COURSE OUTCOMES

Assessment Year: - 2024-25

- **Note: Patterns referred to create this document are:**

A. For FE Computer Engineering (Semester- I, II): 2019 Pattern

B. For SE Computer Engineering (Semester- III, IV): 2019 Pattern

C. For TE Computer Engineering (Semester- V, VI): 2019 Pattern

D. For BE Computer Engineering (Semester- VII, VIII): 2019 Pattern

Course Outcomes

Sanghavi College of Engineering		
Department of Computer Engineering		
FE, Sem - I, II		
FE Computer, Course-2019	**COs**	**Course Outcomes**
110005 Programming and Problem Solving	**110005.1 (CO1)**	Inculcate and apply various skills in problem solving.
	110005.2 (CO2)	Choose most appropriate programming constructs and features to solve the problems in diversified domains.
	110005.3 (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.
	110005.4 (CO4)	Demonstrate significant experience with the Python program development environment.
FE, Sem - II		
FE Computer, Course-2019	**COs**	**Course Outcome**
110013 Project Based Learning	**110013.1 (CO1)**	Project based learning will increase their capacity and learning through shared cognition.
	110013.2 (CO2)	Students able to draw on lessons from several disciplines and apply them in practical way.
	110013.3 (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.

Sanghavi College of Engineering		
Department of Computer Engineering		
SE, Sem - III		
SE Computer, Course-2019	**COs**	**Course Outcomes**
210241 Discrete Mathematics	**210241.1 (CO1)**	Formulate problems precisely, solve the problems, apply formal proof techniques and explain the reasoning clearly.
	210241.2 (CO2)	Apply appropriate mathematical concepts and skills to solve problems in both familiar and unfamiliar situations including those in real life contexts.
	210241.3 (CO3)	Design and analyze real world engineering problems by applying set theory, propositional logic and to construct proofs using mathematical induction.
	210241.4 (CO4)	Specify, manipulate and apply equivalence relations, construct and use functions and apply these concepts to solve new problems.
	210241.5 (CO5)	Calculate number of possible outcomes using Permutations and Combinations to model and analyze computational process using combinatorics.
	210241.6 (CO6)	Model and solve computing problem using tree and graph and solve problems using appropriate algorithms.
	210241.7 (CO7)	Analyze the properties of Binary Operations, apply abstract algebra in coding theory and evaluate the algebraic structures.
210242 Fundamentals of Data Structures	**210242.1 (CO1)**	Design the algorithms to solve the programming problems, identify appropriate algorithmic strategy for specific application, and analyze the time and space complexity.
	210242.2 (CO2)	Discriminate the usage of various structures, Design/Program/Implement the appropriate data structures; use them in implementations of abstract data types and Identity the appropriate data structure in approaching the problem solution.
	210242.3 (CO3)	Demonstrate use of sequential data structures- Array and Linked lists to store and process data.
	210242.4 (CO4)	Understand the computational efficiency of the principal algorithms for searching and sorting and choose the most efficient one for the application.
	210242.5 (CO5)	Compare and contrast different implementations of data structures (dynamic and static).
	210242.6 (CO6)	Understand, Implement and apply principles of data structures-stack and queue to solve computational problems.
210243 Object Oriented Programming	**210243.1 (CO1)**	Apply constructs- sequence, selection and iteration; classes and objects, inheritance, use of predefined classes from libraries while developing software.
	210243.2 (CO2)	Design object-oriented solutions for small systems involving multiple objects.
	210243.3 (CO3)	Use virtual and pure virtual function and complex programming situations.
	210243.4 (CO4)	Apply object-oriented software principles in problem solving.
	210243.5 (CO5)	Analyze the strengths of object-oriented programming.
	210243.6 (CO6)	Develop the application using object-oriented programming language (C++).

210244 Computer Graphics	210244.1 (CO1)	Identify the basic terminologies of Computer Graphics and interpret the mathematical foundation of the concepts of computer graphics.
	210244.2 (CO2)	Apply mathematics to develop Computer programs for elementary graphic operations.
	210244.3 (CO3)	Illustrate the concepts of windowing and clipping and apply various algorithms to fill and clip polygons.
	210244.4 (CO4)	Understand and apply the core concepts of computer graphics, including transformation in two and three dimensions, viewing and projection.
	210244.5 (CO5)	Understand the concepts of color models, lighting, shading models and hidden surface elimination.
	210244.6 (CO6)	Create effective programs using concepts of curves, fractals, animation and gaming.
210245 Digital Electronics & Logic Design	210245.1 (CO1)	Simplify Boolean Expressions using K Map.
	210245.2 (CO2)	Design and implement combinational circuits.
	210245.3 (CO3)	Design and implement sequential circuits.
	210245.4 (CO4)	Develop simple real-world application using ASM and PLD.
	210245.5 (CO5)	Differentiate and choose appropriate logic families IC packages as per the given design specifications.
	210245.6 (CO6)	Explain organization and architecture of computer system
210246 Data Structures Laboratory	210246.1 (CO1)	Use algorithms on various linear data structure using sequential organization to solve real life problems.
	210246.2 (CO2)	Analyze problems to apply suitable searching and sorting algorithm to various applications.
	210246.3 (CO3)	Analyze problems to use variants of linked list and solve various real-life problems.
	210246.4 (CO4)	Designing and implement data structures and algorithms for solving different kinds of problems.
	210246.5 (CO5)	Design and apply algorithms to simulate the applications of Stack and Queue Data Structures. (Added)
210247 OOP and Computer Graphics Laboratory	210247.1 (CO1)	Understand and apply the concepts like inheritance, polymorphism, exception handling and generic structures for implementing reusable programming codes.
	210247.2 (CO2)	Analyze the concept of file and apply it while storing and retrieving the data from secondary storages.
	210247.3 (CO3)	Analyze and apply computer graphics algorithms for line-circle drawing, scan conversion and filling with the help of object-oriented programming concepts
	210247.4 (CO4)	Understand the concept of windowing and clipping and apply various algorithms to fill and clip polygons.
	210247.5 (CO5)	Apply logic to implement, curves, fractals, animation and gaming programs.
210248 Digital	210248.1 (CO1)	Understand the working of digital electronic circuits.
Electronics Laboratory	210248.2 (CO2)	Apply the knowledge to appropriate IC as per the design specifications.

	210248.3 (CO3)	Design and implement Sequential and Combinational digital circuits as per the specifications.
210249 Business Communication Skills	**210249.1 (CO1)**	Express effectively through verbal/oral communication and improve listening skills.
	210249.2 (CO2)	Write precise briefs or reports and technical documents.
	210249.3 (CO3)	Prepare for group discussion/meetings/interviews and presentations.
	210249.4 (CO4)	Explore goal/target setting, self-motivation and practicing creative thinking.
	210249.5 (CO5)	Operate effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership qualities.
210250 Humanity and Social Science	**210250.1 (CO1)**	Aware of the various issues concerning humans and society.
	210250.2 (CO2)	Aware about their responsibilities towards society.
	210250.3 (CO3)	Sensitized about broader issues regarding the social, cultural, economic and human aspects, involved in social changes.
	210250.4 (CO4)	Able to understand the nature of the individual and the relationship between self and the community.
	210250.5 (CO5)	Able to understand major ideas, values, beliefs, and experiences that have shaped human history and cultures.
210251 Audit Course 3 Social Awareness and Governance Program	**210251.1 (CO1)**	Understand Social issues and responsibilities as member of society
	210251 .2 (CO2)	Apply social values and ethics in decision making at social or organizational level.
	210251.3 (CO3)	Promote obstacles in national integration and role of youth for National integration
	210251.4 (CO4)	Demonstrate the basic features of Constitution.
SE Sem - IV		
SE Computer, Course-2019	**COs**	**Course Outcomes**
207003 Engineering Mathematics III	**207003.1 (CO1)**	Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electric circuits.
	207003.2 (CO2)	Solve problems related to Fourier Transform, Z-Transform and applications to Signal and Image Processing.
	207003.3 (CO3)	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 (CO4)	Solve algebraic and transcendental equations and system of linear equations using numerical technique.
	207003.5 (CO5)	Obtain interpolating polynomials, numerical differentiation and integration, numerical solution of ordinary differential equations used in modern scientific computing.
	210252.1 (CO1)	Identify and articulate the complexity goals and benefits of a good hashing scheme for real world applications.

210252 Data Structures and Algorithms	**210252.2 (CO2)**	Apply Non-linear data structures for solving problems of various domains.
	210252.3 (CO3)	Design and specify the operations of a non-linear based abstract data type and implement them in a high-level programming language.
	210252.4 (CO4)	Analyze the algorithmic solutions for Resource Requirements and Optimization.
	210252.5 (CO5)	Use efficient Indexing Methods and Multi-way Search Techniques to store and maintain the data.
	210252.6 (CO6)	Use appropriate Modern Tools to understand and analyze the Functionalities confined to the Secondary Storage.
210253 Software Engineering	**210253.1 (CO1)**	Analyze software requirements and formulate design solution for the software.
	210253.2 (CO2)	Design applicable solutions in one or more application domains using software engineering approaches that integrate ethical, social, legal and economic concerns
	210253.3 (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.
	210253.4 (CO4)	Model and design User interface and component-level.
	210253.5 (CO5)	Identify and handle risk management and software configuration management.
	210253.6 (CO6)	Utilize knowledge of software testing approaches, approaches to verification and validation.
	210253.7 (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.
210254 Microprocessor	**210254.1 (CO1)**	Exhibit skill of assembly language programming for the application.
	210254.2 (CO2)	Classify Processor architectures.
	210242.3 (CO3)	Illustrate advanced features of 80386 Microprocessor.
	210254.4 (CO4)	Compare and contrast different processor modes.
	210254.5 (CO5)	Use interrupts mechanism in applications
	210254.6 (CO6)	Differentiate between Microprocessors and Microcontrollers.
	210254.7 (CO7)	Identify and analyze the tools and techniques used to design, implement, and debug microprocessor-based systems.
210255 Principles of Programming Languages	**210255.1 (CO1)**	Make use of basic principles of programming languages.
	210255.2 (CO2)	Develop a program with Data representation and Computations.
	210255.3 (CO3)	Develop programs using Object Oriented Programming language: Java.
	210255.4 (CO4)	Develop application using inheritance, encapsulation, and polymorphism.

	210255.5 (CO5)	Demonstrate Multithreading for robust application development.
	210255.6 (CO6)	Develop a simple program using basic concepts of Functional and Logical programming paradigm.
210256 Data Structures and Algorithms Laboratory	**210256.1 (CO1)**	Understand the ADT/libraries, hash tables and dictionary to design algorithms for a specific problem.
	210256.2 (CO2)	Choose most appropriate data structures and apply algorithms for Graphical Solutions of the problems.
	210256.3 (CO3)	Apply and analyze non-linear Data Structures to solve complex problems.
	210256.4 (CO4)	Apply and analyze algorithmic design techniques for indexing, sorting and multi-way searching, file organization and compression.
	210256.5 (CO5)	Analyze the efficiency of most appropriate data structures for creating efficient solutions for engineering design situations.
210257 Microprocessor Laboratory	**210257.1 (CO1)**	Understand and apply various addressing modes and instruction set to implement assembly language programs.
	210257.2 (CO2)	Apply logic to implement code conversion.
	210257.3 (CO3)	Analyze and apply logic to demonstrate processor mode of operation.
210258 Project Based Learning II	**210258.1 (CO1)**	Identify the real-life problem from societal need point of view.
	210258.2 (CO2)	Choose and compare alternative approaches to select most feasible one.
	210258.3 (CO3)	Analyze and synthesize the identified problem from technological perspective.
	210258.4 (CO4)	Design the reliable and scalable solution to meet challenges.
	210258.5 (CO5)	Evaluate the solution based on the criteria specified.
	210258.6 (CO6)	Inculcate long life learning attitude towards the societal problems.
210259 Code of Conduct	**210259.1 (CO1)**	Understand the basic perception of profession, professional ethics, various moral and social issues, industrial standards, code of ethics and role of professional ethics in engineering field.
	210259.2 (CO2)	Aware of professional rights and responsibilities of an engineer, responsibilities of an engineer for safety and risk benefit analysis.
	210259.3 (CO3)	Understand the impact of professional Engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
	210259.4 (CO4)	Acquire knowledge about various roles of engineers in variety of global issues and able to apply ethical principles to resolve situations that arise in their professional lives.
210260 Audit Course 4 Science Of Happiness	**210260.1 (CO1)**	Understand what happiness is and why it matters to you
	210260.2 (CO2)	Learn how to increase your Happiness

	210260.3 (CO3)	Understand the power of Social Connection and Science of Empathy
	210260.4 (CO4)	Understand what is mindfulness and its real-world application

Sanghavi College of Engineering		
Department of Computer Engineering		
TE, Sem - V		
TE Computer, Course-2019	**COs**	**Course Outcomes**
310241 Database Management Systems	**310241.1 (CO1)**	Analyze and design Database Management System using ER Model.
	310241.2 (CO2)	Implement database queries using database languages.
	310241.3 (CO3)	Normalize the database design using Normal Forms.
	310241.4 (CO4)	Apply Transaction Management concepts in real time situations.
	310241.5 (CO5)	Use No-SQL databases for processing unstructured data.
	310241.6 (CO6)	Differentiate between complex data types and analyze the use of appropriate data types.
310242 Theory of Computation	**310242.1 (CO1)**	Understand basic constructs of Finite Automata and apply them to construct Finite Automata and its variants.(Modified)
	310242.2 (CO2)	Construct regular expression to present regular language and understand pumping lemma for RE.
	310242.3 (CO3)	Interconversion of regular expression to finite automata and finite automata to regular expression. (Added)
	310242.4 (CO4)	Design Context Free Grammars and learn to simplify the grammar.
	310242.5 (CO5)	Construct Pushdown Automaton model for the Context Free Language.
	310242.6 (CO6)	Design Turing Machine for the different requirements outlined by theoretical computer science.
	310242.7 (CO6)	Understand different classes of problems, classify and analyze them and study concepts of NP completeness.
310243 Systems Programming and Operating System	**310243.1 (CO1)**	Analyze and Synthesize basic System Software and its functionality.
	310243.2 (CO2)	Identify suitable data structure and Design & Implement various system software
	310243.3 (CO3)	Compare different loading schemes and analyze the performance of linker and loader.
	310243.4 (CO4)	Implement and analyze the performance of process scheduling algorithms.

	310243.5 (CO5)	Identify the mechanism to deal with deadlock and concurrency issues.
	310243.6 (CO6)	Demonstrate memory organization and memory management policies.
310244 Computer Networks and Security	**310244.1 (CO1)**	Analyze computer networks, architectures, protocols and technologies. (Modified)
	310244.2 (CO2)	Illustrate the working and functions of data link layer
	310244.3 (CO3)	Analyze the working of different routing protocols and mechanisms
	310244.4 (CO4)	Implement client-server applications using sockets
	310244.5 (CO5)	Illustrate role of application layer with its protocols, Client-Server architectures
	310244.6 (CO6)	Comprehend the basics of information security
310245A Elective-I Internet of Things and Embedded Systems	**310245A.1 (CO1)**	Understand the fundamentals and need of Embedded Systems for the Internet of Things.
	310245A.2 (CO2)	Apply IoT enabling technologies for developing IoT systems.
	310245A.3 (CO3)	Apply design methodology for designing and implementing IoT applications.
	310245A.4 (CO4)	Analyze IoT protocols for making IoT devices communication.
	310245A.5 (CO5)	Design Cloud based IoT Systems.
	310245A.6 (CO6)	Design and develop secured IoT applications.
310245B Elective-I Human Computer Interface	**310245B.1 (CO1)**	Design effective Human Computer Interfaces for all kinds of users.
	310245B.2 (CO2)	Apply and analyze the user interface with the golden rule of interface.
	310245B.3 (CO3)	Analyze and evaluate the effectiveness of a user interface design.
	310245B.4 (CO4)	Implement the interactive designs for feasible data search and retrieval.
	310245B.5 (CO5)	Analyze the scope of HCI in various paradigms like ubiquitous computing, virtual reality, multi-media, World wide web related environments.
	310245B.6 (CO6)	Analyze and identify user models, user support and stakeholder requirements of HCI systems.
310245D Elective-I Software Project Management	**310245D.1 (CO1)**	Comprehend Project Management Concepts
	310245D.2 (CO2)	Use various tools of Software Project Management
	310245D.3 (CO3)	Schedule various activities in software projects
	310245D.4 (CO4)	Track a project and manage changes

	310245D.5 (CO5)	Apply Agile Project Management
	310245D.6 (CO6)	Analyze staffing process for team building and decision making in Software Projects and Management
310246 Database Management Systems Laboratory	**310246.1 (CO1)**	Design ER Model for given requirements and convert the same into database tables.
	310246.2 (CO2)	Design the schema in appropriate normal form considering actual requirements.
	310246.3 (CO3)	Implement SQL queries for the given requirements using different SQL concepts.
	310246.4 (CO4)	Implement PL/SQL code block for given requirement.
	310246.5 (CO5)	Implement No-SQL queries using Mongo-DB.
	310246.6 (CO6)	Design and develop application considering actual requirements and using database concepts.
310247 Computer Networks and Security Laboratory	**310247.1 (CO1)**	Analyze the requirements of network types, topology and transmission media.
	310247.2 (CO2)	Demonstrate error control, flow control techniques and protocols and analyze them.
	310247.3 (CO3)	Demonstrate the subnet formation with IP allocation mechanism and apply various routing.
	310247.4 (CO4)	Develop Client-Server architectures and prototypes.
	310247.5 (CO5)	Implement web applications and services using application layer protocols.
	310247.6 (CO6)	Use network security services and mechanisms.
310248 Laboratory Practice-I	**310248.1 (CO1)**	Implement Language Translator.
	310248.2 (CO2)	Use tools like LEX & YACC.
	310248.3 (CO3)	Implement Internal functionalities of operating System.
	310248.4 (CO4)	Design IoT and Embedded Systems based Applications.
	310248.5 (CO5)	Develop smart applications using IoT.
	310248.6 (CO6)	Develop IoT applications based on cloud environment.
310249 Seminar and Technical Communication	**310249.1 (CO1)**	Analyze a latest topic of professional interest.
	310249.2 (CO2)	Enhance technical writing skills.
	310249.3 (CO3)	Identify an engineering problem, analyze it and propose a work plan to solve it. Communicate with professional technical presentation skills.
	310249.4 (CO4)	Communicate with professional technical presentation skills.

310250 Audit Course 5 Professional Ethics and Etiquettes	310250B.1 (CO1)	Summarize the Principles of proper courtesy as they are practiced in the workplace.
	310250B.2 (CO2)	Apply Proper courtesy in different Professional Situations.
	310250B.3 (CO3)	Practice and apply appropriate etiquettes in the working environment and day to day life
	310250B.4 (CO4)	Build proper practices personal and business communications of Ethics and Etiquettes.

TE, Sem - VI

TE Computer, Course-2019	COs	Course Outcomes
310251 Data Science and Big Data Analytics	310251.1 (CO1)	Analyze needs & challenges for Data Science Big Data Analytics
	310251.2 (CO2)	Apply statistics for Big Data Analytics
	310251.3 (CO3)	Apply the lifecycle of Big Data Analytics to real world problems
	310251.4 (CO4)	Implement Big Data Analytics using Python programming
	310251.5 (CO5)	Implement Data Visualization using visualization tools in Python programming
	310251.6 (CO6)	Design & Implement Big Database using the Hadoop system
310252 Web Technology	310252.1 (CO1)	Implement and analyze behavior of web pages using HTML and CSS
	310252.2 (CO2)	Apply the client-side technologies for web development
	310252.3 (CO3)	Analyze the concepts of Servlet and JSP
	310252.4 (CO4)	Analyze the Web services and frameworks
	310252.5 (CO5)	Apply the server-side technologies for web development
	310252.6 (CO6)	Create the effective web applications for business functionalities using latest web development platforms
310253 Artificial Intelligence	310253.1 (CO1)	Identify and apply suitable Intelligent agents for various AI applications.
	310253.2 (CO2)	Build smart system using different informed search / uninformed search or heuristic approaches.
	310253.3 (CO3)	Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve given problem.
	310253.4 (CO4)	Apply the suitable algorithms to solve AI problems.
	310253.5 (CO5)	Implement ideas underlying modern logical inference systems.
	310253.6 (CO6)	Represent complex problems with expressive yet carefully constrained language of representation.

310254A Elective-II Information Security	**310254A.1 (CO1)**	Model the cyber security threats and apply formal procedures to defend the attacks
	310254A.2 (CO2)	Apply appropriate cryptographic techniques by learning symmetric and asymmetric key cryptography
	310254A.3 (CO3)	Design and analyze web security solutions by deploying various cryptographic techniques along with data integrity algorithms
	310254A.4 (CO4)	Identify and Evaluate Information Security threats and vulnerabilities in Information systems and apply security measures to real time scenarios
	310254A.5 (CO5)	Demonstrate the use of standards and cyber laws to enhance Information Security in the development process and Infrastructure protection.
310254B Elective-II Augmented and Virtual Reality	**310254B.1 (CO1)**	Understand the basics of Augmented and Virtual Reality Systems and list their applications.
	310254B.2 (CO2)	Describe the interface to the virtual world with the help of input and output devices.
	310254B.3 (CO3)	Explain representation and rendering system in the context of Virtual Reality.
	310254B.4 (CO4)	Analyze the manipulation, navigation and interaction of elements in the virtual world.
	310254B.5 (CO5)	Summarize the basic concepts and hardware of Augmented Reality System.
	310254B.6 (CO6)	Create Mobile Augmented Reality using Augmented Reality techniques and software.
310254C Elective-II Cloud Computing	**310254C.1 (CO1)**	Understand the different Cloud Computing environment
	310254C.2 (CO2)	Use appropriate data storage technique on Cloud, based on Cloud application
	310254C.3 (CO3)	Analyze virtualization technology and install virtualization software
	310254C.4 (CO4)	Develop and deploy applications on Cloud
	310254C.5 (CO5)	Apply security in cloud applications
	310254C.6 (CO6)	Use advance techniques in Cloud Computing.
310255 Internship	**310255.1 (CO1)**	To demonstrate professional competence through Industry Internship.
	310255.2 (CO2)	To apply knowledge gained through internships in academics.
	310255.3 (CO3)	To choose appropriate technology and tools to solve problems.
	310255.4 (CO4)	To demonstrate the abilities of a responsible professional and use ethical practices in day-to-day life.
	310255.5 (CO5)	Creating network and social circle and developing relationships with industry people.
	310255.6 (CO6)	To analyze various career opportunities and decide career goals.
310256 Data Science	**310256.1 (CO1)**	Apply principles of Data Science for the analysis of real time problems.

and Big Data Analytics Laboratory	**310256.2 (CO2)**	Implement Data representation using statistical methods.
	310256.3 (CO3)	Implement & evaluate data analytics algorithms.
	310256.4 (CO4)	Perform text preprocessing.
	310256.5 (CO5)	Implement Data Visualization techniques.
	310256.6 (CO6)	Use cutting edge tools & technologies to analyze big data.
310257 Web Technology Laboratory	**310257.1 (CO1)**	Understand the importance of website planning and website design issues
	310257.2 (CO2)	Apply the client side and server-side technologies for web application development
	310257.3 (CO3)	Analyze the web technology languages, frameworks and services
	310257.4 (CO4)	Create three tier web-based applications
310258 Laboratory Practice- II	**310258.1 (CO1)**	Design a system using different informed search / uninformed search or heuristic approaches
	310258.2 (CO2)	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning
	310258.3 (CO3)	Design and develop an interactive AI application
	310258.4 (CO4)	Use tools and techniques in the area of Information Security/Cloud Computing
	310258.5 (CO5)	Use the cryptographic techniques/cloud computing services for problem solving
	310258.6 (CO6)	Design and develop security solution/applications on cloud
310259 Audit Course 6 Sustainable Energy Systems	**310259.1 (CO1)**	Comprehend the importance of Sustainable Energy Systems
	310259.2 (CO2)	Correlate the human population growth and its trend to the natural resource degradation and develop the awareness about his/her role towards Sustainable Energy Systems protection
	310259.3 (CO3)	Identify different types of natural resource pollution and control measures
	310259.4 (CO4)	Correlate the exploitation and utilization of conventional and non-conventional resources

Sanghavi College of Engineering

Department of Computer Engineering

BE, Sem - VII

BE Computer, Course-2019	COs	Course Outcomes
410241 Design and Analysis of Algorithms	410241.1 (CO1)	Formulate the problem.
	410241.2 (CO2)	Analyze the asymptotic performance of algorithms.
	410241.3 (CO3)	Decide and apply algorithmic strategies to solve given problem.
	410241.4 (CO4)	Find optimal solution by applying various methods.
	410241.5 (CO5)	Analyze and Apply Scheduling and Sorting Algorithms.
	410241.6 (CO6)	Solve problems for multi-core or distributed or concurrent environments.
410242 Machine Learning	410242.1 (CO1)	Identify the needs and challenges of machine learning for real time applications.
	410242.2 (CO2)	Apply various data pre-processing techniques to simplify and speed up machine learning algorithms.
	410242.3 (CO3)	Select and apply appropriately supervised machine learning algorithms for real time applications.
	410242.4 (CO4)	Implement variants of multi-class classifier and measure its performance.
	410242.5 (CO5)	Compare and contrast different clustering algorithms.
	410242.6 (CO6)	Design a neural network for solving engineering problems.
410243 Blockchain Technology	410243.1 (CO1)	Interpret the fundamentals and basic concepts in Blockchain.
	410243.2 (CO2)	Compare the working of different blockchain platforms.
	410243.3 (CO3)	Use Crypto wallet for cryptocurrency-based transactions.
	410243.4 (CO4)	Analyze the importance of blockchain in finding the solution to the real-world problems.
	410243.5 (CO5)	Illustrate the Ethereum public block chain platform.
	410243.6 (CO6)	Identify relative application where block chain technology can be effectively used and implemented.
410244C Cyber Security and Digital Forensics	410244C.1 (CO1)	Analyze threats in order to protect or defend it in cyberspace from cyber-attacks.
	410244C.2 (CO2)	Build appropriate security solutions against cyber-attacks.
	410244C.3	Underline the need of digital forensic and role of digital evidences

	(CO3)	
	410244C.4 (CO4)	Explain rules and types of evidence collection.
	410244C.5 (CO5)	Analyze, validate and process crime scenes.
	410244C.6 (CO6)	Identify the methods to generate legal evidence and supporting investigation reports.
410244D Object Oriented Modelling and Design	**410244D.1 (CO1)**	Describe the concepts of object oriented and basic class modelling.
	410244D.2 (CO2)	Draw class diagrams, sequence diagrams and interaction diagrams to solve problems.
	410244D.3 (CO3)	Choose and apply a befitting design pattern for the given problem.
	410244D.4 (CO4)	To Analyze applications, architectural Styles & software control strategies.
	410244D.5 (CO5)	To develop Class design Models & choose Legacy Systems.
	410244D.6 (CO6)	To Understand Design Patterns.
410245C Mobile Computing	**410245C.1 (CO1)**	Develop a strong grounding in the fundamentals of mobile Networks.
	410245C.2 (CO2)	Apply knowledge in MAC, Network, and Transport Layer protocols of Wireless Network.
	410245C.3 (CO3)	Illustrate Global System for Mobile Communications.
	410245C.4 (CO4)	Use the 3G/4G technology-based network with bandwidth capacity planning, VLR and HLR identification algorithms.
	410245C.5 (CO5)	Classify network and transport layer of mobile communication.
	410245C.6 (CO6)	Design & development of various wireless network protocols using simulation tools.
410245D Software Testing and Quality Assurance	**410245D.1 (CO1)**	Describe fundamental concepts in software testing such as manual testing, automation testing and software quality assurance.
	410245D.2 (CO2)	Design and Develop project test plan, design test cases, test data, and conduct test operations.
	410245D.3 (CO3)	Apply recent automation tool for various software testing for testing software.
	410245D.4 (CO4)	Apply different approaches of quality management, assurance, and quality standard to software system.
	410245D.5 (CO5)	Apply and analyze effectiveness Software Quality Tools.
	410245D.6 (CO6)	Apply tools necessary for efficient testing framework.
410246 Laboratory Practice – III	**410246.1 (CO1)**	Apply preprocessing techniques on datasets.
	410246.2 (CO2)	Implement and evaluate linear regression and random forest regression models.

	410246.3 (CO3)	Apply and evaluate classification and clustering techniques.
	410246.4 (CO4)	Analyze performance of an algorithm.
	410246.5 (CO5)	Implement an algorithm that follows one of the following algorithm design strategies: divide and conquer, greedy, dynamic programming, backtracking, branch and bound.
	410246.6 (CO6)	Interpret the basic concepts in Blockchain technology and its applications.
410247 Laboratory Practice – IV	**410247.1 (CO1)**	Apply android application development for solving real life problems.
	410247.2 (CO2)	Design and develop system using various multimedia components.
	410247.3 (CO3)	Identify various vulnerabilities and demonstrate using various tools.
	410247.4 (CO4)	Apply information retrieval tools for natural language processing.
	410247.5 (CO5)	Develop an application using open-source GPU programming languages.
	410247.6 (CO6)	Apply software testing tools to perform automated testing.
	410247.7 (CO7)	Apply software testing methods to perform manual testing. (Added)
410248 Project Stage - I	**410248.1 (CO1)**	Solve real life problems by applying knowledge.
	410248.2 (CO2)	Analyze alternative approaches, apply and use most appropriate one for feasible solution.
	410248.3 (CO3)	Write precise reports and technical documents in a nutshell.
	410248.4 (CO4)	Participate effectively in multi-disciplinary and heterogeneous teams exhibiting team work.
	410248.5 (CO5)	Inter-personal relationships, conflict management and leadership quality.
410249E Audit Course 7 Industrial Safety and Environment Consciousness	**410249.1 (CO1)**	Develop the plan for Safety performance.
	410249.2 (CO2)	Demonstrate the action plan for accidents and hazards.
	410249.3 (CO3)	Apply the safety and security norms in the industry.
	410249.4 (CO4)	Evaluate the environmental issues of Industrialization.

BE, Sem - VIII		
BE Computer, Course-2019	**COs**	**Course Outcomes**
410250 High Performance Computing	**410250.1 (CO1)**	Understand various Parallel Paradigm.
	410250.2 (CO2)	Design and develop an efficient parallel algorithm to solve given problem
	410250.3 (CO3)	Illustrate data communication operations on various parallel architecture.
	410250.4 (CO4)	Analyze and measure performance of modern parallel computing systems.
	410250.5 (CO5)	Apply CUDA architecture for parallel programming.
	410250.6 (CO6)	Analyze the performance of HPC applications.
410251 Deep Learning	**410251.1 (CO1)**	Understand the basics of Deep Learning and apply the tools to implement deep learning applications.
	410251.2 (CO2)	Evaluate the performance of deep learning models (e.g., with respect to the bias-variance trade-off, overfitting and underfitting, estimation of test error).
	410251.3 (CO3)	To apply the technique of Convolution (CNN) and Recurrent Neural Network (RNN) for implementing Deep Learning models.
	410251.4 (CO4)	To implement and apply deep generative models.
	410251.5 (CO5)	Construct and apply on-policy reinforcement learning algorithms.
	410251.6 (CO6)	To Understand Reinforcement Learning Process.
410252C Software Defined Networks	**410252C.1 (CO1)**	Interpret the need of Software Defined networking solutions.
	410252C.2 (CO2)	Analyze different methodologies for sustainable Software Defined Networking solutions.
	410252C.3 (CO3)	Select best practices for design, deploy and troubleshoot of next generation networks.
	410252C.4 (CO4)	Develop programmability of network elements.
	410252C.5 (CO5)	Demonstrate virtualization and SDN Controllers using Open Flow protocol.
	410252C.6 (CO6)	Design and develop various applications of SDN.
410253C Business Intelligence	**410253C.1 (CO1)**	Differentiate the concepts of Decision Support System & Business Intelligence.
	410253C.2 (CO2)	Use Data Warehouse & Business Architecture to design a BI system.
	410253C.3 (CO3)	Build graphical reports.
	410253C.4 (CO4)	Apply different data preprocessing techniques on dataset.

	410253C.5 (CO5)	Implement machine learning algorithms as per business needs.
	410253C.6 (CO6)	Identify role of BI in marketing, logistics, and finance and telecommunication sector.
410254 Laboratory Practice - V	**410254.1 (CO1)**	Analyze and measure performance of sequential and parallel algorithms.
	410254.2 (CO2)	Design and Implement solutions for multicore/Distributed/parallel environment.
	410254.3 (CO3)	Identify and apply the suitable algorithms to solve AI/ML problems.
	410254.4 (CO4)	Apply the technique of Deep Neural network for implementing Linear regression and classification.
	410254.5 (CO5)	Apply the technique of Convolution (CNN) for implementing Deep Learning models.
	410254.6 (CO6)	Design and develop Recurrent Neural Network (RNN) for prediction.
410255 Laboratory Practice - VI	**410255.1 (CO1)**	Apply basic principles of elective subjects to problem solving and modeling.
	410255.2 (CO2)	Use tools and techniques in the area of software development to build mini projects.
	410255.3 (CO3)	Design and develop applications on subjects of their choice.
	410255.4 (CO4)	Generate and manage deployment, administration & security.
410256 Project Stage - II	**410256.1 (CO1)**	Show evidence of independent investigation.
	410256.2 (CO2)	Critically analyze the results and their interpretation.
	410256.3 (CO3)	Report and present the original results in an orderly way and placing the open questions in the right perspective.
	410256.4 (CO4)	Link techniques and results from literature as well as actual research and future research lines with the research.
	410256.5 (CO5)	Appreciate practical implications and constraints of the specialist subject.
410257 Audit Course 8 Usability Engineering	**410257.1 (CO1)**	Describe the human centred design process and usability engineering process and their roles in system design and development.
	410257.2 (CO2)	Discuss usability design guidelines, their foundations, assumptions, advantages, and weaknesses.
	410257.3 (CO3)	Design a user interface based on analysis of human needs and prepare a prototype system.
	410257.4 (CO4)	Assess user interfaces using different usability engineering techniques.
	410257.5 (CO5)	Present the design decisions.