

# Course Outcomes Department Wise

## Basic Science (First Year)

<b>1FY104</b>	<b>Communication Skills Year of study: 2022-23</b>
CO11FY104.1	Students will develop communication skills and techniques which will felicitate their ability to work collaboratively with others
CO11FY104.2	Students will be able to use English grammer accurately that will increase their confidence in English writing and speaking
CO11FY104.3	Students will be able to invent, draft, organize, abstract, elaborate and synthesize their own and other's ideas in formatted way,
CO11FY104.4	Students will learn to use their imagination and produce something on their own after reading stories
CO11FY104.5	Students will be able to apply literary devices after reading stories and poems and also appreciate art in all forms
<b>1FY201</b>	<b>Engineering Mathematics-I Year of study: 2022-23</b>
CO11FY201.1	Students will be able to evaluate volume and surface area of the solid formed by revolution of different curves. Also calculate definite integral through Beta and Gamma functions.
CO11FY201.2	Students will be able to classify the concept of sequence, monotonic sequence, Cauchy's sequence and infinite series. Also apply various methods to test convergence and divergence of sequence and infinite series.
CO11FY201.3	Learner will be able to identify to express a function in term of a series of sine and cosine.
CO11FY201.4	Students will be able to evaluate maxima and minima of multivariable functions using the concept of partial differentiation. Also evaluate limit, continuity and differentiability of two variable function
CO11FY201.5	Students will be able to evaluate double and triple integration and to apply the knowledge to determine area, volume, centre of mass and centre of gravity. Further apply the concept of differentiation and integration on vectors
<b>1FY203</b>	<b>Engineering Chemistry Year of study: 2022-23</b>
CO11FY203.1	Student would be able to differentiate between hard and soft water. To describe the principles of water characterization and treatment for portable. To use various internal and external treatment softening methods for industry.
CO11FY203.2	Student would be able to classify the fuels (solid, liquid and gaseous) like coal, coke, diesel, natural gas etc and describe their sources, manufacturing, refinement and uses. To learn calorific values and carbonization
CO11FY203.3	Student would be able to explain the principle, causes and consequences of corrosion. To use its knowledge to minimize corrosion to improve industrial designs.
CO11FY203.4	Student would be able to gain the basic knowledge of Inorganic Engineering materials like cement, glass, lubricants. To explain the types, properties, manufacturing and uses of cement and glass. To select lubricants for various purposes.
CO11FY203.5	Student would be able to explain the types of organic reactions and gain basic Knowledge of drugs (Paracetamol and Aspirin)

<b>1FY306</b>	<b>Programming for Problem Solving Year of study: 2022-23</b>
CO12FY306.1	Students will be able to write algorithms and draw flowcharts for various problems, using components of flowcharts.
CO12FY306.2	Students will be able to describe architecture of computer and solve number system problems
CO12FY306.3	Students will be able to memorize different data types and operators in C and to write, compile and debug programs in C language.
CO12FY306.4	Students will be able to design flow charts and write programs with multiple instructions, involving decision structures and loops in C.
CO12FY306.5	Students will be able to design flow chart and write programs involving functions and to handle file reading writing operations.
<b>1FY309</b>	<b>Basic Civil Engineering Year of study: 2022-23</b>
CO11FY309.1	List the scope and role of Civil Engineering in development of society.
CO11FY309.2	Recognize the importance of surveying and Solve the problems on linear and angular measurement.
CO11FY309.3	Explain the basic concept of building components and describe about the foundation.
CO11FY309.4	Describe the importance of traffic and road safety.
CO11FY309.5	Discuss the functional concept of eco-system and water quality parameter.
<b>2FY202</b>	<b>Engineering Physics Year of study: 2022-23</b>
CO12FY202.1	Students Would be able to learn and to apply the basic concepts of interference and diffraction on optical Phenomenon. To interpret the intensity variation of light due to interference and diffraction. To use the concept of Resolving Power.
CO12FY202.2	Students would be able to explain the basic concepts of Quantum Mechanics and apply the knowledge to 1D and 3D potential box problem.
CO12FY202.3	Students would be able to describe the concept of coherence and types of it. To explain working principle of laser, lasing action, various types of lasers and optical fibre. To list the uses of Laser and optical fibres in various fields.
CO12FY202.4	Students would be able to differentiate the types of bonds, to explain the classification of solids according to Band theory and Hall effect. The bases for the band theory are focused to learn the types of Semiconductors and the role of carrier concentrations in conductivity.
CO12FY202.5	Students would be able to formulate and solve the engineering problems on electromagnetism To construct Maxwell's equations from basic principles and use it to solve electromagnetic plane wave equations.
<b>2FY307</b>	<b>Basic Mechanical Engineering Year of study: 2022-23</b>
CO11FY307.1	Student will be able to analyze introduction of mechanical engineering and develop knowledge about steam boilers, steam turbines and power plants.
CO11FY307.2	Student will be able to conclude basics of centrifugal, reciprocating pumps and internal combustion engine. Student will be able to create knowledge of various types of refrigeration and air conditioning system with their application.
CO11FY307.3	Student will be able to analyze basic of different types of power transmission systems such as belt, rope, gears and gear trains.
CO11FY307.4	Student will be able to illustrate working of different manufacturing processes.

CO11FY307.5	Student will be able identify different engineering material, their properties and various types of heat treatment processes.
<b>2FY308</b>	<b>Basic Electrical Engineering Year of study: 2022-23</b>
CO12FY308.1	Design and analyse complex DC circuits incorporating electrical circuit elements (R, L, and C), voltage and current sources, and Kirchhoff's current and voltage laws using Series-Parallel circuits, Node voltage method, and Mesh current method. Apply the principles of Superposition, Thevenin's, Norton's, and Maximum Power Transfer theorems to optimize circuit performance.
CO12FY308.2	Analyse single-phase AC circuits with R, L, C, RL, RC, and RLC combinations (series and parallel) using sinusoidal waveforms, phasor representation, and peak/r.m.s values. Evaluate power characteristics, including real power, reactive power, apparent power, and power factor. Understand resonance phenomena and voltage/current relationships in three-phase balanced circuits with star and delta connections.
CO12FY308.3	Comprehend the principles of ideal and practical transformers, including the EMF equation and equivalent circuit. Evaluate losses in transformers and their impact on regulation and efficiency.
CO12FY308.4	Analyse the generation of rotating magnetic fields and the construction/working of a three-phase induction motor, separately excited DC motor, and synchronous generators. Evaluate the significance of torque-slip characteristic, starting methods, speed control techniques for induction motors, and torque-speed characteristics.
CO12FY308.5	Power Converters & Electrical Installations: Evaluate the characteristics of semiconductor devices such as PN junction diode, BJT, SCR, power transistor, and IGBT. Analyse the basic circuits of single-phase rectifier with R load, single-phase inverter, and DC-DC converter. Understand the layout of LT switchgear and the types of earthing (SFU, MCB, ELCB, MCCB). Apply power measurement techniques and perform elementary calculations for energy consumption in electrical installations.
<b>2FY201</b>	<b>Engineering Mathematics-II Year of study: 2022-23</b>
CO12FY201.1	Students will be able to calculate rank of matrix, characteristic equation & characteristic roots & use the applicability of Cayley Hamilton Theorem to find inverse of matrix which is very important in many engineering application.
CO12FY201.2	Students will able to implement various methods to solve ordinary differential equation of first and Higher order which place important role in all branches of Engineering.
CO12FY201.3	Students will be able to apply various methods to solve ordinary differential equation of second order with variable coefficient which is useful for solving the practical problems which arise in the industry.
CO12FY201.4	Students will be able to solve linear and non linear PDE with Lagrange's form, standard forms and Charpit's method
CO12FY201.5	Students will be able to classify of second order PDE & solve by separation of variables methods on one dimensional heat and wave equations and two dimensional laplace equations.
<b>2FY105</b>	<b>Human Values Year of study: 2022-23</b>

CO12FY105.1	Students will identify the importance of happiness through the knowledge of values and skills
CO12FY105.2	Students will develop accuracy regarding the role of basic human aspirations in self and people around them
CO12FY105.3	Students will be able to create harmony in family ,in society along with trust and respect as foundational value of relationship
CO12FY105.4	Students will identify the interconnectedness among the four orders of nature, recyclability, co-existence and harmony at all level of existence.
CO12FY105.5	Students will be prepared for humanistic education , professional competence and ethics and humanistic universal order

### **Computer Science and Engineering**

<b>3CS201</b>	<b>Advanced Engineering Mathematics Year of study: 2022-23</b>
CO23201.1	Students are able to understand the concepts and principles of Random variable and Probability distribution, and able to apply in day to day life
CO23201.2	Students are able to understand the concepts and able to apply different probability distribution to identify and solve real life problem
CO23201.3	Students are able to understand the concepts of the formulation of different mathematical problems into optimization Problems
CO23201.4	Students are able to understand the concepts and apply the principles of optimization using differential calculus
CO23201.5	Students are able to understand the concepts of Liner Programming.
<b>3CS102</b>	<b>Technical Communication Year of study: 2022-23</b>
CO23102.1	Students will be able to interpret and know how to follow the stages of the writing process (prewriting/writing/rewriting) and apply them to technical and workplace writing task
CO23102.2	Students will develop skills related to the basic components of definitions, descriptions, process explanations, and other common forms of technical writing.
CO23102.3	Students will be able to read, understand, and interpret material on technology. They will have an appreciation for some of the ideas, issues, and problems involved in writing about technology and in workplace writing.
CO23102.4	Students will be able to get an in depth knowledge of technical communication used in professional life by getting to know all the forms and aspects of Technical Communication.
CO23102.5	Students will be able to express themselves better in technical writing by understanding the concept, style and methodology used in Technical communication.
<b>3CS304</b>	<b>Digital Electronics Year of study: 2022-23</b>
CO23304.1	Student will be able to show various number systems and will be able to relate their application in digital electronics.
CO23304.2	Student will be able to apply K-map & QM technique to solve the Boolean function to the simplest form for the implementation of compact digital circuits.
CO23304.3	Student will be able to classify logic families and analyze basic circuits of these families.
CO23304.4	Student will be able to design combinational circuits like half adder full adder, MUX, DEMUX encoder, decoder.
CO23304.5	Student will be able to design various synchronous and asynchronous sequential circuits like registers FLIP FLOP, and counters.
<b>3CS405</b>	<b>Data Structure and Algorithm Year of study: 2022-23</b>

CO23405.1	Student will be able to design algorithms and convert those algorithms into a C language code to perform push and pop operation on stack data structure. Students also develop an ability to perform recursion and apply them to the tower of Hanoi problem.
CO23405.2	Student will be able to design algorithms and convert those algorithms into a C language code to perform enqueue, dequeue and traversing operation on queue and Linked list data structure. Student will also be able to list the advantages and disadvantages of Linked List.
CO23405.3	Students will be able to write C code to implement Linear search, Binary Search, bubble sort, Insertion sort, selection sort, quick sort, heap sort, merge sort, radix sort and counting sort.
CO23405.4	Students will be able to write C programming code to create binary tree and implement pre, post and in order traversing on the tree data structure.
CO23405.5	Students will be able to write C programming code to implement Hashing. They should be able to perform breadth and depth first search operations on Graph data structure.
<b>3CS406</b>	<b>Object Oriented Programming Year of study: 2022-23</b>
CO23406.1	Student should be able to list out different programming paradigm such as top down and bottom up.
CO23406.2	Students should be able to apply various OOPs concept, they should be able to create classes and to call the properties of classes using objects. They should be able to apply access specifiers on the members of the class.
CO23406.3	Students should be able to apply inheritance properties of one class into another. They should be able to apply the concept of virtual functions with aspect to multiple inheritance.
CO23406.4	Students should be able to implement operator overloading function and can perform overriding of functions.
CO23406.5	Student should be able to structure dynamic arrays using template programming. Also, he will be able to define generic functions who can perform operations on different datatypes.
<b>3CS407</b>	<b>Software Engineering Year of study: 2022-23</b>
CO23407.1	Student will be summarize fundamental concepts in software engineering, SDLC, software requirements specification, formal requirements specification and verification
CO23407.2	Student will be able to evaluate cost based online of code using Software Project Management .
CO23407.3	Student will be able to structure various documents such as requirement analysis (SRS) and Structured analysis.
CO23407.4	Student will be able to compare various software models based on software design .
CO23407.5	Student will be able to design UML diagrams for a for a real life problem.
<b>4CS201</b>	<b>Discrete Mathematical Structure Year of study: 2022-23</b>
CO24201.1	Students will be able to apply fundamental concepts of set theory, relations, functions and pigeon hole principle in solving various mathematical problems.
CO24201.2	Students will be able to examine the relationship between varieties of arguments using logical notations and classify them as valid/invalid.
CO24201.3	Students will be able to demonstrate the ability to find permutation, combination and lattice.
CO24201.4	Students will be able to learn fundamental concepts of groups and rings.
CO24201.5	Students will be able to calculate distances among the nodes of graph using different traversal methods.
<b>4CS103</b>	<b>Managerial Economics and Financial Accounting Year of study: 2022-23</b>
CO24103.1	Students will be able to analyze economic problems and understand the principles of demand and supply in engineering-related scenarios.
CO24103.2	Students will apply demand forecasting techniques and analyze the elasticity of demand



	and supply in engineering markets.
CO24103.3	Students will demonstrate proficiency in production and cost analysis, optimizing production processes, and making cost-related decisions for engineering projects.
CO24103.4	Students will evaluate and compare different market structures and understand the pricing theory for various types of markets in the context of engineering businesses.
CO24103.5	Students will be able to analyze and interpret financial statements, perform financial ratio analysis, and apply capital budgeting techniques for engineering projects and investment decisions.
<b>4CS304</b>	<b>Microprocessor &amp; Interfaces Year of study: 2022-23</b>
CO24304.1	Student will be able to illustrate the 8085 microprocessor's architecture, pin description and its functionality in depth. Student will be able to explain about microprocessor-based system by designing logical circuitry in order to interface processor with memory and I/O devices.
CO24304.2	Students will experiment with instructions of 8085 microprocessor, their classification and different programming techniques. Student will be able to identify the addressing modes and length in bytes of instructions.
CO24304.3	Student will be able to write, and analyze assembly language programs of 8085 microprocessor also will be able to categorize various interrupts available in 8085 microprocessor.
CO24304.4	Students are able to demonstrate and explain the working & interfacing of 8085 microprocessor peripheral ICs.
CO24304.5	Student will be able to evaluate communication protocols.
<b>4CS405</b>	<b>Data Base Management System Year of study: 2022-23</b>
CO24405.1	Students will demonstrate their ability to prepare entity-relationship diagrams for Large Enterprises using appropriate database design principles.
CO24405.2	Students will write queries using relational algebra and calculus. Students will be able to write SQL queries and execute them.
CO24405.3	Students will apply normalization techniques to decompose relation into different normal forms.
CO24405.4	Students will differentiate between conflict serializability and view serializability, and to test schedules for serializability.
CO24405.5	Students will be able to identify the deadlock situations. Will also able to list various failure and recovery methods.
<b>4CS406</b>	<b>Theory of Computation Year of study: 2022-23</b>
CO24406.1	Student able to design the base of fundamental concept of Automata theory, formal language, and computation models.
CO24406.2	Student will be able to Analyze and identify differentiate between types of automata, such as finite automata, pushdown automata, and turning machine solve to complex problems.
CO24406.3	Students are able to build Demonstrated proficiency in constructing finite automata , pushdown automata, and turning machine to solve specific computational problem. Comprehend the concept of formal language and Grammars, include regular languages, context-free languages, and context-sensitive languages.
CO24406.4	Student are able to apply Relate the theory of computation to various real-world applications, such as compiler design and language processing and automata theory concept.
CO24406.5	Students are able to evaluate approach can be extremely valuable, as it allows developers to automate the creation of programs or systems from high-level specifications, reducing human effort, and minimizing the potential for manual errors.

<b>4CS407 Data Communication &amp; Computer Networks Year of study: 2022-23</b>	
CO24407.1	Students will be able to summarize the fundamental concepts of the data communication model and communications architecture. They will be able to explain characteristics of different communication mediums along with the classification of signals as digital and analog signals outlining their properties.
CO24407.2	Students will be able to list the functions and protocols of the Data Link Layer. They will be able to apply error detection and correction techniques for reliable data transmission.
CO24407.3	Students will be able to list of role and responsibilities of the Network Link Layer. They will be able to analyse different routing protocols, and distinguish the classful and classless IP addressing.
CO24407.4	Students will be able to explain the underlying principles of transport layer protocols such as multiplexing, demultiplexing, reliable data transfer, flow and congestion control. They will be able to examine the UDP and TCP transport layer protocols and list the difference between them.
CO24407.5	Student will be able to explain the underlying application level protocols used in various applications such as mail, file transfer, web browser, domain name resolution. They will be able to summarize the importance of network security. Also will be able to demonstrate the working of various layers in real life situation.
<b>5CS301 Information Theory &amp; Coding Year of study: 2022-23</b>	
CO35301.1	Student will be able to List the information measures used for continuous random variables.
CO35301.2	Student will be able to distinguish Prefix code, Huffman code, Shanon-Fane codes and identify the fundamental limits of communication systems.
CO35301.3	Students will be able to apply the principles and techniques of error detection and correction codes for error detection and correction in digital communication systems.
CO35301.4	Students will be able to calculate the performance of error detection and correction codes, including measures such as minimum distance, error detection and correction capabilities, and error probability bounds.
CO35301.5	Students will compare the performance of different coding schemes, considering error detection and correction codes' effectiveness
<b>5CS402 Compiler Design Year of study: 2022-23</b>	
CO35402.1	Students will be able to summarize major concepts in areas of language translation and compiler design.
CO35402.2	Students will be able to identify, formulate, and solve computer engineering problems with proper systematic & semantic approach
CO35402.3	Students will be able to Develop possible program constructs for further code generation with Type checking.
CO35402.4	Students will be able to analyze various concepts of symbol tables, Run time environments, memory management strategy.
CO35402.5	Students will get the concepts of Intermediate code generation, Code optimization and Code generations.
<b>5CS403 Operating System Year of study: 2022-23</b>	
CO35403.1	Students will be able to summarize principles of operating systems, design, and implementations, Understand the various components and functions of an operating system.
CO35403.2	Students will be able to analyse and apply suitable Process Scheduling Algorithm and Memory Partition Techniques, apply appropriate techniques to avoid control problems such as mutual exclusion and deadlocks
CO35403.3	Students will be able to memorize deadlock, Methods for handling deadlocks and memory management strategies

CO35403.4	Students will be able to compare various memory management algorithm and CPU scheduling techniques. Implement and evaluate operating system components in Windows and Unix environments
CO35403.5	Students will be able to measure and memorize various file and disk management strategies.
<b>5CS404</b>	<b>Computer Graphics &amp; Multimedia Year of study: 2022-23</b>
CO35404.1	Students can list various applications of computer graphics in different fields. Apply scan conversion algorithms to draw lines, circles, and ellipses on a raster display. Implement scan line polygon filling algorithms for area primitives.
CO35404.2	Students can apply transformations to 2D objects using transformation matrices. Utilize composite transformations to efficiently combine multiple transformations.
CO35404.3	Students can list the different methods of 3D display methods. Can apply 3D scaling, rotation, and translation transformations to manipulate objects in a 3D environment.
CO35404.4	Students will be able to list the basic components of illumination models. Describe the purpose and applications of halftone patterns and dithering techniques in image representation.
CO35404.5	Students identify the techniques of morphing and tweening and their purposes. Can also describe how key frame systems and motion specifications contribute to creating smooth animations.
<b>5CS405</b>	<b>Analysis of Algorithms Year of study: 2022-23</b>
CO35405.1	Student will be able to design algorithms and to analyze the performance of algorithms by identify different aspects of time and space complexity of recursive and non recursive codes
CO35405.2	Students will able to apply various algorithms for different computing problems using dynamic programming and branch and bound techniques and try to solve different more real time complex problems
CO35405.3	Students will be able to design and evaluate algorithms using various algorithm design techniques for pattern matching algorithms
CO35405.4	Students will be able to analyze randomized algorithms, Recite algorithms that employ randomization.
CO35405.5	Students will be able to relate the concepts of NP Completeness for analyze and solving the complexity of real life problems.
<b>5CS512</b>	<b>Human-Computer Interaction Year of study: 2022-23</b>
CO3512.1	Student will be able to list the capabilities of both humans and computers from the viewpoint of human information processing.
CO3512.2	Student will be able to describe typical human-computer interaction (HCI) models and styles, as well as various historic HCI paradigms.
CO3512.2	Students will be able to apply an interactive design process and universal design principles to designing HCI systems.
CO3512.3	Students will analyze and identify user models& support, socio-organizational issues, and stakeholder requirements of HCIs.
CO3512.3	Students will be able to discuss tasks and dialogs of relevant HCI systems based on task analysis and dialog design.
<b>6CS301</b>	<b>Digital Image Processing Year of study: 2022-23</b>
CO36301.1	Students will be able to recall and List the fundamental concepts related to digital image representation, including pixel, resolution, color models, and image formats.
CO36301.2	Students will be able to classify various intensity transformation functions, such as contrast stretching, gamma correction, and logarithmic transformations.
CO36301.3	Students will be able to apply inverse filtering techniques to reverse the effects of blurring



	or degradation and recover the original image as closely as possible.
CO36301.4	Students will be able to analyze various image compression techniques, both lossless and lossy, to recognize their principles, advantages, and limitations.
CO36301.5	Students will assess the effectiveness of thresholding algorithms in segmenting images and evaluate their performance under different lighting conditions and image characteristics.
<b>6CS402</b>	<b>Machine Learning Year of study: 2022-23</b>
CO36402.1	Students will be able to compare various supervised machine learning techniques like LRM, NBCD tree, KNN, SVM, RFA etc. which is suitable for a given problem.
CO36402.2	Students will be able to compare various unsupervised machine learning techniques like K means clustering, Hierarchical Clustering, Probabilistic clustering, ARM, AA, F-P growth algorithm and Gaussian Mixture model which are suitable for a given problem.
CO36402.3	Students will be able to apply various data pre-processing and dimensionality reduction techniques to prepare data for modeling purpose
CO36402.4	Students will be able to solve the problems using various models like policy iteration and value iteration, Q-learning, SARSA, Model based Reinforcement Learning.
CO36402.5	Students will be able to evaluate ANN system and apply it to solve a range of real-world applications, for example, in brain informatics, speech recognition etc.
<b>6CS403</b>	<b>Information Security System Year of study: 2022-23</b>
CO36403.1	Students should be able to list different types of security attacks and malware. They should be able to apply substitution and transposition encryption and decryption techniques.
CO36403.2	Students will be able to explain the working of block ciphers like AES and DES work. They'll also be able to list and describe various encryption and decryption modes.
CO36403.3	Students will be able to write the process of how asymmetric key encryption algorithms such as RSA and Rabin cryptosystem works.
CO36403.4	Students will be able to differentiate between the working of Hash functions and Digital signature.
CO36403.5	Students will be able to explain the functioning and use of SSL protocol and Transport layer security protocol. They should be able to explain the symmetric key distribution using symmetric and asymmetric encryptions.
<b>6CS404</b>	<b>Computer Architecture and Organization Year of study: 2022-23</b>
CO36404.1	Recall and identify various computer data types, such as integers, floating-point numbers, and characters, and explain the concept of complement representation. Describe the principles of fixed-point and floating-point number representation, analyze register transfer language, and explain the functioning of basic computer organization and its components.
CO36404.2	Demonstrate the ability to write assembly language programs for basic arithmetic and logic operations, utilize program loops and subroutines, and design programs for I/O operations.
CO36404.3	Analyze different addressing modes and instruction formats, compare and contrast RISC and CISC architectures, and explain the concepts of pipelining and Flynn's taxonomy in parallel processing.
CO36404.4	Evaluate various arithmetic algorithms like Booth's multiplication and division algorithms, assess the benefits and challenges of floating-point arithmetic operations, and analyze input-output interfaces and communication techniques, including DMA and interrupt mechanisms.
CO36404.5	Compare different input-output modes, multiprocessor characteristics, and interconnection structures, and synthesize knowledge to assess cache coherence and shared memory multiprocessors' impact on system performance.
<b>6CS405</b>	<b>Artificial Intelligence Year of study: 2022-23</b>

CO36405.1	Student able to apply various Search algorithms which help intelligent agents to find solutions to various real life problems
CO36405.2	Student can develop and implement various game playing strategies to make new versions of basic games.
CO36405.3	Students are able to build various knowledge based database for AI system
CO36405.4	Student are able to apply Machine learning algorithms and techniques to solve real world problems
CO36405.5	Students are able to evaluate the performance of NLP tools and System
<b>6CS406</b>	<b>Cloud Computing Year of study: 2022-23</b>
CO36406.1	Students will be able to summarize fundamentals and essentials of Cloud Computing.
CO36406.2	Student will be able to compare various cloud infrastructures to understand the tradeoffs in power, efficiency and cost
CO36406.3	Students will be able to apply different levels of virtualization
CO36406.4	Students will be able to Apply best security Practices and techniques to ensure confidentiality ,Integrity and availability of cloud-based systems
CO36406.5	Evaluate and select appropriate cloud Service Providers based on specific business requirements
<b>6CS5-13</b>	<b>E-Commerce &amp; ERP Year of study: 2022-23</b>
6CS5-13.1	Students will be able to Explain the characteristics of E-Commerce and ERP systems.
6CS5-13.2	Analyze the impact of E-Commerce on business models and strategies.
6CS5-13.3	Evaluate the role of ERP systems in streamlining business processes.
6CS5-13.4	Design and implement E-Commerce solutions considering security and usability.
6CS5-13.5	Configure and manage ERP systems for efficient resource planning and management.
<b>7CS401</b>	<b>Internet of Things Year of study: 2022-23</b>
7CS401.1	Describe the definition and usage of the term “Internet of Things” in different contexts recognize the key components that make up an IoT system
7CS401.2	Distinguish between the levels of the IoT stack and be familiar with the key technologies and protocols employed at each layer of the stack
7CS401.3	Relate famous IoT relevant Operating systems and hardware.
7CS401.4	Identify the role of big data, cloud computing and data analytics in a typical IoT system
7CS401.5	Design and Develop IOT based applications such as Lake Monitoring System, Air Quality System and Smart Energy Meter.
<b>7AG6-60.2</b>	<b>Environmental Engineering &amp; Disaster Management Year of study: 2022-23</b>
7AG660.1	To identify the significance of a secure water supply system, describe the needs for domestic water in urban and rural locations, and depict various water supply sources, including intakes and delivery systems.
7AG660.2	To review drinking water quality, familiarise themselves with Indian Standards for drinking water, and comprehend the significance of water treatment for ensuring safe drinking water. Also recognise the importance of sanitation in maintaining public health.
7AG660.3	To examine the quantity, characteristics, and appropriate disposal methods of domestic wastewater in both urban and rural areas. To understand different sewer types, design discharge, and hydraulic design considerations for effective wastewater management.
7AG660.4	To identify the quantity, characteristics, and suitable disposal methods for solid waste in urban and rural areas. Discuss the concept of air pollution, the different types of pollutants, their properties, and their effects on living beings.

7AG660.5	To review various types of disasters and recognise the importance of disaster management. Illustrate the role of disaster management in mitigating the impact of disasters on communities and environments.
<b>8CS41</b>	<b>Big Data Analytics Year of study: 2022-23</b>
8CS41.1	Explain the business decision which can be optimized, and competitive advantage created with Big Data.
8CS41.2	Apply the programming aspects of Map Reducing.
8CS41.3	Analyze Hadoop script to manage the Big Data Analytics.
8CS41.4	Interpret scripts with Hadoop to manage the Big Data Analytics.
8CS41.5	Design the script according to Hadoop architecture along with MapReduce Paradigm.
<b>8TT6-60.2</b>	<b>Disaster Management Year of study: 2022-23</b>
8TT6-602.1	Explain the concepts of disasters and hazards, understand their social and environmental implications, and assess risk and vulnerability in various scenarios.
8TT6-602.2	Identify different types of disasters, including hydro-meteorological disasters and geological disasters, and analyse the causes, impacts, and potential preventive measures for each type of disaster.
8TT6-602.3	Recognise various man-made disasters, such as textile processing industrial hazards, major power breakdowns, traffic accidents, and fire hazards. To understand the factors contributing to these disasters and explore ways to prevent or mitigate their effects.
8TT6-602.4	To understand the management roles in disaster mitigation specifically related to the textile industry and illustrate the strategies and policies implemented by management to reduce disaster risks and ensure business continuity.
8TT6-602.5	To comprehend the responsibilities of production personnel in disaster preparedness, response, and recovery, ensuring the safety of the workforce, and minimising production disruptions during disasters.

## Electrical Engineering

### V Semester

5EE4-03	Subject Name: Control System
CO1	The student will be able to understand the general concept of a system and classify systems into different types and represent a system using different techniques like block diagram, signal flow graph
CO2	The student will be able to develop transfer function model of mechanical, electrical, thermal, fluid system and different control system components like servomotors, synchros, potentiometer, tachos etc.
CO3	Students will be able to analyze system response and evaluate error dynamics in time domain
CO4	Students will be able to determine system stability using routh-hurwitz (RH) criteria, root locus techniques in time domain and bode plot and nyquist technique in frequency domain
CO5	Students will be able to Optimal Control and nonlinear control system. Basic concept and analysis
5EE3-01	Subject Name: Electrical Material
CO1	Identify the electrical properties and characteristics of various materials, used in the electrical appliances, devices and instruments
CO2	Distinguish the different atomic structure and interatomic bondings.

CO3	Explain the property and characteristics of dielectric, magnetic, conducting and semiconducting materials.
CO4	Explain the property and characteristics of conductivity of metal collision time and mean free path
CO5	Explain the property and characteristics of semiconductor material trends in materials used in electrical equipment

<b>5EE4-05</b>	<b>Subject Name: Electrical Machine Design</b>
CO1	Student will be able to classify select proper material for the design of an electrical machine.
CO2	Student will be able to understand the design concepts of transformers and know about how to design the parts
CO3	Students will be able to explain and summarize the concepts of induction machines and solve the problems related to design
CO4	Students will be able to relate and point out concepts of synchronous machines and solve the problems related to design..
CO5	Students will be able to choose the importance of design of machines based on their applications.

<b>5EE6.1A</b>	<b>Subject Name: Electromagnetic Wave</b>
CO1	Define and recognize different co-ordinate systems to describe the spatial variations of the physical quantities.
CO2	Explain fundamental laws governing electromagnetic fields and evaluate the physical quantities of electromagnetic fields.
CO3	Relate the Maxwell's equations and able to apply electromagnetic theory to solve problems primarily in physics and electrical engineering
CO4	Illustrate the knowledge of propagation of electromagnetic energy through different transmission lines or mediums
CO5	Compose the knowledge of the different parameters of antenna in propagation of electromagnetic energy

<b>5EE5-04</b>	<b>Subject Name: Microprocessor</b>
CO1	Able to Classify different types of microcontrollers.
CO2	Able to Sketch interfacing circuit for peripherals like, I/O, A/D, D/A, timer etc
CO3	Able to Analyze response time of different microcontrollers
CO4	Able to Select processors, microcontroller for different application
CO5	Compare microprocessor architecture with Microcontroller architecture based systems

<b>5EE4-02</b>	<b>Subject Name: Power System-I</b>
CO1	The students will be able to analyze the performance of transmission lines, efficiency in transmission lines.
CO2	The students will be able to understand basics of corona, sag and other problems arise in transmission lines.
CO3	The students will be able to analyze and identify the power factor improvement, capacitor bank installation in distribution systems, and metering systems in industrial and residential areas.

CO4	Students will be able to prepare different tariff structures and relate Indian electricity rules under a deregulated environment.
CO5	Students will be able to prepare different tariff structures and relate Indian electricity rules under a deregulated environment.

<b>5EE4-22</b>	<b>Subject Name: Control System Lab</b>
CO1	Will have a strong knowledge of MATLAB software
CO2	Will be able to do various engineering projects.
CO3	Ability to formulate transfer function for given control system problems.
CO4	Ability to find time response of given control system model.
CO5	Plot Root Locus and Bode plots for given control system model.
CO6	Ability to design Lead, Lag, Lead-Lag systems in control systems.

<b>5EE4-23 M</b>	<b>Subject Name: Microprocessor Lab</b>
CO1	To perform the micro programs like addition, subtraction etc.
CO2	To perform the transfer a block of data from memory location XXOO to another memory location XXOO in forward and reverse order.
CO3	To perform the operation on peripheral devices

<b>5EE4-21</b>	<b>Subject Name: Power System-I Lab</b>
CO1	Ability to express types of substations, various bus-bar arrangements.
CO2	Ability to explain basic schemes and single line diagram of hydro, thermal, nuclear and gas power plants.
CO3	Study of high voltage testing of electrical equipment: line insulator, cable, bushing, power capacitor, and power transformer.
CO4	Design an EHV transmission line.
CO5	Ability to design an EHV transmission line.
CO6	Ability to explain flash over voltage testing of insulators.

<b>5EE4-24</b>	<b>Subject Name: System programming Lab</b>
CO1	Ability to express programming & simulation for engineering problems.
CO2	Ability to find importance of this software for Lab Experimentation.
CO3	Articulate importance of software's in research by simulation work.
CO4	In-depth knowledge of providing virtual instruments on LabVIEW Environment.
CO5	Ability to write basic mathematical ,electrical ,electronic problems in Matlab.
CO6	Ability to simulate basic electrical circuit in Simulink.

### VI Semester

<b>6EE3-01</b>	<b>Subject Name: Computer Architecture</b>
CO1	To Develop a base of Computer Data Representation, Types of Arithmetic, Logical & Relational operations, Insights of Instructions & Microoperations
CO2	To Develop the understanding of Various Computer Architecture Languages, Programming the operations, Microprogrammed Control, Address Sequencing role & Design of Control Unit



CO3	To understand the General Register Organization, Stack Organization, Addressing Modes, Instruction Set Codes, Parallel Processing, Pipelining, Vector Processing & Array Processors
CO4	To command over Computer Arithmetic Logics like Addition, Subtraction, Multiplication Algorithms, Floating Point Arithmetic Operations & Input Output Organization
CO5	To understand the Memory Organization, Types of Memory, Multiprocessors, Interconnection Structures, Inter-processor Communication & Synchronization

6EE4-05	Subject Name: Electric Drives
CO1	Student will be able to classify Electrical Drives, And Justify Multi-Quadrant Operation Of Drives
CO2	Student will be able to design and develop concept along With Load Equalization
CO3	Students will be able to analyse The Thermal Model And Determine The Motor Rating For Different
CO4	Students will be able to describe duty Cycles Considering The Effect Of Load Inertia And Environmental
CO5	Students will be able Identify Suitable Form Of Electrical Drives System In Industry

6EE4-04	Subject Name: Electrical Energy Conversion and Auditing
CO1	Student will be able to explain conceptual knowledge of the technology, economics and regulation related issues associated with energy conservation and energy auditing
CO2	Student will have ability to analyse the viability of energy conservation projects
CO3	Students will be able differentiate and point out capability to integrate various options and assess the business and policy environment regarding energy conservation and energy auditing
CO4	Students will be able to relate and show advocacy of strategic and policy recommendations on energy conservation and energy auditing
CO5	Students will be able to relate and Show Maximum demand controllers, automatic power factor controllers, energy efficient motors concepts

6EE4-03	Subject Name: Power System Protection
CO1	Student will be able to introduction to protection, Trip circuit of a circuit breaker, CTs & PTs Current transformer, Steady state ratio and phase angle errors in CTs and PTs, CVT
CO2	Students will be able to design HRC fuse and thermal relay, different types of Overcurrent relays, Earth fault relay, Parallel feeders and ring mains.
CO3	Students will be able to explain generator Protection, Differential and percentage differential protection, Rotor protection-protection against excitation and prime mover failure, Field earth fault and unbalanced stator currents (negative sequence current protection).
CO4	Students will be able to outline and analyze power Transformer protection, Percentage differential protection, Magnetizing inrush current, percentage differential relay with harmonic restrain, Buchholz relay, Busbar Protection, High impedance relay scheme, frame leakage protection.
CO5	Students will be able to solve transformer Line Protection: Construction problems, show operating principle and characteristics of an electromagnetic impedance relay, and can choose Induction Motor Protection: can illustrate various faults and abnormal operating conditions, Earth fault and negative sequence voltage relays.

6EE4-02	Subject Name: Power System - II
CO1	Students will be able to discuss primary components of power system planning, planning methodology for optimum power system expansion, various types of generation, transmission and distribution.
CO2	Students will be able to show knowledge of forecasting of future load requirements of both demand and energy by deterministic and statistical techniques using forecasting tools.
CO3	Students will be able to outline and point out methods to mobilize resources to meet the investment requirement for the power sector
CO4	Students will be able to use and apply economic appraisal to allocate the resources efficiently and appreciate the investment decisions.
CO5	Students will be able to use and apply economic cost curves, Utility functions, Power Exchange and appreciate the investment decisions

6EE5-11	Subject Name: Power System Planning
CO1	Students will be able to discuss primary components of power system planning, planning methodology for optimum power system expansion, various types of generation, transmission and distribution.
CO2	Students will be able to show knowledge of forecasting of future load requirements of both demand and energy by deterministic and statistical techniques using forecasting tools.
CO3	Students will be able to categorize and select methods to mobilize resources to meet the investment requirement for the power sector
CO4	Students will be able to apply and modify economic appraisal to allocate the resources efficiently and appreciate the investment decisions.
CO5	Students will be able to apply computer aided planing, wheeling Insulation coordination reactive compensation

6EE4-22	Subject Name: Electric Drive Lab
CO1	Study and test the firing circuit of three phase half controlled bridge converter.
CO2	Study and obtain waveforms of 3-phase full controlled bridge converter with R and RL loads.
CO3	Control speed of a 3-phase induction motor in variable stator voltage mode using 3-phase AC voltage regulator.
CO4	Study speed control of dc motor using 3-phase dual converter.
CO5	Control of 3-Phase Induction Motor in variable frequency V/f constant mode using 3-phase inverter.

6EE4-24	Subject Name: Modelling and simulation lab
CO1	Simulate Swing Equation in Simulink (MATLAB)
CO2	Modeling of Induction Machine.
CO3	Modeling of Synchronous Machine with PSS
CO4	FACTS Controller designs with FACT devices for SMIB system

6EE4-21	Subject Name: Power System - II Lab
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CO1	Fault analysis (for 3 to 6 bus) and verify the results using MATLAB or any available software for the cases: (i) LG Fault (ii) LLG Fault
CO2	Load flow analysis for a given system (for 3 to 6 bus) using (ii) Newton Raphson and verify results using MATLAB
CO3	Study of overload security analysis and obtain results for the given problem using MATLAB or any software.
CO4	Power flow analysis of a slack bus connected to different loads.

6EE4-23	<b>Subject Name: Power System Protection Lab</b>
CO1	To determine fault type, fault impedance and fault location during single line to ground fault.
CO2	To determine fault type, fault impedance and fault location during double line-to-line fault.
CO3	To study the operation of micro-controller based over current relay in DMT type and IDMT type.
CO4	Zero, Positive and Negative sequence network.

## Electronics & Communication Engineering

<b>III Semester</b>	
<b>3EC2-01</b>	<b>Subject Name: Advanced Engineering Mathematics - I</b>
CO1:	To learn the concepts of various methods to solve the numerical problems.
CO2:	Students apply the knowledge of Fourier Transformation, z-transform and calculus in study of Signal Processing, Control Theory etc.
CO3:	Employ appropriate numerical methods to solve algebraic and transcendental equations and analysis the circuit problem.
CO4:	Students apply the knowledge of Laplace transform in various engineering problem.
CO5:	Student able to apply the concept of z-transform in designing the circuit.
<b>3EC1-02</b>	<b>Subject Name: Technical Communication</b>
CO1:	Students will be able to learn and understand how to follow the various stages of the writing process like prewriting, writing and rewriting and apply them to technical and workplace writing.
CO2:	Students will be able to learn and understand how to follow the various stages of the writing process like prewriting, writing and rewriting and apply them to technical and workplace writing.
CO3:	Students will be able to read, understand and interpret material on technology.
CO4:	They will have appreciation for some of the ideas, issues and problems involved in writing about technology and in workplace writing
CO5:	Students will be able to get an in-depth knowledge of technical communication used in professional life by getting to know all the forms and aspects of technical communication. They will be able to express themselves better in technical writing by understanding the concept, style and methodology used in technical communication
<b>3EC4-04</b>	<b>Subject Name: Digital System Design</b>

CO1:	Develop the understanding of number system and its application in digital electronics.
CO2:	Development and analysis of K-map to solve the Boolean function to the simplest form for the implementation of compact digital circuits.
CO3:	Design various combinational and sequential circuits using various metrics: switching speed, throughput/latency, gate count and area, energy dissipation and power.
CO4:	Understanding Interfacing between digital circuits and analog component using Analog to Digital Converter (ADC), Digital to Analog Converter (DAC) etc.
CO5:	Design and implement semiconductor memories, programmable logic devices (PLDs) and field programmable gate arrays (FPGA) in digital electronics.
<b>3EC4-05</b>	<b>Subject Name: Signal &amp; Systems</b>
CO1:	Classify different types of signals and system properties
CO2:	Demonstrate continuous and discrete systems in time and frequency domain using different transforms.
CO3:	Analyze whether the system is stable.
CO4:	Design and Develop Sampling and reconstruction circuit .
CO5:	Evaluate the output of the MIMO systems.
<b>3EC4-06</b>	<b>Subject Name: Network Theory</b>
CO1:	Student will be able to apply the basic circuit law and simplify the network using network theorems.
CO2:	Student will be able to categorize the frequency domain techniques in different applications.
CO3:	Students will be able to apply Laplace Transform for steady state and transient analysis.
CO4:	Students will be able to evaluate transient response and two-port network parameters.
CO5:	Students will be able to analyze the series resonant and parallel resonant circuit and design filters.
<b>3EC4-07</b>	<b>Subject Name: Electronics Devices</b>
CO1:	Understanding the semiconductor physics of the intrinsic, P and N materials.
CO2:	Understanding the characteristics of current flow in a bipolar junction transistor and MOSFET.
CO3:	Understand and Apply the mathematical models of semiconductor junctions and MOS transistors for circuits and systems.

CO4:	Analyze the characteristics of different electronic devices such as Amplifiers, LEDs, Solar cells, etc.
CO5:	Theoretical as well as experimental understanding of Integrated circuit fabrication.
<b>3EC4-21</b>	<b>Subject Name: Electronics Devices Lab</b>
CO1:	Understand the characteristics of different Electronic Devices.
CO2:	Verify the rectifier circuits using diodes and implement them using hardware.
CO3:	Design various amplifiers like CE, CC, common source amplifiers and implement them using hardware and also observe their frequency responses
CO4:	Understand the construction, operation and characteristics of JFET and MOSFET, which can be used in the design of amplifiers.
CO5:	Understand the need and requirements to obtain frequency response from a transistor so that Design of RF amplifiers and other high frequency amplifiers is feasible
<b>3EC4-22</b>	<b>Subject Name: Digital System Design Lab</b>
CO1:	To Verify the TTL ICs functionality with the datasheet.
CO2:	To minimize the complexity of digital logic circuits.
CO3:	To design and analyse combinational logic circuits.
CO4:	To design and analyse sequential logic circuits.
CO5:	Able to implement applications of combinational & sequential logic circuits.
<b>3EC4-23</b>	<b>Subject Name: Signal Processing lab</b>
CO1:	Able to generate different Continuous and Discrete time signals.
CO2:	Understand the basics of signals and different operations on signals.
CO3:	Develop simple algorithms for signal processing and test them using MATLAB
CO4:	Able to generate the random signals having different distributions, mean and variance.
CO5:	Design and conduct experiments, interpret and analyse data and report results.
<b>IV Semester</b>	
<b>4EC2-01</b>	<b>Subject Name: Advanced Engineering Mathematics - II</b>
CO1:	Gain knowledge about basic concepts of complex analysis and understand how to retrieve real and imaginary part of a given functions and will be able to apply it in engineering problem. Further learn how to map the points from one space to another one.
CO2:	Able to understand singularity, poles and region of convergence that can be apply to solve the circuit problems. The knowledge of Taylor series and Laurent series is applied to obtain analytical part of a function and identifications of singularities respectively.
CO3:	Evaluating definite and indefinite integrals.
CO4:	Students will be able to analyze the electronics problem like frequency modulation, transmission lines, and telephone equations with the help of Bessel function.
CO5:	The study of linear algebra enables student to solve many circuits problem and in communication section it is used in the form of image processing which is used now a days a lot.
<b>4EC1-03</b>	<b>Subject Name: Managerial Economics and Financial Accounting</b>
CO1:	Understanding the basic concepts of managerial economics.
CO2:	Understanding the economic goals of the firms and optimal decision making.



CO3:	Basic concepts of Demand, Supply and Equilibrium and their determinants. • Analyzing the effect of these factors on market dynamics.
CO4:	Understanding and estimating production function. • Law of DMR and three stages of production. • Isoquant and Isocost and finding out optimal combinations of inputs.
CO5:	Pricing and output decisions of monopolistic and oligopoly firm. • Effect of non-price factors on products and services of monopolistic and oligopoly firms
CO6:	To unnderstand the banking concepts
<b>4EC4-04</b>	<b>Subject Name: Analog Circuits</b>
CO1:	Understand the characteristics of diodes and transistors
CO2:	Design and analyze various rectifier and amplifier circuits
CO3:	Design sinusoidal and non-sinusoidal oscillators
CO4:	Understand the functioning of OP-AMP and design OPAMP based circuits
CO5:	Understanding the designing of ADCs and DACs
<b>4EC4-05</b>	<b>Subject Name: Microcontrollers</b>
CO1:	Basic knowledge of assembly language and C language.
CO2:	Use interfacing circuit for peripherals like, I/O, A/D, D/A, timer etc
CO3:	Categorize different types of microcontrollers on the basis of speed, power consumption and response time
CO4:	Design and develop interfacing circuit for memory organization.
CO5:	Compare RSIC architecture with CICS architecture based systems.
<b>4EC3-06</b>	<b>Subject Name: Electronics Measurements &amp; Instruments</b>
CO1:	Describe the use of various electrical/electronic instruments, their block diagram, applications, and principles of operation, standards errors and units of measurements.
CO2:	Develop basic skills in the design of electronic equipment's
CO3:	Analyze different electrical/electronic parameters using state of equipment's of measuring instruments which is require to all types of industries
CO4:	Solve: Identify electronics/ electrical instruments, understanding associated with the instruments
CO5:	Explain use of transducers in different types of field applications
<b>4EC4-07</b>	<b>Subject Name: Analog and digital Communication</b>
CO1:	Analyze and compare different analog modulation schemes for their efficiency and bandwidth
CO2:	Analyze the behaviour of a communication system in presence of noise
CO3:	Investigate pulsed modulation system and analyze their system performance
CO4:	Analyze different digital modulation schemes and can compute the bit error performance
CO5:	Design a communication system comprised of both analog and digital modulation techniques

<b>4EC4-21</b>	<b>Subject Name: Analog and Digital Communication Lab</b>
CO1:	Understand different analog modulation schemes and evaluate modulation index
CO2:	Able to understand the principle of superhetrodyne receiver
CO3:	Develop time division multiplexing concepts in real time applications
CO4:	Develop and able to comprehend different data formatting schemes
CO5:	Comprehend and analyze the concepts of different digital modulation techniques in communication.
<b>4EC4-22</b>	<b>Subject Name: Analog Circuits Lab</b>
CO1:	Discuss and observe the operation of a bipolar junction transistor and field-effect transistor in different region of operations.
CO2:	Analyze and design of transistor Amplifier and Oscillators. Importance of negative feedback.
CO3:	Analyze the frequency response of amplifiers and operational amplifier circuits. Develop an intuition for analog circuit behavior in both linear and nonlinear operation.
CO4:	Design op-amps for specific gain, speed, or switching performance. Compensate operational amplifiers for stability
CO5:	Design and conduct experiments, interpret and analyze data, and report results.
<b>4EC4-23</b>	<b>Subject Name: Microcontrollers Lab</b>
CO1:	Develop skills related to assembly level programming of microprocessors and microcontroller.
CO2:	Interpret the basic knowledge of microprocessor and microcontroller interfacing, delay generation, waveform generation and Interrupts.
CO3:	Interfacing the external devices to the microcontroller and microprocessor to solve real time problems.
CO4:	Illustrate functions of various general purpose interfacing devices.
CO5:	Develop a simple microcontroller and microprocessor based systems
<b>4EC4-24</b>	<b>Subject Name: Electronics Measurement &amp; Instrumentation Lab</b>
CO1:	Understanding of the fundamentals of Electronic Instrumentation. Explain and identify measuring instruments.
CO2:	Able to measure resistance, inductance and capacitance by various methods.
CO3:	Design an instrumentation system that meets desired specifications and requirements.
CO4:	Design and conduct experiments, interpret and analyze data, and report results.
CO5:	Explain the principle of electrical transducers. Confidence to apply instrumentation solutions for given industrial applications.
<b>VII Semester</b>	
<b>7EC5-11</b>	<b>Subject Name: VLSI Design</b>
CO1:	Analyse and Simulate MOS Inverter characteristics.
CO2:	Analyse the various design parameters of CMOS circuits.
CO3:	Design CMOS circuit & Layout.
CO4:	Comprehend and design dynamic CMOS & Semiconductor Memories.
CO5:	Design digital circuits using HDL
<b>7AG6-60.2</b>	<b>Subject Name: Environmental Engineering and Disaster Management</b>
CO1:	Analyse characteristics of water and wastewater

CO2:	Estimate the quantity of drinking water and domestic wastewater generated.
CO3:	Design components of water supply systems.
CO4:	Accumulate the information about water supply fittings.
CO5:	Calculate physical chemical properties by lab experiments for sewage sample
<b>7EC4-21</b>	<b>Subject Name: VLSI Design Lab</b>
CO1	Understand the physical design process of Digital Integrated Circuits
CO2	Describe procedure for designing of programmable circuits
CO3	Describe procedure for designing of programmable circuits
CO4	Implement various combinational and sequential circuits using VHDL on FPGA.
CO5	Implement various combinational and sequential circuits using VHDL on FPGA.
<b>7EC4-22</b>	<b>Subject Name: Advance communication lab</b>
CO1:	Understand the features of an communication system and perform basic functions on signals
CO2:	Explain various methods of generating and detecting different types of code wordss
CO3:	Compute various digital communication parameters with the help of graphical representation.
CO4:	Implement fuzzy system and neural networks for different applications
CO5:	Analyze the effects of sampling on a continuous time signals
<b>7EC4-23</b>	<b>Subject Name: Optical Communication Lab</b>
CO1:	Recall analog and digital link, propagation loss, numerical aperture for optical fiber communication.
CO2:	Sketch the characteristics of fibre optic LEDs, LDR and Laser Diode
CO3:	Calculate the losses with and without OTDR
CO4:	Analyze single mode, multimode fiber, optical waveguides, dispersion compensators, WDM, optical link power budget
CO5:	Analyze the optical system performance using Eye diagram ,Q-factor & BER of optical signals
<b>VIII Semester</b>	
<b>8EC5-11</b>	<b>Subject Name:Artificial Intelligence And Expert Systems</b>
CO1	Define the fundamentals of artificial intelligence , Intelligent Agents, State Space and Uninformed Search, Informed Search and constraint satisfaction
CO2	Student able to Describe predicate logic, reasoning using first order logic and Resolution in FOPL
CO3	Student able to Use basics of Rule based System, Semantic Net, Reasoning in Semantic Net Frames
CO4:	Student able to Examine of rule based expert systems, reasoning with uncertainty and fuzzy logic based reasoning
CO5:	Explain and Synthesis of various machine learning algorithms like Decision Tree, Artificial Neural Networks, Probabilistic Learning. Knowledge of basic concepts and challenges in Natural Language Processing

8TT6-60.2	Subject Name:Disaster Managment
CO1	Student will be able to categorize the different types of disaster andtheircharacteristics
CO2	Students will be able to make an Evaluation of hazard and vulnerability
CO3	Students will be able to outline the concept of capacity building and strengtheningcapacity to reduced is asterrisk
CO4	Students will be able to write Disaster coping strategies, industrialsafety plan, safetynorms, mass media and disaster management intextile industry
CO5	Students will be able to describe Planning in disaster management, formulating risk reduction plan and to under stand act and polices in India
8EC4-21	Subject Name:Internet of Things (IOT) Lab
CO1	Understand the concept of Internet of Things
CO2	Implement interfacing of various sensors with Arduino/Raspberry Pi
CO3	Demonstrate the ability to transmit data wirelessly between different devices
CO4	Show an ability to upload/download sensor data on cloud and server.
CO5	Examine various SQL queries from MySQL database.
8EC4-22	Subject Name:Skill Development Lab
CO1:	Student Should be able to write, test and debug Python programs
CO2:	Student should be able to write Python programs using conditional statements, looping statements and represent Compound data using Lists, Tuples and Dictionaries
CO3:	Students should be able to write Python programs to perform read and write operations on text files.
CO4:	Student should be able to write Python program to implement selection, bubble and merge sort.

## Civil Engineering

III Semester	
<b>Subject Code :3CE2-01</b>	<b>Subject Name: Advanced Engineering Mathematics - I</b>
CO1:	Memorize a range of mathematical theorems and methods to solve routine and complex analytic and applied problems.
CO2:	Analyze data necessary for the solution of engineering problems.
CO3:	Test the effectiveness of proposed solutions to identified engineering problems.
CO4:	Recognize functions of several variables and mean value theorems.
CO5:	Recognize special functions to evaluate some proper and improper integrals using beta and gamma functions.
<b>Subject Code :3CE1-02</b>	<b>Subject Name:Technical Communication</b>
CO1:	Learner can execute and test his/her technical skills required at the industry Levels

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 A. S. Vasu  
 Director





CO1:	Students will be able to remember the basic properties of fluid flow.
CO2:	Students will learn to analyze the pressure, buoyancy and types of flow and its characteristics.
CO3:	Students be able to solve problems related to Fluid Kinematics.
CO4:	Students will be able to apply concepts on flow parameters such as discharge, velocity, acceleration etc. on the basis of flow problems (Dynamics).
CO5:	Students be able to analyze the flow through pipes.

<b>Subject Code :3CE4-07</b>	<b>Subject Name: Building Materials and construction</b>
CO1:	Define different materials especially eco-friendly materials and safety measures to be adopted at any construction site.
CO2:	Describe the various types of building materials and its Engineering application.
CO3:	Memorize the knowledge of modern equipment's and the recent techniques to be used
CO4:	Understanding the use of non-conventional Civil Engineering materials
CO5:	Understand use of arches, lintels and partition wall. And learn about stairs and damp-proof course and joints in construction

<b>Subject Code :3CE4-08</b>	<b>Subject Name: Engineering Geology</b>
CO1:	Define different types of rocks & minerals found on earth.
CO2:	List types of faults and folds in earth crust.
CO3:	State the difference between several minerals by examining their physical & chemical properties.
CO4:	Understand the remote sensing process and application in various fields of civil engineering.
CO5:	Analyse Engineering consideration of faults, fold, joints and unconformities, Dip and strike.

<b>Subject Code :3CE4-21</b>	<b>Subject Name: Surveying Lab</b>
CO1:	Understand working of different type of surveying equipment's.
CO2:	Analyze the procedures involved in field work.
CO3:	Understand accurate measurements, field book, plotting and adjustment of errors.
CO4:	Solve distance, direction and elevation via measurement, angle measurement, differential levelling and contouring.
CO5:	Understand profile levelling, plot longitudinal and cross sections for road.

<b>Subject Code :3CE4-22</b>	<b>Subject Name: Fluid Mechanics Lab</b>
CO1:	Students will analyze and perform Bernoulli's theorem in practical sense

CO2:	Students will understand the concepts of Venturimeter and Orificemeter.
CO3:	Students will understand the concepts of Venturimeter and Orificemeter.
CO4:	Students will analyze the orificemeter and mouthpiece.
CO5:	Students will evaluate the problems related to fluid flow.
<b>Subject Code :3CE4-23</b>	<b>Subject Name: Computer aided civil engineering drawing</b>
CO1:	To understand the basic command, principles and features behind AutoCAD.
CO2:	Execute skills to draft the plan, elevation and sectional views of buildings
CO3:	Students can Sketch or draft 2D and 3D views of buildings
CO4:	Understand development of front elevation and sectional elevation from a given plan
CO5:	Understand development of plan, front elevation and sectional elevation from line diagram
<b>Subject Code :3CE3-24</b>	<b>Subject Name: Civil Engineering Materials Lab</b>
CO1:	Explain about fly ash, different stones, different glasses, aluminum and steel sections.
CO2:	To memorize the various properties of cement.
CO3:	Student can distinguish the various building materials by visual inspection.
CO4:	Identify the properties and utilization of fly ash, glass, timber, kota stone, aluminum and steel sections
CO5:	Understand the manufacturing and use of concrete hollow block
<b>Subject Code :3CE3-25</b>	<b>Subject Name: Geology Lab</b>
CO1:	Explain different types of rocks & minerals found on earth
CO2:	Explain faults and folds in earth crust
CO3:	Explain the difference between several minerals by examining their physical & chemical properties
CO4:	The students will interpret subsurface information such as thickness of soil, weathered zone, depth of hard rock and saturated zone by using geophysical method
CO5:	The students will learn the techniques in the interpretation of LANDSAT Imageries to find out the lineaments and other structural features for the given area
<b>IV Semester</b>	
<b>Subject Code :4CE2-01</b>	<b>Subject Name: Advanced Engineering Mathematics - II</b>
CO1:	Students understand to apply concepts of probability.

CO2:	Students will be able to use discrete and continuous probability distributions, including requirements, mean and variance, and making decisions
CO3:	Students are able to apply different probability distribution to identify and solve real life problem. understanding of Legendre's function, Rodrigues formula and Bessel function.
CO4:	Students are able to analyzing the pair of variable are related or not, and predict the future value by using the regression equations
CO5:	Student use the statistical test to developing better management system and providing good services or results in their future life journey
<b>Subject Code :4CE1-03</b>	<b>Subject Name: Managerial Economics and Financial Accounting</b>
CO1:	Understanding the basic concepts of managerial economics.
CO2:	Understanding the economic goals of the firms and optimal Decision making.
CO3:	Basic concepts of Demand, Supply and Equilibrium and their Determinants. • Analyzing the effect of these factors on market dynamics.
CO4:	Understanding and estimating production function. • Law of DMR and three stages of production. • Isoquant and Isocost and finding out optimal combinations of inputs.
CO5:	Pricing and output decisions of monopolistic and oligopoly Firm. • Effect of non-price factors on products and services of monopolistic and oligopoly firms
CO6:	To understand the banking concepts
<b>Subject Code :4CE3-04</b>	<b>Subject Name:Basic Electronics for Civil Engineering Applications</b>
CO1:	Learner can define introduction to Semiconductors, Diodes, V-I characteristics, Bi polar junction transistors uses.
CO2:	Learner can state data acquisition system and data processing.
CO3:	Students get to understand the basic of Sensors & Transducers Used in various instruments
CO4:	Understand the working of various instruments and measure the error.
CO5:	Understand the concept and processing of digital images.
<b>Subject Code :4CE4-05</b>	<b>Subject Name: Strength of Materials</b>

CO1:	Analyze and design structural members subjected to tension, compression, torsion, bending and combined stresses using the fundamental concepts of stress, strain and elastic behavior of materials.
CO2:	Utilize appropriate materials in design considering engineering properties, sustainability, cost and weight.
CO3:	Perform engineering work in accordance with ethical and economic constraints related to design of structures.
CO4:	Exposure to the systematic methods for solving engineering problems in solid mechanics.
CO5:	Build the necessary theoretical background for further structural analysis.
<b>Subject Code :4CE4-06</b>	
<b>Subject Name: Hydraulics Engineering</b>	
CO1:	Students will be able to analyze the process of deriving equation by using dimensional methods.
CO2:	Students will analyze the problems related to flow of fluids in channel.
CO3:	Students will be able to explain and remember the different types of turbines & pumps used.
CO4:	Student will be able to create economic sections for fluid channels.
CO5:	Students will be able to remember the concepts of Hydrology.
<b>Subject Code :4CE4-07</b>	
<b>Subject Name: Building Planning</b>	
CO1:	Identify the factors to be considered in planning and construction of building.
CO2:	Impart the ability to work with an architect and contractor.
CO3:	Plan a building following the bye-laws.
CO4:	Plan the buildings according the modern requirements such as sustainability, environment friendly etc.
CO5:	Prepare drawings, foundation plans and others executable drawings with proper details for different building
<b>Subject Code :4CE4-08</b>	
<b>Subject Name: Concrete Technology</b>	
CO1:	Understand chemistry, properties, and classification of cement, fly ash, aggregates and admixtures, and hydration of cement in concrete.
CO2:	Execute the test for fresh concrete.
CO3:	Execute the test for hardened concrete with destructive and non- destructive testing instruments.

CO4:	Implement India standard codes procedure for design concrete mix of desired grade.
CO5:	Learner can state the concrete handling equipment and different special concrete types.
<b>Subject Code :4CE4-21</b>	<b>Subject Name: Material Testing Lab</b>
CO1:	Determine the compressive and tensile strength of steel and HYSD bar.
CO2:	Determine the strength of cement and concrete cubes.
CO3:	Determine the hardness and impact of distinct materials.
CO4:	Explain basic material's properties like fatigue, torsion, modulus of rupture etc
CO5:	Explain the characteristics involved in finalizing the selection of material for a specific work
<b>Subject Code :4CE4-22</b>	<b>Subject Name: Hydraulics Engineering Lab</b>
CO1:	Students will be able to analyze the process of deriving equation by using dimensional methods.
CO2:	Students will analyze the problems related to flow of fluids in channel
CO3:	Students will be able to explain and remember the different types of turbines & pumps used.
CO4:	Students will be able to create economic sections for fluid channels
CO5:	Students will be able to remember the concepts of Hydrology.
<b>Subject Code :4CE4-23</b>	<b>Subject Name: Building Drawing</b>
CO1:	Learner can sketch, plan and do drawing of residential building with details of site plan, foundation plan, furniture plan, water supply and sanitary plan
CO2:	Learner can sketch, plan and do drawing of institutional building with details of site plan, foundation plan, furniture plan
CO3:	Learner can sketch and do the drawing of commercial building with details of site plan, foundation plan, furniture plan
CO4:	Draw the details of parts of buildings.
CO5:	Draw the details of parts of buildings.
<b>Subject Code :4CE4-24</b>	<b>Subject Name: Advanced Surveying Lab</b>
CO1:	Test the relative altitudes and distance of different points onground
CO2:	Perform the tests for setting of horizontal curves in field
CO3:	Test the Survey work using Total-station
CO4:	Prepare the map of area by Plane Table



CO5:	Measurement of area of horizontal and vertical angle by TotalStation
<b>Subject Code :4CE4-25</b>	<b>Subject Name: Concrete Lab</b>
CO1:	To determine the different properties of building materials like cement, concrete, aggregates through practical(s).
CO2:	To design concrete mix (M-20 and M-40) in lab
CO3:	Learner can state what a Non Destructive testing is.
CO4:	Test the properties of fresh concrete mix.
CO5:	Design concrete mix for various grades of concrete according to IS recommendations with and without admixture
<b>V Semester</b>	
<b>Subject Code :5CE3-01</b>	<b>Subject Name: Construction technology and equipment</b>
CO1:	Understand the construction practices and techniques.
CO2:	Learner executes the rules used in using construction equipment and its Management.
CO3:	Test the factors to be considered in planning and construction of buildings.
CO4:	Learn objectives and functions of material management.
CO5:	Understand about construction equipment and their management.
<b>Subject Code :5CE4-02</b>	<b>Subject Name: Structural Analysis-I</b>
CO1:	Understand the behaviour of the structures under different loading condition
CO2:	Derive the mathematical expression of structural vibration if the structures
CO3:	Analyse of indeterminate structure using area moment method, conjugate beam method and three moment's theorem.
CO4:	Analyse of statically indeterminate structures using slope deflection and moment distribution method.
CO5:	Determine an equation of analysis of statically determinate and indeterminate structures
<b>Subject Code :5CE4-03</b>	<b>Subject Name: Design of concrete Structures</b>
CO1:	Students will be able to identify the design mix and compute the characteristic strength of concrete.
CO2:	Students will be able to classify the basic philosophy of Working Stress and Limit State Design of RCC structures.

CO3:	Students will be able to design different structural components like beams, columns, slabs etc
CO4:	Students will be able to prepare detailed reinforcement diagram of each component using techniques involved in the course.
CO5:	Students will be able to compute shear, deflection and development length.
<b>Subject Code :SCE4-04</b>	<b>Subject Name: Geotechnical Engineering</b>
CO1:	Student will be able to Explain different types of soil present on Earth crust.
CO2:	Student will be able to Explain different types of soil properties And their use in engineering fields.
CO3:	Students will be able to Analyze engineering properties of soil Like compaction, permeability, and shear strength.
CO4:	Students will be able to Analyze engineering properties of soil Like compaction, permeability, shear strength
CO5:	Students will be able to Compute the lateral thrust due to backfill On the retaining walls
<b>Subject Code :SCE4-05</b>	<b>Subject Name: Water Resource Engineering</b>
CO1:	Students will be able to Understand the basics of Hydrograph, rainfall analysis and its distribution.
CO2:	Student will learn to analyse the rainfall patterns and can evaluate the same with probabilistic methods.
CO3:	Students be able to design the channels on the basis of Kennedy's theory and Lacey's theory.
CO4:	Students will be able to generate designs and layout of canal according to the use.
CO5:	Students be able to differentiate between types of canals and canal headworks.
<b>Subject Code :SCE5-12</b>	<b>Subject Name: Disaster Management</b>
CO1:	Understand how the disasters are being categorized, depending on the conditions under which disaster happened
CO2:	Differentiate what are disasters, how to approach the vulnerability and risk involved.

CO3:	Pre & post disaster measures and how to ensure safety.
CO4:	Local National & State policies, to counter disaster, as per act of 2005.
CO5:	Case Study of different disaster happened in past to understand the preservative measure.
<b>Subject Code :5CE5-14</b>	<b>Subject Name: Repair and Rehabilitation of Structures.</b>
CO1:	Student will be able to Plan and understand the repair strategies for buildings and Rehabilitation of structure
CO2:	Student will be able to analyze the serviceability and Durability of concrete
CO3:	Students will be able to Able to choose the materials and repair techniques or method.
CO4:	Students will be able to Able to Develop of “DEMOLITION TECHNIQUES “Engineered demolition techniques for Dilapidated structures – case study
CO5:	Students will be able to apply method of repairs, rehabilitation and retrofitting of Structures.
<b>Subject Code :5CE4-21</b>	<b>Subject Name: Concrete structure design</b>
CO1:	Students will be able to identify the design mix and compute the Characteristic strength of concrete.
CO2:	Students will be able to classify the basic philosophy of WorkingStress and Limit State Design of RCC structures.
CO3:	Students will be able to design different structural components like beams, columns, slabs etc.
CO4:	Students will be able to prepare detailed reinforcement diagram of Each component using techniques involved in the course
CO5:	Students will be able to compute shear, deflection and Development length.
<b>Subject Code :5CE4-22</b>	<b>Subject Name: Geotechnical Engineering Lab</b>
CO1:	Ability to identify the index properties of soils

CO2:	Students are able determine the field density by sand replacement method
CO3:	Capable to find all consistency limits for soil.
CO4:	Able to impart knowledge on the various factors governing Engineering behavior of soils and the suitability of soils Geotechnical Engineering applications
CO5:	Able to characterize stress-strain behaviour of soils, criteria and to evaluate the shear strength and compressibility Parameters of soils.
<b>Subject Code :5CE4-23</b>	<b>Subject Name: Water Resource Engineering</b>
CO1:	Various components of the hydrologic cycle that affect the movement of water in the earth
CO2:	Various Stream flow measurements technique. the concepts of movement of groundwater beneath the earth
CO3:	The basic requirements of irrigation and various irrigation techniques, requirements
<b>VI Semester</b>	
<b>Subject Code :6CE3-01</b>	<b>Subject Name: Wind and seismic analysis</b>
CO1:	Understand the types of structures, symmetry and asymmetry in building forms, shear walls and multi-storey configurations.
CO2:	Analyze design loads for different types of buildings.
CO3:	Calculate wind load on flat roof, pitched roof and single sloped Roof buildings
CO4:	Calculate earthquake loads on framed structures and design of Earthquake Resistant Construction
CO5:	Apply wind & seismic load for analyzing the structure to evaluate the response of lateral load.
<b>Subject Code :6EC4-02</b>	<b>Subject Name: Structure analysis -II</b>
CO1:	The student will be able to state the advanced methods of analysis of structures like flexibility and stiffness method, kanis method, Moment distribution method, Slope and deflection method.

CO2:	Learner will be able to test and analysis of beams by using an advanced method of analysis.
CO3:	Students will be able to define the procedure for doing analysis of portal frame.
CO4:	Learner can explain the procedure to calculate stresses, shear center and deflection of unsymmetrical section..
CO5:	Learner can explain the procedure for analysis of multistory frames by portal, cantilever and factor methods

<b>Subject Code :6CE4-03</b>	<b>Subject Name: Environmental Engineering</b>
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CO1:	Understand demand for water supply to households, industry and public services.
CO2:	Understand source of water and their quality parameter
CO3:	Analyse the process of preliminary treatment of water and their transmission
CO4:	Analyse the process of advanced treatment of water.
CO5:	Understand the basic knowledge of water distribution and plumbing system in building.

<b>Subject Code :6CE4-04</b>	<b>Subject Name: Design of steel structures</b>
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CO1:	Learner will be able to solve the designing of tension and compression members.
CO2:	Learner will be able to solve the designing of beams and beam columns.
CO3:	Learner will be able to solve the designing of bolt and weld connections.
CO4:	Learner will be able to solve the designing of the gantry girder.
CO5:	Classify and design the structural steel components of industrial building.

<b>Subject Code :6CE4-05</b>	<b>Subject Name: Estimating and costing</b>
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CO1:	Students will evaluate the estimate of quantities for a Residential Building & Abstract cost Estimate.
CO2:	Students will be able analyze the rates of work quantities and labor.
CO3:	Students will be able to evaluate the calculation regarding earth work quantity for roads and canals, Analyze different types of contracts, tender document for building & valuation

CO4:	Students will remember the concepts of Valuation.
CO5:	Student will create Bill of Quantities.
<b>Subject Code :6CE5-12</b>	<b>Subject Name: Solid and Hazardous waste management</b>
CO1:	To list the solid waste management and disposal techniques.
CO2:	To define the waste management rules to generators of solid waste And its generation rate.
CO3:	To state what biomedical waste management and hazardous solid Waste management are
CO4:	To understand the environment and health impacts of solid waste Mismanagement.
CO5:	Understand the engineering, financial and technical options for waste Management.

<b>Subject Code :6CE5-16</b>	<b>Subject Name:Geographic Information system and remote system</b>
CO1:	Student will be able to Understand the basic concept of Remote Sensing and know about different types of satellite and sensors.
CO2:	Student will be able to Apply the concepts of Photogrammetric and its applications such as determination of heights of objects on terrain.
CO3:	Students will be able to Express the principles of aerial and satellite remote sensing, Able to comprehend the energy interactions with earth surface features, spectral properties of water bodies.
CO4:	Students will be able Illustrate spatial and non-spatial data features in GIS and understand the map projections and coordinates systems
CO5:	Students will be able Develop knowledge on conversion of data from analogue to digital and working with GIS software

<b>Subject Code :6CE4-21</b>	<b>Subject Name: Environmental engineering design and Lab</b>
CO1:	Understand about the water quality parameters and their permissible limits as per the standards
CO2:	Analyze the physical tests to be conducted for the water before supply.



CO3:	Analyze chemical tests to be conducted for the water before supply.
CO4:	Analyze chemical tests to be conducted for the water before supply.
CO5:	Calculate physical chemical properties by lab experiments for sewage sample
<b>Subject Code :6CE4-22</b>	<b>Subject Name: Steel Structures design</b>
CO1:	Learner will be able to solve the designing of tension and compression members.
CO2:	Learner will be able to solve the designing of beams and beam columns.
CO3:	Learner will be able to solve the designing of bolt and weld connections.
CO4	Learner will be able to solve the designing of the gantry girder.
CO5	Classify and design the structural steel components of industrial building.
<b>Subject Code :6CE4-23</b>	<b>Subject Name: Quantity surveying and valuation</b>
CO1:	Students will evaluate the estimate of quantities for a Residential Building & Abstract cost Estimate.
CO2:	Students will be able analyze the rates of work quantities and labour.
CO3:	Students will be able to evaluate the calculation regarding earth work quantity for roads and canals, Analyse different types of contracts, tender document for building & valuation
CO4	Students will remember the concepts of Valuation
CO5	Student will create Bill of Quantities
<b>Subject Code :6CE4-24</b>	<b>Subject Name: Water and earth retaining structures design</b>
CO1:	Student will create Bill of Quantities
CO2:	Design the torsion, continuous and curve beam

CO3:	Design of circular domes and water tank
CO4:	Analyze Yield line theory and design retaining wall
CO5:	Design the culvert and bridge
<b>VII Semester</b>	
<b>Subject Code :7CE4-01</b>	<b>Subject Name:Transportation Engineering</b>
CO1:	To understand the principles of Highway geometrics design as per IRC standards. Perform geometric design for the Highway & Basic concept of Pavement design.
CO2:	To understand Types of pavements & Materials required for highway construction. Construction procedures for different types of pavements. Maintenance procedures for different types of pavements.
CO3:	To understand the Traffic engineering & different types of traffic control device.
CO4	Analysing the strength required for pavement and designing flexible and rigid pavement by different methods.
CO5	Describe and understand the various components of railway track.
<b>Subject Code :7CE6-60.2</b>	<b>Subject Name: Environmental Engineering and Disaster Management</b>
CO1:	Analyse characteristics of water and wastewater.
CO2:	Estimate the quantity of drinking water and domestic wastewater generated.
CO3:	Design components of water supply systems.
CO4:	Accumulate the information about water supply fittings.
CO5:	Calculate physical chemical properties by lab experiments for sewage sample.
<b>Subject Code</b>	<b>Subject Name: Road Material Testing Lab</b>

<b>:7CE4-21</b>	
CO1:	Understand the importance and determination of physical properties of aggregates.
CO2:	Understand the importance and determination of physical properties of bitumen.
CO3:	Evaluate and analyze the suitability of materials from data collected by physical tests done on aggregates and bitumen.
CO4	Design of different bituminous layers of flexible pavement and compare their results with IRC/MoRTH recommendations.
CO5	Design of different bituminous layers of flexible pavement and compare their results with IRC/MoRTH recommendations.
<b>Subject Code :7CE4-22</b>	<b>Subject Name: Professional Practices &amp; field Engineering lab</b>
CO1	Understand the Different types of Knots Site plan, index plan, layout plan, plinth area, floor area of buildings
CO2	Understand the Foundation plan layout infield.
CO3	Analysis of Bar bending schedule
CO4	Understand the Specifications- For different classes of building and Civil Engineering works
CO5	Understand the Valuation of buildings and properties
<b>Subject Code :7CE4-23</b>	<b>Subject Name: Soft Skill Lab</b>
CO1:	To encourage the all-round development of students by focusing on soft skills
CO2:	To make the engineering students aware of the importance, the role and the content of soft skills through instruction, knowledge acquisition, demonstration and practice
CO3:	To test the practices about Time management
CO4	To develop and nurture the soft skills of the students through individual and group activities.
CO5	To expose students to right attitudinal and behavioral aspects and to build the same through activities
<b>Subject Code</b>	<b>Subject Name: Environmental Monitoring and design Lab</b>


<b>:7CE4-24</b>	
CO1:	Analyze characteristics of water and wastewater
CO2:	Estimate the quantity of drinking water and domestic wastewater generated.
CO3:	Design components of water supply systems.
CO4:	Accumulate the information about water supply fittings.
CO5:	Calculate physical chemical properties by lab experiments for sewage sample.

### VIII Semester

<b>Subject Code :8EC4-01</b>	<b>Subject Name:Project planning and construction management</b>
CO1	Students will be able to understand construction risk management, the roles and responsibilities of all constituencies involved in the design and construction process.
CO2	Students will be able to understand concept of network analysis CPM and PERT methods and network rules and regulations
CO3	Students will be able to design a network diagram to create the project schedules, Critical path, slack in between activities using CPM & PERT techniques.
CO4	Students will be able to Identify the project cost and time control using network techniques.
CO5	Students be able to Analyze about the contract management.

<b>Subject Code :8TT6-60.2</b>	<b>Subject Name:Disaster Management</b>
CO1	Student will be able to categorize the different types of disaster and their characteristics
CO2	Students will be able to make an Evaluation of hazard and vulnerability
CO3	Students will be able to outline the concept of capacity building and strengthening capacity to reduce disaster risk
CO4	Students will be able to write Disaster coping strategies, industrial safety plan, safety norms, mass media and disaster management in textile industry.
CO5	Students will be able to describe Planning in disaster management, formulating risk reduction plan and to understand act and polices in India

<b>Subject Code :8CE4-21</b>	<b>Subject Name:Project planning and construction management Lab</b>
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 Director

CO1	Students will be able to understand construction risk management, the roles and responsibilities of all constituencies involved in the design and construction process
CO2	Students will be able to understand concept of network analysis CPM and PERT methods and network rules and regulations
CO3	Students will be able to design a network diagram to create the project schedules, Critical path, slack in between activities using CPM & PERT techniques.
CO4	Students will be able to Identify the project cost and time control using network techniques.
CO5	Students be able to Analyze about the contract management.
<b>Subject Code :8CE4-22</b>	<b>Subject Name: Pavment Design</b>
CO1:	Identify the pavement components, functions and the differences between different types of pavement
CO2:	Relate the response characteristics of soil, aggregate, asphalt, and asphalt mixes
CO3:	Analyzing the flexible pavement using empirical and semi empirical methods
CO4:	Analyze the warping, friction, wheel load stress and calculate the combined stress
CO5:	Design rigid pavements by IRC method and evaluate the pavements

### **Mechanical Engineering**

3ME-201	Advanced Engineering mathematics Year of study: 2022-23
CO1	Apply a range of mathematical theorems and methods to solve routine and complex analytic and applied problem
CO2	Analyze data necessary for the solution of engineering problems
CO3	Examine the effectiveness of proposed solutions to identified engineering problem
CO4	Examine the Fourier Series Analysis.
CO5	Examine Z transform and Understand Basic Mathematical Calculation
3ME-102	Technical Communication Year of study: 2022-23
CO1	Students will be able to learn and understand how to follow the various stages of the writing process like prewriting, writing and rewriting and apply them to technical and workplace writing.
CO2	Students will understand the basic components of definitions, descriptions, process explanations, and other common technical writings
CO3	Students will be able to read, understand and interpret material on technology.
CO4	They will have appreciation for some of the ideas, issues and problems involved in writing about technology and in workplace writing.

CO5	Students will be able to get an in-depth knowledge of technical communication used in professional life by getting to know all the forms and aspects of technical communication. They will be able to express themselves better in technical writing by understanding the concept, style and methodology used in technical communication
3ME3-04	Engineering Mechanics Year of study: 2022-23
CO1	Students will be able to demonstrate knowledge of mathematics and mechanics with logics in resolution and composition of force systems
CO2	Students will be able to demonstrate the ability to relate kinematics with kinetic equations on linear displacement, velocity and acceleration
CO3	Students will be able to develop the confidence for self learning in application of equilibrium conditions for co-planar and nonco-planar force system
CO4	Students will be able to correlate power; work and energy to solve practical problems.
CO5	Students will be able to solve practical examples related to curvilinear motion
3ME4-05	Engineering Thermodynamics Year of study: 2022-23
CO1	Explain the basic principles and applications of the thermodynamics to the various real life systems.
CO2	Describe fundamental laws of thermodynamics.
CO3	Apply the concepts such as Entropy, Energy Balance also the calculations of heat, work and other important thermodynamic properties for various ideal gas processes.
CO4	Estimate performance of various thermodynamic gas power cycles and gas refrigeration cycle and availability in each case.
CO5	Estimate Pure Substance problem and Analysis of Substance
3ME4-06	Material Science Engineering Year of study: 2022-23
CO1	Student will be able to apply core concepts in Materials Science to solve engineering problems
CO2	Student will be able to interpret about material fundamental and material processing
CO3	Students will be able to distinguish the defects in crystal and its effect on crystal properties.
CO4	Students will be able to figure out the different mechanical properties of material by studying different destructive and non-destructive testing
CO6	Students will be able to understand articulate and utilize corrosion prevention strategies and estimate corrosion behavior of materials and components
3ME4-07	Mechanics of Solids Year of study: 2022-23
CO1	To understand the basics of material properties, stress and strain
CO2	To apply knowledge of mathematics, science, for engineering applications
CO3	Ability to identify, formulate, and solve engineering & real life problems
CO4	Ability to design and conduct experiments, as well as to analyze and interpret data
CO5	To Design Pressure Vessels and Find Stress Concentration Factor



3ME4-21	Mechine Drawing Practice Year of study: 2022-23
CO1	Learn the basic concepts and to draw the views of section of solids, orthographic projections and threaded fasteners.
CO2	Create assembly and get the detailed drawing of machine components.
CO3	Represent tolerances and the levels of surface finish of machine elements.
CO4	Develop the ability to apply Limits, Fits, and Dimensional Tolerances, as well as Geometric Tolerances to components and assemblies on Engineering Drawings.
CO5	Develop an ability to create 2D drawings from 3D models.
3ME4-22	Material Testing Lab Year of study: 2022-23
CO1	Learn the principles of materials science and engineering through lab investigation.
CO2	Learn the basic skills required to properly use materials science Instrument.
CO3	Analyze mechanical properties of materials.
CO4	Perform Rockwell hardness tester for measurement of hardness.
CO5	Analyze impact test, fatigue test and bending test.
3ME4-23	Basic Mechanical Engineering Lab Year of study: 2022-23
CO1	Do hands on assembling and disassembling of SI & CI Engine.
CO2	Do hands on assembling and disassembling of bicycle & sewing machine.
CO3	Understand working principles & classification of boilers and their accessories.
CO4	Understand working principles & classification of pumps.
3ME4-24	MATLAB Year of study: 2022-23
CO1	Use MATLAB effectively to analyze and visualize data.
CO2	Apply numeric techniques and computer simulations to solve engineering-related problems.
CO3	Apply a top-down, modular, and systematic approach to design, write, test, and debug sequential MATLAB programs to achieve computational objectives.
CO4	Design and document computer programs and analyses in a careful and complete manner so as to effectively communicate results, to facilitate evaluation.
CO5	Create and control simple plot and user-interface graphics objects in MATLAB.
4ME2-01	Data Analytics Year of study: 2022-23
CO1	Describe Data Analytics and the skill sets need for a data analyst.
CO2	Explain statistical inference and probability distribution commonly used as foundation for statistical modelling
CO3	Explain statistical inference and probability distribution commonly used as foundation for statistical modelling
CO4	Identify common approaches and algorithms for basic features selection, decision trees and factor analysis.
CO5	Apply common approaches and algorithms used for Cluster analysis and Time series model
4ME1-03	Managerial Economics and Financial Accounting Year of study: 2022-23
CO1	Understanding the basic concepts of managerial economics.
CO2	Understanding the economic goals of the firms and optimal decision making.
CO3	Basic concepts of Demand, Supply and Equilibrium and their determinants. • Analyzing the effect of these factors on market dynamics.

CO4	Understanding and estimating production function. • Law of DMR and three stages of production. • Isoquant and Isocost and finding out optimal combinations of inputs.
CO5	Pricing and output decisions of monopolistic and oligopoly firm. • Effect of non-price factors on products and services of monopolistic and oligopoly firms
CO6	To understand the banking concepts
<b>4ME3-04</b>	<b>Digital Electronics Year of study: 2022-23</b>
CO1	Basic knowledge of the fundamental concepts and techniques used in digital electronics
CO2	Understand and examine the structure of various number systems and its application in digital design.
CO3	Understand, analyze and design various combinational and sequential circuits.
CO4	Identify basic requirements for a design application and propose a cost effective solution.
CO5	Identify and prevent various hazards and timing problems in a digital design
<b>4ME4-05</b>	<b>Fluid Mechanics &amp; Machines Year of study: 2022-23</b>
CO1	Students will summarize the fundamental concepts of fluid mechanics including continuum, velocity field, surface tension, flow visualization etc
CO2	Students can create the basic equation of fluid statics to determine forces on planer and curved surfaces that are submerged in a static fluid.
CO3	Students will be able to formulate the forces and moments on surfaces of various shapes and simple machines
CO4	Students will able to combine Euler's and Bernoulli's equations and the conservation of mass to determine velocities, pressures, and accelerations for incompressible and in viscid fluids
CO5	Students will be able to arrange pipe fittings arrangement as per the requirements.
<b>4ME4-06</b>	<b>Manufacturing Processes Year of study: 2022-23</b>
CO1	Students will be able to understand materials, types and allowances of patterns used in casting and analyze the components of moulds
CO2	Student will be able to design core, core print and gating system in metal casting processes
CO3	Students will be able to understand arc, gas, solid state and resistance welding processes.
CO4	Students will be able to develop process-maps for metal forming processes using plasticity principles
CO5	Students will be able to Identify the effect of process variables to manufacture defect free products.
<b>4ME4-07</b>	<b>Theory of Machines Year of study: 2022-23</b>
CO1	Understand the principles of kinematic pairs, chains and their classification, DOF, inversions, equivalent chains and planar mechanisms
CO2	Analyze the planar mechanisms for position, velocity and acceleration.
CO3	Synthesize planar four bars and slider crank mechanisms for specified kinematic conditions.
CO4	Evaluate gear tooth geometry and select appropriate gears for the required applications.
CO5	Design cams and followers for specified motion profiles.
<b>4ME3-21</b>	<b>Digital Electronics Lab Year of study: 2022-23</b>
CO1	Distinguish between analog and digital systems.
CO2	Identify the various digital ICs and understand their operation.

CO3	Apply Boolean laws and K-map to simplify the digital circuits.
CO4	Understand the function of elementary digital circuits under real and simulated environment.
<b>4ME4-22</b>	<b>Fluid Mechanics Lab Year of study: 2022-23</b>
CO1	Conduct experiments for a given purpose
CO2	Analyze experimental data and develop empirical equations
CO3	Verify the basic principles and equations of fluid mechanics
CO4	Work individually and as a team
CO5	Communicate in written reports and oral presentation.
<b>4ME4-23</b>	<b>Production practice-I Year of study: 2022-23</b>
CO1	Learn about material removal in various modern manufacturing processes.
CO2	Gaining knowledge of Foundry and Welding, etc.
CO3	Analyze the processes and evaluate the role of each process parameter during machining of various advanced materials.
CO4	Solve the various problems for the given profiles to be imparted on the work specimens.
<b>4ME4-24</b>	<b>Theory of Machine Lab Year of study: 2022-23</b>
CO1	Get the practical knowledge about various mechanisms.
CO2	Learn about applications of various mechanisms.
CO3	Go through and observe the various experiments/working of different mechanism like cam-follower mechanism, four bar chain, steering mechanism etc.
<b>5ME3-01</b>	<b>Mechatronics Year of study: 2022-23</b>
CO1	Understand key elements of Mechatronics system, representation into block diagram
CO2	Understand & describe principles of sensors, its characteristics, interfacing with DAQ microcontroller
CO3	Understand the concept of PLC system and code the ladder programming, and significance of PLC systems in industrial application
CO4	Understand control actions such as Proportional, derivative and integral and study its significance in industrial applications
CO5	Understand about PLC
<b>5ME4-02</b>	<b>Heat Transfer Year of study: 2022-23</b>
CO1	Understand the basic modes of heat transfer & Determine Thermal Conductivity
CO2	Compute temperature distribution in steady-state and unsteady-state heat conduction & Determine Stefan Boltzmann Constant
CO3	Understand and analyse heat transfer through extended surfaces. & Estimate heat transfer coefficient & Measure heat transfer coefficient in free convection
CO4	Interpret and analyze forced and free convection heat transfer & To Study and Compare LMTD and Effectiveness
CO5	Understand the principles of radiation heat transfer and basics of mass transfer
<b>5ME4-03</b>	<b>Manufacturing Technology Year of study: 2022-23</b>

CO1	Analyze and select the appropriate manufacturing process for a given application. This outcome would involve the ability to evaluate a specific manufacturing need and determine which process or combination of processes would be most appropriate for achieving the desired outcome.
CO2	Demonstrate proficiency in using CNC machines and programming techniques. This outcome would involve demonstrating practical skills related to programming and operating CNC machines, including understanding of G-code, tool selection, and workpiece setup
CO3	Apply principles of additive manufacturing to design and produce a part. This outcome would involve the ability to conceptualize and produce a part using additive manufacturing techniques, such as 3D printing, while adhering to principles such as tolerancing, material selection, and production time/cost optimization
CO4	Evaluate the quality of a finished product and identify potential process improvements. This outcome would involve the ability to identify and evaluate key factors in the quality of a finished product, such as surface finish, dimensional accuracy, or material properties, and then suggest potential modifications to the manufacturing process to improve quality
CO5	Communicate effectively about manufacturing technologies and processes. This outcome would involve the ability to effectively communicate about manufacturing processes and their benefits/limitations to both technical and non-technical audiences. This could involve written reports, oral presentations, or other forms of communication
<b>5ME4-04</b>	<b>Design of Machine Element-I Year of study: 2022-23</b>
CO1	Explain the fundamental scientific principles of mechanical design (stress, strain, material properties, failure theories, fatigue phenomena, fracture mechanics) and their importance and use in design analysis
CO2	Develop practical experience with the function, design and analysis of actual machine components including prediction of their life and failures
CO3	Reorganize systematic approaches to mechanical design and analysis procedures
CO4	Summarize component behavior subjected to loads and identify the failure criteria.
CO5	Design a machine component using theories of failure.
<b>5ME4-05</b>	<b>Principles of Management Year of study: 2022-23</b>
CO1	Explain the role of a manager and how it relates to the organization's mission.
CO2	To combine management, its four basic functions and skills.
CO3	Summarize critical management theories and philosophies and how to apply them.
CO4	Comply the concept of social responsiveness and its benefits.
CO5	Comply the part communication plays in the management function.
<b>5ME5-12</b>	<b>Automobile Engineering Year of study: 2022-23</b>
CO1	Student will be able to understand the basic lay-out of an automobile
CO2	Student will be able to understand the operation of engine cooling, lubrication, ignition, electrical and air conditioning systems
CO3	Students will be able to understand the principles of transmission, suspension, steering and braking systems.
CO4	Students will be able to understand automotive electronics.
CO5	Students will be able to understand latest developments in automobiles
<b>5ME3-21</b>	<b>Mechatronics Lab Year of study: 2022-23</b>

CO1	Identification of key elements of mechatronics system and its representation in terms of block diagram
CO2	Understanding the concept of signal processing and use of interfacing systems such as ADC, DAC, digital I/O
CO3	Interfacing of Sensors, Actuators using appropriate DAQ micro-controller
CO4	Time and Frequency domain analysis of system model (for control application)
CO5	PID control implementation on real time systems
CO6	Development of PLC ladder programming and implementation of real life system.
<b>5ME4-22</b>	<b>Heat Transfer Lab Year of study: 2022-23</b>
CO1	Determine Thermal Conductivity.
CO2	Determine Stefan Boltzmann Constant.
CO3	Estimate heat transfer coefficient.
CO4	Measure heat transfer coefficient in free convection
CO5	To Study and Compare LMTD and Effectiveness
CO6	Analyze rates of heat transfer for different materials
<b>5ME4-23</b>	<b>Production Engineering Lab Year of study: 2022-23</b>
CO1	Perform Linear and Angular measurements.
CO2	Understand the concept of Slip gauges.
CO3	Perform tests to measures gear tooth profiles and screw threads.
CO4	To measure flatness and surface defects in the given test specimen
CO5	Force measurements during turning, drilling and milling operations.
<b>5ME4-24</b>	<b>Machine Design Practice-I Year of study: 2022-23</b>
CO1	Understand the problem and draw the design specifications.
CO2	Solve problems related to fits and tolerances
CO3	Understand component behavior subjected to loads and identify the failure criteria
CO4	Design beams, cotters and knuckle etc
<b>6ME3-01</b>	<b>Measurement &amp; Metrology Year of study: 2022-23</b>
CO1	Student will be able to explain the basics of measurement, limits, fits.
CO2	Student will be able to identify the uses of gauges and comparators.
CO3	Students will be able to understand the significance of measurement system, errors.
CO4	Students will be able to understand interpret measurement of field variables like force, torque
CO5	Students will be able to comprehend the fundamentals of thermocouple and strain.
<b>6ME4-02</b>	<b>Computer Integrated Manufacturing System Year of study: 2022-23</b>
CO1	The students will able to use computers in manufacturing and to combine the advanced knowledge in manufacturing tools, solutions to industrial applications
CO2	Students will be able to apply knowledge about Computer Aided Quality control and Process Planning Control.
CO3	Students will be able to apply knowledge about Computer Aided Quality control and Process Planning Control.
CO4	Generate habit of individual critical thinking in analysing a complex problem in the computer aided designing, manufacturing and optimization

CO5	Formulate CNC part programs using CADEM simulation package for simulation of machining operations such as Turning, Drilling & Milling.
<b>6ME4-03</b>	<b>Mechanical Vibration Year of study: 2022-23</b>
CO1	Explain the causes and effects of vibration in mechanical systems
CO2	Formulate schematic models for physical systems and formulate governing equations of motion.
CO3	Explain the role of damping, stiffness and inertia in mechanical systems
CO4	Summarise rotating and reciprocating systems and compute critical speeds.
CO5	Reorganize and design machine supporting structures, vibration isolators and absorbers.
<b>6ME4-04</b>	<b>Design of Machine Element-II Year of study: 2022-23</b>
CO1	Ability to design mechanical system for fluctuating loads.
CO2	Ability to decide optimum design parameters for mechanical systems
CO3	Ability to analyze the stress and strain of mechanical components and understand, identify and quantify failure modes for mechanical part.
CO4	Enhancement in proficiency of CAD software for designing Mechanical systems and to generate production drawing.
CO5	Making actual models of machine elements like bearings, gears connecting rod with all calculations
<b>6ME4-05</b>	<b>Quality Management Year of study: 2022-23</b>
CO1	Making actual models of machine elements like bearings, gears connecting rod with all calculations
CO2	Making actual models of machine elements like bearings, gears connecting rod with all calculations
CO3	Students will be able to Construct and interpret control charts for variables such as x-bar, r, s charts.
CO4	Students will be able to Construct the sampling plan and OC curve etc
<b>6ME5-12</b>	<b>Non-Conventional Machining Methods Year of study: 2022-23</b>
CO1	Understand the principles and applications of refrigeration systems.
CO2	Understand vapour compression refrigeration system and identify methods for performance improvement.
CO3	Study the working principles of air, vapour absorption, thermoelectric and steam-jet refrigeration systems.
CO4	Analyze air-conditioning processes using the principles of psychrometry.
CO5	Evaluate cooling and heating loads in an air-conditioning system.
<b>6ME4-21</b>	<b>Computer Integrated Manufacturing Lab Year of study: 2022-23</b>
CO1	Create the G-code program (with a standard computer post processor) of a work-piece on a standard numerically controlled machine tool with CNC controls.
CO2	Create basic and advanced CNC programs from imported CAD data using several CAM systems.
CO3	Use effectively CAD / CAM systems in order to produce the final NC code for the manufacturing of various mechanical parts and carry out exchange of data between CAD and CAM systems
CO4	Compare the operation and programming of CNC machine tool using manual programming



CO5	Compare the operation and programming of CNC machine tool using CAM systems.
6ME4-22	Vibration Engineering Lab Year of study: 2022-23
CO1	Design on experiment to measure the periodic time of free-vibrations of single degree and multi degree of freedom system
CO2	Analyze the mechanical vibrations to determine the material properties of mechanical elements used
CO3	Understand the fundamental of vibration measurement in the real world
6ME4-23	Machine Design Practice – II Year of study: 2022-23
CO1	Design mechanical components under fatigue loading.
CO2	Design helical compression, tension and torsional springs.
CO3	Design of bolts subjected to variable stresses.
CO4	Design of spur, bevel and helical gears.
6ME4-24	Thermal Engineering Lab-1 Year of study: 2022-23
CO1	Differentiate between SI & CI Engines.
CO2	Differentiate between 2-stroke & 4-stroke Engines
CO3	Understand theoretical and actual working cycles of SI & CI Engines.
CO4	Demonstrate steering system.
CO5	Demonstrate Ignition & Fuel Supply System.
7ME5-11	IC Engine Year of study: 2022-23
CO1	Explain working and performance of IC Engines through thermodynamic cycles.
CO2	Explain the combustion phenomena in SI and CI engines and factors influencing combustion chamber design.
CO3	To summarize formation mechanism of IC engines, its effects and the legislation standards.
CO4	Explain working principles of instrumentation used for engine performance and emission parameters.
CO5	Develop methods for improving the IC engine performance.
7AG6-60.2	Environmental Engineering and Disaster Management Year of study: 2022-23
CO1	Analyse characteristics of water and wastewater.
CO2	Estimate the quantity of drinking water and domestic wastewater generated.
CO3	Design components of water supply systems.
CO4	Accumulate the information about water supply fittings.
CO5	Calculate physical chemical properties by lab experiments for sewage sample.
7ME4-21	Finite Element Analysis Lab Year of study: 2022-23
CO1	Demonstrate the ability to create models for trusses, frames, plate structures, machine parts, and components using ANSYS general purpose software
CO2	Model multi-dimensional heat transfer problems using ANSYS
CO3	Demonstrate the ability to evaluate and interpret FEA analysis results for design and evaluation purposes
CO4	Develop a basic understanding of the limitations of the FE method and understand the

	possible error sources in its use.
<b>7ME4-22</b>	<b>Thermal Engineering Lab-II Year of study: 2022-23</b>
CO1	Conduct constant speed and variable speed tests on IC engines and interpret their performance.
CO2	Estimate energy distribution by conducting heat balance test on IC engines
CO3	Evaluate performance parameters of steam power plant.
CO4	Determine performance parameters of refrigeration and air-conditioning systems
CO5	Evaluate the performance of turbo machines.
<b>7ME4-23</b>	<b>Quality Control Lab Year of study: 2022-23</b>
CO1	Understand the role of statistical tools in quality improvement.
CO2	Understand the different types of variability, rational subgroups, and how a control chart is used to detect assignable causes.
CO3	Construct and interpret control charts for variables such as x-bar, r, s, and individuals charts.
CO4	Conduct the experiments related to probability distribution.
CO5	Solve the SQC problems using MINITAB software.
<b>8ME5-12</b>	<b>Supply &amp; Operations Management Year of study: 2022-23</b>
CO1	Summarize the fundamental operations concepts, key principles of its management, and relevant analysis approaches.
CO2	Develop the ability to understand a real-world unstructured problem, and gather necessary information and data to formulate into a structured problem
CO3	To develop quantitative and qualitative analysis framework and solution methods, and appropriately implement them to obtain meaningful solutions
CO4	Set up strengths and weaknesses of alternative solutions and obtain relevant managerial insights.
CO5	Setup Facilities Layout , Facility Location and Enhance Product Quality.
<b>8TT6-60.2</b>	<b>Disaster Management Year of study: 2022-23</b>
CO1	Student will be able to categorize the different types of disaster and their characteristics
CO2	Students will be able to make an Evaluation of hazard and vulnerability
CO3	Students will be able to outline the concept of capacity building and strengthening capacity to reduced risk
CO4	Students will be able to write Disaster coping strategies, industrial safety plan, safety norms, mass media and disaster management in textile industry.
CO5	Students will be able to describe Planning in disaster management, formulating risk reduction plan and to understand act and policies in India
<b>8ME4-21</b>	<b>Industrial Engineering Lab-II Year of study: 2022-23</b>
CO1	Apply industrial engineering concept in industrial environment.
CO2	Understand different concepts regarding Organization and Productivity in industries.
CO3	Manage and implement different concepts involved in work and method study and understanding of work contents in different situations.
CO4	Undertake small case study based project works regarding work measurement and time study.
<b>8ME4-22</b>	<b>Metrology Lab Year of study: 2022-23</b>

CO1	Develop quality standards of engineering products in industries
CO2	Demonstrate work in quality control departments of industries and to ensure quality of products.
CO3	Analyze the measurement of the surface roughness and perform alignment tests.
CO4	Develop the ability to apply the principles in instruments and measuring techniques.
CO5	Demonstrate work in designing the instrumentation for a particular purpose and special purpose devices