



Sinhgad Institutes

**Sinhgad Technical Education Society's**

**SINHGAD ACADEMY OF ENGINEERING**

(Affiliated to University of Pune and Approved by, AICTE, New Delhi.)  
S. No. 40/4 A. Near octroi Post, Kondhwa –Saswad Road, Pune – 411048.  
E-mail : saeprincipal@sinhgad .edu, Website : [www.sinhgad.edu](http://www.sinhgad.edu)

**Department of Computer Engineering**

## Course Outcomes

| SEM-I  |       |              |                                 |  |
|--------|-------|--------------|---------------------------------|--|
| Sr.No. | Class | Subject Code | Subject Name                    | Course outcomes  |
| 1      | SE    | 210242       | Discrete Mathematics            | <p>CO1: Formulate problems precisely, solve the problems, apply formal proof techniques, and explain the reasoning clearly.</p> <p>CO2: Apply appropriate mathematical concepts and skills to solve problems in both familiar and unfamiliar situations including those in real-life contexts.</p> <p>CO3: Design and analyze real world engineering problems by applying set theory, propositional logic and to construct proofs using mathematical induction.</p> <p>CO4: Specify, manipulate and apply equivalence relations; construct and use functions and apply these concepts to solve new problems.</p> <p>CO5: Calculate numbers of possible outcomes using permutations and combinations; to model and analyze computational processes using combinatorics.</p> <p>CO6: Model and solve computing problem using tree and graph and solve problems using appropriate algorithms.</p> <p>CO7: Analyze the properties of binary operations, apply abstract algebra in coding theory and evaluate the algebraic structures.</p> |
| 2      | SE    | 210242:      | Fundamentals of Data Structures | <p>CO1: Design the algorithms to solve the programming problems, identify appropriate algorithmic strategy for specific application, and analyze the time and space complexity.</p> <p>CO2: Discriminate the usage of various structures, Design/Program/Implement the appropriate data structures; use them in implementations of abstract</p>  |



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|   |    |        |  | <p>data types and Identify the appropriate data structure in approaching the problem solution.</p> <p>CO3: Demonstrate use of sequential data structures- Array and Linked lists to store and process data.</p> <p>CO4: Understand the computational efficiency of the principal algorithms for searching and sorting and choose the most efficient one for the application.</p> <p>CO5: Compare and contrast different implementations of data structures (dynamic and static).</p> <p>CO6: Understand, Implement and apply principles of data structures-stack and queue to solve computational problems.</p> |
| 3 | SE | 210243 | <b>Object Oriented Programming (OOP)</b> | <p>CO1: Apply constructs- sequence, selection and iteration; classes and objects, inheritance, use of predefined classes from libraries while developing software.</p> <p>CO2: Design object-oriented solutions for small systems involving multiple objects.</p> <p>CO3: Use virtual and pure virtual function and complex programming situations.</p> <p>CO4: Apply object-oriented software principles in problem solving.</p> <p>CO5: Analyze the strengths of object-oriented programming.</p> <p>CO6: Develop the application using object oriented programming language(C++).</p>                        |
| 4 | SE | 210244 | <b>Computer Graphics</b>                 | <p>CO1: Identify the basic terminologies of Computer Graphics and interpret the mathematical foundation of the concepts of computer graphics.</p> <p>CO2: Apply mathematics to develop Computer programs for elementary graphic operations.</p> <p>CO3: Illustrate the concepts of windowing and clipping and apply various algorithms to fill and clip polygons.</p> <p>CO4: Understand and apply the core concepts of computer graphics, including transformation in two and three dimensions, viewing and projection.</p> <p>CO5: Understand the concepts of color models,</p>                               |



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|               |    |        |                                      | lighting, shading models and hidden surface elimination.<br>CO6: Create effective programs using concepts of curves, fractals, animation and gaming.  |
| 5             | SE | 210245 | Digital Electronics and Logic Design | CO1: Simplify Boolean Expressions using K Map<br>CO2: Design and implement combinational circuits<br>CO3: Design and implement sequential circuits.<br>CO4: Develop simple real-world application using ASM and PLD.<br>CO5: Differentiate and Choose appropriate logic families IC packages as per the given design specifications.<br>CO6: Explain organization and architecture of computer system   |
| <b>SEM-II</b> |    |        |                                      |   |
| 6             | SE | 207003 | Engineering Mathematics III          | CO1: Solve Linear differential equations, essential in modelling and design of computer-based systems.<br>CO2: Apply concept of Fourier transform and Z-transform and its applications to continuous and discrete systems and image processing.<br>CO3: Apply Statistical methods like correlation and regression analysis and probability theory for data analysis and predictions in machine learning.<br>CO4: Solve Algebraic and Transcendental equations and System of linear equations using numerical techniques.<br>CO5: Obtain Interpolating polynomials, numerical differentiation and integration, numerical solutions of ordinary differential equations used in modern scientific computing. |
| 7             | SE | 210252 | Data Structures and Algorithms       | CO1: Identify and articulate the complexity goals and benefits of a good hashing scheme for real-world applications.<br>CO2: Apply non-linear data structures for solving problems of various domain.<br>CO3: Design and specify the operations of a nonlinear-based abstract data type and implement   |



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|          |           |               |                       | <p>them in a high-level programming language.</p> <p>CO4: Analyze the algorithmic solutions for resource requirements and optimization</p> <p>CO5: Use efficient indexing methods and multiway search techniques to store and maintain data.</p> <p>CO6: Use appropriate modern tools to understand and analyze the functionalities confined to the secondary storage.</p>   |
| <b>8</b> | <b>SE</b> | 210253        | Software Engineering  | <p>CO1: Analyze software requirements and formulate design solution for a software.</p> <p>CO2: Design applicable solutions in one or more application domains using software engineering approaches that integrate ethical, social, legal and economic concerns.</p> <p>CO3: Apply new software models, techniques and technologies to bring out innovative and novelistic solutions for the growth of the society in all aspects and evolving into their continuous professional development.</p> <p>CO4: Model and design User interface and component-level.</p> <p>CO5: Identify and handle risk management and software configuration management.</p> <p>CO6: Utilize knowledge of software testing approaches, approaches to verification and validation.</p> <p>CO7: Construct software of high quality – software that is reliable, and that is reasonably easy to understand, modify and maintain efficient, reliable, robust and cost-effective software solutions.</p> |
| <b>9</b> | <b>SE</b> | <b>210254</b> | <b>Microprocessor</b> | <p>CO1: Exhibit skill of assembly language programming for the application.</p> <p>CO2: Classify Processor architectures.</p> <p>CO3: Illustrate advanced features of 80386 Microprocessor.</p> <p>CO4: Compare and contrast different processor modes.</p> <p>CO5: Use interrupts mechanism in applications</p> <p>CO6: Differentiate between Microprocessors and Microcontrollers.</p>   |



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|              |           |               |  | CO7: Identify and analyze the tools and techniques used to design, implement, and debug microprocessor-based systems.   |
| <b>10</b>    | <b>SE</b> | <b>210255</b> | <b>Principles of Programming Languages</b> | CO1: Make use of basic principles of programming languages.<br>CO2: Develop a program with Data representation and Computations.<br>CO3: Develop programs using Object Oriented Programming language : Java.<br>CO4: Develop application using inheritance, encapsulation, and polymorphism.<br>CO5: Demonstrate Multithreading for robust application development.<br>CO6: Develop a simple program using basic concepts of Functional and Logical programming paradigm.                           |
| <b>SEM-I</b> |           |               |  |   |
| <b>11</b>    | <b>TE</b> | 310241        | Theory of Computation                      | CO1:Able to design deterministic Turing machine for all inputs all outputs<br>CO2:Able to subdivide problem space based on input subdivision using constraints<br>CO3:Able to apply linguistic theory   |
| <b>12</b>    | <b>TE</b> | 310242        | Database Management Systems                | CO1: Design E-R Model for given requirements and convert the same into database tables.<br>CO2: Use database techniques such as SQL & PL/SQL.<br>CO3: Use modern database techniques such as NOSQL.<br>CO4: Explain transaction Management in relational database System.<br>CO5: Describe different database architecture and analyses the use of appropriate architecture in real time environment.<br>CO6: Students will be able to use advanced database Programming concepts Big Data – HADOOP |
| <b>13</b>    | <b>TE</b> | 310243        | Software Engineering                       | CO1: Decide on a process model for a developing a software project  |



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|    |    |        | and Project Management                        | CO2: Classify software applications and Identify unique features of various domains<br>CO3: Design test cases of a software system.<br>CO4: Understand basics of IT Project management.<br>CO5: Plan, schedule and execute a project considering the risk management.<br>CO6: Apply quality attributes in software development life cycle.   |
| 14 | TE | 310244 | Information Systems and Engineering Economics | CO1: Understand the need, usage and importance of an Information System to an organization.<br>CO2: Understand the activities that are undertaken while managing, designing, planning, implementation, and deployment of computerized information system in an organization.<br>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<br>CO4: Outline the past history, present position and expected performance of a company engaged in engineering practice or in the computer industry.<br>CO5: Perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives.<br>CO6: Be able to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives. |
| 15 | TE | 310245 | Computer Networks                             | CO1: Analyze the requirements for a given organizational structure to select the most appropriate networking architecture and technologies<br>CO2: Demonstrate LAN and WAN protocol behavior using Modern Tools.<br>CO3: Analyze data flow between peer to peer in an IP network using Application, Transport and Network Layer Protocols.<br>CO4: Illustrate applications of Computer Network capabilities, selection and usage for various sectors of user community.<br>CO5: Develop Client-Server architectures and  |



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|               |           |        |  | prototypes by the means of correct standards and technology.  |
| <b>SEM-II</b> |           |        |  |   |
| <b>16</b>     | <b>TE</b> | 310250 | Design and Analysis of Algorithms        | CO1: Formulate the problem<br>CO2: Analyze the asymptotic performance of algorithms<br>CO3: Decide and apply algorithmic strategies to solve given problem<br>CO4: Find optimal solution by applying various methods  |
| <b>17</b>     |           | 310251 | Systems Programming and Operating System | CO1: Analyze and synthesize system software • Use tools like LEX & YACC.<br>CO2: Implement operating system functions.  |
| <b>18</b>     | <b>TE</b> | 310252 | Embedded Systems and Internet of Things  | CO1: Implement an architectural design for IoT for specified requirement<br>CO2: Solve the given societal challenge using IoT<br>CO3: Choose between available technologies and devices for stated IoT challenge  |
| <b>19</b>     | <b>TE</b> | 310253 | Software Modeling and Design             | CO1: Analyze the problem statement (SRS) and choose proper design technique for designing web-based/ desktop application<br>CO2: Design and analyze an application using UML modeling as fundamental tool<br>CO3: Apply design patterns to understand reusability in OO design<br>CO4: Decide and apply appropriate modern tool for designing and modeling<br>CO5: Decide and apply appropriate modern testing tool for testing web-based/desktop application |
| <b>20</b>     | <b>TE</b> | 310254 | Web Technology                           | CO1: analyze given assignment to select sustainable web development design methodology<br>CO2: develop web based application using suitable client side and server side web technologies<br>CO3: develop solution to complex problems using appropriate method, technologies, frameworks, web   |



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|              |           |           |                                      | services and content management   |
| <b>SEM-I</b> |           |           |                                      |   |
| <b>21</b>    | <b>BE</b> | 410241    | High Performance Computing           | CO1: Describe different parallel architectures, inter-connect networks, programming models<br>CO2: Develop an efficient parallel algorithm to solve given problem<br>CO3: Analyze and measure performance of modern parallel computing systems<br>CO4: Build the logic to parallelize the programming task  |
| <b>22</b>    | <b>BE</b> | 410242    | Artificial Intelligence and Robotics | CO1 Identify and apply suitable Intelligent agents for various AI applications<br>CO2: Design smart system using different informed search / uninformed search or heuristic approaches.<br>CO3: Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve given problem.<br>CO4: Apply the suitable algorithms to solve AI problems |
| <b>23</b>    | <b>BE</b> | 410243    | Data Analytics                       | CO1: Write case studies in Business Analytic and Intelligence using mathematical models<br>CO2: Present a survey on applications for Business Analytic and Intelligence<br>CO3: Provide problem solutions for multi-core or distributed, concurrent/Parallel environments   |
| <b>24</b>    | <b>BE</b> | 410244(D) | Data Mining and Warehousing          | CO1: Apply basic, intermediate and advanced techniques to mine the data<br>CO2: Analyze the output generated by the process of data mining<br>CO3: Explore the hidden patterns in the data<br>CO4: Optimize the mining process by choosing best data mining technique   |
| <b>25</b>    | <b>BE</b> | 410245(B) | Software Testing and Quality         | CO1: Describe fundamental concepts in software testing such as manual testing, automation testing and software quality assurance.<br>CO2: Design and develop project test plan, design  |





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|               |    |           | Assurance                                | test cases, test data, and conduct test operations<br>CO3: Apply recent automation tool for various software testing for testing software<br>CO4: Apply different approaches of quality management, assurance, and quality standard to software system<br>CO5: Apply and analyze effectiveness Software Quality Tools                              |
| <b>SEM-II</b> |    |           |  |  |
| 26            | BE | 410250    | Machine Learning                         | CO1: Distinguish different learning based applications<br>CO2: Apply different preprocessing methods to prepare training data set for machine learning.<br>CO3: Design and implement supervised and unsupervised machine learning algorithm.<br>CO4: Implement different learning models<br>CO5: Learn Meta classifiers and deep learning concepts |
| 27            | BE | 410251    | Information and Cyber Security           | CO1: Gauge the security protections and limitations provided by today's technology.<br>CO2: Identify information security and cyber security threats.<br>CO3: Analyze threats in order to protect or defend it in cyberspace from cyber-attacks.<br>CO4: Build appropriate security solutions against cyber-attacks.                               |
| 28            | BE | 410252(C) | Embedded and Real Time Operating Systems | CO1: Recognize and classify embedded and real-time systems<br>CO2: Explain communication bus protocols used for embedded and real-time systems<br>CO3: Classify and exemplify scheduling algorithms<br>CO4: Apply software development process to a given RTOS application<br>CO5: Design a given RTOS based application                           |
| 29            | BE | 410253(C) | Cloud Computing                          | CO1: To install cloud computing environments.<br>CO2: To develop any one type of cloud<br>CO3: To explore future trends of cloud computing   |