li> <li>➤ Short Answers</li> <li>➤ Objectives</li> <li>➤ Type</li> </ul> |
| VII  | 8  | Discuss Guidance and counseling.            | <b>Guidance and counseling definition</b><br>* Basic principles of guidance and counseling<br>* Organisation of guidance and counseling services<br>* Counselling process<br>* Managing disciplinary problems<br>* Management of crisis   | <ul style="list-style-type: none"> <li>• Chalkboard</li> <li>• Transparency</li> <li>• Power Point</li> <li>• Charts</li> </ul> | <ul style="list-style-type: none"> <li>➤ Assignments</li> <li>➤ Unit tests,</li> <li>➤ Essay type</li> <li>➤ Short Answers</li> <li>➤ Objectives</li> <li>➤ Type</li> </ul> |
| VIII | 6  | Discuss In-service education.               | <b>In-service education</b><br>* Introduction to nature scope of in-service education programme<br>* Principles of adult learning<br>* Planning for in- service programme<br>* Techniques, and methods of staff education programme<br>* Evaluation of in-service programme.  | <ul style="list-style-type: none"> <li>• Chalkboard</li> <li>• Transparency</li> <li>• Power Point</li> <li>• Charts</li> </ul> | <ul style="list-style-type: none"> <li>➤ Assignments</li> <li>➤ Unit tests,</li> <li>➤ Essay type</li> <li>➤ Short Answers</li> <li>➤ Objectives</li> <li>➤ Type</li> </ul> |



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## PRACTICUM

Each student should:

- Conduct five planned teaching using different methods and media
- Prepare different types of teaching aids
- Plan, organize and conduct inservice education programme.
- Conduct at least one counseling session
- Prepare rotation plans.

## References :

1. Bhatia, Kamala & Bhatia B.D.: The Principles and Methods of Teaching: Delhi, Doaba House, 1977.
2. Neeraja, Nursing Education, New Delhi, Jaypee Brother, 2004.
3. Safaya, Raghunath & Shaída, B.D. Educational Theory & Practice, Delhi, Dhanpat Row & Sons, 1974.
4. Bhatia, Hans Raj Elements of Educational Psychology, Bombay, QnentConpman, 5th ed. 1973.

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**DISTRIBUTION OF TYPE OF QUESTION AND MARKS  
FOR THE SUBJECT INTRODUCTION TO NURSING EDUCATION**

| Question No. | Question description                                       | Division of marks | Total marks |
|--------------|--|-------------------|-------------|
| 1.           | Total MCQs:- 15  | 15 x 1            | 15          |
| 2.           | Long Answer Questions (LAQ)<br>(Any 2 out of 3)            | 2 x 10            | 20          |
| 3.           | Short Notes (8 out of 10)<br>a) b) c) d) e) f) g) h) i) j) | 8x5               | 40          |

**Note :**

1. MCQ : Each MCQ carries 1 mark.
2. Long Answer Questions : 3 questions will be given out of it 2 have to be answered.
3. Short Notes : 10 questions will be given out of it 8 have to be answered.




## INTRODUCTION TO NURSING SERVICE ADMINISTRATION

Placement : Second year Time

Allotted: Theory -60 hrs

Practical -180 hrs

### COURSE CONTENTS

This course is designed to give an opportunity to the student to gain an understanding of the principles of administration and its application to nursing service. It is also intended to assist the students to develop an understanding of professional leadership need.

### OBJECTIVES

At the end of the course, the student will

1. Identify the principles of administration
2. Describe the principles and techniques of supervision
3. Explain the principles and methods of personnel management
4. Explain the principles of budgeting
5. Organise and manage a nursing unit effectively
6. Identify dynamics of organizational behaviour, styles and functions of effective leadership.

| UNIT NO | HOURS | Learning Objective   | COURSE CONTENT   | TEACHING LEARNING ACTIVITIES   | ASSESSMENT   |
|---------|-------|--|--|--|--|
| I       | 2     | Discuss the Meaning of education, aims, function and principles. Philosophy of education | <b>Principles and practice of Administration</b><br>* Significance, elements and principles of administration,<br>* Organization of hospital – Definition, Aims, functions and classifications, health team.<br>* Policies of hospital, different departments with special emphasis to department of | <ul style="list-style-type: none"><li>• Chalkboard</li><li>• Transparency</li><li>• Power Point</li><li>• Charts</li></ul> | <ul style="list-style-type: none"><li>➤ Assignments</li><li>➤ Unit tests,</li><li>➤ Essay type</li><li>➤ Short Answers</li><li>➤ Objectives</li><li>➤ Type</li></ul> |

|     |    |   |   |   |   |
|-----|----|---|---|---|---|
|     |    |   | nursing and office management.<br>* Responsibilities of the nursing personnel specially of ward sister, medico legal aspects, concept of cost effectiveness.  |   |   |
| II  | 4  | Discuss Teaching learning process           | <b>Nursing unit Management</b><br>* Physical layout of a nursing unit and necessary facilities<br>* Factors affecting the quality of nursing care<br>* Maintenance of a therapeutic environment<br>* Administration of the unit-management of patient care<br>* Maintenance of physical environment<br>* Assignment of duties and time plan.<br>* Patient assignment, safety measures, prevention of accidents and infections,<br>* Maintenance of patients records and reports, legal responsibilities.<br>* Maintenance of quality nursing care, nursing audit. | Chalkboard<br><br>• Transparency<br><br>• Power Point<br><br>• Charts   | <ul style="list-style-type: none"> <li>➤ Assignments</li> <li>➤ Unit tests,</li> <li>➤ Essay type</li> <li>➤ Short Answers</li> <li>➤ Objectives</li> <li>➤ Type</li> </ul> |
| III | 10 | Enlist various types of Methods of teaching | <b>Personnel management</b><br>* Staff recruitment and selection, appointment, promotions, personnel policies and job descriptions.<br>* Job analysis.<br>* Staffing the unit, staffing norms, rotation plan, leave planning, performance appraisal, staff welfare and management of disciplinary problems.   | <ul style="list-style-type: none"> <li>• Chalkboard</li> <li>• Transparency</li> <li>• Power Point</li> <li>• Charts</li> </ul> | <ul style="list-style-type: none"> <li>➤ Assignments</li> <li>➤ Unit tests,</li> <li>➤ Essay type</li> <li>➤ Short Answers</li> <li>➤ Objectives</li> <li>➤ Type</li> </ul> |



|     |    |   |   |   |   |
|-----|----|---|---|---|---|
| IV  | 10 | Explain the Educational media               | <b>Supervision</b><br>* Principles of supervision, nature and objectives<br>* Tools and techniques of supervision<br>* Evaluation<br>* Nursing audit<br>* Staff development – orientation program<br>* Skill training<br>* Leadership development<br>* Problem solving process. | • Chalkboard<br>• Transparency<br>• Power Point<br>• Charts | ➤ Assignments<br>➤ Unit tests,<br>➤ Essay type<br>➤ Short Answers<br>➤ Objectives<br>➤ Type |
| V   | 10 | Discuss the Methods of assessment           | <b>Material management</b><br>* Principles of material management<br>* Quality control<br>* Inventory, care of equipment, safekeeping<br>* Role of nursing personnel in material management.  | • Chalkboard<br>• Transparency<br>• Power Point<br>• Charts | ➤ Assignments<br>➤ Unit tests,<br>➤ Essay type<br>➤ Short Answers<br>➤ Objectives<br>➤ Type |
| VI  | 10 | Discuss the Management of school of Nursing | <b>Financial Management</b><br>* Budgeting – Principles of budgeting, audit.  | • Chalkboard<br>• Transparency<br>• Power Point<br>• Charts | ➤ Assignments<br>➤ Unit tests,<br>➤ Essay type<br>➤ Short Answers<br>➤ Objectives<br>➤ Type |
| VII | 8  | Discuss Guidance and counseling.            | <b>Organizational behaviour</b><br>* Group dynamic and human relation, organizational communication (hospital information system)<br>* Public relations, leadership styles and functions<br>* Methods of reporting<br>* Maintaining records and reports                         | • Chalkboard<br>• Transparency<br>• Power Point<br>• Charts | ➤ Assignments<br>➤ Unit tests,<br>➤ Essay type<br>➤ Short Answers<br>➤ Objectives<br>➤ Type |

## PRACTICUM

Observe the functioning of nursing administration at various level i.e. institution, department, unit.

Each student will practice ward management under supervision.

Student will prepare rotation plan of the staff, write reports, give verbal report of the ward and assist in maintaining the inventory of the nursing unit.

Visit to private and government hospital and write observation reports.

### References :

1. TNAI. Nursing Administration and Management, 1st edn, Academic Press: New Delhi, 2000.
2. Shakharkar, B M. Principles of Hospital Administration and Planning, Jaypee Brothers: Bangalore, 1998.
3. Pai, Pragna. Effective Hospital Management, 1st edn, The National Book Depot: Mumbai, 2002.
4. Srinivasan, A V. Managing a Modern Hospital, 1st edn, Sage Publications: New Delhi, 2002.
5. Basavanthappa, B T. Nursing Administration, 1st edn, J P Brothers Medical Publishers: New Delhi, 2000.
6. Goel, S & Kumar, R. Hospital Administration and Management, 1st edn, Deep and Deep Publications: New Delhi, 2000.
7. Park K. Park's Textbook of Preventive and Social Medicine, 17th edn, M/S Banarsidas Bhanot Publishers: Jabalpur, 2003.
8. Russels, C S. Management & Leadership for Nurse Managers, 3rd edn, Jones Bartlett Publishers: London, 2002.



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**DISTRIBUTION OF TYPE OF QUESTION AND MARKS**  
**FOR THE SUBJECT**  
**INTRODUCTION TO NURSING ADMINISTRATION**

| Question No. | Question description                                       | Division of marks | Total marks |
|--------------|--|-------------------|-------------|
| 1.           | Total MCQs:- 15  | 15 x 1            | 15          |
| 2.           | Long Answer Questions (LAQ)<br>(Any 2 out of 3)            | 2 x 10            | 20          |
| 3.           | Short Notes (8 out of 10)<br>a) b) c) d) e) f) g) h) i) j) | 8x5               | 40          |

**Note :**

1. MCQ : Each MCQ carries 1 mark.
2. Long Answer Questions : 3 questions will be given out of which , 2 have to be answered.
3. Short Notes : 10 questions will be given out of which, 8 have to be answered.

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*(Surya)*



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*Prashant*

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## INTRODUCTION TO NURSING RESEARCH AND STATISTICS

Placement :Second Year Time

Allotted: Theory -45 hrs

Practical -120 hrs

### COURSE DESCRIPTION

The course is designed to assist the students to develop an understanding of basic concepts of research and statistics, use the findings of nursing research in nursing practice, apply the knowledge in conducting projects(s) and solve problems related to nursing using scientific method.

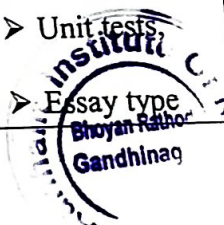
### OBJECTIVES

At the end of the course, the students will:-

1. Define the terms and concepts of nursing research
2. Identify needs and scope of nursing research
3. Identify and define a research problem
4. Locate and list sources of literature for a specific study
5. Describe different research approaches, methods of data collection and sampling techniques with a special reference to survey method.
6. Develop tool for data collection
7. Enumerate steps of data analysis and present data summary in tabular form.
8. Use descriptive and co-relational statistics in data analysis
9. Conduct a group research project.

| UNIT NO | HOURS | Learning Objective              | COURSE CONTENT   | TEACHING LEARNING ACTIVITIES   | ASSESSMENT  |
|---------|-------|---------------------------------|--|--|---|
| I       | 4     | Defines the research definition | <b>A.INTRODUCTION TO RESEARCH METHODOLOGY</b><br>* Steps of scientific methods.<br>* Definition of research<br>* Need for nursing research<br>* Characteristics of good research.<br>Research process. | <ul style="list-style-type: none"><li>• Chalkboard</li><li>• Transparen cy</li></ul> | <ul style="list-style-type: none"><li>➤ Assignments</li><li>➤ Unit tests,</li><li>➤ Objectives</li><li>➤ Type</li></ul> |

|     |   |  |  |  |   |
|-----|---|--|--|--|---|
| II  | 4 | Discuss the Definition or research terms and Review of literature. | <b>Statement of research problem</b><br>* Statement of purpose and objectives<br>* Definition or research terms<br>* Review of literature.   | <ul style="list-style-type: none"> <li>• Chalkboard</li> <li>• Transparency</li> <li>• Power Point</li> </ul>        | <ul style="list-style-type: none"> <li>➤ Assignments</li> <li>➤ Short Answers</li> <li>➤ Objectives</li> <li>➤ Type</li> </ul>        |
| III | 4 | Discuss Research approaches  | <b>Research approaches:-</b> historical, survey and experimental   | <ul style="list-style-type: none"> <li>• Chalkboard</li> <li>• Transparency</li> <li>• Power Point</li> </ul>        | <ul style="list-style-type: none"> <li>➤ Essay type</li> <li>➤ Short Answers</li> <li>➤ Objectives</li> <li>➤ Type</li> </ul>         |
| IV  | 4 | Enlist various Sampling techniques and methods of data collection  | <b>Sampling techniques and methods of data collection.</b><br>* Sampling<br>* Instruments-Questionnaire.<br>Interview<br>* Observation schedule, records, measurements<br>* Reliability and validity or instruments. | <ul style="list-style-type: none"> <li>• Chalkboard</li> <li>• Transparency</li> </ul>                               | <ul style="list-style-type: none"> <li>➤ Assignments</li> <li>➤ Objectives</li> <li>➤ Type</li> </ul>                                 |
| V   | 4 | Explain the Analysis of Data                                       | <b>Analysis of Data:</b> Tabulation<br>* Classification and summarization<br>* Presentation<br>* Interpretation of data  | <ul style="list-style-type: none"> <li>• Chalkboard</li> <li>• Transparency</li> <li>• Power Point</li> </ul> Charts | <ul style="list-style-type: none"> <li>➤ Assignments</li> <li>➤ Unit tests,</li> <li>➤ Essay type</li> <li>➤ Short Answers</li> </ul> |
| VI  | 4 | Discuss the Communication of research findings                     | <b>Communication of research findings</b><br>* Writing Report:<br>* Organizing materials for writing<br>* Format of the report<br>* Use of computers   | <ul style="list-style-type: none"> <li>• Chalkboard</li> <li>• Transparency</li> </ul>                               | <ul style="list-style-type: none"> <li>➤ Assignments</li> <li>➤ Unit tests,</li> <li>➤ Objectives Type</li> </ul>                     |
| VII | 8 | Discuss the Measures of central tendency                           | <b>B.INTRODUCTION TO STATISTICS</b><br>* Descriptive Statistics.<br>* Frequency Distribution –Types of measure – frequencies, class  | <ul style="list-style-type: none"> <li>• Chalkboard</li> <li>• Transparency</li> </ul>                               | <ul style="list-style-type: none"> <li>➤ Assignments</li> <li>➤ Unit tests</li> <li>➤ Essay type</li> </ul>                           |



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|      |   |  |   |   |  |
|------|---|--|---|---|--|
|      |   |  | interval, graphic methods of describing frequency.<br>* Measures of central tendency – Mode, Median and mean.<br>* Measures of variability : Range, standard deviation<br>* Introduction to normal probability.   | <ul style="list-style-type: none"> <li>• Power Point</li> <li>Charts</li> </ul>                               | <ul style="list-style-type: none"> <li>➤ Short Answers</li> <li>➤ Objectives</li> <li>➤ Type</li> </ul>      |
| VIII | 4 | Discuss Correlation                              | <b>Correlation</b><br>* Computation by rank difference methods<br>* Uses of correlation co-efficient  | <ul style="list-style-type: none"> <li>• Chalkboard</li> <li>• Transparency</li> </ul>                        | <ul style="list-style-type: none"> <li>➤ Assignments</li> <li>➤ Objectives</li> <li>Type</li> </ul>          |
| IX   | 4 | Discuss Biostatistics                            | <b>Biostatistics:</b> Crude rates and standardized rates, ratio and estimation of the trends.   | <ul style="list-style-type: none"> <li>• Chalkboard</li> <li>• Transparency</li> <li>• Power Point</li> </ul> | <ul style="list-style-type: none"> <li>➤ Assignments</li> <li>➤ Unit tests,</li> <li>➤ Essay type</li> </ul> |
| X    | 6 | Explain the Introduction to computers in nursing | <b>Introduction to computers in nursing</b><br>* Introduction to computers and disk-operating system.<br>* Introduction to word processing<br>* Introduction to data base<br>* Windows applications, word, excel, power point, multimedia.<br>* Use of statistical packages.<br>* Introduction to internet & use of electronic mail<br>* Computer aided teaching and testing. | <ul style="list-style-type: none"> <li>• Chalkboard</li> <li>• Transparency</li> <li>• Power Point</li> </ul> | <ul style="list-style-type: none"> <li>➤ Assignments</li> <li>➤ Unit tests,</li> <li>➤ Essay type</li> </ul> |

### PRACTICUM

Students will conduct research project in small groups in selected areas of nursing and submit a report (Group studies may include studying of existing health practices, improved practices of nursing (procedures) health records, patient records and survey on nursing literature)

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### References:

1. Polit, D.F. & Beck CT, Nursing Research, Principles and Methods, 7th ed. Lippincott Williams & Wilkins, Philadelphia, 2003.
2. Polit Dennis and Hunglar B P, Nursing research principles and methods, 6th edition Lippincott, Philadelphia, 1999.
3. Laura A. Talbot, Principles and practice of nursing research, Mosby St. Louis 1993.
4. Dorothy Y B & Marie TH, Fundamentals of research in Nursing, 3rd ed. Jones & Bartlett Publishers, Boston, 2003.
5. Rao TB, Methods in Medical Research, 1st ed, Radha Rani Publishers, Guntur AP, 2002.
6. Smith, P Research Mindedness for Practice. An interactive approach for nursing and health care, Churchill Livingstone, New York, 1997
7. American Psychological Association publication manual. 2001.
8. Mahajan Methods in Bio statistics.
9. Treece E.W. & Treece JW: Elements of Research in Nursing, 3rd ed The CV Mosby Company St. Louis 1986.

### DISTRIBUTION OF TYPE OF QUESTION AND MARKS FOR THE SUBJECT INTRODUCTION TO NURSING RESEARCH AND STATISTICS

| Question No. | Question description                            | Division of marks | Total marks |
|--------------|---|-------------------|-------------|
| 1.           | Total MCQs:- 10                                 | 10 x 1            | 10          |
| 2.           | Long Answer Questions (LAQ)<br>(Any 2 out of 3) | 2 x 10            | 20          |
| 3.           | Short Notes (4 out of 6)<br>a) b) c) d) e) f)   | 4x5               | 20          |

### Note :

1. MCQ : Each MCQ carries 1 mark.
2. Long Answer Questions : 3 questions will be given out of which , 2 have to be answered in Nursing Research.
3. Short Notes : 6 questions will be given out of which, 4 have to be answered.

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