SAPTHAGIRI COLLEGE OF ENGINEERING

(Affiliated to VTU, Belagavi and approved by AICTE, New Delhi)
#14/5, Chikkasandra, Hesaraghatta main road, Bengaluru-560057

DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

II,III & IV Year Information Science and Engineering

Course Code	Course Name	Course Outcomes-On completion of this course the students will be able to
17CS32	**ANALOG AND DIGITAL ELECTRONICS**	**CO 1- Discuss** about various Electronic Devices like Cathode ray Oscilloscope, Signal generators, Digital Trainer Kit, Multimeters and components like Resistors, Capacitors, Op amp and Integrated Circuit **CO 2- Design** various combinational logic circuits **CO 3- Develop** various types of counters and Registers using Flip-flop **CO 4- Develop** simulation package to design circuits **CO 5- Explain** the working and implementation of ALU
17CS33	**DATA STRUCTURES AND APPLICATIONS**	**CO 1- Compare** linear and non-linear data structures **CO 2- Classify** different types of data structures and their applications **CO 3- Explain** different searching and sorting algorithms **CO 4- Select** appropriate data structures to solve real world problems
17CS34	**COMPUTER ORGANIZATION**	**CO 1- Demonstrate** the basic structure of computer, machine instructions and programs **CO 2- Present** the input/output organization and interrupts **CO 3- Analyze** the memory system **CO 4- Develop** the arithmetic and logical units **CO 5- Apply** the fundamental concepts of basic processing unit
17CS35	**UNIX SHELL PROGRAMMING**	**CO 1-** Illustrate the knowledge of Unix operating system and its basic features to address known queries **CO 2-** Analyze the working of basic UNIX commands **CO 3-** Make use of Vi editor and apply regular expressions to perform pattern matching **CO 4-** Apply UNIX concepts in shell and Unix utilities to create and manage simple file operations **CO 5-** Demonstrate perl script and mechanism for process creation.
17CS36	**DISCRETE MATHEMATICAL**	**CO 1-** Illustrate the principles of counting and set theory **CO 2-** Identify the quantifiers and their uses and learn the fundamentals of logic theory

	STRUCTURE	**CO 3-** Apply the Mathematical induction principle and pigeonhole principle to solve the real time problems **CO 4-** Solve the problems using the concepts of relations and functions and Identify the different ways of representing relations. **CO 5-** Apply the concepts of group theory and coding theory to solve the given problem
17CSL37	**ANALOG AND DIGITAL ELECTRONICS LAB**	**CO 1- Design** logic circuits and analog circuits. **CO 2- Demonstrate** analog waveforms and simulations. **CO 3- Write** HDL code for digital circuits.
17CSL38	**DATA STRUCTURES LABORATORY**	**CO 1- Analyze** operations on linear data structures **CO 2- Design** operations on trees **CO 3- Implement** various sorting techniques. **CO 4- Compare** various searching techniques
17CS42	**OBJECT ORIENTED CONCEPT**	**CO 1-Explain** the object-oriented concepts and JAVA. **CO 2-Develop** computer programs to solve real world problems in Java. **CO 3- Design** simple GUI interfaces for a computer program to interact with users, and to comprehend the event-based GUI handling principles using Applets and swings.
17CS43	**DESIGN AND ANALYSIS OF ALGORITHMS**	**CO 1-** Apply computational knowledge to solve well known problems like searching, sorting etc **CO 2-** Estimate the computational complexity of different algorithms **CO 3-** Explain the basic concepts of time and space complexity and various design strategies and brief out the analysis of elementary data structures.
17CS44	**MICROPROCESSORS AND MICROCONTROLLERS**	**CO 1- Classify and Demonstrate** between microprocessors and microcontrollers and understand the 8086 MP architecture. **CO 2- Design and Develop** assembly language code to solve problems and interrupt routines interface **CO 3- Illustrate** the memory interfacing of various devices to x 86 families. **CO 4- Able to Implements** the ARM processor architecture and its fundamentals And Able to understand ARM instruction set and apply the same to design the program.
17CS45	**SOFTWARE ENGINEERING**	**CO 1- Explain** basics of Software Engineering concepts, methods & applications and to assess Software Engineering Ethics and professionalism. **CO 2- Design** a software system, component, or process to meet desired needs within realistic constraints with help of UML **CO 3- Make Use of d**ifferent type of Software Testing methods and to manage System Evolution **CO 4- Employ** in multi-disciplinary teams like planning, developing, quality management. **CO 5- Relate** modern engineering tools and techniques like Agile method.

17CS46	**DATA COMMUNICATION**	**CO 1-** Explain various network models and determine the performance of the network **CO 2-** Construct encoding scheme, multiplexing methods and suitable media for data transmission **CO 3-** Present different switching circuits, link addressing and apply different error detection and correction methods for data transmission **CO 4-** Select suitable media access control protocol and data link protocols and for data transmission **CO 5-** Outline the architecture of Wired and wireless LAN
17CSL47	**DESIGN AND ANALYSIS OF ALGORITHMS**	**CO 1-** Design algorithms using appropriate design techniques (brute-force, greedy, dynamic programming, etc.) **CO 2-** Develop variety of algorithms such as sorting, graph related, combinatorial, etc., in a high-level language **CO 3-** Analyze and compare the performance of algorithms using language features **CO 4-** Apply and implement learned algorithm design techniques and data structures to solve real-world problems.
17CSL48	**MICROPROCESSOR AND MICROCONTROLLER LABORATORY**	**CO 1- Demonstrate** writing of Assembly Language Programs in 8086 by using Macros and procedures. **CO 2- Develop** Assembly Language Programs to interface 8086 with 8255. **CO 3- Implement** writing Assembly Language Programs and C program for ARM processor.
17CS51	**MANAGEMENT AND ENTERPRENUERSHIP FOR IT INDUSTRY**	**CO 1- Outline** the significance of management and functions of a manager **CO 2- Examine** the process of planning and principles of organizing **CO 3- Investigate** the roles of entrepreneurs in the economic development of the country **CO 4- Compare** the different leadership styles **CO 5- Appraise** the ethical principles related to the intellectual property protection
17CS52	**COMPUTER NETWORKS**	**CO 1- Apply** principles of application layer protocols. **CO 2- Demonstrate** transport layer services and infer UDP and TCP protocols **CO 3- Classify** routers, IP and Routing Algorithms in network layer **CO 4- Illustrate** the Wireless and Mobile Networks covering IEEE 802.11 Standard **CO 5- Analyze** Multimedia Networking and Network Management
17CS53	**DATABASE MANAGEMENT SYSTEM**	**CO 1-** Apply database objects, Data Model, enforce integrity constraints on a database using RDBMS. **CO 2-** Demonstrate the concepts of Relational algebra, SQL for database manipulation **CO 3-** Design relational database application using user interface and backend server. **CO 4-** Analyze the functional dependency by using normalization process **CO 5-** Examine the use of concurrency and transaction in database

17CS54	**AUTOMATA THEORY & COMPUTABILITY**	**CO 1-** Classify formal languages, grammars, automata and their relationships with the Equivalence of DFA, NFA and Regular Language **CO 2-** Design Finite Automata for different Regular Expressions and Languages **CO 3-** Construct context free grammar for various languages, transformation and simplification of CFG **CO 4-** Illustrate PDA, equivalence of PDA and CFG **CO 5-** Describe the construction and working of Turing machine and the concept of enumerable languages.
17CS553	**ADVANCED JAVA & J2EE**	**CO 1- Present the** need for advanced Java concepts of enumerations, Type Wrappers and annotations **CO 2- Interpret** the necessity for collections in developing modular and efficient programs. **CO 3- Explain** in detail the advanced java concepts like String Handling. **CO 4- Describe** how servlets fit into Java-based web application architecture **CO 5- Demonstrate** the use of JDBC to access database through Java Programs
17CS562	**ARTIFICIAL INTELLIGENCE**	**CO 1-** IdentCompare and construct different AI techniques available ify the problem where AI is required and different methods available **CO 2-** Compare and construct different AI techniques available **CO 3-** Define and explain learning algorithms
17CSL57	**COMPUTER NETWORKS LABORATORY**	**CO 1- Analyze** various networking protocols. **CO 2- Demonstrate** the working of different concepts of networking. **CO 3- Implement** various networking protocols in NS2 / NS3.
17CSL58	**DBMS LABORATORY WITH MINI PROJECT**	**CO 1-** I**mplement** SQL operations and constraints for the given database schema **CO 2- Demonstrate** the different concepts of relational database system **CO 3- Develop** the project developed for an application.

17CS61	**CRYPTOGRAPHY NETWORK SECURITY AND CYBER LAW**	**CO 1-** Interpret the various cyber-attacks, Cipher properties, cryptographic techniques and fundamental concepts of cyber security **CO 2-** Design a security solution using various cryptographic algorithms like RSA, Hashing and Diffie Hellman **CO 3-** Analyze the different key management, authentication techniques and security protocols at different layers. **CO 4-** Examine the attacks in WLAN Security as per IEEE 802.11 Standards based on authentication, confidentiality and to understand about the intrusion detection system **CO 5-** Summarize the existing Cyber laws and Ethics to create awareness about security issues.
17IS62	**FILE STRUCTURES**	**CO 1- Apply** appropriat8 file structure for storage representation and their mechanism to store different types of files **CO 2- Analyze** the organization of fields and records in files **CO 3- Relate** suitable sorting techniques to arrange the data and multi-level indexing and B-Tree techniques for organization of data in a file. **CO 4- Select** suitable indexing mechanism and hashing technique for better performance of file accessing. **CO 5- Make** use of advanced file storage structures like extendible hashing for better performance
17IS63	**SOFTWARE TESTING**	**CO 1- Define** and explain the basic concepts of Software Testing. **CO 2- Demonstrate** the Path testing and Dataflow testing for designing of flow graph for creating run time support for test execution **CO 3- Design** and develop test cases using Decision table approach **CO 4- Explain** the principles that characterize various approaches for testing, planning and monitoring of the processes intertwined with documentation **CO 5- Illustrate** the concepts of integration and component-based testing techniques
17CS64	**OPERATING SYSTEMS**	**CO 1- Illustrate** the concept of operating system, system structure, system calls and virtual machine. **CO 2- Apply** the concepts of threading, scheduling algorithms and interprocess communication. **CO 3- Analyze** the problems related to Synchronization and concepts of deadlocks. **CO 4- Demonstrate** virtual memory management and implementation of file system. **CO 5- Examine** disk scheduling, management and concepts of Linux operating system.

17CS653	**OPERATION RESEARCH**	**CO 1- Apply** Various optimization techniques for various problems. **CO 2- Demonstrate** the theoretical workings of the simplex method for linear programming to find optimal solutions for linear programming models. **CO 3- Design** the relationship between a linear program and its dual. To understand the primal dual relationships and adapting to other models. **CO 4- Distinguish** the different application areas of operations research like transportation problem, assignment model and to solve them. **CO 5- Analyze** the students with the concepts and prominent applications of Game Theory and to understand fundamental concepts of heuristics in solving various optimization problems with emphasis on met heuristics.
17CS664	**PYTHON APPLICATION DEVELOPMENT**	**CO 1- Explain** Python syntax and semantics and be fluent in the use of Python flow control and functions. **CO 2- Demonstrate** proficiency in handling Strings and File Systems. **CO 3- Implement** Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions. **CO 4- Interpret** the concepts of Object-Oriented Programming as used in Python. **CO 5- Apply** exemplary applications related to Network Programming, Web Services and Databases in Python.
17ISL67	**SOFTWARE TESTING LABORATORY**	**CO 1-** Develop test cases based on Boundary value Analysis testing method **CO 2-** Create test cases using Equivalence class partitioning **CO 3-** Design and develop test cases using Decision table approach **CO 4-** Analyze structural testing techniques using Data flow approach. **CO 5-** Examine structural testing through basis path testing technique
17ISL68	**FILE STRUCTURE LABORATORY WITH MINI PROJECT**	**CO 1- Apply** operations related to files **CO 2- Demonstrate** the concepts of file system to produce the given application. **CO 3- Analyze** performance of various file systems on given parameters.

17CS71	**WEB TECHNOLOGY AND ITS APPLICATIONS**	**CO 1- Demonstrate** syntax and semantic structures of HTML Documents and CSS, styling in order to develop web pages **CO 2- Create** HTML Forms, Multicolumn layout and CSS Concept and its framework **CO 3- Examine** well-structured JavaScript and PHP code to validate and display contents of dynamic web pages **CO 4- Illustrate** the concepts of PHP, Error and exceptional handling using PHP. **CO 5- Design** dynamic interactive websites with the help of JavaScript frameworks like AJAX, jQuery, Backbone ,MVC and web services
17IS72	**SOFTWARE ARCHITECTURE AND DESIGN PATTERNS**	**CO 1- Classify** the types and qualities of design patterns **CO 2- Analyze** handling Strings and File Systems. **CO 3- Applying** principles in the design of object-oriented systems and distributed systems. **CO 4- Demonstrate** an understanding of an interactive systems **CO 5- Design** and model object-oriented systems using different types of pattern.
17CS73	**MACHINE LEARNING**	**CO 1- Analyze** the learning system for a specific type of problems of Machine learning. **CO 2- Explain** the algorithms for different types of Decision tree learning. **CO 3- Apply** the concepts of Artificial Neural Network (ANNs) to tune network parameters to fit a training set of input-out pairs using BACKPROPAGATION algorithm **CO 4- Use** of Bayesian Reasoning, Bayes Theorem and Concept Learning that provides basis for learning algorithms that directly manipulate probabilities. **CO 5- Compare** learning algorithms and approximate real valued or discrete valued target function using K-nearest neighbor algorithm.
17CS743	**INFORMATION AND NETWORK SECURITY**	**CO 1-** Describe the crypto basic techniques & taxonomy of Cryptography. **CO 2-** Demonstrate the cryptographic hash functions. **CO 3-** Analyze the cryptographic protocols. **CO 4-** Illustrate the need of Key Management. **CO 5-** Apply cryptography applications.

17CS754	**STORAGE AREA NETWORKS**	**CO 1-** Classify different storage networking technologies and virtualization **CO 2-** Show components of Storage Area Network and the implementation of NAS **CO 3-** Demonstrate CAS architecture and type of archives and forms of virtualization **CO 4-** Apply concepts of data center using cloud computing techniques **CO 5-** Examine the storage infrastructure and management activities
17CSL76	**MACHINE LEARNING LABORATORY**	**CO 1- Understand** the implementation procedures for the machine learning algorithms. **CO 2- Design and apply** machine Learning algorithms to solve real world problem using Java/Python **CO 3- Apply** appropriate data sets to the Machine Learning algorithms.
17CSL77	**WEB TECHNOLOGY LABORATORY WITH MINI PROJECT**	**CO 1- Make use of the** concepts of mark-up languages like HTML, CSS and XML to develop web pages. **CO 2- Apply** the client-side scripting and validation concepts using JavaScript. **CO 3- Create** dynamic web pages using PHP for back-end processing which also provides access to database.
17ISP78	**PHASE 1 PROJECT**	**CO 1-** Demonstrate independent study for literature survey in the domain, to identify the mathematical, science, management principles and engineering concepts to solve the searched engineering problem. **CO 2-** Identify the community that shall benefit through the solution to the searched Engineering problem and also demonstrate concern for environment. **CO 3-** Select the engineering tools/components for solving the searched Engineering problem **CO 4-** Apply the identified concepts and engineering tools to arrive at design Solution for the searched engineering problem PO 3 **CO 5-** Analyze and interpret results of experiments conducted on the designed Solution to arrive at valid conclusions