Course Outcomes (COs) of 2019 Pattern

SE Computer (2019 Pattern)			
Sr No	**Subject Code**	**Course Name**	**Course Outcomes**
1	210241	Discrete Mathematics	**CO1:** Formulate problems precisely, solve the problems, apply formal proof techniques, and explain the reasoning clearly.
			CO2: Apply appropriate mathematical concepts and skills to solve problems in both familiar and unfamiliar situations including those in real-life contexts.
			CO3: Design and analyze real world engineering problems by applying set theory, propositional logic and to construct proofs using mathematical induction.
			CO4: Specify, manipulate and apply equivalence relations; construct and use functions and apply these concepts to solve new problems.
			CO5: Calculate numbers of possible outcomes using permutations and combinations; to model and analyze computational processes using combinatorics.
			CO6: Model and solve computing problem using tree and graph and solve problems using appropriate algorithms.
			CO7: Analyze the properties of binary operation apply abstract algebra in coding theory and evaluate algebraic structure.
2	210242	Fundamentals of data structure	**CO1:** Design the algorithms to solve the programming problems, identify appropriate algorithms strategy for specific application, and analyze the time and space complexity.
			CO2: 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
			CO3: Demonstrate use of sequential data structure array and linked list to store and process data.
			CO4: Understand the computational efficiency of the principal algorithm's for searching and sorting and choose the most efficient one for the application.
			CO5: Compare and contrast different implementation of data structure
			CO6: Understand, Implement and apply principles of data structure stack and queue to sole computational problems.
3	210243	Object Oriented Programing	**CO1:** Apply Construct sequence , selection and iteration, classes and objects, inheritance ,use of predefined classes from libraries while developing software.
			CO2: Design object oriented solution for small systems involving software.
			CO3: Use virtual and pure virtual function and complex programing situations.
			CO4: Apply object oriented software principles in problem

			solving.
			CO5: Analyze the strength of object oriented programing.
			CO6: Develop the application using object oriented programing language(C++)
4	210244	Computer Graphics	**CO1:** Identify the basic terminologies of computer graphics and interpret the mathematical foundations of the concepts of computer graphics.
			CO2: Apply mathematics to develop computer programs for elementary graphics operations.
			CO3: Illustrate the concepts of windowing and clipping and apply various algorithms to fill and clip polygons.
			CO4: Understand and apply the core concepts of computer graphics including, transformations in two and three dimensions, viewing and protection.
			CO5: Understand the concepts of color models, lighting, shading, models and hidden surface elimination.
			CO6: Create effective programing using concepts of curves, fractals, animation and gaming.
5	210245	Digital Electronics & Logic design	**CO1:** Simplify Boolean Expression using K-Maps
			CO2: Design and implement Combinational digital circuits
			CO3: Design and implement sequential digital circuits
			CO4: Develop simple real world application PLD & ASM.
			CO5: Differentiate and choose appropriate logic families IC packages as per given design specification.
			CO6: Explain organization and architecture of computer system
6	210246	Data structureLab	**CO1:** Use algorithms on various linear data structure using sequential organization to solve real life problems.
			CO2: Analyze problems to apply suitable searching and sorting algorithms to various applications.
			CO3: Analyze problems to use variants of linked list and solve various real problems.
			CO4: Designing and implement data structure and algorithms for solving different kinds of problems.
7	210247	OOP & Computer Graphics Lab	**CO1:** Understand and apply concepts like inheritance, polymorphism, exception handling and generic structure for implementing reusable programming codes
			CO2: Analyze the concept of file and apply if while storing and retrieving the data from secondary storage
			CO3: Analyze and apply computer graphics algorithms for line circle drawing ,scan conversation and filling with help of object oriented programing concepts.
			CO4: Understand the concept of windowing and clipping apply various algorithms to fill and clip polygons.
			CO5: Apply logic to implement, curves, fractals, animation and gaming programs.
8	210248	Digital Electronic	**CO1:** Understand the working of digital electronic circuits
			CO2: Apply the knowledge to appropriate IC as per design specification.

		Lab	**CO3:** Design and implement Sequential and Combinational digital circuits as per the specifications
9	210249	Business Communication Lab	**CO1:** Express Effectively through verbal/oral communication and improve the listening skills
			CO2: Write precise briefs or reports and technical documents.
			CO3: Prepare for group discussion / meetings / interviews and presentations.
			CO4: Explore goal/target setting, self-motivation and practicing creative thinking.
			CO5: Operate effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality.
10	210250	Humanity & social science	**CO1:** Aware of the various issue concerning human & society
			CO2: Aware of the responsibility towards society
			CO3: Sensitized about broader issue regarding social, culture, economic and human aspects involve in social changes
			CO4: Able to understand nature of individual and relationship between self and the community.
			CO5: Able to understand major ideas, values, beliefs, experiences that have shaped human history and culture.
11	210251	Environmental Studies	**CO1:** Comprehend the importance of ecosystem & biodiversity
			CO2: Correlate the human population growth and its trend to the Environmental degradation & develop awareness about of his/her role towards Environmental protection prevention
			CO3: Identify different types of Environmental pollution and control measures.
			CO4: Correlate the exploitation and utilization of conventional non-conventional resources
12	207003	Mathematics-III	**CO1:** Solve linear differential equation essential in modeling and designing in computer based system
			CO2: Apply concept of Fourier transform, Z-Transform and applications to continuous and discrete system and Image processing.
			CO3: Apply statistical methods like correlation, regression analysis and probability theory for analysis and prediction of a given data as applied to machine intelligence.
			CO4: Solve algebraic and transcendental equation and system of linear equation using numerical techniques.
			CO5: Obtain interpolating polynomials, numerical differentiation and integration , numerical solution of ordinary differential equations used in modern scientific computing.
13			**CO1:** Identify and articulate the complexity goals and benefits of a good hashing scheme for real world application
			CO2: Apply nonlinear data structure for solving problems

	210252	Data Structure Algorithms	of various domain.
			CO3: Design and specify the operation of a nonlinear based abstract data type and implement them in a high level programming language.
			CO4: Analyze the algorithms solution for resource requirement and optimization.
			CO5: Use efficient indexing methods and multiway search techniques to store and maintain data.
			CO6: Use appropriate modern tools to understand and analyze the functionality confined to the secondary storage.
14	210253	Software Engineering	**CO1:** Analyze software requirements and formulate design solution for software.
			CO2: Design applicable solution in one or more application domain using software engg. Approaches that integrate ethical, social, legal and economic concerns.
			CO3: 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.
			CO4: Model and design user interface and component level.
			CO5: Identify and handle risk management and software configuration management.
			CO6: Utilize knowledge of software testing approaches, approaches to verification and validation.
			CO7: 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.
15	210254	Microprocessor	**CO1:** Exhibit skill of assembly language programing for the application.
			CO2: Classify Processor architectures
			CO3: Illustrate advanced features of 80386 Microprocessor.
			CO4: Compare and Contrast different processor modes.
			CO5: Use Interrupts mechanism in applications.
			CO6: Difference between Microprocessors and Microcontrollers.
			CO7: Identify and analyze the tools and techniques used to design, implement, and Microprocessor based system.
16	210255	Principles of Programing Language	**CO1:** Make use of basic principles of programing languages.
			CO2: Develop a program with data representation and computation.
			CO3: Develop programs using object oriented programming language.
			CO4: Develop application using inheritance, encapsulation and polymorphism.

			CO5: Demonstrate multithreading for robust application development
			CO6: Develop a simple program using basic concepts of functional and logical programming paradigm
17	210256	Data Structure Algorithm Lab	**CO1:** Make use of basic principles f programing and computation.
			CO2: Develop a program with data representation and computation
			CO3: Develop program using object oriented programing language : Java
			CO4: Develop application using inheritance , encapsulation and polymorphism.
			CO5: Demonstrate multithreading for robust application development.
			CO6: Develop a simple program using basic concepts of functional and logical programing paradigm.
18	210257	Microprocessor Lab	**CO1:** Understand and apply various addressing modes and instruction set to implement ALP
			CO2: Apply logic to implement code conversion
			CO3: Analyze and apply logic to demonstrate processor mode of operation
19	210258	Project Based Learning-II	**CO1:** Identify the real life problem from societal need point of view.
			CO2: Choose and compare alternative approaches to select most feasible one.
			CO3: Analyze and synthesize the identical problem from technological perspective
			CO4: Design the realible and scalable solution to meet challenges.
			CO5: Evaluate the solution based on the criteria specified.
			CO6: Inculcate long life learning attitude towards the societal problems.
20	210259	Intellectual Property rights and patents	**CO1:** Understand the fundamental legal principles related to confidential information, copyright, patents, designs, trademarks and unfair competition
			CO2: Identify, apply and assess principles of law relating to each of these areas of intellectual property
			CO3: Apply the appropriate ownership rules to intellectual property you have been involved in creating

SINHGAD TECHNICAL EDUCATION SOCIETY'S
SINHGAD INSTITUTE OF TECHNOLOGY
(Affiliated to SPPU Pune and Approved by, AICTE, New Delhi.)
Gat No. 309/310 , Kusgaon (Bk), off Mumbai –Pune, Expressway.
Lonavala, Pune, 410401, Website : sit.sinhgad.edu
Department of Computer Engineering

Course Outcomes (COs) of 2015 Pattern

SE Computer (2015 Pattern)			
Sr No	**Subject Code**	**Course Name**	**Course Outcomes**
1	210241	Discrete Mathematics	**CO1:** Solve real world problems logically using appropriate set, function, and relation models and interpret the associated operations and terminologies in context.
			CO2: Analyze and synthesize the real world problems using discrete mathematics.
2	210242	Digital Electronics and Logic Design	**CO1:** Realize and simplify Boolean Algebraic assignments for designing digital circuits using K-Maps
			CO2: Design and implement Sequential and Combinational digital circuits as per the specifications
			CO3: Apply the knowledge to appropriate IC as per the design specifications
			CO4: Design simple digital systems using VHDL.
			CO5: Develop simple embedded system for simple real world application.
3	210243	Data Structures and Algorithms	**CO1:** To discriminate the usage of various structures in approaching the problem solution.
			CO2: To design the algorithms to solve the programming problems.
			CO3: To use effective and efficient data structures in solving various Computer Engineering domain problems.
			CO4: To analyze the problems to apply suitable algorithm and data structure.
			To use appropriate algorithmic strategy for better efficiency
4	210244	Computer Organization and Architecture	**CO1:** Demonstrate computer architecture concepts related to design of modern processors, memories and I/Os.
			CO2: Analyze the principles of computer architecture using examples drawn from commercially available computers.
			CO3: Evaluate various design alternatives in processor organization.
5	210245	Object Oriented Programming	**CO1:** Analyze the strengths of object oriented programming
			CO2: Design and apply OOP principles for effective programming
			CO3: Develop programming application using object oriented programming language C++
			CO4: Percept the utility and applicability of OOP
6	210249	Soft Skills	**CO1:** Effectively communicate through verbal/oral communication and improve the listening skills
			CO2: Write precise briefs or reports and technical documents.
			CO3: Actively participate in group discussion / meetings / interviews and prepare & deliver presentations.
			CO4: Become more effective individual through goal/target setting, self-motivation and practicing creative thinking.
			CO5: Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality.

7	210250	Audit Cours-I	**CO1:** Making engineering and technology students aware of the various issues concerning man and society.
			CO2: These issues will help to sensitize students to be broader towards the social, cultural, economic and human issues, involved in social changes
			CO3: Able to understand the nature of the individual and the relationship between the self and the community
			CO4: Understanding major ideas, values, beliefs, and experiences that have shaped human history and cultures
8	207003	Mathematics-III	**CO1:** Solve higher order linear differential equation using appropriate techniques for modelling and analyzing electrical circuits.
			CO2: Solve problems related to Fourier transform, Z-Transform and applications to Signal and Image processing.
			CO3: Apply statistical methods like correlation, regression analysis and probability theory for analysis and prediction of a given data as applied to machine intelligence.
			CO4: Perform vector differentiation and integration to analyze the vector fields and apply to compute line, surface and volume integrals.
			CO5: Analyze conformal mappings, transformations and perform contour integration of complex functions required in Image processing, Digital filters and Computer graphics.
9	210251	Computer Graphics	**CO1:** To acquaint the learner with the basic concepts of Computer Graphics
			CO2: To learn the various algorithms for generating and rendering graphical figures
			CO3: To get familiar with mathematics behind the graphical transformations
			CO4: To understand and apply various methods and techniques regarding projections, animation ,shading ,illumination, lighting.
10	210252	Advanced Data Structures	**CO1:** o apply appropriate advanced data structure and efficient algorithms to approach the problems of various domain.
			CO2: To design the algorithms to solve the programming problems.
			CO3: To use effective and efficient data structures in solving various Computer Engineering domain problems.
			CO4: To analyze the algorithmic solutions for resource requirements and optimization
			CO5: To use appropriate modern tools to understand and analyze the functionalities confined to the data structure usage.
11	210253	Microprocessor	**CO1:** To apply the assembly language programming to develop small real life embedded application.
			CO2: To understand the architecture of the advanced processor thoroughly to use the resources for programming
			CO3: To understand the higher processor architectures descended from 80386 architecture
12	210254	Principles of Programing Language	**CO1:** To analyze the strengths and weaknesses of programming languages for effective and efficient program development.
			CO2: To inculcate the principles underlying the programming languages enabling to learn new programming languages.
			CO3: To grasp different programming paradigms

			CO4: To use the programming paradigms effectively in application development.
			CO5: apply Object Oriented Programming(OOP) principles using C++ and Java
13	210258	Audit Course- II	**CO1:** Understand the fundamental legal principles related to confidential information, copyright, patents, designs, trademarks and unfair competition
			CO2: Identify, apply and assess principles of law relating to each of these areas of intellectual property
			CO3: Apply the appropriate ownership rules to intellectual property you have been involved in creating

	BE Computer (2015 Pattern)		
Sr No	**Subject Code**	**Course Name**	**Course Outcomes**
1	410241	High Performance Computation	**CO1:** Describe different parallel architectures, inter-connect networks, programming models
			CO2: Develop an efficient parallel algorithm to solve given problem
			CO3: Analyze and measure performance of modern parallel computing systems
			CO4: Build the logic to parallelize the programming task
2	410242:AIR	Artificial Intelligence and Robotics	**CO1:** Identify and apply suitable Intelligent agents for various AI applications
			CO2: Design smart system using different informed search / uninformed search or heuristic approaches
			CO3: Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve given problem.
			CO4: Apply the suitable algorithms to solve AI problems
3	410243:DA	Data Analytics	**CO1:** Write case studies in Business Analytic and Intelligence using mathematical models
			CO2: Present a survey on applications for Business Analytic and Intelligence
			CO3: Provide problem solutions for multi-core or distributed, concurrent/Parallel environments
4	410244(D)	Data Mining and Warehousing	**CO1:** Apply basic, intermediate, and advanced techniques to mine the data
			CO2: Analyze the output generated by the process of data mining
			CO3: Explore the hidden patterns in the data
			CO4: Optimize the mining process by choosing best data mining technique
5	410245(B)	Software Testing and Quality	**CO1:** Describe fundamental concepts in software testing such as manual testing, automation testing and software quality assurance.

		Assurance	**CO2:** Design and develop project test plan, design test cases, test data, and conduct test operations
			CO3: Apply recent automation tool for various software testing for testing software
			CO4: Apply different approaches of quality management, assurance, and quality standard to software system
			CO5: Apply and analyze effectiveness Software Quality Tools
6	410248	Project work-I	**CO1:** Solve real life problems by applying knowledge.
			CO2: Analyze alternative approaches, apply and use most appropriate one for feasible solution.
			CO3: Write precise reports and technical documents in a nutshell.
			CO4: Participate effectively in multi-disciplinary and heterogeneous teams exhibiting team work, Inter-personal relationships, conflict management and leadership quality.
7	410249	Audit Course-5	**CO1:** Understand the legalities in product development
			CO2: Undertake the process of IPR, Trademarks, Copyright and patenting
			CO3: Understand and apply functional plans
			CO4: Manage Entrepreneurial Finance
			CO5: Inculcate managerial skill as an entrepreneur
8	41050	Machine Learning	**CO1:** Distinguish different learning based applications
			CO2: Apply different preprocessing methods to prepare training data set for machine learning.
			CO3: Design and implement supervised and unsupervised machine learning algorithm.
			CO4: Implement different learning models
			CO5: Learn Meta classifiers and deep learning concepts Course Contents
9	410251	Information & cyber security	**CO1:** Gauge the security protections and limitations provided by today's technology.
			CO2: Identify information security and cyber security threats.
			CO3: Analyze threats in order to protect or defend it in cyberspace from cyber-attacks.
			CO4: Build appropriate security solutions against cyber-attacks.
10	410252 (B)	Compilers	**CO1:** Design and implement a lexical analyzer and a syntax analyzer
			CO2: Specify appropriate translations to generate intermediate code for the given programming language construct
			CO3: Compare and contrast different storage management schemes
			CO4: Identify sources for code optimization
11	410252(C)	Embedded and	**CO1:** Recognize and classify embedded and real-time

		Real Time Operating Systems	systems
			CO2: Explain communication bus protocols used for embedded and real-time systems
			CO3: Classify and exemplify scheduling algorithms
			CO4: Apply software development process to a given RTOS application
			CO5: Design a given RTOS based application
12	410252(D)	Soft Computing and Optimization Algorithms	**CO1:** Apply soft computing methodologies, including artificial neural networks, fuzzy sets, fuzzy logic, fuzzy inference systems and genetic algorithms
			CO2: 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.
13	410253	Human Computer Interface	**CO1:** Evaluate the basics of human and computational abilities and limitations.
			CO2: Inculcate basic theory, tools and techniques in HCI.
			CO3: Apply the fundamental aspects of designing and evaluating interfaces.
			CO4: Apply appropriate HCI techniques to design systems that are usable by people
14	410256	Project work-II	**CO1:** Show evidence of independent investigation
			CO2: Critically analyze the results and their interpretation.
			CO3: Report and present the original results in an orderly way and placing the open questions in the right perspective
			CO4: Link techniques and results from literature as well as actual research and future research lines with the research
			CO5: Appreciate practical implications and constraints of the specialist subject
15	410257	Audit Course-6	**CO1:** Apply the concepts of Business Intelligence in real world applications
			CO2: Explore and use the data warehousing wherever necessary
			CO 3 Design and manage practical BI systems

TE Computer (2015 Pattern)			
Sr No	Subject Code	Course Name	Course Outcomes
1	310241	Theory Of Computation	**CO1:** Able to design deterministic Turing machine for all inputs and all outputs .
			CO2: Able to subdivide problem space based on input subdivision using constraints
			CO3: Able to apply linguistic theory
2	310242	Database management	**CO1:** Apply basic language statement on database
			CO2: Design various models using database
			CO3: Use modern database techniques such as NOSQL
			CO4: Apply & Explain transaction Management in relational database System.
			CO5: Analyze the use of appropriate architecture in real time environment.
			CO6: Develop the application using database SQL/ NOSQL with different platform.
3	31024	Software Engg Project management	**CO1:** Decide on a process model for a developing a software project
			CO2: Classify software applications and Identify unique features of various domains
			CO3: Design test cases of a software system
			CO4: Understand basics of IT Project management.
			CO5: Plan, schedule and execute a project considering the risk management
			CO6: Apply quality attributes in software development life cycle
4	310244	Information system &engg. Economics	**CO1:** Understand the need, usage and importance of an Information System to an organization.
			CO2: Understand the activities that are undertaken while managing, designing, planning, implementation, and deployment of computerized information system in an organization.
			CO3: 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
			CO4: Outline the past history, present position and expected performance of a company engaged in engineering practice or in the computer industry.
			CO4: Perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives.
5	310245	Computer Network	**CO1:** Analyse the requirements for a given organizational structure to select the most appropriate networking architecture, topologies, transmission mediums, and technologies
			CO2: Demonstrate design issues, flow control and error control
			CO3: Analyze data flow between TCP/IP model using

			Application, Transport and Network Layer Protocols.
			CO4: Illustrate applications of Computer Network capabilities, selection and usage for various sectors of user community.
			CO5: **I**llustrate Client-Server architectures and prototypes by the means of correct standards and technology.
			CO6: Demonstrate different routing and switching algorithms
6	310249	Audit Course-3	**CO1:** understand the basic perception of profession, professional ethics, various moral issues & uses of ethical theories
			CO2: understand various social issues, industrial standards, code of ethics and role of professional ethics in engineering field.
			CO3: follow Ethics as an engineering professional and adopt good standards & norms of engineering practice.
			CO4: apply ethical principles to resolve situations that arise in their professional lives
7	310250	Design & Analysis of Algorithms	**CO1:** Formulate the problem.
			CO2: Analyze the asymptotic performance of algorithms.
			CO3: Decide and apply algorithmic strategies to solve given problem
			CO4: Find optimal solution by applying various methods.
8	310251	Systems Programming & Operating System	**CO1:** Analyze and synthesize system software
			CO2: Use tools like LEX & YACC.
			CO3: Implement operating system functions. Course
9	310252	Embedded Systems & Internet of Things	**CO1:** To understand fundamentals of IoT and embedded system including essence, basic design strategy and process modeling
			CO2: To introduce students a set of advanced topics in embedded IoT and lead them to understand research in network
			CO3: To develop comprehensive approach towards building small low cost embedded IoT system.
			CO4: To understand fundamentals of security in IoT
			CO5: To learn to implement secure infrastructure for IoT
			CO6: To learn real world application scenarios of IoT along with its societal and economic impact using case studies
10	310253	Software Modeling and Design	**CO1:** Analyze the problem statement (SRS) and choose proper design technique for designing webbased/ desktop application.
			CO2: Design and analyze an application using UML modeling as fundamental tool
			CO3: Apply design patterns to understand reusability in

			OO design
			CO4: Decide and apply appropriate modern tool for designing and modelling
			CO5: Decide and apply appropriate modern testing tool for testing web-based/desktop application
11	310254	Web Technology	**CO1:** Analyze given assignment to select sustainable web development design methodology
			CO2: Develop web based application using suitable client side and server side web technologies
			CO3: Develop solution to complex problems using appropriate method, technologies, frameworks, web services and content management
12	310255	Seminar & Technical Communication	**CO1:** be able to be familiar with basic technical writing concepts and terms, such as audience analysis, jargon, format, visuals, and presentation.
			CO2: be able to improve skills to read, understand, and interpret material on technology.
			CO3: improve communication and writing skills
13	310259	Audit Course-4	**CO1:** Enhanced holistic development of students and improve their employability skills