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

I Year Information Science and Engineering

Course Code	Course Name	Course Outcomes-On completion of this course the students will be able to
18MAT11	**Calculus and Linear Algebra**	CO1: Find the angle between radius vector and tangent, Pedal Equations, curvature, radius of curvature and their applications. CO2: Find the Taylor's and Maclaurin's series, indeterminate forms, partial differentiation, Maxima and Minima for a function of two variables. CO3: Evaluate the double and triple integrals, and by changing the order of integration, using Beta and Gamma functions and their application. CO4: Solve linear and non-linear ordinary differential equations. CO5: Solve the system of linear equations and to compute the Eigen value, Eigen vectors for diagonalization.
18PHY12/22	**Engineering Physics**	CO1: Classify various types of oscillations and their implications, the role of Shock waves in various fields Engineering and Technical fields. CO2: Recognize the elastic properties of materials for engineering applications. CO3: Realize the interrelation between time varying electric field and magnetic field, the transverse nature of the EM waves and their role in optical fiber communication. CO4: Compute Eigen values, Eigen functions of a particles using Time independent 1-D Schrodinger's wave equation and apprehend theoretical background of different types of laser and its applications in various fields. CO5: Distinguish various electrical and thermal properties of materials like conductors, semiconductors and dielectrics using different theoretical models.
		CO1: Analyse D.C circuits. CO2: Analyse A.C circuits CO3: Explain the principle of operation and construction of single phase transformers.Discuss concepts of

		electrical wiring, circuit protecting devices and earthing
18ELE13/23	**Basic Electrical Engineering**	CO4: Explain the principle of operation and construction of DC machine and its performance. CO5: Explain the principle of operation and construction of synchronous machines and three phase induction motors.
18CIV14/24	**Elements of Civil Engineering and Mechanics**	CO1: Mention the applications of various fields of Civil Engineering. CO2: Compute the resultant of given force system subjected to various loads. CO3: Comprehend the action of Forces, Moments and other loads on systems of rigid bodies and compute the reactive forces that develop as a result of the external loads. CO4: Locate the Centroid and compute the Moment of Inertia of regular and built-up sections. CO5: Express the relationship between the motions of bodies and analyze the bodies in motion. CO6: Apply the concepts of kinetics and kinematics, to understand about curvilinear and rectilinear motion and to analyze the various problems based on these.
18EGDL15/25	**Engineering Graphics**	CO1: Demonstrate the usage of CAD software. CO2: Draw orthographic projections of points, lines, planes and solids. CO3: Generate the development of lateral surfaces of solids. CO4: Covert orthographic views to isometric projections of solids and vice-versa.
18PHYL16/17	**Engineering Physics Laboratory**	CO1: Apprehend the concepts of interference of light, diffraction of light, Fermi energy and magnetic effect of current CO2: Understand the principles of operations of optical fibers and Semiconductor devices such as Photodiode, and NPN transistor using Simple circuits CO3: Determine elastic moduli and moment of inertia of given materials with the help of suggested procedures CO4: Recognize the resonance concept and its practical applications CO5: Understand the importance of measurement procedure, honest recording and representing the data, reproduction of final results
		CO1: Identify common electrical components, measuring instruments used in electrical laboratory and understand basic electrical laws such as Ohm's Law, Kirchhoff's Current Law, and Kirchhoff's Voltage Law, then, verify the same in simple electrical circuits. CO2: Compare the power consumed and power factor of various types of lamps, such as

18ELEL17/27	**Basic Electrical Engineering Laboratory**	Incandescent lamps, Fluorescent Lamps, and LED lamps. CO3: Understand the operation of two-way and three-way control of lamps in domestic wiring. CO4: Determine the various parameters of a choke coil, such as impedance, resistance, inductance, and quality factor. CO5: Establish star and delta type of connections using three numbers of single-phase loads and verify the phase and line relationships of voltage and currents. CO6: Determine and verify the total power consumed by a three phase star connected load using the two-wattmeter method. CO7: Understand the effects of open and short circuits in a simple electrical circuit.
18EGH18	**Technical English-I**	CO 1: Use grammatical English and essentials of language skills and identify the nuances of phonetics, intonation and flawless pronunciation CO2: Implement English vocabulary at command and language proficiency CO3: Identify common errors in spoken and written communication CO4: Understand and improve the non verbal communication and kinesics CO5: Perform well in campus recruitment, engineering and all other general competitive examinations.
18MAT21	**Advanced calculus and numerical methods**	CO1: Find the velocity, acceleration, gradient, curl and divergence CO2: Solve linear ordinary differential equations. CO3: Form and solve partial differential equations. CO4: Solve the infinite series and power series solutions. CO5: Solve algebraic and transcendental equations, interpolating polynomials, Intermediate values and evaluation of integrals using appropriate numerical techniques.
18CHE12/22	**Engineering Chemistry**	CO1: Analyze use of thermodynamics concepts to understand and to calculate potential value and nature of different classes of batteries applications. CO2: Analyze the understand nature of corrosion of different metals, causes and their protection through different techniques. CO3: Analyze calorific value of solid or liquid fuel and understand utilization of various energy sources. CO4: Explain the source sand effects of environmental pollution, the knowledge of waste management and assessment of water quality parameters CO5: Use instruments for various quantitative analysis and prepare the nonmaterial's and their applications.

18CPS13/23	**C Programming for Problem Solving**	CO1: Illustrate simple algorithms from the different domains such as mathematics, physics, etc. CO2: Construct a programming solution to the given problem using C. CO3: Identify and correct the syntax and logical errors in C programs. CO4: Modularize the given problem using functions and structures.
18ELN14/24	**Basic Electronics**	CO1: Apply the Knowledge of Semiconductor diode for designing Regulated power supply Using Rectifier, filter and IC regulator. CO2: Describe the construction, working and operation of JFET, MOSFET also discuss the Operating Principles of SCR with the Phase control application. CO3: Explain the Various Op-Amp parameters and using Op-amp design basic application like Inverting, non -inverting amplifier, Integrator differentiator etc. CO4: Use BJT for applications like amplifier and switch for power control, Describe the Principles operation of feedback amplifier and oscillators. CO5: Explain the different number system and their conversions and construct simple combinational and sequential logic circuits using Flip-Flops. CO6: Describe the basic principle of operation of communication system and mobile phones.
18ME15/25	**Elements of Mechanical Engineering**	CO1: Explain various sources of energy and conversion, basics of thermodynamics and properties of steam. CO2: Describe the principles & operations of boilers, hydraulic turbines and hydraulic pumps. CO3: Describe principles and operations of internal combustion engines, refrigeration and air-conditioning. CO4: Explain basics of engineering materials and various joining processes of metals. CO5: Describe power transmission methods by belt and gear drives and estimation of velocity ratios. CO6: Explain different machining processes by lathe, milling machines and basics of CNC machines and robotics
18CHEL16/26	**Engineering Chemistry Laboratory**	CO1: Handling different types of instruments for analysis of materials using small Quantities of materials involved for quick and accurate results. CO2: Carrying out different types of titrations for estimation of concerned in materials using comparatively more quantities of materials involved for good results.

18CPL17/27	**C Programming Laboratory**	CO1: Write algorithms, flowcharts and program for simple problems.
		CO2: Correct syntax and logical errors to execute a program.
		CO3: Write iterative and wherever possible recursive programs.
		CO4:Demonstrate use of functions, arrays, strings, structures and pointers in problem solving.
18EGH28	**Technical English-II**	CO1: Improve the functional effectiveness through better workplace communication skills.
		CO2: Acquire basic proficiency in English reading and listening, comprehensions, writing and speaking skills.
		CO3: Write campus recruitment exams, engineering competitive exams and all other general competitive exams.
		CO4: Improve business and technical communication skills and technical writing skills.

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II Year Information Science and Engineering

SL.No	Course Code	Course Name	Course Outcomes-On completion of this course the students will be
1	15MAT31	Engineering Mathematics - III	CO1: Comprehend and use of analytical and numerical methods in different engineering fields CO2: Apprehend and apply Fourier Series CO3: Realize and use of Fourier transforms and Z-Transforms CO4: Use of statistical methods in curve fitting applications CO5: Use of numerical methods to solve algebraic and transcendental equations, vector integration and calculus of variatio
2	15CS32	Analog and Digital Electronics	CO1: Explain the operation of JFETs and MOSFETs , Operational Amplifier circuits and their application CO2: Explain Combinational Logic, Simplification Techniques using Karnaugh Maps, Quine McClusky technique. CO3: Demonstrate Operation of Decoders, Encoders, Multiplexers, Adders and Subtractors, working of Latches, Flip-Flops, Designing Registers, Counters, A/D and D/A Converters. CO4: Design of Counters, Registers and A/D & D/A converters.
3	15CS33	Data Structures and Applications	CO1: To Understand, Practice fundamentals of data structures and their applications AND Describe, Analyze, Design and Evaluate the Linear Data Structures: Stack CO2: To Describe, Analyze, Design and Evaluate the Linear Data Structures: Queues and Linked list CO3: To Evaluate the Non-Linear Data Structures: Trees, Graphs Describe, Analyze, Design and Evaluate the sorting & searching algorithms
4	15CS34	Computer Organization	CO1: Explain the basic sub systems of a computer, their organization, structure and operation. CO2: Illustrate the concept of programs as sequences of machine instructions. CO3: Demonstrate different ways of communicating with I/O devices and standard I/O interfaces. CO4: Describe memory hierarchy and concept of virtual memory. CO5: Describe

			arithmetic and logical operations with integer and floating-point operands. CO6: Illustrate organization of a simple processor, pipelined processor and other computing systems
5	15CS35	Unix and Shell Programming	CO1: Explain multi user OS UNIX and its basic features CO2: Interpret UNIX Commands, Shell basics, and shell environments CO3: Design and develop shell programming, communication, System calls and terminology. CO4: Design and develop UNIX File I/O and UNIX Processes. CO5: Perl script writing
6	15CS36	Discrete Mathematical Structures	CO1: Use propositional and predicate logic in knowledge representation and truth verification. CO2: Apply different mathematical proofs techniques in proving theorems in the courses CO3: Demonstrate the application of discrete structures in different fields of computer science CO4: Solve problems using recurrence relations and general functions CO5: Compare graphs, trees and their applications
7	15CSL37	Analog and Digital Electronics Laboratory	CO1:Analog components and circuits including Operational Amplifier, Timer, etc. CO2:Combinational logic circuits. CO3: Flip - Flops and their operations CO4: Counters and registers using flip-flops. CO5: Synchronous and Asynchronous sequential circuits. CO6: A/D and D/A converters
8	15CSL38	Data Structures Laboratory	CO1: Asymptotic performance of algorithms. CO2: Linear data structures and their applications such as stacks, queues and lists CO3: Non-Linear data structures and their applications such as trees and graphs CO4: Sorting and searching algorithms
9	15MAT41	Engineering Mathematics - IV	1. To understand the concept of various numerical methods to solve the linear ordinary differential equations of first and second order 2. To impart the knowledge on series solutions of Bessel's and Legendre's differential equations and properties of Bessel's function and Legendre's Polynomials. 3. To understand the concept of analytic Function and Cauchy –Riemann equations.

			4. To impart the knowledge on complex line integrals, residue theorem, Conformal and bilinear transformations. 5. To present the concept of probability random variables and probability Distributions. To present the knowledge of sampling distributions, testing of hypothesis to accept or reject the hypothesis and stochastic process.
10	15CS 42/17CS45	Software Engineering	1. Outline software engineering principles and activities involved in Building large software programs. 2. Identify ethical and professional issues and explain why they are of concern to software engineers. 3. Describe the process of requirements gathering, requirements classification, requirements specification and requirements validation. 4. Differentiate system models, use UML diagrams and apply design patterns. 5. Discuss the distinctions between validation testing and defect testing. 6. Recognize the importance of software maintenance and describe the intricacies involved in software evolution. 7. Apply estimation techniques, schedule Project activities and compute pricing. 8. Identify software quality parameters and quantify software using measurements and Metrics. 9. List software quality standards and outline the Practices involved. 10. Recognize the need for agile Software Development, describes agile methods, apply agile practices and plan for agility.
11	15CS43	Design and Analysis of Algorithms	1. Explain various computational problem solving Techniques. 2. Apply appropriate method to solve a given Problem. 1. Compute computational complexity of different algorithms. 2. Describe various methods of algorithm analysis.
12	15CS44	Microprocessors and Microcontrollers	1. Differentiate between microprocessors and Microcontrollers 2. Design and develop assembly language code to solve problems 3. Gain the knowledge for interfacing various devices to x86 family and ARM processor 4. Demonstrate design of interrupt routines for interfacing devices 5. Demonstrate simple applications on Microprocessor and microcontroller based

			systems.
13	15CS45	Object Oriented Concepts	1. Learn fundamental features of object oriented language and JAVA 2. Set up Java JDK environment to create, debug and run simple Java programs. 3. Create multi-threaded programs and event handling mechanisms. 4. Introduce event driven Graphical User Interface (GUI) programming using applets and swings.
14	15CS46	Data Communication	1. Comprehend the transmission technique of digital data between two or more computers and a Computer network that allows computers to exchange data. 2. Explain with the basics of data communication and various types of computer networks; 3. Illustrate TCP/IP protocol suite and switching criteria. 4. Demonstrate Medium Access Control protocols for reliable and noisy channels. 5. Expose wireless and wired LANs along with IP version.
15	15CSL47	Design and Analysis of Algorithm Laboratory	1 To analyze worst-case running time of algorithms and understand fundamental algorithmic problems. 2 To understand how asymptotic notation is used to provide a rough classification of algorithms, how a number of algorithms for fundamental problems in computer science and engineering work and compare with one another. 3 To introduce the methods of designing and analyzing algorithms To study about various designing paradigms of algorithms for solving real world problems.
16	15CSL48	Microprocessors Laboratory	1. Design and develop assembly Language code to solve problems 2. Learn to interface various devices to x86 family and ARM processor 3. Demonstrate the usage of interrupt routines.

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III Year Information Science and Engineering

SL.No	Course Code	Course Name	Course Outcomes-On completion of this course the students will be
1	15CS51	Management and Entrepreneurship for IT Industry	CO1: Able to analyze explain the principles of management, organization and entrepreneur. CO2: Able to utilize the resource available effectively through ERP. CO3: Able to make use of IPR and Institutional support for EntrepreneuR.
2	15CS52	Computer Networks	CO1: Explain principles of application layer protocols CO2:Recognize transport layer services and infer UDP and TCP protocols CO3:Understand and describe the concepts of routing process and Multimedia Networking applicationsand network management CO4:Understand the fundamentals of Wireless and Mobile Networks
3	15CS53	Database Management System	CO1: Identify, analyse and define database objects, enforce integrity constraints on a database using RDBMS. CO2: Use Structured Query Language (SQL) for database manipulation CO3: Design and build simple database systems CO4: Develop application to interact with databases.
4	15CS54	Automata theory and Computability	CO1: Acquire fundamental understanding of the core concepts in automata theory and Theory of Computation CO2: Learn how to translate between different models of Computation (e.g., Deterministic and Non-deterministic and Software models). CO3: Design Grammars and Automata (recognizers) for different language classes and become knowledgeable about restricted models of Computation (Regular, Context Free) and their relative powers. CO4: Develop skills in formal reasoning and reduction of a problem to a formal model, with an emphasis on semantic precision and conciseness. CO5: Classify a problem with respect to different models of Computation.
5	15CS553	Advanced JAVA and J2EE	CO1: Interpret the need for advanced Java concepts like enumerations and collections in developing modular and efficient programs.

			CO2: Build client-server applications and TCP/IP socket programs CO3: Illustrate database access and details for managing information using the JDBC API CO4: Describe how servlets fit into Java-based web application architecture CO5: Develop reusable software components using Java Beans
6	15CS565	Cloud Computing	CO1: Able to understand public private and hybrid clouds CO2: Able to Understand main frames s, cluster s and grids CO3: Able to Understand different architecture s. CO4: Able to analyze data intensive technologies and challenges
7	15CSL57	Computer Network Laboratory	CO1: Demonstrate operation of network and its management commands CO2: Simulate and demonstrate the performance of GSM and CDMA CO3: Implement data link layer and transport layer protocols
8	15CSL58	DBMS Laboratory with mini project	CO1: Foundation knowledge in database concepts, technology and practice to groom students into well-informed database application developers. CO2: Strong practice in SQL programming through a variety of database problems. CO3: Develop database applications using front-end tools and back-end DBMS
9	15CS61	Cryptography, Network Security and Cyber Law	1. Explain the concepts of Cyber security 2. Illustrate key management issues and solutions. 3. Familiarize with Cryptography and very essential algorithms 4. Introduce cyber Law and ethics to be followed.
10	15IS62	File Structures	1. Explain the fundamentals of file structures and their management. 2. Measure the performance of different file structures 3. Organize different file structures in the memory. 4. Demonstrate hashing and indexing techniques.
11	15IS63	Software Testing	1. Differentiate the various testing techniques 2. Analyze the problem and derive suitable test cases. 3. Apply suitable technique for designing of flow graph 4. Explain the need for planning and monitoring a process
12	15CS64	Operating Systems	1. Explain the fundamentals and functions of modern operating systems. 2. Understand, analyze & evaluate the process scheduling algorithms 3. Understand & solve synchronization problem and gain knowledge about how to deal with deadlock situation. 4. Understand memory management strategies, File system & directory structure. 5. Understand secondary storage structure, analyze and solve disk scheduling

			problem. 6. Explain the history, design principles, kernel modules & Inter process communication of Linux.
13	15CS653	Operations Research	1. To understand definition, scope, objectives, phases, models & limitations of operations research and to understand and analyze managerial problems and formulate a real-world problem as a mathematical programming model and apply the graphical method to solve simple linear programming problems to find optimal solution. 2. To understand the theoretical workings of the simplex method for linear programming to find optimal solutions for linear programming models. 3. To understand the relationship between a linear program and its dual. To understand the primal dual relationships and adapting to other models. 4. To understand different application areas of operations research like transportation problem, assignment model and to solve them. 5. To acquaint 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.
14	15CS664	Python Application Programming	1. Learn Syntax and Semantics and create Functions in Python. 2. Handle Strings and Files in Python. 3. Understand Lists, Dictionaries and Regular expressions in Python. 4. Implement Object Oriented Programming concepts in Python 5. Build Web Services and introduction to Network and Database Programming in Python.
15	15ISL67	Software Testing Lab	1. Analyze the requirements for the given problem statement 2. Design and implement various solutions for the given problem 3. Employ various design strategies for problem solving.
16	15ISL68	File structure Lab with mini project	1. Demonstrate simple algorithms using file structures 2. Measure the performance of different file structures 3. Write a program to manage operations on given file system.

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IV Year Information Science and Engineering

SL.No	Course Code	Course Name	Course Outcomes-On completion of this course the students will be
1	15CS71	WEB TECHNOLOGY AND ITS APPLICATIONS	CO-1. Adapt HTML and CSS syntax and semantics to build web pages. CO-2. Construct and visually format tables and forms using HTML and CSS. CO-3. Develop Client-Side Scripts using JavaScript and Server-Side Scripts using PHP to generate and display the contents dynamically. CO-4. Appraise the principles of object oriented development using PHP. CO-5. Inspect JavaScript frameworks like jQuery and Backbone which facilitates developer to focus on core features.
2	15IS72	Software Architecture & Design Pattern.	CO1: Describe Software architecture. CO2: Measure the performance of architectures in terms of right parameters. CO3: Summarize parallel architecture and the software used for them.
3	15CS73	Machine Learning	CO1: Define machine learning and problems relevant to machine learning. CO-2:Differentiate supervised, unsupervised and reinforcement learning CO-3:Apply neural networks, Bayes classifier and k nearest neighbor, for problems appear in machine learning. CO-4Perform statistical analysis of machine learning techniques.
4	15CS744	Unix System Programming	CO1:Explain the fundamental design of the unix operating system CO2:Familiarize with the systems calls provided in the unix environment CO3:Design and build an application/service over the unix operating system
5	15CS754	Storage Area Network	CO1: Identify key challenges in managing information and analyze different storage Networking technologies and virtualization CO2: Explain components and implementations of NAS CO3: Describe BC,CAS architecture and types of archives and local and remote replication CO4: Describe Cloud architecture and different forms of virtualization CO5: Illustrate the storage infrastructure and management activities
6	15CSL77	Web Technology laboratory with Mini Project	CO1. Design and develop static and dynamic web pages. CO2. Familiarize with Client-Side Programming, Server-Side Programming, Active server Pages. CO3. Learn Database Connectivity to web applications.

7	15CSL76	Machine Learning Lab	CO1. Make use of Data sets in implementing the machine learning algorithms CO2. Implement the machine learning concepts and algorithms in any suitable language of choice.
8	15CS81	Internet of Things and Applications	CO1:.Assess the genesis and impact of IoT applications, architectures in real world. CO2:Illustrate diverse methods of deploying smart objects and connect them to network. CO3:Compare different Application protocols for IoT. CO4:Infer the role of Data Analytics and Security in IoT. CO5:Identifysensor technologies for sensing real world entities and understand the role of IoT in various domains of Industry.
9	15CS82	Big Data Analytics	CO1:Understand Hadoop Distributed File system and examine MapReduce Programming CO2: Explore Hadoop tools and manage Hadoop with Ambari CO3: Appraise the role of Business intelligence and its applications across industries CO4:Assess core data mining techniques for data analytics CO5:Identify various Text Mining techniques
10	15CS834	System Modeling and Simulation	CO1: Explain the basic system concept and definitions of system; CO2:Discuss techniques to model and to simulate various systems; CO3:Analyze a system and to make use of the information to improve the performance.

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