

COURSE OUTCOMES

Assessment Year: - 2024-25

- **Note: Patterns referred to create this document are:**
 - A. For FE Computer Engineering (Semester- I, II): 2015 Pattern**
 - B. For SE Computer Engineering (Semester- III, IV): 2015 Pattern**
 - C. For TE Computer Engineering (Semester- V, VI): 2015 Pattern**
 - D. For BE Computer Engineering (Semester- VII, VIII): 2015 Pattern**

Course Outcomes

Sanghavi College of Engineering		
Department of Computer Engineering		
FE, Sem - I		
FE Computer, Course-2015	COs	Course Outcomes
110003 Fundamentals of Programming Language – I	110003.1	Ability to develop Computer Programs.
	110003.2	Ability to choose a Programming Language to solve a problem.
	110003.3	Ability to develop C Programs.
	110003.1	Ability to develop Computer Programs.
FE, Sem - II		
FE Computer, Course-2019	COs	Course Outcome
110010 Fundamentals of Programming Language – II	110010.1	Ability to develop Computer Programs.
	110010.2	Ability to choose a Programming Language to solve a problem.
	110010.3	Ability to learn programs in Embedded C and Advanced Programming.

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SE, Sem - III

SE Computer, Course-2015	COs	Course Outcomes
210241 Discrete Mathematics	210241.1	Solve real world problems logically using appropriate set, function, and relation models and interpret the associated operations and terminologies in context.
	210241.2	Analyze and synthesize the real-world problems using discrete mathematics.
	210241.3 (Added)	Combinatorial analysis to solve counting problems and analyze algorithms.
	210241.4 (Added)	Ability to work with abstract mathematical structures which can be used to represent real life objects and relation between the objects, to solve real life problems.
210242 Digital Electronics & Logic Design	210242.1	Realize and simplify Boolean Algebraic assignments for designing digital circuits using K-Maps.
	210242.2	Design and implement Sequential and Combinational digital circuits as per the specifications.
	210242.3	Apply the knowledge to appropriate IC as per the design specifications.
	210242.4	Design simple digital systems using VHDL.
	210242.5	Develop simple embedded system for simple real-world application
210243 Data Structures and Algorithms	210243.1	To discriminate the usage of various structures in approaching the problem solution.
	210243.2	To design the algorithms to solve the programming problems.
	210243.3	To use effective and efficient data structures in solving various Computer Engineering domain problems
	210243.4	To analyze the problems to apply suitable algorithm and data structure.
	210243.5	To use appropriate algorithmic strategy for better efficiency
210244 Computer Organization and Architecture	210244.1	Demonstrate computer architecture concepts related to design of modern processors, memories and I/Os.
	210244.2	Analyze the principles of computer architecture using examples drawn from commercially available computers.
	210244.3	Evaluate various design alternatives in processor organization
210245 Object Oriented Programming	210245.1	Analyze the strengths of object-oriented programming
	210245.2	Design and apply OOP principles for effective programming
	210245.3	Develop programming application using object-oriented programming language C++

	210245.4	Percept the utility and applicability of OOP
210246 Digital Electronics Lab	210246.1	Realize and simplify Boolean Algebraic assignments for designing digital circuits using K-Maps.
	210246.2	Design and implement Sequential and Combinational digital circuits as per the specifications.
	210246.3	Apply the knowledge to appropriate IC as per the design specifications.
	210246.4	Design simple digital systems using VHDL.
	210246.5	Develop simple embedded system for simple real-world application
210247 Data Structures Lab	210247.1	To discriminate the usage of various structures in approaching the problem solution.
	210247.2	To design the algorithms to solve the programming problems.
	210247.3	To use effective and efficient data structures in solving various Computer Engineering domain problems
	210247.4	To analyze the problems to apply suitable algorithm and data structure.
	210247.5	To use appropriate algorithmic strategy for better efficiency
210248 Object Oriented Programming Lab	210248.1	Analyze the strengths of object-oriented programming
	210248.2	Design and apply OOP principles for effective programming
	210248.3	Develop programming application using object-oriented programming language C++
	210248.4	Percept the utility and applicability of OOP
210249 Soft Skills	210249.1	Effectively communicate through verbal/oral communication and improve the listening skills
	210249.2	Write precise briefs or reports and technical documents.
	210249.3	Actively participate in group discussion / meetings / interviews and prepare & deliver presentations.
	210249.4	Become more effective individual through goal/target setting, self motivation and practicing creative thinking.
	210249.5	Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality.
210250 Audit Course 1 AC1-I: Road Safety	210250.1 (Added)	Students should be able to take new initiatives in raising awareness, skill and knowledge of road safety as one of the stake holders.
	210250.2 (Added)	Students should be able to follow the rules and policies of the government in order to facilitate safety of individual and safe mobility of others.

SE Sem - IV

SE Computer, Course-2015	COs	Course Outcomes
207003 Engineering Mathematics III	207003.1	Solve higher order linear differential equation using appropriate techniques for modelling and analysing electrical circuits.
	207003.2	Solve problems related to Fourier transform, Z-Transform and applications to Signal and Image processing.
	207003.3	Apply statistical methods like correlation, regression analysis and probability theory for analysis and prediction of a given data as applied to machine intelligence.
	207003.4	Perform vector differentiation and integration to analyze the vector fields and apply to compute line, surface and volume integrals.
	207003.5	Analyze conformal mappings, transformations and perform contour integration of complex functions required in Image processing, Digital filters and Computer graphics.
210251 Computer Graphics	210251.1	Apply mathematics and logic to develop Computer programs for elementary graphic operations
	210251.2	Develop scientific and strategic approach to solve complex problems in the domain of Computer Graphics
	210251.3	Develop the competency to understand the concepts related to Computer Vision and Virtual reality
	210251.4	Apply the logic to develop animation and gaming programs
210252 Advanced Data Structures	210252.1	To apply appropriate advanced data structure and efficient algorithms to approach the problems of various domain.
	210252.2	To design the algorithms to solve the programming problems.
	210252.3	To use effective and efficient data structures in solving various Computer Engineering domain problems.
	210252.4	To analyze the algorithmic solutions for resource requirements and optimization
	210252.5	To use appropriate modern tools to understand and analyze the functionalities confined to the data structure usage.
210253 Microprocessor	210253.1	To apply the assembly language programming to develop small real life embedded application.
	210253.2	To understand the architecture of the advanced processor thoroughly to use the resources for programming
	210253.3	To understand the higher processor architectures descended from 80386 architecture
210254 Principles of Programming Languages	210254.1	To analyze the strengths and weaknesses of programming languages for effective and efficient program development.
	210254.2	To inculcate the principles underlying the programming languages enabling to learn new programming languages.
	210254.3	To grasp different programming paradigms
	210254.4	To use the programming paradigms effectively in application development.

210255 Computer Graphics Lab	210255.1	Apply mathematics and logic to develop Computer programs for elementary graphic operations
	210255.2	Develop scientific and strategic approach to solve complex problems in the domain of Computer Graphics
	210255.3	Develop the competency to understand the concepts related to Computer Vision and Virtual reality
	210255.4	Apply the logic to develop animation and gaming programs
210256 Advanced Data Structures Lab	210256.1	To apply appropriate advanced data structure and efficient algorithms to approach the problems of various domain.
	210256.2	To design the algorithms to solve the programming problems.
	210256.3	To use effective and efficient data structures in solving various Computer Engineering domain problems.
	210256.4	To analyze the algorithmic solutions for resource requirements and optimization
	210256.5	To use appropriate modern tools to understand and analyze the functionalities confined to the data structure usage.
210257 Microprocessor Lab	210257.1	To apply the assembly language programming to develop small real life embedded application.
	210257.2	To understand the architecture of the advanced processor thoroughly to use the resources for programming
	210257.3	To understand the higher processor architectures descended from 80386 architecture
210258 Audit Course 2: AC2-IV: Stress Relief: Yoga and Meditation	210258.1	Students understanding of philosophy and religion as well as daily life issues will be challenged and enhanced.
	210258.2	Enhances the immune system.
	210258.3	Intellectual and philosophical understanding of the theory of yoga and basic related Hindu scriptures will be developed.
	210258.4	Powers of concentration, focus, and awareness will be heightened.

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TE, Sem - V

TE Computer, Course-2015	COs	Course Outcomes
310241 Theory of Computation	310241.1 (Added)	Ability to Design deterministic and non-deterministic finite automata for all inputs and all outputs;
	310241.2	Ability to Design deterministic Turing machine for all inputs and all outputs;
	310241.3	Ability to subdivide problem space based on input subdivision using constraints;
	310241.4	Ability to apply linguistic theory;
310242 Database Management Systems	310242.1	Design ER model for given requirements and convert the same into database tables;
	310242.2	Use database techniques such as SQL and PL/SQL;
	310242.3	Use modern database techniques such as NoSQL;
	310242.4	Explain transaction management in relational database systems;
	310242.5	Describe different database architecture and analyzes the use of appropriate architecture in real time environment;
	310242.6	Use advanced database programming concepts.
310243 Software Engineering & Project Management	310243.1	Decide on a process model for a developing a software project.
	310243.2	Classify software applications & identify unique features of various domains
	310243.3	Design test cases of a software system
	310243.4	Understands basics of IT Project Management
	310243.5	Plan, schedule & execute a project considering the risk management
	310243.6	Apply quality attributes in software development life cycle
310244 Information systems and Engineering Economics	310244.1	Understand the need, usage and importance of an Information System to an organization.
	310244.2	Understand the activities that are undertaken while managing, designing, planning, implementation, and deployment of computerized information system in an organization
	310244.3	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
	310244.4	Outline the past history, present position and expected performance of a company engaged in engineering practice or in the computer industry.

	310244.5	Perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives.
	310244.6	Be able to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives.
310245 Computer Network	310245.1	Analyze the requirements for a given organizational structure to select the most appropriate networking architecture, topologies, transmission mediums, and technologies.
	310245.2	Demonstrate design issues, flow control and error control
	310245.3	Analyze data flow between TCP/IP model using Application, Transport and Network Layer Protocols.
	310245.4	Illustrate applications of Computer Network capabilities, selection and usage for various sectors of user community.
	310245.5	Illustrate Client-Server architectures and prototypes by the means of correct standards and Technology.
	310245.6	Demonstrate different routing and switching algorithms.
310246 Skill Development Lab	310246.1	Evaluate problems and analyze data using current technologies in a wide variety of business and organizational contexts
	310246.2	Create data-driven web applications
	310246.3	Incorporate best practices for building applications
	310246.4	Employ Integrated Development Environment (IDE) for implementing and testing of software solution
	310246.5	Construct software solutions by evaluating alternate architectural patterns
310247 Database Management System Lab	310247.1	Develop the ability to handle databases of varying complexity;
	310247.2	Use advanced database programming concepts.
310248 Computer Network Lab	310248.1	Demonstrate LAN and WAN protocol behaviour using Modern Tools.
	310248.2	Analyze data flow between peer to peer in an IP network using Application, Transport and Network Layer Protocols.
	310248.3	Demonstrate basic configuration of switches and routers.
	310248.4	Develop Client Server architectures and prototypes by the means of correct standards and Technology.
310249 Audit Course 3 AC – III: Emotional Intelligence	310249.1	Expand your knowledge of emotional patterns in yourself and others
	310249.2	Discover how you can manage your emotions, and positively influence yourself and others
	310249.3	Build more effective relationships with people at work and at home
	310249.4 (Added)	Positively influence and motivate colleagues, team members, managers

	310249.5 (Added)	Increase your leadership effectiveness by creating an atmosphere that engages others
	310249.6 (Added)	Apply EI behaviours and supports high performance

TE, Sem - VI

TE Computer, Course-2015	COs	Course Outcomes
310250 Design and Analysis of Algorithms	310250.1	Formulate the problem
	310250.2	Analyze the asymptotic performance of algorithms
	310250.3	Decide and apply algorithmic strategies to solve given problem
	310250.4	Find optimal solution by applying various methods
	310250.5 (Added)	Familiar with solid foundations to deal with a wide variety of computational problems.
	310250.6 (Added)	Analyzing the problem to identify appropriate computing requirements for its solution.
310251 Systems Programming and Operating System	310251.1	Ability to understand internal working and Data Structures used for Assembler.
	310251.2	Ability to understand Loaders & Linkers and Macro processing.
	310251.3	To learn and understand lexical analysis and parsing using LEX and YACC tool.
	310251.4	Ability to understand Operating System Functionalities like Process Management & different Scheduling Techniques
	310251.5 (Added)	Ability to understand IO Management and Memory Management.
310252 Embedded Systems and Internet of Things	310252.1	Implement an architectural design for IoT for specified requirement
	310252.2	Solve the given societal challenge using IoT
	310252.3	Choose between available technologies and devices for stated IoT challenge
310253 Software Modeling & Design	310253.1	Analyze the problem statement (SRS) and choose proper design technique for designing web based/ desktop application
	310253.2	Design and analyze an application using UML modelling as fundamental tool
	310253.3	Apply design patterns to understand reusability in OO design

	310253.4	Decide and apply appropriate modern tool for designing and modelling
	310253.5	Decide and apply appropriate modern testing tool for testing web-based/desktop application
310254 Web Technology	310254.1	Analyze given assignment to select sustainable web development design methodology.
	310254.2	Develop web-based application using suitable client side and server-side web technologies.
	310254.3	Develop solution to complex problems using appropriate method, technologies, frameworks, web services and content management.
310255 Seminar & Technical Communication	310255.1	To be able to be familiar with basic technical writing concepts and terms, such as audience analysis, jargon, format, visuals, and presentation
	310255.2	To be able to improve skills to read, understand, and interpret material on technology.
	310255.3	Improve communication and writing skills
310256 WT Lab	310256.1	Develop web-based application using suitable client side and server-side web technologies
	310256.2	Develop solution to complex problems using appropriate method, technologies, frameworks, web services and content management
310357 SP & OS LAB	310357.1	Ability to understand and implement 2 pass Assembler and 2 pass Macro processor using different data structures of JAVA Language.
	310357.2	Ability to implement lexical analyser and parser by handling tools like LEX & YACC.
	310357.3	To understand and implement the internals and functionalities of operating systems using JAVA language.
	310357.4	Ability to understand and implement various real life problems using JAVA language.
310358 ES and IOT Lab	310358.1	Design the minimum system for sensor-based application
	310358.2	Solve the problems related to the primitive needs using IoT
	310358.3	Develop full-fledged IoT application for distributed environment.
310359 Audit Course 4-IV: Leadership and Personality Development	310359.1	On completion of the course, enhance holistic development of students and improve employability skills.

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BE, Sem - VII

BE Computer, Course-2015	COs	Course Outcomes
410241 High Performance Computing	410241.1	Describe different parallel architectures, inter-connect networks, programming models.
	410241.2	Develop an efficient parallel algorithm to solve given problem
	410241.3	Analyze and measure performance of modern parallel computing systems
	410241.4	Build the logic to parallelize the programming task
410242 Artificial Intelligence and Robotics	410242.1	Identify and apply suitable Intelligent agents for various AI applications.
	410242.2	Design smart system using different informed search / uninformed search or heuristic approaches.
	410242.3	Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve given problem.
	410242.4	Apply the suitable algorithms to solve AI problems
410243 Data Analytics	410243.1	Write case studies in Business Analytic and Intelligence using mathematical models
	410243.2	Present a survey on applications for Business Analytic and Intelligence
	410243.3	Provide problem solutions for multi-core or distributed, concurrent/Parallel environments
Elective – I 410244(B) Software Architecture and Design	410244(B).1	Express the analysis and design of an application.
	410244(B).2	Specify functional semantics of an application.
	410244(B).3	Evaluate software architectures.
	410244(B).4	Select and use appropriate architectural styles and software design patterns.
	410244(B).5 (Added)	To acquaint with the interaction between qualities attributes, Software patterns and software architecture for building a Software Project.
Elective – I 410244(D) Data Mining and Warehousing	410244(D).1	Apply basic, intermediate and advanced techniques to mine the data
	410244(D).2	Analyze the output generated by the process of data mining
	410244(D).3	Explore the hidden patterns in the data
	410244(D).4	Optimize the mining process by choosing best data mining technique

Elective – II 410245(B): Software Testing and Quality Assurance	410245(B).1	Describe fundamental concepts in software testing such as manual testing, automation testing and software quality assurance.
	410245(B).2	Design and develop project test plan, design test cases, test data, and conduct test operations
	410245(B).3	Apply recent automation tool for various software testing for testing software
	410245(B).4	Apply different approaches of quality management, assurance, and quality standard to software system
	410245(B).5	Apply and Analyze effectiveness Software Quality Tools
Elective – II 410245(D): Mobile Communication	410245(D).1	Justify the Mobile Network performance parameters and design decisions.
	410245(D).2	Choose the modulation technique for setting up mobile network.
	410245(D).3	Formulate GSM/CDMA mobile network layout considering futuristic requirements which conforms to the technology.
	410245(D).4	Use the 3G/4G technology-based network with bandwidth capacity planning.
	410245(D).5	Percept to the requirements of next generation mobile network and mobile applications.
410246 Laboratory Practice I	410246.1	Exposure of practical hands on to enhance employability;
	410246.2	Enhance competency of core courses through implementation of assignments;
410247 Laboratory Practice II	410247.1	Use the 3G/4G technology-based network with bandwidth capacity planning for next generation mobile network and mobile applications.
	410247.2	Design and develop project test plan, design test cases, test data, and conduct test operations using recent automation tools for testing the software
	410247.3	To acquaint with the interaction between qualities attributes, Software patterns and software architecture for building a Software Project.
	410247.4	Apply basic, intermediate and advanced techniques to mine the data, analyze the output generated and optimize the mining process by choosing best data mining technique
410248 Project Work Stage I	410248.1	Solve real life problems by applying knowledge.
	410248.2	Analyze alternative approaches, apply and use most appropriate one for feasible solution.
	410248.3	Write precise reports and technical documents in a nutshell.
	410248.4	Participate effectively in multi-disciplinary and heterogeneous teams exhibiting team work, Inter-personal relationships, conflict management and leadership quality.
410249 Audit Course 5- Industrial Safety and Environment	410249.1 (Added)	Formulate the plan for Safety performance
	410249.2 (Added)	Formulate the action plan for accidents and hazards
Consciousness	410249.3 (Added)	Follow the safety and security norms in the industry

	410249.4 (Added)	Consider critically the environmental issues of Industrialization
BE, Sem - VIII		
BE Computer, Course-2015	COs	Course Outcomes
410250 Machine Learning	410250.1	Distinguish different learning-based applications
	410250.2	Apply different pre-processing methods to prepare training data set for machine learning.
	410250.3	Design and implement supervised and unsupervised machine learning algorithm.
	410250.4	Implement different learning models.
	410250.5	Learn Meta classifiers and deep learning concepts.
410251 Information and Cyber Security	410251.1	Gauge the security protections and limitations provided by today's technology.
	410251.2	Identify information security and cyber security threats.
	410251.3	Analyze threats in order to protect or defend it in cyberspace from cyber-attacks.
	410251.4	Build appropriate security solutions against cyber-attacks.
Elective III 410252(C) Embedded and Real Time Operating Systems	410252(C).1	Recognize and classify embedded and real-time systems.
	410252(C).2	Explain communication bus protocols used for embedded and real-time systems.
	410252(C).3	Classify and exemplify scheduling algorithms.
	410252(C).4	Apply software development process to a given RTOS application
	410252(C).5	Design a given RTOS based application.
Elective IV 410253(B) Human Computer Interface	410253(B).1	Evaluate the basics of human and computational abilities and limitations.
	410253(B).2	Inculcate basic theory, tools and techniques in HCI.
	410253(B).3	Apply the fundamental aspects of designing and evaluating interfaces.
	410253(B).4	Apply appropriate HCI techniques to design systems that are usable by people.
Elective IV 410253(C) Cloud Computing	410253(C).1	To install cloud computing environments.
	410253(C).2	To develop any one type of cloud

	410253(C).3	To explore future trends of cloud computing
410254 Laboratory Practice III	410254.1	To implement different machine learning based applications
	410254.2	To implement information and cyber security-based threat detection and security applications against cyber-attacks.
	410254.3	To analyze effect of different classifiers on training data
	410254.4	To implement key generation methods to encrypt data.
410255 Laboratory Practice IV	410255.1	To install cloud computing environment & develop any one type of cloud to explore future trends of cloud computing.
	410255.2	The course enables to Design, Planning & Modelling a Real Time Embedded system by implementing the basic concept & features of embedded system.
	410255.3	To study various soft computing methodologies and implement its application to get the practical knowledge of it.
	410255.4	Evaluate the basics of human & computational abilities & limitation to include basic theory, tools & techniques to design, evaluate & develop the systems that are usable by people
410256 Project Work Stage II	410256.1	Show evidence of independent investigation
	410256.2	Critically analyze the results and their interpretation.
	410256.3	Report and present the original results in an orderly way and placing the open questions in the right perspective.
	410256.4	Link techniques and results from literature as well as actual research and future research lines with the research.
	410256.5	Appreciate practical implications and constraints of the specialist subject
410257 Audit Course 6 - Business Intelligence	410257.1 (Added)	Apply the concepts of Business Intelligence in real world applications
	410257.2 (Added)	Explore and use the data warehousing wherever necessary
	410257.3 (Added)	Design and manage practical BI systems