

1.1.1 Summary table of course objectives for curricular developed and implemented have relevance to the local, regional, national, and global developmental needs:

Sr. No.	Institute	Programme	No. of Course Objectives relevance to the local, regional developmental needs	No. of Course Objectives relevance to the national developmental needs	No. of Course Objectives relevance to the global developmental needs
1.	Swarnim Institute of Technology	B.Tech	51	175	165
Total			51	175	165

1.1 Curriculum Design and Development

Metric No. 1.1.1

Curricula developed and implemented have relevance to the local, regional, national, and global developmental needs, which is reflected in the Programme outcomes (POs), and Course Outcomes (COs) of the Programmes offered by the University.

Document: List of CO's & PO's for Computer engineering

Program Outcomes (PO) of Computer engineering with effect from Academic Year: 2019-2020

PO1- Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2- Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3- Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4-Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5- Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6- The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7- Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8- Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9- Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10- Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11- Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12- Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Course Outcomes					
Academic Year: 2023-24					
			Relevance To The		
Subject	Name Of CO	Description	Regional /Local	National	Global
Semester-1					
23000004 Fundamentals of Computer Programming	CO-1	Apply fundamental principles of problem solving in software engineering.	✓	✓	✓
	CO-2	Apply basic programming principles using C language.	✓	✓	–
	CO-3	Apply basic C program structure in software development	✓	✓	–
	CO-4	Prepare graduates for professional careers in roles including, but not limited to, the following: computer programmer, software engineer, software systems designer, software applications developer, technical software project lead, computer systems analyst, computer systems programmer, software applications tester and maintainer.	✓	✓	✓
	CO-5	To prepare graduates with the knowledge and skills to do advanced studies and research in computer science and related engineering and scientific disciplines	–	✓	✓
23000001 Maths-I	CO-1	Analyze and manipulate infinite sequences and series.	–	✓	✓
	CO-2	Evaluate limits involving indeterminate forms.	–	✓	✓
	CO-3	Understand and apply techniques for improper integrals.	–	✓	✓
	CO-4	Analyze functions of several variables and solve optimization problems.	–	✓	✓
	CO-5	Solve systems of linear equations using matrices and determinants.	✓	✓	✓
23000012 Elements of electrical engineering	CO-1	Apply fundamental principles of problem solving in software engineering.	✓	✓	✓
	CO-2	Apply basic programming principles using C language.	✓	✓	–
	CO-3	Apply basic C program structure in software development	✓	✓	–
	CO-4	Prepare graduates for professional careers in roles including, but not limited to, the following: computer programmer, software engineer, software systems designer, software applications developer, technical software project lead, computer systems analyst, computer systems programmer, software applications tester and maintainer.	✓	✓	✓

	CO-5	To prepare graduates with the knowledge and skills to do advanced studies and research in computer science and related engineering and scientific disciplines	—	✓	✓
23000003 Elements of Mechanical Engineering	CO-1	Describe the various sources of energy and basic terminology of Mechanical engineering.	✓	✓	✓
	CO-2	Make calculations for commonly used working fluids i.e. ideal gases and steam.	—	✓	✓
	CO-3	Analyze various heat engine cycles and understand construction and working of IC engines.	✓	✓	✓
	CO-4	Discuss working and applications of steam boilers and various energy conversion systems.	✓	✓	✓
	CO-5	Discuss various power transmission elements and properties of various engineering materials with their applications.	✓	✓	✓
12300001 Orientation Program in Start- up and Entrepreneurship	CO-1	Apply the basic principles of entrepreneurship	✓	✓	✓
	CO-2	Distinguish the concepts of the entrepreneurship ecosystem, entrepreneurship education, and various entrepreneurial opportunities	✓	✓	✓
	CO-3	Understanding various individual attributes of entrepreneurial personality traits, entrepreneurial characteristics, behavioral attributes and importance of creativity and innovation.	✓	✓	✓
	CO-4	Develop an understanding of best techniques for idea generation and opportunities exploration.	✓	✓	✓
23000002 Electrical and Electronics Workshop	CO-1	Measure different electrical quantities.	—	—	✓
	CO-2	Understand the requirement and operation of safety devices	—	—	✓
	CO-3	Select the appropriate tools and components required for specific operation	—	—	✓
	CO-4	Wire and trouble shoot of house-hold appliances.	—	✓	—
Semester-2					
23000005 Engineering Physics	CO-1	Understand the basic concepts and classification of sound.	✓	✓	✓
	CO-2	Analyze applications of superconductors.	—	✓	✓
	CO-3	Understand the fundamentals of laser radiation.	—	—	✓
	CO-4	Evaluate the applications of optical fibers.	—	✓	✓
	CO-5	Apply dielectric materials in capacitors and transformers.	—	✓	✓

23000008 Communication Skills	CO-1	To improve students' communicative and linguistic approach in English.	✓	✓	✓
	CO-2	To provide an icebreaking technique using LSRW skills and soft skills	✓	✓	✓
	CO-3	To learn techniques to improve overall communication abilities and effective use of writing in the field of advertising and public relations.	–	✓	✓
	CO-4	Improve communication skills through practicing debate, discussion and appearing in interview.	–	✓	✓
	CO-5	Use of ethical consideration in order to develop good etiquettes both in online and offline communication.	–	✓	✓
23000009 Basic Electronics	CO-1	To study basics of semiconductor & devices and their applications in different areas.	–	✓	✓
	CO-2	Demonstrate the operating principle and output characteristics of pn junction diodes, zener diode, Varactor diode, BJT, rectifiers and different diode circuits	–	✓	✓
	CO-3	Compute and characterization of different biasing techniques to operate transistor, FET, MOSFET and operational amplifier in different modes	–	✓	✓
	CO-4	To implementation of basic digital gates using diode and basic family of logic families	–	✓	✓
23000010 Maths-II	CO-1	Understand vectors in $R^n \times R^n$ and operations involving linear combinations.	–	–	✓
	CO-2	Identify subspaces and determine basis and dimension and Perform coordinate transformations and understand the change of basis.	–	–	✓
	CO-3	Understand linear transformations and their properties and represent linear transformations with matrices and explore the concept of similarity.	–	–	✓
	CO-4	Apply inner product spaces to least squares approximation and diagonalization of symmetric matrices and Explore applications of quadratic forms and optimization.	–	–	✓
	CO-5	Apply double and triple integrals over different regions and Utilize Fubini's	–	–	✓

		theorem and change of variables in multiple integrals.			
	CO-6	Apply integration techniques to calculate volumes of various solids.	–	–	✓
23000011 Engineering Graphics	CO-1	Describe the fundamental methods of engineering drawing, sketching and drafting.	–	✓	✓
	CO-2	Understanding the object through orthographic projections.	–	✓	✓
	CO-3	Construct basic and intermediate geometry and application of engineering curves.	–	✓	✓
	CO-4	Enhance visualization skills for developing new products.	–	✓	✓
	CO-5	Develop new products through technical communication skill in the form of communicative drawings.	–	✓	✓
	CO-6	Develop the theory of orthographic projection and views.	–	✓	✓
12300002 Basic Program in Entrepreneurship	CO-1	Develop an understanding of best techniques for idea generation, opportunities exploration, and market research.	✓	✓	✓
	CO-2	Check technical, market, financial and other types of Feasibility of their business idea.	✓	✓	✓
	CO-3	Develop business model to describe the rationale of how an organization creates, delivers, and captures value	–	✓	✓
	CO-4	Conduct the customer's survey to know the need of their business idea.	✓	✓	–
23000004 Fundamentals of Computer Programming	CO-1	Apply fundamental principles of problem solving in software engineering.	✓	✓	✓
	CO-2	Apply basic programming principles using C language.	✓	✓	–
	CO-3	Apply basic C program structure in software development	✓	✓	–
	CO-4	Prepare graduates for professional careers in roles including, but not limited to, the following: computer programmer, software engineer, software systems designer, software applications developer, technical software project lead, computer systems analyst, computer systems programmer, software applications tester and maintainer.	✓	✓	✓
	CO-5	To prepare graduates with the knowledge and skills to do advanced studies and research in computer science and related engineering and scientific disciplines	–	✓	✓

Semester-3					
23040302 Data Structure And Algorithm	CO-1	Learn the basic types for data structure, implementation and application.	✓	✓	–
	CO-2	Know the strength and weakness of different data structures.	✓	✓	–
	CO-3	Use the appropriate data structure in context of solution of given problem.	✓	✓	✓
	CO-4	Develop programming skills which require solving given problem.	✓	✓	✓
	CO-5	Learn the data structure, implementation and application.	✓	✓	–
23040301 Database Management System	CO-1	Understand the basic concepts of database management systems.	✓	✓	–
	CO-2	Apply SQL to find solutions to a broad range of queries.	✓	✓	✓
	CO-3	Apply normalization techniques to improve database design.	–	–	✓
	CO-4	Analyze a given database application scenario to use ER model.	✓	–	✓
	CO-5	conceptual design of the database.	–	✓	✓
23040303 Computer Network	CO-1	Understand the fundamental concepts of computer networks, including network edge, core, delay, loss, throughput, and protocol layers.	✓	✓	✓
	CO-2	Analyze error detection and correction techniques, multiple access protocols, and Ethernet switching in the link layer and local area networks.	✓	✓	✓
	CO-3	Demonstrate knowledge of network layer functions, including IP addressing, routing algorithms, and virtual/datagram networks.	✓	✓	✓
	CO-4	Explain transport layer services such as UDP, TCP, reliable data transfer, congestion control, and multiplexing/de multiplexing.	–	✓	✓
	CO-5	Evaluate the role of different network protocols and routing techniques in improving network performance and reliability.	–	✓	✓
23000015 Maths III	CO-1	Apply Fourier series to analyze and represent periodic functions.	✓	✓	✓
	CO-2	Apply Laplace transforms to solve differential equations and system problems.	✓	–	✓
	CO-3	Apply methods such as integrating factor, Bernoulli equations, and linear differential equations.	✓	✓	–
	CO-4	Apply series solutions to solve differential equations and analyze the	–	✓	✓

		convergence and divergence of series solutions.			
	CO- 5	Apply the method of separation of variables to solve PDEs to analyze solutions in cylindrical and spherical polar coordinates.	—	✓	✓
12300003 Foundation Program in Entrepreneurship	CO- 1	Apply the basic principles of entrepreneurial finance.	✓	✓	✓
	CO- 2	Understand the importance of industrial collaborations.	✓	✓	✓
	CO- 3	Acquire funds from different sources for seed funding.	—	✓	✓
	CO- 4	Prepare guideline for earning maximum profits with minimum cost.	✓	✓	✓
	CO- 5	Explore Entrepreneurial ecosystem support for start-ups.	✓	✓	✓
Semester-4					
23040401 Operating System	CO- 1	Understand the fundamental concepts of Operating Systems, including their evolution, types, structures, and system calls.	✓	✓	✓
	CO- 2	Analyze process management techniques, including process scheduling, multithreading, and inter-process communication mechanisms.	✓	✓	✓
	CO- 3	Demonstrate knowledge of deadlock handling strategies, including prevention, avoidance, detection, and recovery techniques.	✓	✓	✓
	CO- 4	Explain memory management concepts such as paging, segmentation, virtual memory, and page replacement policies.	✓	✓	✓
	CO- 5	Evaluate various I/O management strategies, file systems, disk scheduling algorithms, and storage structures.	—	✓	✓
	CO-6	Explore Unix/Linux operating systems, including kernel functionalities, system administration, and shell programming.	—	—	✓
23040402 Object Oriented Programming with C++	CO-1	Understand the fundamental concepts of Object-Oriented Programming (OOP), its principles, benefits, and applications.	✓	—	✓
	CO-2	Apply basic C++ programming concepts, including program structure, control structures, data types, and operators.	✓	✓	✓
	CO-3	Implement functions in C++, including inline functions, function overloading, default arguments, and virtual functions.	—	✓	✓
	CO-4	Develop object-oriented solutions using classes, objects, constructors, destructors, and operator overloading.	—	✓	✓

	CO-5	Demonstrate inheritance concepts, including different types of inheritance and method overriding.	✓	✓	✓
23040403 System Software	CO-1	To understand the relationship between system software and machine.	✓	✓	—
	CO-2	To understand architecture..	✓	✓	—
	CO-3	To understand the processing of an HLL program for execution on a computer.	✓	✓	✓
	CO-4	To understand the process of scanning and parsing.	—	✓	✓
	CO-5	To know the design and implementation of assemblers, macro processor, linker.	✓	✓	✓
23070401 Computer Organization and Microprocessor	CO-1	To know the background of internal communication of computer.	✓	✓	—
	CO-2	To have better idea on how to write assemble language programs.	✓	✓	✓
	CO-3	To be clear with memory management techniques.	—	✓	✓
	CO-4	To better with IO devices communication with processor.	✓	✓	✓
	CO-5	To notice how to perform computer arithmetic operations.	✓	✓	—
23000018 Maths-IV	CO-1	Apply methods to handle approximations, errors, and significant figures.	✓	✓	✓
	CO-2	Analyze and solve engineering problems using root-finding techniques.	✓	✓	—
	CO-3	Solve systems of linear equations using Gauss elimination, Gauss–Seidel methods, and their applications.	✓	✓	✓
	CO-4	Apply least squares linear and polynomial regression for data fitting.	—	✓	✓
	CO-5	Apply numerical integration techniques such as the trapezoidal rule and Simpson’s rules to solve engineering problems involving numerical integration through case studies	✓	✓	✓
12300004 Intermediate Program in Entrepreneurship	CO-1	Design marketing and sales strategy for a venture	✓	✓	—
	CO-2	Understand new product design and development procedure.	✓	✓	✓
	CO-3	Register any one form of business.	—	✓	✓
	CO-4	Make pitch deck to present business idea to different stakeholders.	✓	✓	✓

Semester: 5					
23040501 Object Oriented Programming with JAVA	CO-1	Able to solve real world problems using OOP techniques.	✓	✓	✓
	CO-2	Able to understand the use of abstract classes.	—	✓	✓
	CO-3	Able to solve problems using java collection framework and I/o classes.	—	✓	✓
	CO-4	Able to develop multithreaded applications with synchronization.	—	✓	✓
	CO-5	Able to develop applets for web applications.	—	✓	✓
23040503 Information Network & Cyber Security	CO-1	Understand the fundamental concepts of cryptography, including symmetric and asymmetric key models, and their applications in securing data.	✓	✓	—
	CO-2	Analyze different cryptographic techniques such as substitution, transposition, stream ciphers, and block ciphers, including their structures and operational principles.	—	✓	—
	CO-3	Evaluate the security features and transformation functions of encryption standards like DES and AES, and understand the Cipher Block Chaining (CBC) mode of operation.	—	✓	✓
	CO-4	Apply public key cryptographic techniques, including RSA and Diffie-Hellman key exchange algorithms, to secure communication channels.	—	✓	✓
	CO-5	Understand and implement secure hashing mechanisms, digital signatures, and key management strategies to maintain data integrity and authenticity.	—	—	✓
23040504 Web Technology	CO-1	Understand the foundational concepts of the Internet, the World Wide Web, HTTP protocol, web browsers and servers, and Web 2.0 features, along with principles of effective web design and site navigation.	✓	—	✓
	CO-2	Apply basic HTML elements such as text formatting, hyperlinks, tables, images, and meta tags to create structured and interactive web pages.	✓	✓	✓
	CO-3	Develop websites using advanced HTML elements including character entities, frames, frame sets, and understand browser architecture and website structure.	—	✓	✓
	CO-4	Create responsive and semantic web forms using HTML and HTML5, incorporating various input types and new HTML5 elements.	—	✓	✓
	CO-5	Design and style web pages using CSS2 and CSS3, applying layout properties,	—	✓	✓

		background customization, text and font styling, box models, and positioning.			
23040502 Theory of Computation	CO-1	Understand fundamental mathematical concepts including sets, functions, logic, proofs, relations, and recursive definitions essential for formal language theory.	✓	–	✓
	CO-2	Apply the concepts of regular languages and finite automata, including DFA, NFA, ϵ -NFA, their inter conversion, minimization, and use of regular expressions.	✓	✓	✓
	CO-3	Analyze and construct context-free grammars (CFG), evaluate ambiguity, and perform simplification and transformation using normal forms like CNF and GNF.	–	✓	✓
	CO-4	Design and simulate Pushdown Automata (PDA) for context-free languages and understand their correspondence with CFGs.	–	✓	–
	CO-5	Understand and analyze Turing Machines and its variants, including Universal TM and Non-deterministic TM, and explore computational models like Two-Stack PDA.	–	✓	–
23040507 Image Processing	CO-1	Discuss the processes involved in design Engineering	✓	✓	✓
	CO-2	Analyze interesting interaction of various segments of humanities, disciplines and engineering in the progress of a design	✓	✓	✓
	CO-3	Analyze use of AEIOU framework, logbook, mind mapping for the observation.	✓	✓	✓
	CO-4	Identify the flow of the system and design the system accordingly.	✓	✓	✓
	CO-5	Define the problem domain by identifying the various product functions and features and compile the product development canvas.	✓	✓	✓
12300005 Intellectual Property Rights	CO-1	The students once they complete their academic projects, shall get an adequate knowledge on patent and copyright for their innovative research works.	✓	✓	✓
	CO-2	During their research career, information in patent documents provide useful insight on novelty of their idea from state-of-the art search. This provide further way for developing their idea or innovations.	–	✓	–
	CO-3	Pave the way for the students to catch up Intellectual Property(IP) as an career option as a R&D IP Counsel, Government Jobs as Patent Examiner,	✓	✓	✓

		Private Jobs in any corporate, Patent agent and Trademark agent and as an Entrepreneur.			
Semester: 6					
23040601 Wireless Network	CO-1	Understand the architecture and characteristics of 3G/4G and WiMAX wireless networks.	–	✓	✓
	CO-2	Design and implement wireless network environments using appropriate protocols and standards.	–	✓	–
	CO-3	Evaluate the role of wireless communication protocols in mobile computing environments.	–	✓	–
	CO-4	Develop and deploy applications for smart phones and mobile devices using modern wireless technologies.	✓	✓	✓
	CO-5	Assess the strategies and challenges in implementing smart network-based applications in real-world scenarios.	✓	✓	✓
23040602 Compiler Design	CO-1	Realize basics of compiler design and apply for real time applications.	✓	✓	✓
	CO-2	To introduce different translation languages	–	✓	✓
	CO-3	To understand the importance of code optimization	–	✓	✓
	CO-4	To know about compiler generation tools and techniques	–	✓	✓
	CO-5	To learn working of compiler and non compiler applications	✓	✓	✓
23040603 Cloud Computing	CO-1	Explain the core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.	–	✓	–
	CO-2	Apply the fundamental concepts in datacenters to understand the tradeoffs in power, efficiency and cost.	–	✓	–
	CO-3	Identify resource management fundamentals, i.e. resource abstraction, sharing and sandboxing and outline their role in managing infrastructure in cloud computing.	–	✓	✓
	CO-4	Analyze various cloud programming models and apply them to solve problems on the cloud.	–	–	✓
	CO-5	Explain the core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.	–	–	✓

23040604 Data Mining and Warehousing	CO-1	Be familiar with mathematical foundations of data mining tools.	—	✓	✓
	CO-2	Understand and implement classical models and algorithms in data warehouses and	—	✓	✓
	CO-3	data mining discovered by association rule	—	✓	✓
	CO-4	Characterize the kinds of patterns that can be discovered by association rule	—	✓	✓
	CO-5	Data mining, classification and clustering.	—	✓	✓
23040606 Advance JAVA	CO-1	Able to solve real world problems using OOP techniques.	✓	—	✓
	CO-2	Able to understand the use of abstract classes.	—	—	✓
	CO-3	Able to solve problems using java collection framework and I/o classes.	—	✓	✓
	CO-4	Able to develop multithreaded applications with synchronization.	—	✓	✓
	CO-5	Able to develop applets for web applications.	—	✓	✓
12300006 Expert Program in Entrepreneurship	CO-1	Apply the basic principles of Start-up scalability	✓	—	✓
	CO-2	Understanding various individual attributes of strategic business plan development	✓	✓	✓
	CO-3	Develop strategies for start-ups growth.	—	✓	✓
	CO-4	Experience real world financial modeling and valuation through IPO.	✓	✓	✓
Semester: 7					
23040701 Artificial Intelligence	CO-1	Understand the foundational concepts and applications of Artificial Intelligence.	✓	✓	✓
	CO-2	Apply and compare uninformed and informed search techniques for problem-solving.	—	✓	✓
	CO-3	Apply logical reasoning and representation techniques for knowledge modeling.	—	✓	—
	CO-4	Analyze adversarial search strategies and apply minimax and alpha-beta pruning.	✓	✓	—
	CO-5	Use Prolog for AI programming and problem-solving.	✓	✓	✓
23040702 Python Programming	CO-1	Develop proficiency in creating applications using Python Programming Language.	—	✓	✓
	CO-2	Apply various Python data structures to solve computational problems.	—	✓	✓
	CO-3	Perform testing and debugging of Python programs effectively.	—	✓	✓
	CO-4	Create and customize visualizations using PyLab for data representation.	—	✓	✓

	CO-5	Utilize regular expressions for text filtering in Python applications.	✓	✓	✓
12300007 Start-Up Project Part-1	CO-1	Initiate a start-up in team.	✓	✓	✓
	CO-2	Register it as any form of business.	—	✓	✓
	CO-3	Develop a team to run the venture.	✓	✓	✓
	CO-4	Collaborate with government and industry fraternity.	✓	✓	✓
Semester: 8					
23040802 Programming with XML & JSON	CO-1	Students are able to develop a dynamic webpage by the use of java script and DHTML.	✓	✓	✓
	CO-2	Students will be able to write a well formed / valid XML document.	—	✓	✓
	CO-3	Students will be able to connect a java program to a DBMS and perform insert, update.	—	✓	✓
	CO-4	Delete operations on DBMS table.	—	✓	✓
	CO-5	Students will be able to write a server side java application called Servlet to catch form data	—	✓	✓
Start-Up Project Part-2	CO-1	Initiate a start-up in team.	✓	✓	✓
	CO-2	Design Financial and marketing strategies for their venture.	—	✓	✓
	CO-3	Generate revenue for them and contribute to society with their problem solving product.	✓	✓	✓
	CO-4	Register it as any form of business.	—	✓	✓