Sinhgad Technical Education Society's

Sinhgad Institute of Technology, Lonavala

Department of Engineering Sciences

Academic Year 2019-20

Program Outcomes (POs)

List of Program Outcomes (POs)		
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

Program Educational Objectives (PEOs)

Program Educational Objectives (PEOs)	
PEO1	To provide opportunity to acquire strong theoretical and sound practical knowledge of basic sciences, so as to enable them to excel in further education.
PEO2	To develop talent among students to innovate, communicate, analyze, interpret and apply technical concepts to solve real time engineering problems.
PEO3	To aware and accomplish scientific and engineering breadth amongst student through various curricular, co-curricular and extra-curricular activities.
PEO4	To inculcate professional and ethical attitude among students for providing engineering solution in a global and societal context.
PEO5	To accomplish the overall development of students with the aid of project based learning environment.

Program Specific Outcomes (PSOs)

Program Specific Outcomes (PSOs)	
PSO1	Get solid foundation in basic sciences along with engineering fundamentals for a successful professional career.
PSO2	Able to co-relate engineering issues to broad social context.

Course Outcomes (COs)

FE 2019 Pattern Semester I			
SN	**Course Code**	**Course Name**	**Course Outcomes (COs)**
01	107001	Engineering Mathematics-I	The students will be able to learn **CO1**: Mean value theorems and its generalizations leading to Taylors and Maclaurin's series useful in the analysis of engineering problems. **CO2:** the Fourier series representation and harmonic analysis for design and analysis of periodic continuous and discrete systems. **CO3:** to deal with derivative of functions of several variables that is essential in various branches of Engineering. **CO4:** to apply the concept of Jacobian to find partial derivative of implicit function and functional dependence. Use of partial derivatives in estimating error and approximation and finding extreme values of the function. **CO5**: the essential tool of matrices and linear algebra in a comprehensive manner for analysis of system of linear equations, finding linear and orthogonal

			transformations, Eigen values and Eigen vectors applicable to engineering problems
02	107002	Engineering Physics	On completion of the course, learner will be able to– **CO1**: Develop understanding of interference, diffraction and polarization; connect it to few engineering applications. **CO2**: Learn basics of lasers and optical fibers and their use in some applications. **CO3**: Understand concepts and principles in quantum mechanics. Relate them to some applications. **CO4**: Understand theory of semiconductors and their applications in some semiconductor devices. **CO5**: Summarize basics of magnetism and superconductivity. Explore few of their technological applications. **CO6**: Comprehend use of concepts of physics for Non Destructive Testing. Learn some properties of nano-materials and their application.
03	107009	Engineering Chemistry	On completion of the course, learner will be able to– **CO1**: Apply the different methodologies for analysis of water and techniques involved in softening of water as commodity. **CO2:** Select appropriate electro-technique and method of material analysis. **CO3:** Demonstrate the knowledge of advanced engineering materials for various engineering applications. **CO4:** Analyze fuel and suggest use of alternative fuels. **CO5:** Identify chemical compounds based on their structure. **CO6:** Explain causes of corrosion and methods for minimizing corrosion.
04	102003	Systems in Mechanical Engineering	On completion of the course, learner will be able to **CO1**: Describe and compare the conversion of energy from renewable and non-renewable energy sources **CO2**: Explain basic laws of thermodynamics, heat transfer and their applications **CO3**: List down the types of road vehicles and their specifications **CO4**: Illustrate various basic parts and transmission system of a road vehicle

			CO5: Discuss several manufacturing processes and identify the suitable process **CO6**: Explain various types of mechanism and its application
05	103004	Basic Electrical Engineering	At the end of course students will be able to **CO1**: Differentiate between electrical and magnetic circuits and derive mathematical relation for self and mutual inductance along with coupling effect. **CO2**: Calculate series, parallel and composite capacitor as well as characteristics parameters of alternating quantity and phasor arithmetic **CO3**: Derive expression for impedance, current, power in series and parallel RLC circuit with AC supply along with phasor diagram. **CO4**: Relate phase and line electrical quantities in polyphase networks, demonstrate the operation of single phase transformer and calculate efficiency and regulation at different loading conditions **CO5**: Apply and analyze the resistive circuits using star-delta conversion KVL, KCL and different network theorems under DC supply. **CO6**: Evaluate work, power, and energy relations and suggest various batteries for different applications, concept of charging and discharging and depth of charge.
06	104010	Basic Electronics Engineering	On completion of the course, learner will be able to– **CO1:** Explain the working of P-N junction diode and its circuits. **CO2:** Identify types of diodes and plot their characteristics and also can compare BJT with MOSFET. **CO3:** Build and test analog circuits using OPAMP and digital circuits using universal/basic gates and flip flops. **CO4:** Use different electronics measuring instruments to measure various electrical parameters. **CO5:**Select sensors for specific applications. **CO6**: Describe basic principles of communication systems.
07	110005	Programming and Problem Solving	On completion of the course, learner will be able to– **CO1:** Inculcate and apply various skills in

			problem solving. **CO2:** Choose most appropriate programming constructs and features to solve the problems in diversified domains. **CO3:** Exhibit the programming skills for the problems those require the writing of well-documented programs including use of the logical constructs of language, Python. **CO4:** Demonstrate significant experience with the Python program development environment.
08	101011	Engineering Mechanics	On completion of the course, learner will be able to– **CO1:** Determine resultant of various force systems **CO2:** Determine centroid, moment of inertia and solve problems related to friction **CO3:**Determine reactions of beams, calculate forces in cables using principles of equilibrium **CO4:** Solve trusses, frames for finding member forces and apply principles of equilibrium to forces in space **CO5:** Calculate position, velocity and acceleration of particle using principles of kinematics **CO6:** Calculate position, velocity and acceleration of particle using principles of kinetics and Work, Power, Energy
09	111006	Workshop	**CO1**: Familiar with safety norms to prevent any mishap in workshop. **CO2**: Able to handle appropriate hand tool, cutting tool and machine tools to manufacture a job. **CO3**: Able to understand the construction, working and functions of machine tools and their parts. **CO4**: Able to know simple operations (Turning and Facing) on a centre lathe.
10	101007	Audit Course 1 Environmental Studies-I	On completion of the course, learner will be able to– **CO1**: Demonstrate an integrative approach to environmental issues with a focus on sustainability. **CO2**: Explain and identify the role of the organism in energy transfers in different ecosystems. **CO**3: Distinguish between and provide examples of renewable and nonrenewable resources & analyze personal consumption

			of resources. **CO4:** Identify key threats to biodiversity and develop appropriate policy options for conserving biodiversity in different settings.
FE 2019 Pattern Semester II			
01	107008	Engineering Mathematics-II	The students will be able to learn **CO1:** the effective mathematical tools for solutions of first order differential equations that model physical processes such as Newton's law of cooling, electrical circuit, rectilinear motion, mass spring systems, heat transfer etc. **CO2:** advanced integration techniques such as Reduction formulae, Beta functions, Gamma functions, Differentiation under integral sign and Error functions needed in evaluating multiple integrals and their applications. **CO3:** to trace the curve for a given equation and measure arc length of various curves. **CO4:** the concepts of solid geometry using equations of sphere, cone and cylinder in a comprehensive manner. **CO5:** evaluation of multiple integrals and its application to find area bounded by curves, volume bounded by surfaces, Centre of gravity and Moment of inertia.
02	107002	Engineering Physics	On completion of the course, learner will be able to– **CO1**: Develop understanding of interference, diffraction and polarization; connect it to few engineering applications. **CO2**: Learn basics of lasers and optical fibers and their use in some applications. **CO3**: Understand concepts and principles in quantum mechanics. Relate them to some applications. **CO4**: Understand theory of semiconductors and their applications in some semiconductor devices. **CO5**: Summarize basics of magnetism and superconductivity. Explore few of their technological applications. **CO6**: Comprehend use of concepts of physics for Non Destructive Testing. Learn some properties of nanomaterials and their application.
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08	102012	Engineering Graphics	On completion of the course, learner will be able to **CO1**: Draw the fundamental engineering objects using basic rules and able to construct the simple geometries. **CO2:** Construct the various engineering curves using the drawing instruments. **CO3:** Apply the concept of orthographic projection of an object to draw several 2D views and its sectional views for visualizing the physical state of the object. **CO4**: Apply the visualization skill to draw

			a simple isometric projection from given orthographic views precisely using drawing equipment. **CO5:** Draw the development of lateral surfaces for cut section of geometrical solids. **CO6:** Draw fully-dimensioned 2D, 3D drawings using computer aided drafting tools.
09	110013	Project Based Learning	**CO1:** Project based learning will increase their capacity and learning through shared cognition. **CO2:** Students able to draw on lessons from several disciplines and apply them in practical way. **CO3:** Learning by doing approach in PBL will promote long-term retention of material and replicable skill, as well as improve teachers' and students' attitudes towards learning.
10	101014	Audit Course 2 Environmental Studies-II	On completion of the course, learner will be able to– **CO1:** Have an understanding of environmental pollution and the science behind those problems and potential solutions. **CO2:** Have knowledge of various acts and laws and will be able to identify the industries that are violating these rules. **CO3:** Assess the impact of ever increasing human population on the biosphere: social, economic issues and role of humans in conservation of natural resources. **CO4:** Learn skills required to research and analyze environmental issues scientifically and learn how to use those skills in applied situations such as careers that may involve environmental problems and/or issues.
	107015	Audit Course 2 Physical Education-Exercise and Field Activities	--

Sinhgad Institutes

Sinhgad Technical Education Society's

Sinhgad Institute of Technology, Lonavala

Department of Computer Engineering

Academic Year2019-20

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Program Educational Objectives (PEOs)

Program Educational Objectives (PEOs)	
PEO1	To prepare globally competent graduates having strong fundamentals and domain knowledge to provide effective solutions for engineering problems.
PEO2	To prepare the graduates to work as a committed professional with strong professional ethics and values, sense of responsibilities, understanding of legal, safety, health, societal, cultural and environmental issues.
PEO3	To prepare committed and motivated graduates with research attitude, lifelong learning, investigative approach, and multidisciplinary thinking.
PEO4	To prepare the graduates with strong managerial and communication skills to work effectively as individual as well as in teams.

Program Specific Outcomes (PSOs)

Program Specific Outcomes (PSOs)	
PSO1	The ability to understand, analyse and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying.
PSO2	The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.
PSO3	The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

Course Outcomes (COs)

SE Computer Engineering 3rd Sem (2019 Pattern)			
SrNo	**Subject Code**	**Course Name**	**Course Outcomes**
1	210241: DM/COs1	Discrete Mathematics	Formulate problems precisely, solve the problems, apply formal proof techniques, and explain the reasoning clearly.
	210241: DM/COs2		Apply appropriate mathematical concepts and skills to solve problems in both familiar and unfamiliar situations including those in real-life contexts.
	210241: DM/COs3		Design and analyze real world engineering problems by applying set theory, propositional logic and to construct proofs using mathematical induction.
	210241: DM/COs4		Specify, manipulate and apply equivalence relations; construct and use functions and apply these concepts to solve new problems.
	210241: DM/COs5		Calculate numbers of possible outcomes using permutations and combinations; to model and analyze computational processes using

			combinatorics.
	210241: DM/COs6		Model and solve computing problem using tree and graph and solve problems using appropriate algorithms.
	210241: DM/COs7		Analyze the properties of binary operation apply abstract algebra in coding theory and evaluate algebraic structure.
2	210242: FDS/COs1	Fundamentals of data structure	Design the algorithms to solve the programming problems, identify appropriate algorithms strategy for specific application, and analyze the time and space complexity.
	210242: FDS/COs2		Discriminate the usage of various structures, design/program/Implement the appropriate data structure , use them in implementations of abstract data types and identity the appropriate data structure in approaching the problem solution
	210242: FDS/COs3		Demonstrate use of sequential data structure array and linked list to store and process data.
	210242: FDS/COs4		Understand the computational efficiency of the principal algorithm's for searching and sorting and choose the most efficient one for the application.
	210242: FDS/COs5		Compare and contrast different implementation of data structure
	210242: FDS/COs6		Understand, Implement and apply principles of data structure stack and queue to sole computational problems.
3	210243: OOP/COs1	Object Oriented Programing	Apply Construct sequence, selection and iteration, classes and objects, inheritance, use of predefined classes from libraries while developing software.
	210243: OOP/COs2		Design object oriented solution for small systems involving software.
	210243: OOP/COs3		Use virtual and pure virtual function and complex programing situations.
	210243: OOP/COs4		Apply object oriented software principles in problem solving.
	210243: OOP/COs5		Analyze the strength of object oriented programing.
	210243: OOP/COs6		Develop the application using object oriented programing language(C++)
4	210244: CG/COs1	Computer Graphics	Identify the basic terminologies of computer graphics and interpret the mathematical foundations of the concepts of computer graphics.
	210244: CG /COs2		Apply mathematics to develop computer programs for elementary graphics operations.
	210244: CG /COs3		Illustrate the concepts of windowing and clipping and apply various algorithms to fill and clip polygons.
	210244: CG /COs4		Understand and apply the core concepts of computer graphics including, transformations in

			two and three dimensions, viewing and protection.
	210244: CG /COs5		Understand the concepts of color models, lighting, shading, models and hidden surface elimination.
	210244: CG /COs6		Create effective programing using concepts of curves, fractals, animation and gaming.
5	210245:DELD /COs1	Digital Electronics & Logic design	Simplify Boolean Expression using K-Maps
	210245: DELD /COs2		Design and implement Combinational digital circuits
	210245: DELD /COs3		Design and implement sequential digital circuits
	210245: DELD /COs4		Develop simple real world application PLD & ASM.
	210245:DELD /COs5		Differentiate and choose appropriate logic families IC packages as per given design specification.
	210245: DELD /COs6		Explain organization and architecture of computer system
6	210246:DSL/COs 1	Data structureLa b	Use algorithms on various linear data structure using sequential organization to solve real life problems.
	210246: DSL/COs2		Analyze problems to apply suitable searching and sorting algorithms to various applications.
	210246: DSL/COs3		Analyze problems to use variants of linked list and solve various real problems.
	210246:DSL/COs 4		Designing and implement data structure and algorithms for solving different kinds of problems.
7	210247:OOP CGL/COs1	OOP & Computer Graphics Lab	Understand and apply concepts like inheritance, polymorphism, exception handling and generic structure for implementing reusable programming codes
	210247:OOP CGL/COs1		Analyze the concept of file and apply if while storing and retrieving the data from secondary storage
	210247:OOP CGL/COs1		Analyze and apply computer graphics algorithms for line circle drawing, scan conversation and filling with help of object oriented programing concepts.
	210247:OOP CGL/COs1		Understand the concept of windowing and clipping apply various algorithms to fill and clip polygons.
	210247:OOP CGL/COs1		Apply logic to implement, curves, fractals, animation and gaming programs.
8	210248:DEL/COs 1	Digital Electronic Lab	Understand the working of digital electronic circuits
	210248:DEL/COs 2		Apply the knowledge to appropriate IC as per design specification.
	210248:DEL/COs 3		Design and implement Sequential and Combinational digital circuits as per the specifications
9	210249:BCL/COs	Business	Express Effectively through verbal/oral

	1	Communication Lab	communication and improve the listening skills
	210249:BCL/COs2		Write precise briefs or reports and technical documents.
	210249:BCL/COs3		Prepare for group discussion / meetings / interviews and presentations.
	210249:BCL/COs4		Explore goal/target setting, self-motivation and practicing creative thinking.
	210249:BCL/COs5		Operate effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality.
10	210250: HSS/COs1	Humanity & social science	Aware of the various issue concerning human & society
	210250: HSS/COs2		Aware of the responsibility towards society
	210250: HSS/COs3		Sensitized about broader issue regarding social, culture, economic and human aspects involve in social changes
	210250: HSS/COs4		Able to understand nature of individual and relationship between self and the community.
	210250: HSS/COs5		Able to understand major ideas, values, beliefs, experiences that have shaped human history and culture.
11	210251: AC-3/COs1	Environmental Studies	Comprehend the importance of ecosystem & biodiversity
	210251: AC-3/COs2		Correlate the human population growth and its trend to the Environmental degradation & develop awareness about of his/her role towards Environmental protection prevention
	210251: AC-3/COs3		Identify different types of Environmental pollution and control measures.
	210251: AC-3/COs4		Correlate the exploitation and utilization of conventional non-conventional resources
SE Computer Engineering 4th Sem (2019 Pattern)			
1	207003:M-III/COs1	Mathematics-III	Solve linear differential equation essential in modeling and designing in computer based system
	207003:M-III/COs2		Apply concept of Fourier transform, Z-Transform and applications to continuous and discrete system and Image processing.
	207003:M-III/COs3		Apply statistical methods like correlation, regression analysis and probability theory for analysis and prediction of a given data as applied to machine intelligence.
	207003:M-III/COs4		Solve algebraic and transcendental equation and system of linear equation using numerical techniques.
	207003:M-III/COs5		Obtain interpolating polynomials, numerical differentiation and integration , numerical solution of ordinary differential equations used in modern

			scientific computing.
2	210252: DSA /COs1	Data Structure Algorithms	Identify and articulate the complexity goals and benefits of a good hashing scheme for real world application
	210252: DSA /COs2		Apply nonlinear data structure for solving problems of various domain.
	210252: DSA /COs3		Design and specify the operation of a nonlinear based abstract data type and implement them in a high level programming language.
	210252: DSA /COs4		Analyze the algorithms solution for resource requirement and optimization.
	210252: DSA /COs5		Use efficient indexing methods and multiway search techniques to store and maintain data.
	210252: DSA /COs6		Use appropriate modern tools to understand and analyze the functionality confined to the secondary storage.
3	210253:SE/COs1	Software Engineering	Analyze software requirements and formulate design solution for software.
	210253:SE/COs2		Design applicable solution in one or more application domain using software engg. Approaches that integrate ethical, social, legal and economic concerns.
	210253:SE/COs3		Apply new software models, techniques and technologies o bring out innovative and novelistic solution for the growth of the society in all aspects and evolving into their continuous professional development.
	210253:SE/COs4		Model and design user interface and component level.
	210253:SE/COs5		Identify and handle risk management and software configuration management.
	210253:SE/COs6		Utilize knowledge of software testing approaches, approaches to verification and validation.
	210253:SE/COs7		Construct software of high quality software that is reliable, and is reasonably easy to understand, modify and maintain efficient, reliable, robust and cost effective software solution.
4	210254:MP/COs1	Microprocessor	Exhibit skill of assembly language programing for the application.
	210254:MP/COs2		Classify Processor architectures
	210254:MP/COs3		Illustrate advanced features of 80386 Microprocessor.
	210254:MP/COs4		Compare and Contrast different processor modes.
	210254:MP/COs5		Use Interrupts mechanism in applications.
	210254:MP/COs6		Difference between Microprocessors and Microcontrollers.
	210254:MP/COs7		Identify and analyze the tools and techniques used to design, implement, and Microprocessor based

			system.
5	210255: PPL/COs1	Principles of Programing Language	Make use of basic principles of programing languages.
	210255: PPL/COs2		Develop a program with data representation and computation.
	210255: PPL/COs3		Develop programs using object oriented programming language.
	210255: PPL/COs4		Develop application using inheritance, encapsulation and polymorphism.
	210255: PPL/COs5		Demonstrate multithreading for robust application development
	210255: PPL/COs6		Develop a simple program using basic concepts of functional and logical programming paradigm
6	210256: DSL/COs1	Data Structure Algorithm Lab	Make use of basic principles f programing and computation.
	210256: DSL/COs2		Develop a program with data representation and computation
	210256: DSL/COs3		Develop program using object oriented programing language : Java
	210256: DSL/COs4		Develop application using inheritance, encapsulation and polymorphism.
	210256: DSL/COs5		Demonstrate multithreading for robust application development.
	210256: DSL/COs6		Develop a simple program using basic concepts of functional and logical programing paradigm.
7	210257: MPL/COs1	Microprocessor Lab	Understand and apply various addressing modes and instruction set to implement ALP
	210257: MPL/COs2		Apply logic to implement code conversion
	210257: MPL/COs3		Analyze and apply logic to demonstrate processor mode of operation
8	210258: PBL/COs1	Project Based Learning-II	Identify the real life problem from societal need point of view.
	210258: PBL/COs1		Choose and compare alternative approaches to select most feasible one.
	210258: PBL/COs1		Analyze and synthesize the identical problem from technological perspective
	210258: PBL/COs1		Design the realible and scalable solution to meet challenges.
	210258: PBL/COs1		Evaluate the solution based on the criteria specified.
	210258: PBL/COs1		Inculcate long life learning attitude towards the societal problems.
9	210259: AC-4/COs1	Intellectual Property rights and patents	Understand the fundamental legal principles related to confidential information, copyright, patents, designs, trademarks and unfair competition
	210259: AC-4/COs2		Identify, apply and assess principles of law relating to each of these areas of intellectual property
	210259: AC-		Apply the appropriate ownership rules to

	4/COs3		intellectual property you have been involved in creating

	TE Computer Engineering 5th Sem (2015 Pattern)		
SN	Subject Code		Course Outcomes
1	310241:TOC/COs1	Theory Of Computation	Able to design deterministic Turing machine for all inputs and all outputs .
	310241:TOC/COs2		Able to subdivide problem space based on input subdivision using constraints
	310241:TOC/COs3		Able to apply linguistic theory
2	310242:DBMS/COs1	Database management	Apply basic language statement on database
	310242:DBMS/COs2		Design various models using database
	310242:DBMS/COs3		Use modern database techniques such as NOSQL
	310242:DBMS/COs4		Apply & Explain transaction Management in relational database System.
	310242:DBMS/COs5		Analyze the use of appropriate architecture in real time environment.
	310242:DBMS/COs6		Develop the application using database SQL/ NOSQL with different platform.
3	310243:SEPM/COs1	Software Engg Project management	Decide on a process model for a developing a software project
	310243:SEPM/COs2		Classify software applications and Identify unique features of various domains
	310243:SEPM/COs3		Design test cases of a software system
	310243:SEPM/COs4		Understand basics of IT Project management.
	310243:SEPM/COs5		Plan, schedule and execute a project considering the risk management
	310243:SEPM/COs6		Apply quality attributes in software development life cycle
4	310244:ISEE/COs1	Information system & engg. Economics	Understand the need, usage and importance of an Information System to an organization.
	310244:ISEE/COs2		Understand the activities that are undertaken while managing, designing, planning, implementation, and deployment of computerized information system in an organization.
	310244:ISEE/COs3		Further the student would be aware of various Information System solutions like ERP, CRM, Data warehouses and the issues in successful implementation of these technology solutions in any organizations
	310244:ISEE/COs4		Outline the past history, present position and

			expected performance of a company engaged in engineering practice or in the computer industry.
	310244:ISEE/COs5		Perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives.
5	310245CN/COs1	Computer Network	Analyze the requirements for a given organizational structure to select the most appropriate networking architecture, topologies, transmission mediums, and technologies
	310245CN/COs2		Demonstrate design issues, flow control and error control
	310245CN/COs3		Analyze data flow between TCP/IP model using Application, Transport and Network Layer Protocols.
	310245CN/COs4		Illustrate applications of Computer Network capabilities, selection and usage for various sectors of user community.
	310245CN/COs5		Illustrate Client-Server architectures and prototypes by the means of correct standards and technology.
	310245CN/COs6		Demonstrate different routing and switching algorithms
6	310246:SDL/COs1	Software Develop Ment Lab	Evaluate problems and analyze data using current technologies in a wide variety of business and organizational contexts.
	310246:SDL/COs2		Create data-driven web applications
	310246:SDL/COs3		Incorporate best practices for building applications
	310246:SDL/COs4		Employ Integrated Development Environment(IDE) for implementing and testing of software solution
	310246:SDL/COs5		Construct software solutions by evaluating alternate architectural patterns
7	310247:DBMSL/COs1	Database management lab	Develop the ability to handle databases of varying complexities
	310247:DBMSL/COs2		Use advanced database Programming concepts
8	310248:CNL/COs1	Computer Network Lab	Demonstrate LAN and WAN protocol behaviour using Modern Tools.
	310248:CNL/COs2		Analyze data flow between peer to peer in an IP network using Application, Transport and Network Layer Protocols.
	310248:CNL/COs3		Demonstrate basic configuration of switches and routers.
	310248:CNL/COs4		Develop Client-Server architectures and prototypes by the means of correct standards and technology.

9	310249:AC-3/COs1	Audit Course-3	understand the basic perception of profession, professional ethics, various moral issues & uses of ethical theories
	310249:AC-3/COs2		understand various social issues, industrial standards, code of ethics and role of professional ethics in engineering field.
	310249:AC-3/COs3		follow Ethics as an engineering professional and adopt good standards & norms of engineering practice.
	310249:AC-3/COs4		apply ethical principles to resolve situations that arise in their professional lives
TE Computer Engineering 6th Sem (2015 Pattern)			
1	310250:DAA/COs1	Design & Analysis of Algorithms	Formulate the problem.
	310250:DAA/COs2		Analyze the asymptotic performance of algorithms.
	310250:DAA/COs3		Decide and apply algorithmic strategies to solve given problem
	310250:DAA/COs4		Find optimal solution by applying various methods.
2	310251:SPOS/COs 1	Systems Programming & Operating System	Analyze and synthesize system software
	310251:SPOS/COs 2		Use tools like LEX & YACC.
	310251:SPOS/COs 3		Implement operating system functions. Course
3	310252:ESIOT/CO s1	Embedded Systems & Internet of Things	To understand fundamentals of IoT and embedded system including essence, basic design strategy and process modeling
	310252:ESIOT/CO s2		To introduce students a set of advanced topics in embedded IoT and lead them to understand research in network
	310252:ESIOT/CO s3		To develop comprehensive approach towards building small low cost embedded IoT system.
	310252:ESIOT/CO s4		To understand fundamentals of security in IoT
	310252:ESIOT/CO s5		To learn to implement secure infrastructure for IoT
	310252:ESIOT/CO s6		To learn real world application scenarios of IoT along with its societal and economic impact using case studies
4	310253:SMD/COs1	Software Modeling and Design	Analyze the problem statement (SRS) and choose proper design technique for designing webbased/ desktop application.
	310253:SMD/COs2		Design and analyze an application using UML modeling as fundamental tool
	310253:SMD/COs3		Apply design patterns to understand reusability in OO design
	310253:SMD/COs4		Decide and apply appropriate modern tool for designing and modelling

	310253:SMD/COs5		Decide and apply appropriate modern testing tool for testing web-based/desktop application
5	310254:WT/COs1	Web Technology	Analyze given assignment to select sustainable web development design methodology
	310254:WT/COs2		Develop web based application using suitable client side and server side web technologies
	310254:WT/COs3		Develop solution to complex problems using appropriate method, technologies, frameworks, web services and content management
6	310255:STC/COs1	Seminar & Technical Communication	be able to be familiar with basic technical writing concepts and terms, such as audience analysis, jargon, format, visuals, and presentation.
	310255:STC/COs2		be able to improve skills to read, understand, and interpret material on technology.
	310255:STC/COs3		improve communication and writing skills
7	310256:WTL/COs1	Web Technology Lab	develop web based application using suitable client side and server side web technologies
	310256:WTL/COs2		develop solution to complex problems using appropriate method, technologies, frameworks, web services and content management
8	310257:SPOSL/COs1	SP & OS Lab	Understand the internals of language translators
	310257:SPOSL/COs2		Handle tools like LEX & YACC.
	310257:SPOSL/COs3		Understand the Operating System internals and functionalities with implementation point of view
9	310258:ESIOTL/COs1	ES & IoT Lab	Design the minimum system for sensor based application
	310258:ESIOTL/COs2		Solve the problems related to the primitive needs using IoT
	310258:ESIOTL/COs3		Develop full fledged IoT application for distributed environment
10	310259:AC-4/COs1	Audit Course-4	Enhanced holistic development of students and improve their employability skills

	BE Computer Engineering 7th Sem (2015 Pattern)		
SN	**Subject Code**	**Course Name**	**Course Outcomes**
1	410241:HPC/COs1	High Performance Computation	Describe different parallel architectures, inter-connect networks, programming models
	410241:HPC/COs2		Develop an efficient parallel algorithm to solve given problem

	410241:HPC/COs3		Analyze and measure performance of modern parallel computing systems
	410241:HPC/COs4		Build the logic to parallelize the programming task
2	410242:AIR/COs1	Artificial Intelligence and Robotics	Identify and apply suitable Intelligent agents for various AI applications
	410242:AIR/COs2		Design smart system using different informed search / uninformed search or heuristic approaches
	410242:AIR/COs3		Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve given problem.
	410242:AIR/COs4		Apply the suitable algorithms to solve AI problems
3	410243:DA/COs1	Data Analytics	Write case studies in Business Analytic and Intelligence using mathematical models
	410243:DA/COs2		Present a survey on applications for Business Analytic and Intelligence
	410243:DA/COs3		Provide problem solutions for multi-core or distributed, concurrent/Parallel environments
4	410244(D):DMW/COs1	Data Mining and Warehousing	Apply basic, intermediate, and advanced techniques to mine the data
	410244(D):DMW/COs2		Analyze the output generated by the process of data mining
	410244(D):DMW/COs3		Explore the hidden patterns in the data
	410244(D):DMW/COs4		Optimize the mining process by choosing best data mining technique
5	410245(B):STQA/COs1	Software Testing and Quality Assurance	Describe fundamental concepts in software testing such as manual testing, automation testing and software quality assurance.
	410245(B):STQA/COs2		Design and develop project test plan, design test cases, test data, and conduct test operations
	410245(B):STQA/COs3		Apply recent automation tool for various software testing for testing software
	410245(B):STQA/COs4		Apply different approaches of quality management, assurance, and quality standard to software system
	410245(B):STQA/COs5		Apply and analyze effectiveness Software Quality Tools
6	410246:LP-I/COs1	Lab Practice-I	Practical hands on is the absolute necessity as far as employability of the learner is concerned.

	410246:LP-I/COs2		The presented course is solely intended to enhance the competency by undertaking the laboratory assignments of the core courses.
7	410247:LP-II/COs1	Lab Practice-II	Practical hands on is the absolute necessity as far as employability of the learner is concerned.
	410247:LP-II/COs2		The presented course is solely intended to enhance the competency by undertaking the laboratory assignments of the core courses.
	410247:LP-II/COs3		Enough choice is provided to the learner to choose an elective of one‟s interest.
8	410248:PW-I/COs1	Project work-I	Solve real life problems by applying knowledge.
	410248:PW-I/COs2		Analyze alternative approaches, apply and use most appropriate one for feasible solution.
	410248:PW-I/COs3		Write precise reports and technical documents in a nutshell.
	410248:PW-I/COs4		Participate effectively in multi-disciplinary and heterogeneous teams exhibiting team work, Inter-personal relationships, conflict management and leadership quality.
9	410249:AC-5/COs1	Audit Course-5	Understand the legalities in product development
	410249:AC-5/COs2		Undertake the process of IPR, Trademarks, Copyright and patenting
	410249:AC-5/COs3		Understand and apply functional plans
	410249:AC-5/COs4		Manage Entrepreneurial Finance
	410249:AC-5/COs5		Inculcate managerial skill as an entrepreneur
BE Computer Engineering 8th Sem (2015 Pattern)			
1	41050:ML/COs1	Machine Learning	Distinguish different learning based applications
	41050:ML/COs2		Apply different preprocessing methods to prepare training data set for machine learning.
	41050:ML/COs3		Design and implement supervised and unsupervised machine learning algorithm.
	41050:ML/COs4		Implement different learning models
	41050:ML/COs5		Learn Meta classifiers and deep learning concepts Course Contents
2	410251:ICS/COs1	Information & cyber security	Gauge the security protections and limitations provided by today's technology.
	410251:ICS/COs2		Identify information security and cyber security threats.

	410251:ICS/COs3		Analyze threats in order to protect or defend it in cyberspace from cyber-attacks.
	410251:ICS/COs4		Build appropriate security solutions against cyber-attacks.
3	410252(B):Compiler/COs 1	Compiler	Design and implement a lexical analyzer and a syntax analyzer
	410252(B):Compiler/COs 2		Specify appropriate translations to generate intermediate code for the given programming language construct
	410252(B):Compiler/COs 3		Compare and contrast different storage management schemes
	410252(B):Compiler/COs 4		Identify sources for code optimization
4	410252(C):ERTOS/COs1	Embedded and Real Time Operating Systems	Recognize and classify embedded and real-time systems
	410252(C):ERTOS/COs2		Explain communication bus protocols used for embedded and real-time systems
	410252(C):ERTOS/COs3		Classify and exemplify scheduling algorithms
	410252(C):ERTOS/COs4		Apply software development process to a given RTOS application
	410252(C):ERTOS/COs5		Design a given RTOS based application
5	410252(D):SCOA /COs1		Apply soft computing methodologies, including artificial neural networks, fuzzy sets, fuzzy logic, fuzzy inference systems and genetic algorithms
	410252(D):SCOA /COs2		Design and development of certain scientific and commercial application using computational neural network models, fuzzy models, fuzzy clustering applications and genetic algorithms in specified applications.
6	410253:HCI/COs1	Human Computer Interface	Evaluate the basics of human and computational abilities and limitations.
	410253:HCI/COs2		Inculcate basic theory, tools and techniques in HCI.
	410253:HCI/COs3		Apply the fundamental aspects of designing and evaluating interfaces.
	410253:HCI/COs4		Apply appropriate HCI techniques to design systems that are usable by people
7	410254:LP-III/COs1	Lab Practice-III	Practical hands on is the absolute necessity as far as employability of the learner is concerned.
	410254:LP-III/COs2		The presented course is solely intended to enhance the competency by undertaking the laboratory assignments of the core courses.
8	410255:LP-IV/COs1	Lab	Practical hands on is the absolute

		Practice-IV	necessity as far as employability of the learner is concerned.
	410255:LP-IV/COs2		The presented course is solely intended to enhance the competency by undertaking the laboratory assignments of the core courses.
	410255:LP-IV/COs3		Enough choice is provided to the learner to choose an elective of one‟s interest.
9	410256:PW-II/COs1	Project work-II	Show evidence of independent investigation
	410256:PW-II/COs2		Critically analyze the results and their interpretation.
	410256:PW-II/COs3		Report and present the original results in an orderly way and placing the open questions in the right perspective
	410256:PW-II/COs4		Link techniques and results from literature as well as actual research and future research lines with the research
	410256:PW-II/COs5		Appreciate practical implications and constraints of the specialist subject
10	410257:AC-6/COs1	Audit Course-6	Apply the concepts of Business Intelligence in real world applications
	410257:AC-6/COs2		Explore and use the data warehousing wherever necessary
	410257:AC-6/COs3		Design and manage practical BI systems

Sinhgad Technical Education Society's

Sinhgad Institute of Technology, Lonavala

Department of Information Technology

Academic Year2019-20

Program Outcomes (POs)

List of Program Outcomes (POs)		
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

Program Educational Objectives (PEOs)

Program Educational Objectives (PEOs)	
PEO1	To provide strong fundamental concepts in mathematics, science, engineering and Technology to address technological challenges.
PEO2	To provide knowledge and skills in the field of Computer Science and Information Technology for analyzing, designing and implementing complex engineering problems of any domain with innovative approaches.
PEO3	To provide an attitude and aptitude for research, entrepreneurship and higher studies in the field of Computer Science and Information Technology.
PEO4	Shall have commitment to ethical practices, societal contributions through communities and lifelong learning.
PEO5	To provide better communication, presentation, time management and teamwork skills leading to responsible & competent professionals and will be able to address challenges in the field of IT at global level.

Program Specific Outcomes (PSOs)

Program Specific Outcomes (PSOs)	
PSO1	An ability to apply diverse Information Technology concepts to solve complex business and computational problems through the analysis, design, development and management of information processing systems and applications in interdisciplinary domains.
PSO2	Acquire technical, professional and social skills through the use of latest technology to be competent enough for professional responsibilities.

Course Outcomes (COs)

SR NO	Course Name	Course Code	Course Outcomes
SE [IT] 2019 Pattern SEM I			
1	**Discrete Mathematics**	**214441 -1**	Formulate and apply formal proof techniques and solve the problems with logical reasoning.
		214441 -2	Analyze and evaluate the combinatorial problems by using probability theory.
		214441 -3	Apply the concepts of graph theory to devise mathematical models.
		214441 -4	Analyze types of relations and functions to provide solution to computational problems.
		214441 -5	Identify techniques of number theory and its application.
		214441 -6	Identify fundamental algebraic structures.
2	**Logic Design and Computer Organization**	**214442 -1**	Perform basic binary arithmetic & simplify logic expressions.
		214442 -2	Grasp the operations of logic ICs and Implement combinational logic functions using ICs.
		214442 -3	Comprehend the operations of basic memory cell types and Implement sequential logic

			functions using
		214442 -4	Elucidate the functions & organization of various blocks of CPU.
		214442 -5	Understand CPU instruction characteristics, enhancement features of CPU.
		214442 -6	Describe an assortment of memory types (with their characteristics) used in computer systems and basic principle of interfacing input, output devices.
3	**Data Structures and Algorithms**	**214443 -1**	Perform basic analysis of algorithms with respect to time and space complexity.
		214443 -2	Select appropriate searching and/or sorting techniques in the application development.
		214443 -3	Implement abstract data type (ADT) and data structures for given application.
		214443 -4	Design algorithms based on techniques like brute - force, divide and conquer, greedy, etc.
		214443 -5	Apply implement learned algorithm design techniques and data structures to solve problems.
		214443 -6	Design different hashing functions and use files organizations.
4	**Object Oriented Programming**	**214444 -1**	Differentiate various programming paradigms.
		214444 -2	Identify classes, objects, methods, and handle object creation, initialization, and Destruction to model real-world problems.
		214444 -3	Identify relationship among objects using inheritance and polymorphism principles.
		214444 -4	Handle different types of exceptions and perform generic programming.
		214444 -5	Use of files for persistent data storage for real world application.
		214444 -6	Apply appropriate design patterns to provide object-oriented solutions.
5	**Basics of Computer Network**	**214445 -1**	Understand and explain the concepts of communication theory and compare functions of OSI and TCP/IP model.
		214445 -2	Analyze data link layer services, error detection and correction, linear block codes, cyclic Codes, framing and flow control protocols.
		214445 -3	Compare different access techniques, channelization and IEEE standards.
		214445 -4	Apply the skills of sub netting, super netting and routing mechanisms.
		214445 -5	Differentiate IPv4 and IPv6.

		214445 -6	Illustrate services and protocols used at transport layer.
6	**Logic Design Computer Organization Lab**	**214446-1**	Use logic function representation for simplification with K-Maps and design Combinational logic circuits using SSI & MSI chips.
		214446-2	Design Sequential Logic circuits: MOD counters using synchronous counters.
		214446-3	Understand the basics of simulator tool & to simulate basic blocks such as ALU & memory.
7	**Data Structures and Algorithms Lab**	**214447-1**	Analyze algorithms and to determine algorithm correctness and time efficiency class.
		214447-2	Implement abstract data type (ADT) and data structures for given application.
		214447-3	Design algorithms based on techniques like brute - force, divide and conquer, greedy, etc.).
		214447-4	Solve problems using algorithmic design techniques and data structures.
		214447-5	Analyze of algorithms with respect to time and space complexity.
8	**Object Oriented Programming Lab**	**214448-1**	Differentiate various programming paradigms.
		214448-2	Identify classes, objects, methods, and handle object creation, initialization, and destruction to model real-world problems.
		214448-3	Identify relationship among objects using inheritance and polymorphism.
		214448-4	Handle different types of exceptions and perform generic programming.
		214448-5	Use file handling for real world application.
		214448-6	Apply appropriate design patterns to provide object-oriented solutions.
9	**Soft Skill Lab**	**214449-1**	Introspect about individual's goals, aspirations by evaluating one's SWOC and think creatively.
		214449-2	Develop effective communication skills including Listening, Reading, Writing and Speaking.
		214449-3	Constructively participate in group discussion, meetings and prepare and deliver Presentations.
		214449-4	Write precise briefs or reports and technical documents.
		214449-5	Practice professional etiquette, present oneself confidently and successfully handle personal interviews
		214449-6	Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality.
10	**Mandatory**	**214450-1**	Adapt the global ethical principles and modern ethical

	Audit Course 3 Ethics and Values in Information Technology		issues.
		214450-2	Apprehend ethics in the business relationships and practices of IT.
		214450-3	Implement trustworthy computing to manage risk and security vulnerabilities.
		214450-4	Analyze concerns of privacy, privacy rights in information-gathering practices in IT.
SE [IT] 2019 Pattern SEM II			
1	**Engineering Mathematics- III**	**207003 -1**	Solve Linear differential equations, essential in modelling and design of computer-based systems.
		207003 -2	Apply concept of Fourier transform and Z-transform and its applications to continuous and discrete systems and image processing.
		207003 -3	Apply Statistical methods like correlation& regression analysis and probability theory for data analysis and predictions in machine learning.
		207003 -4	Solve Algebraic &Transcendental equations and System of linear equations using numerical techniques.
		207003 -5	Obtain Interpolating polynomials, numerical differentiation and integration, numerical solutions of ordinary differential equations used in modern scientific computing.
2	**Processor Architecture**	**214451-1**	Apprehend architecture and memory organization of PIC 18 microcontroller.
		214451-2	Implement embedded C programming for PIC 18.
		214451-3	Use concepts of timers and interrupts of PIC 18.
		214451-4	Demonstrate real life applications using PIC 18.
		214451-5	Analyze architectural details of ARM processor.
3	**Database Management System**	**214452-1**	Apply fundamental elements of database management systems.
		214452-2	Design ER-models to represent simple database application scenarios.
		214452-3	Formulate SQL queries on data for relational databases.
		214452-4	Improve the database design by normalization & to incorporate query processing.
		214452-5	Apply ACID properties for transaction management and concurrency control.
		214452-6	Analyze various database architectures and technologies.
4	**Computer Graphics**	**214453-1**	Apply mathematical and logical aspects for developing elementary graphics operations like scan conversion of points, lines, circle, and apply it for problem solving.
		214453-2	Employ techniques of geometrical transforms to produce, position and manipulate Objects in 2

			dimensional and 3-dimensional space respectively.
		214453-3	Describe mapping from a world coordinates to device coordinates, clipping, and projections in order to produce 3D images on 2D output device.
		214453-4	Apply concepts of rendering, shading, animation, curves and fractals using computer graphics tools in design, development and testing of 2D, 3D modeling applications.
		214453-5	Perceive the concepts of virtual reality.
5	**Software Engineering**	**214454-1**	Classify various software application domains.
		214454-2	Analyze software requirements by using various modeling techniques.
		214454-3	Translate the requirement models into design models.
		214454-4	Apply planning and estimation to any project.
		214454-5	Use quality attributes and testing principles in software development life cycle.
		214454-6	Discuss recent trends in Software engineering by using CASE and agile tools.
6	**Programming Skill Development Lab**	**214455-1**	Apply concepts related to embedded C programming.
		214455-2	Develop and Execute embedded C program to perform array addition, block transfer, sorting operations
		214455-3	Perform interfacing of real-world input and output devices to PIC18FXXX microcontroller.
		214455-4	Use source prototype platform like Raspberry-Pi/Beagle board/Arduino.
7	**Database Management System Lab**	**214456-1**	Install and configure database systems.
		214456-2	Analyze database models & entity relationship models.
		214456-3	Design and implement a database schema for a given problem-domain
		214456-4	Implement relational database systems.
		214456-5	Populate and query a database using SQL DDL / DML / DCL commands.
		214456-6	Design a backend database of any one organization: CASE STUDY
8	**Computer Graphics Lab**	**214457 -1**	Apply line& circle drawing algorithms to draw the objects.
		214457 -2	Apply polygon filling methods for the object.
		214457 -3	Apply polygon clipping algorithms for the object.
		214457 -4	Apply the 2D transformations on the object.
		214457 -5	Implement the curve generation algorithms.
		214457 -6	Demonstrate the animation of any object using animation principles.

9	**Project Based Learning**	**214458 -1**	Design solution to real life problems and analyze its concerns through shared cognition.
		214458 -2	Apply learning by doing approach in PBL to promote lifelong learning.
		214458 -3	Tackle technical challenges for solving real world problems with team efforts.
		214458 -4	Collaborate and engage in multi-disciplinary learning environments.
10	**Mandatory Audit Course 4** **Water Supply and Management**	**214459 -1**	Relate the relations between the environment and ecology, estimating water requirement for public water supply scheme.
		214459 -2	Assess the quality of water as per BIS and select the appropriate treatment method required for the water source.
		214459 -3	Analyze the suitable distribution system for a locality and know the appurtenances used.
		214459 -4	Summarize the arrangement of water supply and fittings in a building.
		214459 -5	Determine the need of conservation of water and rural water supply.
		214459 -6	Identify the sources of water pollution and suitable control measures.
TE [IT] 2015 Pattern SEM I			
1	Theory of Computation	CO314441-1	To construct finite state machines to solve problems in computing.
		CO314441-2	To write mathematical expressions for the formal languages
		CO314441-3	To apply well defined rules for syntax verification.
		CO314441-4	To construct and analyze Push Down, Post and Turing Machine for formal languages.
		CO314441-5	To express the understanding of the decidability and decidability problems.
		CO314441-6	To express the understanding of computational complexity.
2	Database Management Systems	CO314442-1	To define basic functions of DBMS & RDBMS.
		CO314442-2	To analyze database models & entity relationship models.
		CO314442-3	To design and implement a database schema for a given problem-domain.
		CO314442-4	To populate and query a database using SQL DML/DDL commands.
		CO314442-5	Do Programming in PL/SQL including stored procedures, stored functions, cursors and packages.

		CO314442-6	To appreciate the impact of analytics and big data on the information industry and the external ecosystem for analytical and data services.
3	Software Engineering & Project Management	CO314443-1	To identify unique features of various software application domains and classify software applications.
		CO314443-2	To choose and apply appropriate lifecycle model of software development.
		CO314443-3	To describe principles of agile development, discuss the SCRUM process and distinguish agile process model from other process models.
		CO314443-4	To analyze software requirements by applying various modeling techniques.
		CO314443-5	To list and classify CASE tools and discuss recent trends and research in software engineering.
		CO314443-6	To understand IT project management through life cycle of the project and future trends in IT Project Management.
4	Operating System	CO314444-1	Fundamental understanding of the role of Operating Systems.
		CO314444-2	To understand the concept of process and thread management.
		CO314444-3	To apply the cons of process/thread scheduling.
		CO314444-4	To apply the concept of process synchronization, mutual exclusion and the deadlock.
		CO314444-5	To realize the concept of I/O management and File system.
		CO314444-6	To understand the various memory management techniques.
5	Human-Computer Interaction	CO314445-1	To explain importance of HCI study and principles of user-centred design (UCD) approach.
		CO314445-2	To develop understanding of human factors in HCI design.
		CO314445-3	To develop understanding of models, paradigms and context of interactions.
		CO314445-4	To design effective user-interfaces following a structured and organized UCD process.
		CO314445-5	To evaluate usability of a user-interface design.
		CO314445-6	To apply cognitive models for predicting human-computer-interactions.
6	Software Laboratory-I	CO314446-1	To install and configure database systems.
		CO314446-2	To analyze database models & entity relationship models
		CO314446-3	To design and implement a database schema for a given problem-domain

		CO314446-4	To understand the relational and document type database systems
		CO314446-5	To populate and query a database using SQL DML/DDL commands
		CO314446-6	To populate and query a database using MongoDB commands.
7	Software Laboratory-II	CO314447-1	To understand the basics of Linux commands and program the shell of Linux.
		CO314447-2	To develop various system programs for the functioning of operating system.
		CO314447-3	To implement basic building blocks like processes, threads under the Linux.
		CO314447-4	To develop various system programs for the functioning of OS concepts in user space like concurrency control and file handling in Linux.
		CO314447-5	To design and implement Linux Kernel Source Code.
		CO314447-6	To develop the system program for the functioning of OS concepts in kernel space like embedding the system call in any Linux kernel.
8	Software Laboratory-III	CO314448-1	To identify the needs of users through requirement gathering.
		CO314448-2	To apply the concepts of Software Engineering process models for project development.
		CO314448-3	To apply the concepts of HCI for user-friendly project development.
		CO314448-4	To deploy website on live webserver and access through URL.
		CO314448-5	To understand, explore and apply various web technologies.
		CO314448-6	To develop team building for efficient project development.
9	Audit Course 3- Leadership and Personality Development	CO314449-1	To exhibit responsible decision-making and personal accountability
		CO314449-2	To demonstrate an understanding of group dynamics and effective teamwork
		CO314449-3	To develop a range of leadership skills and abilities such as effectively leading change, resolving conflict, and motivating others.
		CO314449-4	To develop overall personality
TE [IT] 2015 Pattern SEM II			
1	Computer Network Technology	CO314450-1	To know Responsibilities, services offered and protocol used at each layer of network.
		CO314450-2	To understand different addressing techniques used in network.

		CO314450-3	To know the difference between different types of network.
		CO314450-4	To know the different wireless technologies and IEEE standards.
		CO314450-5	To use and apply the standards and protocols learned, for application development.
		CO314450-6	To understand and explore recent trends in network domain.
2	Systems Programming	CO314451-1	To learn independently modern software development tools and creates novel solutions for language processing applications.
		CO314451-2	To design and implement assemblers and macro processors.
		CO314451-3	To use tool LEX for generation of Lexical Analyzer.
		CO314451-4	To use YACC tool for generation of syntax analyzer.
		CO314451-5	To generate output for all the phases of compiler.
		CO314451-6	To apply code optimization in the compilation process.
3	Design and Analysis of Algorithms	CO314452-1	To calculate computational complexity using asymptotic notations for various algorithms.
		CO314452-2	To apply Divide & Conquer as well as Greedy approach to design algorithms.
		CO314452-3	To practice principle of optimality.
		CO314452-4	To illustrate different problems using Backtracking.
		CO314452-5	To compare different methods of Branch and Bound strategy.
		CO314452-6	To explore the concept of P, NP, NP-complete, NP-Hard and parallel algorithms.
4	Cloud Computing	CO314453-1	To understand the need of Cloud based solutions
		CO314453-2	To understand Security Mechanisms and issues in various Cloud Applications
		CO314453-3	To explore effective techniques to program Cloud Systems.
		CO314453-4	To understand current challenges and trade-offs in Cloud Computing.
		CO314453-5	To find challenges in cloud computing and delve into it to effective solutions.
		CO314453-6	To understand emerging trends in cloud computing.
5	Data Science & Big Data Analytics	CO314454-1	To understand Big Data primitives.
		CO314454-2	To learn and apply different mathematical models for Big Data.
		CO314454-3	To demonstrate their Big Data learning skills by developing industry or research applications.
		CO314454-4	To analyze each learning model come from a different algorithmic approach and it will perform differently under different datasets.

		CO314454-5	To understand needs, challenges and techniques for big data visualization.
		CO314454-6	To learn different programming platforms for big data analytics.
6	SOFTWARE LABORATORY – IV	CO314455-1	To implement small size network and its use of various networking commands.
		CO314455-2	To understand and use various networking and simulations tools.
		CO314455-3	To configure various client/server environments to use application layer protocols
		CO314455-4	To understand the protocol design at various layers.
		CO314455-5	To explore use of protocols in various wired and wireless applications.
		CO314455-6	To develop applications on emerging trends.
7	SOFTWARE LABORATORY – V	CO314456-1	To design and implement two pass assembler for hypothetical machine instructions.
		CO314456-2	To design and implement different phases of compiler (Lexical Analyzer, Parser, Intermediate code generation)
		CO314456-3	To use the compile generation tools such as “Lex" and "YACC”.
		CO314456-4	To apply algorithmic strategies for solving various problems.
		CO314456-5	To compare various algorithmic strategies.
		CO314456-6	To analyze the solution using recurrence relation.
8	SOFTWARE LABORATORY – VI	CO314457-1	To apply Big data primitives and fundamentals for application development.
		CO314457-2	To explore different Big data processing techniques with use cases.
		CO314457-3	To apply the Analytical concept of Big data using R/Python.
		CO314457-4	To visualize the Big Data using Tableau.
		CO314457-5	To design algorithms and techniques for Big data analytics.
		CO314457-6	To design Big data analytic application for emerging trends.
9	PROJECT BASED SEMINAR	CO314458-1	To Gather, organize, summarize and interpret technical literature with the purpose of formulating a project proposal.
		CO314458-2	To write a technical report summarizing state-of-the-art on an identified topic.
		CO314458-3	Present the study using graphics and multimedia presentations.
		CO314458-4	Define intended future work based on the technical review.
		CO314458-5	To explore and enhance the use of various presentation tools and techniques.

		CO314458-6	To understand scientific approach for literature survey and paper writing.
10	Audit Course 4 - Health & Fitness Management	CO314459-1	Identify the health- and skill-related fitness components.
		CO314459-2	Understand the benefits of physical fitness, and the underlying principles, physiology, and practices for fitness development.
		CO314459-3	Apply of fitness management skills and strategies for the development of physical activity habits and personal fitness by the students.
		CO314459-4	Aware about healthy diet for physical and mental fitness of an individual.
		CO314459-5	Understand importance of mental fitness along with physical fitness by practicing yoga, meditation and relaxation techniques.
BE [IT] 2015 Pattern SEM I			
1	Information and Cyber Security	CO414453-1	Use basic cryptographic techniques in application development.
		CO414453-2	Apply methods for authentication, access control, intrusion detection and prevention.
		CO414453-3	To apply the scientific method to digital forensics and perform forensic investigations.
		CO414453-4	To develop computer forensics awareness.
		CO414453-5	Ability to use computer forensics tools.
2	Machine Learning and Applications	CO414454-1	Model the learning primitives.
		CO414454-2	Build the learning model..
		CO414454-3	Tackle real world problems in the domain of Data Mining and Big Data Analytics, Information Retrieval, Computer vision, Linguistics and Bioinformatics.
3	Software Design and Modeling	CO414455-1	Understand object oriented methodologies, basics of Unified Modeling Language (UML).
		CO414455-2	Understand analysis process, use case modeling, domain/class modeling
		CO414455-3	Understand interaction and behavior modeling.
		CO414455-4	Understand design process and business, access and view layer class design
		CO414455-5	Get started on study of GRASP principles and GoF design patterns.
		CO414455-6	Get started on study of architectural design principles and guidelines in the various type of application development.
4	Elective-I Business	CO414456-1	Comprehend the Information Systems and development approaches of Intelligent Systems.

	Analytics and Intelligence	CO414456-2	Evaluate and rethink business processes using information systems.
		CO414456-3	Propose the Framework for business intelligence.
		CO414456-4	Get acquainted with the Theories, techniques, and considerations for capturing organizational intelligence.
		CO414456-5	Align business intelligence with business strategy.
		CO414456-6	Apply the techniques for implementing business intelligence systems.
5	Elective-II Software Testing and Quality Assurance	CO414457-1	Test the software by applying testing techniques to deliver a product free from bugs.
		CO414457-2	Investigate the scenario and to select the proper testing technique.
		CO414457-3	Explore the test automation concepts and tools and estimation of cost, schedule based on standard metrics.
		CO414457-4	Understand how to detect, classify, prevent and remove defects.
		CO414457-5	Choose appropriate quality assurance models and develop quality.
		CO414457-6	Ability to conduct formal inspections, record and evaluate results of inspections.
6	Computer Laboratory-VII	CO414458-1	The students will be able to implement and port controlled and secured access to software systems and networks.
		CO414458-2	The students will be able to build learning software in various domains.
7	Computer Laboratory-VIII	CO414459-1	Draw, discuss different UML 2.0 diagrams, their concepts, notation, advanced notation, forward and reverse engineering aspects.
		CO414459-2	Identify different software artifacts used to develop analysis and design model from requirements.
		CO414459-3	Develop use case model.
		CO414459-4	Develop, implement analysis model and design model.
		CO414459-5	Develop, implement Interaction and behavior Model.
		CO414459-6	Implement an appropriate design pattern to solve a design problem.
8	Project Phase-I	CO414460-1	To show preparedness to study independently in chosen domain of Information Technology and programming languages and apply their acquired knowledge to variety of real time problem scenarios.
		CO414460-2	To function effectively as a team to accomplish a desired goal.
		CO414460-3	An understanding of professional, ethical, legal, security and social issues and responsibilities related to Information Technology Project.

9	Audit Course-V-Critical Thinking	CO414461-1	If students whole-heartedly participate in the course, they can expect to be smarter, stronger and more confident thinkers.
		CO414461-2	They can embark on a life-long journey of "self-directed learning".
BE [IT] 2015 Pattern SEM II			
1	Distributed Computing System	CO414462-1	Understand the principles and desired properties of distributed systems based on different application areas.
		CO414462-2	Understand and apply the basic theoretical concepts and algorithms of distributed systems in problem solving.
		CO414462-3	Recognize the inherent difficulties that arise due to distributed-ness of computing resources.
		CO414462-4	Identify the challenges in developing distributed applications
2	Ubiquitous Computing	CO414463-1	Demonstrate the knowledge of design of Ubicomp and its applications.
		CO414463-2	Explain smart devices and services used Ubicomp.
		CO414463-3	Describe the significance of actuators and controllers in real time application design.
		CO414463-4	Use the concept of HCI to understand the design of automation applications.
		CO414463-5	Classify Ubicomp privacy and explain the challenges associated with Ubicomp privacy.
		CO414463-6	Get the knowledge of ubiquitous and service oriented networks along with Ubicomp
3	Elective-III Internet of Things (IoT)	CO414464-1	Explain what is internet of things.
		CO414464-2	Explain architecture and design of IoT
		CO414464-3	Describe the objects connected in IoT
		CO414464-4	Understand the underlying Technologies.
		CO414464-5	Understand the platforms in IoT
		CO414464-6	Understand cloud interface to IoT
4	Elective-IV Social Media Analytics	CO414465-1	Understand the basics of Social Media Analytics.
		CO414465-2	Explain the significance of Data mining in Social media.
		CO414465-3	Demonstrate the algorithms used for text mining.
		CO414465-4	Apply network measures for social media data.
		CO414465-5	Explain Behavior Analytics techniques used for social media data.
		CO414465-6	Apply social media analytics for Face book and Twitter kind of applications.
5	Computer Laboratory-IX	CO414466-1	Demonstrate knowledge of the core concepts and techniques in distributed systems.

		CO414466-2	Learn how to apply principles of state-of-the-Art Distributed systems in practical application.
		CO414466-3	Design, build and test application programs on distributed systems.
6	Computer Laboratory-X	CO414467-1	Set up the Android environment and explain the Evolution of cellular networks.
		CO414467-2	Develop the User Interfaces using pre-built Android UI components.
		CO414467-3	Create applications for performing CURD SQLite database operations using Android.
		CO414467-4	Create the smart android applications using the data captured through sensors.
		CO414467-5	Implement the authentication protocols between two mobile devices for providing. Security.
		CO414467-6	Analyze the data collected through android sensors using any machine learning algorithm.
7	Project Work	CO414468-1	Learn teamwork.
		CO414468-2	Be well aware about Implementation phase.
		CO414468-3	Get exposure of various types of testing methods and tools.
		CO414468-4	Understand the importance of documentation.
8	Audit Course-VI -IoT Applications in Engineering Field	CO414469-1	Expand your knowledge of Internet of Things.
		CO414469-2	Discover how you can use IoT in your Engineering applications.
		CO414469-3	Build more effective hands on with IoT elements.
		CO414469-4	Expand the practical knowledge of using IoT components like sensors, processors.
		CO414469-5	Expand the understanding of using different protocols.

Sinhgad Technical Education Society's

Sinhgad Institute of Technology, Lonavala

Department of Electronics and Telecommunication Engineering

Academic Year2019-20

Program Outcomes (POs)

List of Program Outcomes (POs)		
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

Program Educational Objectives (PEOs)

Program Educational Objectives (PEOs)	
PEO1	To develop students to achieve high level of technical expertise with Strong theoretical background and sound practical knowledge.
PEO2	To inculcate research environment for enhancement of Academia – Industry collaboration through conference.
PEO3	To prepare graduates to be sensitive to ethical, societal and Environmental issues while engaging their professional duties, Entrepreneurship and leadership.
PEO4	To Enhance ability of students for providing Engineering solution in a global and societal context.
PEO5	Pursue higher education for professional development

Program Specific Outcomes (PSOs)

Program Specific Outcomes (PSOs)	
PSO1	Get solid foundation in design and development of electronics modules useful to society.
PSO2	Able to handle skills based challenges

Course Outcomes (COs)

SE [E&TC] 2019 Pattern			
SN	**Course Code**	**Course Name**	**Course Outcomes (COs)**
01	(204181)	Signals & Systems	Understand mathematical description and representation of continuous and discrete time signals and systems. Develop input output relationship for linear shift invariant system and understand the convolution operator for continuous and discrete time system. Understand and resolve the signals in frequency domain using Fourier series and Fourier transforms. Understand the limitations of Fourier transform and need for Laplace transform and develop the ability to analyze the system in s- domain. Understand the basic concept of probability, random variables & random signals and develop the ability to find correlation, CDF, PDF and probability of a given event.
02	(204182)	Electronic Devices & Circuits	Comply and verify parameters after exciting devices by any stated method. Implement circuit and test the performance Analyze small signal model of FET and MOSFET. Explain behavior of FET at low frequency. Design an adjustable voltage regulator circuits simulate electronics circuits using computer

			simulation software and verify desired results.
03	(204183)	Electrical Circuits and Machines	Analyze basic AC & DC circuit for voltage, current and power by using KVL, KCL, and network theorems. Design and analyze transformers. Explain the working principle of different DC electrical machines. Explain the working principle of different AC electrical machines. Select proper electrical motor like BLDC, Reluctance, universal motor for given application. Select proper electrical motor like Stepper motor, Servomotor, Single phase Induction mootor for given application.
04	(204184)	Data Structures and Algorithms	Discuss the computational efficiency of the principal algorithms Write and understand the programs that use arrays & pointers in C Describe how arrays, records, linked structures are represented in memory and use them in algorithms Implement stacks & queues for various applications Understand various terminologies and traversals of trees and use them for various application Understand various terminologies and traversals of graphs and use them for various applications.
05	(204185)	Digital Electronics	Use the basic logic gates and various reduction techniques of digital logic circuit in detail. Design of combinational circuits. Design of sequential circuits. Design of Sequential circuit using ASM. Design and implement hardware circuit to test performance and application. Understand the architecture and use of microcontrollers for basic operations and Simulate using simulation software.
06	(207005)	Engineering Mathematics III	Solve higher order linear differential equation using appropriate techniques for modelling analyzing of electrical circuits and control systems Apply concept of Fourier transform & Z-transform and its applications to continuous & discrete systems, signal & image processing and communication systems.

			Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-step iterative methods used in modern scientific computing. Perform vector differentiation & integration, analyze the vector fields and apply to electromagnetic fields & wave theory. Analyze Complex functions, Conformal mappings, Contour integration applicable to electrostatics, digital filters, signal and image processing.
07	(204187)	Integrated Circuits	Understand the characteristics of IC and Op-Amp and identify the internal structure. Derive and determine various performances based parameters and their significance for Op-Amp. Comply and verify parameters after exciting IC by any stated method. Analyze and identify linear applications of Op-Amp. Analyze and identify nonlinear applications of Op-Amp. Understand and verify results (levels of V & I) with hardware implementation. Implement hardwired circuit to test performance and application for what it is being designed. Understand and apply the functionalities of PLL to Frequency synthesizer, multiplier, FM, and AM demodulators. Understand and design filters for different cutoff frequencies.
08	(204188)	Control Systems	Determine and use models of physical systems in form suitable for use in the analysis and design of control systems Determine the absolute stability of a closed loop Control system Perform time domain and frequency domain analysis of control systems required for stability analysis Perform Time domain and frequency domain correlation analysis Apply root locus Frequency plots technique to analyze control system express and solve system Equation in state variable form
09	(204189)	Analog Communication	Understand and identify the fundamental concepts and various components of analog communication systems. Evaluation of performance characteristics of AM

			receiver. Describe the nonlinear modulation techniques with mathematical analysis Develop the ability to compare and contrast the strengths and weaknesses of various communication systems. Explain signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system. Describe analog pulse modulation techniques and digital modulation technique.
10	(204190)	Object Oriented Programming	Describe the principles of object oriented programming. Apply the concepts of data encapsulation, inheritance in C++. Understand basic program constructs in Java Apply the concepts of classes, methods and inheritance to write programs Java. Use arrays, vectors and strings concepts and interfaces to write programs in Java. Describe and use the concepts in Java to develop user friendly program,
TE [E&TC] 2015 Pattern			
01	(304181)	Digital Communication	Understand working of waveform coding techniques and analyse their performance. Analyze the performance of a baseband and pass band digital communication system in terms of error rate and spectral efficiency. Perform the time and frequency domain analysis of the signals in a digital communication system. Represent the signal in its vector and estimate the detected signal with minimum error Design of digital communication system. Understand working of spread spectrum communication system and analyze its performance.
02	(304182)	Digital Signal Processing	Analyze the discrete time signals and system using different transform domain techniques. Design and implement LTI filters for filtering different real world signals. Develop different signal processing applications using DSP processor.
03	(304183)	Electromagnetics	Understand the basic mathematical concepts related to electromagnetic vector fields. Apply the principles of electrostatics to the solutions of problems relating to electric field and electric potential, boundary conditions and electric energy density.

			Apply the principles of magneto statics to the solutions of problems relating to magnetic field and magnetic potential, boundary conditions and magnetic energy density. Understand the concepts related to Faraday‘s law, induced emf and Maxwell‘s equations Apply Maxwell‘s equations to solutions of problems relating to transmission lines and uniform plane wave propagation Apply the basic mathematical concepts related to electromagnetic vector fields
04	(304184)	Microcontrollers	Selects microcontroller on the basis of performance parameters Writes Programs in Assemble and C Learn Importance of Microcontroller in designing Embedded applications Learn Use of Hardware and Software tools Develop Interfacing to real world peripheral devices Develop the Data Acquisition System
05	(304185)	Mechatronics	To understand the concept and key elements of Mechatronics system, representation into block diagram To understand principles of sensors their characteristics To Understand of various data presentation and data logging systems To Understand concept of actuator To Understand various case studies of Mechatronics systems
06	(304186)	Power Electronics	Design & implement a triggering / gate drive circuit for a power device Understand, perform different controlled converters. Aanalyze different controlled converters. Design of power electronics applications like UPS, SMPS Evaluate battery backup time & design a battery charger. Design & implement over voltage / over current protection circuit.
07	(304187)	Information Theory, Coding and Communication Networks	Perform Information theoratic analysis of Communication System Design a data compression scheme using Suitable source coding technique Design a channel coding scheme for a communication system Understand and apply fundamental principles of data communication and networking

			Apply flow and error control techniques in Communication Networks Study of Error control techniques
08	(304188)	Business Management	Get overview of Management Science aspects useful in business. 2) Get motivation for Entrepreneurship 3) Get Quality Aspects for Systematically Running the Business 4) To Develop Project Management aspect and Entrepreneurship Skills.
09	(304189)	Advanced Processors	To understand need and application of ARM Microprocessors in embedded system. To study the architecture of ARM series microprocessor To learn interfacing of real world input and output devices Design embedded system with available resources. Use of DSP Processors and resources for signal processing applications. To understand architecture and features of typical DSP Processors.
10	(304190)	System Programming and Operating Systems	To understand system software concepts, like the use and implementation of assembler, macros, linker, loaders and compiler To get acquainted with software tools for program development. To explore memory allocation methods, input output devices and file system w. r. t. various operating system To study and implement various processes scheduling techniques and dead lock avoidance schemes in operating system.
BE [E&TC] 2015 Pattern			
01	(404181)	VLSI Design& Technology	Write effective HDL coding for digital design. Apply knowledge of real time issues in digital design. Model digital circuit with HDL, simulate, synthesis and prototype in PLDs. Design CMOS circuits for specified applications. Analyze various issues and constraints in design of an ASIC Apply knowledge of testability in design and build self-test circuit.
02	(404182)	Computer Networks & Security	To understand state-of-the-art in network protocols, architectures, and applications To provide students with a theoretical and practical base in computer networks issues To outline the basic network configurations To understand the transmission methods underlying

			LAN and WAN technologies. To understand security issues involved in LAN and Internet.
03	(404183)	Radiation & Microwave Techniques	Differentiate various performance parameters of radiating elements. Analyze various radiating elements and arrays. Apply the knowledge of waveguide fundamentals in design of transmission lines. Design and set up a system consisting of various passive microwave components. Analyze tube based and solid state active devices along with their applications. Measure various performance parameters of microwave components.
04	(404184)	Elective I (IOT)	To understand the fundamental concepts and protocols related to Internet of Things. To study the different sensors, acctuators, IoT standards and APIs for prototyping. To understand the fundamental concepts and protocols related to Internet of Things Understand and apply various IP based protocols for design of IoT systems To be familiar with the big data and cloud in the IoT basis To study the application areas of the Internet of Things.
05	(404185)	Elective II (EPD)	Know the basics of product design concept, requirements and specification. Design various stages of hardware from requirements and specifications. Analyse need of software for human interface. Able to explore advance PCB design techniques. Know the importance of product test & test specifications. Able to define the term documentation and its importance in product design.
06	(404189)	Mobile Communication	Student will be able to describe how wireless networks are penetrating our lives for data, multimedia and voice transmission. Student will be able to analyze different traffic model to predict and measure the propagation loss. Students will understand basic concepts of cellular system, wireless propagation and the techniques used to maximize the capacity of cellular network. Students understand the detailed Architecture of GSM with the call establishment process. They also comprehended the details of mobility management.

			Students will be able to the necessary relationship to evaluate the performance of CDMA and GSM system Learner would be able to get the overview of LTE architecture, and opportunities and requirements in 5G networks.
07	(404190)	Broadband Communication Systems	To comprehend the three primary components of a fiber optic communication system. To understand the system design issues and the role of WDM components in advanced light wave systems To understand the basics of orbital mechanics and the look angles from ground stations to the satellite. To apply subject understanding in Link Design. To understand the basics of Satellite and the their structure. To apply understanding in Satellite Design.
08	(404191)	Elective III (AVE)	Apply the fundamentals of Analog Television and Colour Television standards. Explain the fundamentals of Digital Television, DTV standards and parameters Study and understand various HDTV standards and Digital TV broadcasting systems and acquainted with different types of analog, digital TV and HDTV systems. Know advanced TV systems - IP Audio & IP Video, Wi-Fi Audio & Video and 3G transmission. Understand fundamentals of recording and reproductions. Understand acoustic fundamentals and various acoustic systems.
09	(404192)	Elective IV (WN)	Explain various concepts and terminologies used in WSN. Describe importance and use of radio communication and link management in WSN. Explain various wireless standards and protocols associated with WSN. Recognize importance of localization and routing techniques used in WSN. Understand techniques of data aggregation and importance of security in WSN. Examine the issues involved in design and deployment of WSN.

Sinhgad Technical Education Society's

Sinhgad Institute of Technology, Lonavala

Department of Mechanical Engineering

Academic Year2019-20

Program Outcomes (POs)

List of Program Outcomes (POs)		
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

Program Educational Objectives (PEOs)

Program Educational Objectives (PEOs)	
PEO1	To develop students to achieve high level of technical expertise with Strong theoretical background and sound practical knowledge.
PEO2	To inculcate research environment for enhancement of Academia – Industry collaboration through conference.
PEO3	To prepare graduates to be sensitive to ethical, societal and Environmental issues while engaging their professional duties, Entrepreneurship and leadership.
PEO4	To Enhance ability of students for providing Engineering solution in a global and societal context.
PEO5	Pursue higher education for professional development

Program Specific Outcomes (PSOs)

Program Specific Outcomes (PSOs)	
PSO1	Recognize, formulate and analyze Real life Mechanical engineering problems through different skill set
PSO2	Apply the acquired Mechanical Engineering knowledge for entrepreneur and to the advancement of society

Course Outcomes (COs)

SE [Mech]			
SN	**Course Code**	**Course Name**	**Course Outcomes (COs)**
01	**207002**	**Engineering Mathematics-III**	Solve higher order linear differential equations and apply to modeling and analyzing mass spring systems
			Apply Laplace transform and Fourier transform techniques to solve differential equations involved in Vibration theory, Heat transfer and related engineering applications.
			Apply statistical methods like correlation, regression analysis in analyzing, interpreting experimental data and probability theory in testing and quality control.
			Perform vector differentiation and integration, analyze the vector fields and apply to fluid flow problems.
			Solve various partial differential equations such as wave equation, one and two dimensional heat flow equations.
02	**202041**	**Manufacturing Process**	To make acquaintance of foundry processes

		- I	pattern making and casting
			To study metal forming processes such forging, rolling, extrusion and wire drawing
			To make study of different plastic molding processes
			To study metal joining processes
			To design and development of product with Sheet metal working process
			Introduction to center lathe
03	**202042**	**(Computer Aided Machine Drawing)**	Understand the importance of CAD in the light of allied technologies such as CAM, CAE, FEA, CFD, PLM.
			Understand the significance of parametric technology and its application in 2D sketching.
			Understand the significance of parametric feature-based modelling and its application in 3D machine components modelling.
			Ability to create 3D assemblies that represent static or dynamic Mechanical Systems.
			Ability to ensure manufacturability and proper assembly of components and assemblies.
			Ability to communicate between Design and Manufacturing using 2D drawings
04	**202043**	**Thermodynamics)**	Apply various laws of thermodynamics to various processes and real systems.
			Apply the concept of Entropy, Calculate heat, work and other important thermodynamic properties for various ideal gas processes.
			Estimate performance of various Thermodynamic gas power cycles and gas refrigeration cycle and availability in each case.
			Estimate the condition of steam and performance of vapour power cycle and vapour compression cycle
			Estimate Stoichiometric air required for combustion, performance of steam generators and natural draught requirements in boiler plants.
05	**202044**	**Material Science**	Understand the basic concepts and properties of Material.
			Understand about material fundamental and

			processing.
			Select proper metal, alloys, nonmetal and powder metallurgical component for specific requirement
			Detect the defects in crystal and its effect on crystal properties.
			Evaluate the different properties of material by studying different test
			Recognize how metals can be strengthened by cold-working and hot working
06	**202051**	**Strength of Materials)**	Apply knowledge of mathematics, science for engineering applications
			Design and conduct experiments, as well as to analyze and interpret data
			Design a component to meet desired needs within realistic constraints of health and safety
			Identify, formulate, and solve engineering problems
			Practice professional and ethical responsibility
			Use the techniques, skills, and modern engineering tools necessary for engineering practice
07	**202045**	**Fluid Mechanics)**	Use of various properties in solving the problems in fluids
			Use of various types of flows and use of continuity equation in pipe flows
			Use of Bernoulli's equation for solutions in fluids and its application in measuring devices
			Use of velocity, shear stress distribution equation for laminar and turbulent flow
			Use of Darcy Weisbach equation for solving head loss problems and use of dimensional analysis
			Determination of forces drag and lift on immersed bodies and boundary layer theory
08	**202048**	**Theory of Machines-I)**	To make the student conversant with commonly used mechanism for industrial application.
			To develop competency in drawing velocity and acceleration diagram for simple and complex mechanism.
			To develop analytical competency in solving kinematic problems using complex algebra method.
			To develop competency in graphical and analytical method for solving problems in static and dynamic force analysis.
			To develop competency in conducting laboratory experiments for finding moment of

			inertia of rigid bodies,
			To Analyze velocity and acceleration of mechanisms by vector and graphical methods.
09	**202049**	**(Engineering Metallurgy)**	Describe how metals and alloys formed and how the properties change due to microstructure
			Apply core concepts in Engineering Metallurgy to solve engineering problems.
			Conduct experiments, as well as to analyze and interpret data
			Select materials for design and construction.
			Possess the skills and techniques necessary for modern materials engineering practice
			Recognize how metals can be strengthened by alloying, cold-working, and heat treatment
10	**202050**	**Applied Thermodynamics)**	Classify various types of Engines, Compare Air standard, Fuel Air and Actual cycles and make out various losses in real cycles.
			Understand Theory of Carburetion, Modern Carburettor, Stages of Combustion in S. I. Engines and Theory of Detonation, Pre-ignition and factors affecting detonation.
			Understand Fuel Supply system, Types of Injectors and Injection Pumps, Stages of Combustion in CI Engines, Theory of Detonation in CI Engines and Comparison of SI and CI Combustion and Knocking and Factors affecting, Criteria for good combustion chamber and types.
			Carry out Testing of I. C. Engines and analyze its performance
			Describe construction and working of various I. C. Engine systems (Cooling, Lubrication, Ignition, Governing, and Starting) also various harmful gases emitted from exhaust and different devices to control pollution and emission norms for pollution control.
			Describe construction, working of various types of reciprocating and rotary compressors with performance calculations of positive displacement compressors.
11	**203152**	**Electrical and Electronics Engineering)**	To Develop the capability to identify and select suitable DC motor / and its speed control method for given industrial application.
			To Develop the capability to identify and select suitable induction and its speed control method for given industrial application.
			To Develop the capability to identify and select suitable special purpose motor and its

			speed control method for given industrial application.
			To Develop the capability to identify and select suitable microcontroller and its application in industry.
			To understand Embedded systems terminologies and sensors
			To understand Data acquisition system for mechanical applications
TE [Mech]			
01	**302041**	**Design of Machine Elements-I)**	Ability to identify and understand failure modes for mechanical elements and design of machine elements based on strength.
			Ability to design Shafts, Keys and Coupling for industrial applications.
			Ability to design machine elements subjected to fluctuating loads.
			Ability to design Power Screws for various applications.
			Ability to design fasteners and welded joints subjected to different loading conditions.
			Ability to design various Springs for strength and stiffness.
02	**302042**	**Heat Transfer)**	Analyse the various modes of heat transfer and implement the basic heat conduction equation for steady state 1-D thermal system.
			Implement the general heat conduction equation to thermal systems with and without internal heat generation and transient heat conduction.
			Apply knowledge of lumped parameter analysis for unsteady state heat conduction and transient heat analysis using charts.
			Analyse the heat transfer rate in natural and forced convection and evaluate through experimental investigation.
			Interpret Radiation heat transfer between objects with simple geometries.
			Analyse the heat transfer equipment and investigate the performance.
03	**30204**	**Theory of Machines-II) 3**	To develop competency in understanding of theory of all types of gears.
			To understand the analysis of different types of gear train.
			To understand step-less regulations.
			To make the student conversant with synthesis of the mechanism.
			To understand step-less regulations.
			To understand mechanisms for system control

			– Gyroscope.
04	**302044**	**(Turbo Machines)**	Apply thermodynamics and kinematics principles to turbo machines.
			Analyze the performance of turbo machines.
			Ability to select turbo machine for given application.
			Predict performance of turbo machine using model analysis.
			Perform the preliminary design of turbo machines (pumps, rotary compressors and turbines)
			Interpret the language and some of the current efforts of turbo machinery manufacturers.
05	**302045**	**Metrology and Quality Control)**	Explain tolerance, limits of size, fits, geometric and position tolerances, and gauge design
			Understand the methods of measurement, selection of measuring instruments / standards of measurement, carryout data collection and its analysis.
			Understand the advanced methods of measurement, and relevant concepts from interdisciplinary areas.
			Develop an ability of problem solving and decision making by identifying and analysing the cause for variation and recommend suitable corrective actions for quality Improvement.
			Understand and use/apply Quality Control Techniques/ Statistical Tools appropriately
			Understand and use/apply TQM tools and Quality management systems
06	**302046**	**(Skill Development) 302046**	To Develop the skill required for shop floor working
			To have a Knowledge of Different tools and tackles used in machine assembly shop
			To apply Theoretical Knowledge in Practice
			To study Practical Aspect of each component in the assembly of machine shop
			To understand Function of Parts and its uses.
			To Understand part Drawing with GD & T sequencing.
07	**302047**	**Numerical Methods**	Recognize the difference between analytical

		and Optimization)	and Numerical Methods.
			Identify the appropriate Numerical Methods to solve complex mechanical engineering problems.
			Formulate algorithms for Numerical methods and implement same to evaluate the solution using programming language.
			Analyze and formulate Solutions for real life problem using optimization techniques.
			Develop logical sequencing for solution procedure and skills in soft computing.
			Implement Numerical methods in research problem
08	**302048**	**Design of Machine Elements-II)**	To understand and apply principles of gear design to spur gears and industrial spur gear boxes.
			To become proficient in Design of Helical and Bevel Gear.
			To develop capability to analyse Rolling contact bearing manufacturing's Catalogue.
			To learn a skill to design worm gear box for various industrial applications.
			To inculcate an ability to design belt drives and selection of belt, rope and chain drives.
			To achieve an expertise in design of sliding contact bearing in industrial applications.
09	**302049**	**Refrigeration and Air Conditioning)**	Compare different refrigerants with respect to properties, applications and environmental issues, Know applications of refrigeration and air-conditioning
			Study the various refrigeration cycles and evaluate performance using refrigeration property tables.
			Explain the need for multiple pressure refrigeration systems and Evaluate their performance by applying mass and energy balance equations.
			Understand the basic air conditioning processes on psychrometric charts, calculate cooling load for its applications.
			Study of various equipment- operating principles, operating and safety controls employed in refrigeration and air conditioning systems.
			Understand the air distribution systems with air handling unit.
10	**302050**	**(Mechatronics)**	Identification of key elements of mechatronics system and its representation in terms of block

			diagram.
			Ability to explain working principle, characteristics and applications of basic sensors and actuators.
			Ability to estimate transfer function of given system represented in block diagram format.
			Ability to explain analog to digital conversion principle and procedure.
			Ability to draw ladder diagram for given simple control situation.
			Ability to explain significance of P, I and D control actions..
11	**302051**	**Manufacturing Processes-II)**	Student should be able to apply the knowledge of various manufacturing Process.
			Student should be able to identify various process
			Student should be able to understand various parameters effect on Processes.
			Student should able to figure out application of modern machining.
			Student should get the Knowledge of Jigs and Fixtures
			Student should get the Knowledge for variety of operations.
12	**302053**	**(Seminar)**	Identify and compare technical and practical issues related to the area of course specialization
			Outline annotated bibliography of research demonstrating scholarly skills
			Prepare a well-organized report employing elements of technical writing and critical thinking
			Demonstrate the ability to describe, interpret and analyze technical issues and develop competence in presenting
			Recognize and relate practical and applied elements of technical writing and critical thinking
			Determine the capability to express the area of course specialization
BE [Mech]			
01	**402041**	**Hydraulics and Pneumatics)**	Able to apply various laws of fluid mechanics to the hydraulic and Pneumatic systems
			Able to define various principles and functions of various components of Hydraulic & pneumatic systems.
			Able to select appropriate components required for hydraulic and pneumatic systems

			Design hydraulic and pneumatic system for industrial applications and tried the same on the training kit
			Able to understand industrial applications of hydraulic and pneumatic system.
			Implement knowledge to design hydraulics and pneumatics applications.
02	**402042**	**CAD/CAM Automation)**	Apply homogeneous transformation matrix for geometrical transformations of 2D CAD entities for basic geometric transformations
			Use analytical and synthetic curves and surfaces in part modeling.
			Do real times analysis of simple mechanical elements like beams, trusses, etc. and comment on safety of engineering components using analysis software
			Generate CNC program for Turning / Milling and generate tool path using CAM software.
			Demonstrate understanding of various rapid manufacturing techniques and develop competency in designing and developing products using rapid manufacturing technology.
			Understand the robot systems and their applications in manufacturing industries.
03	**402043**	**Dynamics of Machinery**	Apply balancing technique for static and dynamic balancing of multi cylinder inline and radial engines.
			Estimate natural frequency for single DOF undamped & damped free vibratory systems
			Determine response to forced vibrations due to harmonic excitation, base excitation and excitation due to unbalance forces.
			Estimate natural frequencies, mode shapes for 2 DOF undamped free longitudinal and torsional vibratory systems
			Describe vibration measuring instruments for industrial / real life applications along with suitable method for vibration control.
			Explain noise, its measurement & noise reduction techniques for industry and day today life Problems.
04	**402044A**	**Finite Element Analysis)**	Understand the different techniques used to solve mechanical engineering problems.
			Derive and use 1-D and 2-D element stiffness

			matrices and load vectors from various methods to solve for displacements and stresses.
			Apply mechanics of materials and machine design topics to provide preliminary results used for testing the reasonableness of finite element results.
			Explain the inner workings of a finite element code for linear stress, displacement, temperature and modal analysis.
			Use commercial finite element analysis software to solve complex problems in solid mechanics and heat transfer.
			Interpret the results of finite element analyses and make an assessment of the results in terms of modeling (physics assumptions) errors, discretization (mesh density and refinement toward convergence) errors, and numerical (round-off) errors
05	**402045A**	**(Automobile Engineering)**	To compare and select the proper automotive system for the vehicle
			To analyse the performance of the vehicle.
			To diagnose the faults of automobile vehicles.
			To apply the knowledge of EVs, HEVs and solar vehicles
06	**402045C**	**Energy Audit and Management)**	Compare energy scenario of India and World.
			Carry out Energy Audit of the Residence / Institute/ Organization.
			Evaluate the project using financial techniques
			Identify and evaluate energy conservation opportunities in Thermal Utilities.
			Identify and evaluate energy conservation opportunities in Electrical Utilities.
			Identify the feasibility of Cogeneration and WHRUse a CFD tool effectively for practical problems and research.
07	**402046**	**(Project-I)**	Find out the gap between existing mechanical systems and develop new creative new mechanical system.
			Learn about the literature review
			Get the experience to handle various tools, tackles and machines.
			Strategise different Mechanisms for problem solving
			Defining various Methodologies for different Problem statement
			Fill the Gap between Industry and Academics for particular areas and generating numerous profit sources.

08	**402047**	**(Energy Engineering)**	To study the power generation scenario, the components of thermal power plant, improved Rankin cycle, Cogeneration cycle
			To understand details of steam condensing plant, analysis of condenser, an environmental impacts of thermal power plant, method to reduce various pollution from thermal power plant
			To study layout, component details of hydroelectric power plant, hydrology and elements, types of nuclear power plant
			To understand components; layout of diesel power plant, components; different cycles methods to improve thermal efficiency of gas power plant
			To understand components; layout of diesel power plant, components; different cycles methods to improve thermal efficiency of gas power plant
			To learn the different instrumentation in power plant and basics of economics of power generation.
09	**402048**	**Mechanical System Design**	Design machine tool gear boxes using standard procedure and modify them for enhanced efficiency
			Assess the data by using statistical concepts and provide correct interpretation
			Identify different conveyors, categorize them for respective material handling systems and design them using related concepts
			Recognize thick & thin cylinders, categorize different pressure vessels and design them using Indian (IS-2825) & International (ASME Code for pressure vessel design) Standards
			Identify materials for I C engine components and apply design procedure to design them
			Outline objectives of optimum design and develop ability to apply optimum design principles of design for manufacturing, assembly & safety
10	**402049B**	**Industrial Engineering)**	Describe different aspect of industrial engineering and productivity improvement techniques.
			Apply different concepts of method study to improve the work content
			describe and analyze techniques of work measurement and time study
			Illustrate different aspect of work system

			design and production planning control
			Identify various cost accounting and financial management practices applicable in different industries
			Apply concept of engineering economy, ergonomics and industrial safety practices.
11	**402050A**	**(Advance Manufacturing Processes)**	Classify and Analyze special forming process
			Analyze and identify applicability of advanced joining process
			Understand and analyze basic mechanisms of hybrid non-conventional machining techniques
			Select appropriate micro and nano fabrication techniques for engineering applications
			Understand and apply various additive manufacturing techniques for engineering applications
			Understand Material Characterization techniques to analyze effects of chemical composition, composition variation, crystal structure etc.
12	**402051**	**(Project-II)**	Find out the gap between existing mechanical systems and develop new creative new mechanical system.
			Learn about the literature review
			Get the experience to handle various tools, tackles and machines.
			Strategise different Mechanisms for problem solving
			Defining various Methodologies for different Problem statement
			Fill the Gap between Industry and Academics for particular areas and generating numerous profit sources.

Sinhgad Technical Education Society's

Sinhgad Institute of Technology, Lonavala

Department of Electrical Engineering

Academic Year2019-20

Program Outcomes (POs)

List of Program Outcomes (POs)		
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

Program Educational Objectives (PEOs)

Program Educational Objectives (PEOs)	
PEO1	Engage in designing, manufacturing, testing, operating and/or maintaining systems in the field of electrical engineering and industries
PEO2	Solve problems of social relevance applying the knowledge of electrical engineering, and/or pursue higher education and research.
PEO3	Engage in lifelong learning, career enhancement and adopt to changing professional and social needs.

Program Specific Outcomes (PSOs)

Program Specific Outcomes (PSOs)	
PSO1	To apply the fundamental knowledge of Mathematics, Science, and Electrical Engineering to analyse and solve the complex problems in Electrical and allied interdisciplinary areas
PSO2	To apply the appropriate techniques and modern engineering hardware and software tools in electrical engineering to engage in life-long learning and to successfully adapt in multi-disciplinary environments

Course Outcomes (COs)

SE [Electrical] 2019 Pattern			
SN	**Course Code**	**Course Name**	**Course Outcomes (COs)**
01	207006	Engineering Mathematics III	CO1:Solve higher order linear differential equation using appropriate techniques to model and analyze electrical circuits. CO2: Apply Integral transforms such as Laplace transform, Fourier transform and Z-Transform to solve problems related to signal processing and control systems. CO3: Apply Statistical methods like correlation, regression and Probability theory as applicable to analyze and interpret experimental data related to energy management, power systems, testing and quality control. CO4: Perform Vector differentiation and integration, analyze the vector fields and apply to wave theory and electro-magnetic fields. CO5: Analyze Complex functions, conformal mappings, and perform contour integration in the study of electrostatics, signal and image processi
02	203141	Power Generation Technologies	CO1: Identify components and elaborate working principle of conventional power plants.

			CO2: Recognize the importance and opportunities of renewable energies. CO3: Calculate and control power output of wind solar, and hydro power plant. CO4: Describe process of grid interconnection of distributed generation and requirements. CO5: Interpret the environmental and social impact of various generation technologies
03	203142	Material Science	CO1: Discuss classification,properties and characteristics of different electrical engineering materials. CO2: State various applicationsmeasuring methods for parameters of different classes of electrical engineering materials. CO3: Solve simple problems based on dielectric, magnetic and conducting materials. CO4: Apply knowledge of Nano-technology to electrical engineering. CO5: Execute tests ondielectric, insulating, magnetic, conducting, resistive materials as per IS to decide the quality of thematerials. CO6: Create learning resource material ethically to demonstrate self learning leading to lifelong learning skills and usage of ICT/ online technology through collaborative/active learning activities.
04	203143	Analog And Digital Electronics	CO1: Design logical, sequential and combinational digital circuit using K-Map. CO2: Demonstrate different digital memories and programmable logic families. CO3: Apply and analyze applications of OPAMP in open and closed loop condition. CO4: Design uncontrolled rectifier with given specifications
05	203144	Electrical Measurements and Instrumentation	CO1: Define various characteristic and classify measuring instruments along with range extension techniques. CO3: Apply measurement techniques for measurement of resistance, inductance and capacitance. CO4: Demonstrate construction, working principle of electrodynamo type and induction type instruments for measurement of power and energy. CO5: Make use of CRO for measurement of voltage, current and frequency. CO6: Classify transducer and apply it for measurement of physical parameters in real

			t
06	203145:	Power System-I	CO1: Recognize different patterns of load curve and calculate associated different factors with it and tariff. CO2: Draft specifications of electrical equipment in power station. CO3: Design electrical and mechanical aspects in overhead transmission and underground cables. CO4: Evaluate the inductance and capacitance of different transmission line configurations. CO5: Analyse the performance of short and medium transmission line
07	203146:	Electrical Machines-I	CO1: Evaluate performance parameters of transformer with experimentation and demonstrate construction along with specifications as per standards. CO2: Distinguish between various types of transformer connections as per vector groups with application and to perform parallel operation of single/three phase transformers. CO3: Select and draft specifications of DC machines and Induction motors for various applications along with speed control methods. CO4: Justify the need of starters in electrical machines with merits and demerits. CO5: Test and evaluate performance of DC machines and Induction motors as per IS standard
08	203147:	Network Analysis	CO1: Calculate current/voltage in electrical circuits using simplification techniques, Mesh, Nodal analysis and network theorems. CO2: Analyze the response of RLC circuit with electrical supply in transient and stead state. CO3: Apply Laplace transform to analyze behaviour of an electrical circuit. CO4: Derive formula and solve numerical of two port network and Design of filters CO5: Applyknowledge of network theory to find transfer function, poles and zeroes location to perform stability analysis and parallel resonance
09	203148:	Numerical Methods and Computer	CO1:Demonstrate types of errors in computation and their causes of occurrence.

		Programming	CO2: Calculate root of algebraic and transcendental equations using various methods. CO3: Apply numerical methods for various mathematical problems such as interpolation, numerical differentiation, integration and ordinary differential equation. CO4: Solve linear simultaneous equation using direct and indirect method. CO5:Develop algorithms and write computer programs for various numerical methods.
10	203149:	Fundamental of Microcontroller and Applications	CO1: Describe the architecture and features of various types of the microcontroller. CO2: Illustrate addressing modes and execute programs in assembly language for the microcontroller. CO3: Write programs in C language for microcontroller 8051. CO4: Elaborate interrupt structure of 8051 and program to handle interrupt and ADC809 CO5: Define the protocol for serial communication and understand the microcontroller development systems. CO6: Interface input output devices and measure electrical parameters with 8051 in real time
TE [Electrical] 2015 Pattern			
01	311121:	Industrial And Technology Management	CO1. Differentiate between different types of business organization and discuss the fundamentals of economics and management. CO2. Explain the importance of technology management and quality management. CO3. Describe the characteristics of marketing and its types. CO4. Discuss the qualities of a good leader.
02	303141:	Advance Microcontroller and its Applications	CO1: Explain architecture of PIC18F458 microcontroller, its instructions and the addressing modes. CO2: Develop and debug program in assembly language or C language for specific applications CO3: Use of an IDE for simulating the functionalities of PIC microcontroller and its use for software and hardware development. CO4: Interface a microcontroller to various

			devices. CO5: Effectively utilize advance features of microcontroller peripherals
03	303142:	Electrical Machines II	CO1: Explain construction & working principle of three phase synchronous machines CO2: Estimate regulation of alternator by direct and indirect methods. CO3: Demonstrate operation of synchronous motor at constant load and variable excitation (v curves & ∧ curves) & constant excitation and variable load. CO4:Explain Speed control methods of three phase induction motor. CO5: Plot circle diagram of ac series motor CO6: Obtain equivalent circuit of single phase induction motor by performing no load & blocked rotor test.
04	303143:	Power Electronics	CO1: Understand Fundamentals of power electronic devices and characteristics. CO2: Know The concepts and operating principles of power electronics circuits. CO3: Design procedures and techniques of power electronics systems. CO4: Develop characteristics of different power electronic switching devices CO5: Reproduce working principle of power electronic converters for different types of loads CO6: Analyse the performance of power electronic converters
05	303144:	Electrical Installation, Maintenance and Testing	CO1: Classify distribution systems, its types and substations CO2: Design of different earthing systems for residential and industrial premises CO3: Select methods of condition monitoring and testing of various Electrical Equipments CO4: Estimate and Costing of residential and industrial premises
06	303145:	Seminar and Technical Communication	CO1: Relate with the current technologies and innovations in Electrical engineering. CO2: Improve presentation and documentation skill. CO3: Apply theoretical knowledge to actual industrial applications and research activity. CO4: Communicate effectively.
07	303146 :	Power System II	CO1: Develop analytical ability for Power system. CO2: Introduce concept of EHVAC and

			HVDC System. CO3: Demonstrate different computational methods for solving problems of load flow. CO4: Analyse the power system under symmetrical and Unsymmetrical fault conditions
08	303147 :	Control System-I	CO1: Model physical system, CO2: Determine time response of linear system, CO3: Analyse stability of LTI system, CO4: Design PID controller for LTI system
09	303148 :	Utilization of Electrical Energy	CO1: Get knowledge of principle of electric heating, welding and its applications. CO2: Design simple resistance furnaces and residential illumination schemes. CO3: Calculate tractive effort, power, acceleration and velocity of traction. CO4: Get knowledge of electric braking methods, control of traction motors, train lighting and signaling system. CO5: Understand collection of technical information and delivery of this technical information through presentations
10	303149:	Design of Electrical Machines	CO1: Calculate main dimensions and Design of single phase and three phase transformer. CO2: Calculate main dimensions of three phase Induction motor. CO3: Determine the parameters of transformer. CO4: Determine parameters of three phase Induction motor.
11	303150	Energy Audit and Management	CO1:To get knowledge of BEE Energy policies, Electricity Acts. CO2: Use various energy measurement and audit instruments. CO3: Carry out preliminary energy audit of various sectors CO4: Enlist energy conservation and demand side measures for electrical, thermal and utility Systems. CO5: Solve simple problems on cost benefit analysis
BE [ELECTRICAL] 2015 Pattern			
01	403141:	Power System Operation and Control	CO1. Identify and analyze the dynamics of power system and suggest means to improve stability of system. CO2. Comprehend the effect of reactive power on Power system and suggest the suitable means of reactive power

			management. CO3. Selection of appropriate FACTs devices CO4. Analyze the generation-load balance in real time operation and its effect on frequency and develop automatic control strategies with mathematical relations. CO5. Formulate objective functions for optimization tasks such as unit commitment and economic load dispatch and get solution using computational techniques. CO6. Evaluate reliability indices of Power system
02	403142	PLC and SCADA Applications	CO1. Develop block diagram of PLC and explain the working. CO 2. Classify input and output interfacing devices with PLC. CO3. Develop architecture of SCADA and explain the importance of SCADA in critical infrastructure. CO 4. Execute, debug and test the programs developed for digital and analog operations. CO5. Describe various SCADA protocols along with their architecture. CO6. Observe development of various industrial applications using PLC and SCADA
03	403143 (B)	Elective I: Power Quality	CO1. Identify importance of various power quality issues. CO2. Carry out power quality monitoring CO3. List and explain various causes and effects of power quality problems CO4. Analyze power quality parameters and carry out power quality analysis CO5. Select cost effective mitigation technique for various power quality problems CO6. Use IEEE 519-2014 power quality standard for harmonic compliance
04	403144 (A)	Elective II :Restructuring and Deregulation	CO1. Enlist the functions of various key entities in India and explain the implications of various policies and acts on restructuring and deregulation. CO2. Describe the regulatory process in India along with various methods of regulations. CO3. List the components involved in tariff determination. CO4. Explain different power sector restructuring models

			CO5. Explain different types of electricity markets. CO6. State different transmission pricing methods and discuss congestion management
05	403145:	Control System II	CO1. Recognize the importance of digital control system. CO2. Derive pulse transfer function. CO3. Analyze digital controllers. CO4. Convert system in state space format. CO5. Solve state equation. CO6. Design observer for system.
06	403147	Switchgear and Protection	CO1. Describe arc interruption methods in circuit breaker. CO2. Derive expression for restriking voltage and RRRV in circuit breaker CO3. Explain construction and working of different high voltage circuit breakers such as ABCB, SF6 CB, and VCB. CO4. Classify and Describe different type of relays such as over current relay, Reverse power relay, directional over current relay, Differential relay, Distance relay, Static relay and numerical relay CO5. Describe various protection schemes used for transformer, alternator and busbar CO6. Describe transmission line protection schemes.
07	403148:	Power Electronic Controlled Drives	CO1. Explain motor load dynamics and multi quadrant operation of drives CO2. Analyze operation of converter fed and chopper fed DC drives. CO3. Describe braking methods of D.C. and induction motor drive. CO4. Explain vector control for induction motor drives CO5. Describe synchronous motor drive. CO6. Identify classes and duty cycles of motor and applications of drives in industries
08	403149 (A)	Elective –III : High Voltage Engineering	CO1. Identify, describe and analyze the breakdown theories of solid, liquid and gaseous materials CO2. Describe as well as use different methods of generation of high AC, DC, impulse voltage and current. CO3. Demonstrate and use different methods of measurement of high AC, DC, impulse voltage and current. CO4. Identify the occurrence of overvoltage

			and to provide remedial solutions CO5. Demonstrate an ability to carry out different tests on high voltage equipment and devices as well as ability to design the high voltage laboratory with all safety measures
09	403150 (A)	Elective –IV : Smart Grid	CO1. Apply the knowledge to differentiate between Conventional and Smart Grid. CO2. Identify the need of Smart Grid, Smart metering, Smart storage, Hybrid Vehicles, Home Automation, Smart Communication, and GIS CO3. Comprehend the issues of micro grid CO4. Solve the Power Quality problems in smart grid CO5. Apply the communication technology in smart grid
10	403151	Project II	CO1: Work in team and ensure satisfactory completion of project in all respect. CO2: Handle different tools to complete the given task and to acquire specified knowledge in area of interest. CO3: Provide solution to the current issues faced by the society. CO4: Practice moral and ethical value while completing the given task. CO5: Communicate effectively findings in verbal and written forms.