Dr. Vitthalrao Vikhe Patil
College of Engineering Ahmednagar

Dr. Vithalrao Vikhe Patil Foundation
Ahmednagar

DTE College Code: EN-5161

Estt.1983

Department of Information Technology

Course Outcomes

SE – 2019 Course		
Semester – III		
Course Code	**Course Name**	**Course Outcomes**
214441	**Discrete Mathematics**	CO1 Formulate and apply formal proof techniques and solve the problems with logical reasoning.
		CO2 Analyze and evaluate the combinatorial problems by using probability theory.
		CO3 Apply the concepts of graph theory to devise mathematical models.
		CO4 Analyze types of relations and functions to provide solution to computational problems.
		CO5 Identify techniques of number theory and its application.
		CO6 Identify fundamental algebraic structures.
214442	**Logic Design & Computer Organization**	CO1 Perform basic binary arithmetic & simplify logic expressions.
		CO2 Grasp the operations of logic ICs and Implement combinational logic functions using ICs.
		CO3 Comprehend the operations of basic memory cell types and Implement sequential logic functions using ICs.
		CO4 Elucidate the functions & organization of various blocks of CPU.
		CO5 Understand CPU instruction characteristics, enhancement features of CPU.
		CO6 Describe an assortment of memory types (with their characteristics) used in computer systems and basic principle of interfacing input, output devices.
214443	**Data Structure & Algorithms**	CO1 Perform basic analysis of algorithms with respect to time and space complexity.

		CO2	Select appropriate searching and/or sorting techniques in the application development.
		CO3	Implement abstract data type (ADT) and data structures for given application.
		CO4	Design algorithms based on techniques like brute - force, divide and conquer, greedy, etc.
		CO5	Apply implement learned algorithm design techniques and data structures to solve problems.
		CO6	Design different hashing functions and use files organizations.
214444	**Object-Oriented Programming**	CO1	Differentiate various programming paradigms.
		CO2	Identify classes, objects, methods, and handle object creation, initialization, and Destruction to model real-world problems
		CO3	Identify relationship among objects using inheritance and polymorphism principles.
		CO4	Handle different types of exceptions and perform generic programming.
		CO5	Use of files for persistent data storage for real world application.
		CO6	Apply appropriate design patterns to provide object-oriented solutions.
214445	**Basics of Computer Network**	CO1	Understand and explain the concepts of communication theory and compare functions of OSI and TCP/IP model
		CO2	Analyze data link layer services, error detection and correction, linear block codes, cyclic Codes, framing and flow control protocols.
		CO3	Compare different access techniques, channelization and IEEE standards.
		CO4	Apply the skills of subnetting, supernetting and routing mechanisms
		CO5	Differentiate IPv4 and IPv6.
		CO6	Illustrate services and protocols used at transport

			layer.
214446	**Logic Design &Computer Organization Lab**	CO1	Use logic function representation for simplification with K-Maps and design Combinational logic circuits using SSI & MSI chips.
		CO2	Design Sequential Logic circuits: MOD counters using synchronous counters.
		CO3	Understand the basics of simulator tool & to simulate basic blocks such as ALU & memory.
214447	**Data Structure & Algorithms Lab**	CO1	Analyze algorithms and to determine algorithm correctness and time efficiency class.
		CO2	Implement abstract data type (ADT) and data structures for given application
		CO3	Design algorithms based on techniques like brute - force, divide and conquer, greedy, etc.).
		CO4	Solve problems using algorithmic design techniques and data structures.
		CO5	Analyze of algorithms with respect to time and space complexity.
214448	**Object Oriented Programming Lab**	CO1	Differentiate various programming paradigms and apply basic concepts of OOP.
		CO2	Identify classes, objects, methods, and handle object creation, initialization, and destruction to model real-world problems.
		CO3	Identify relationship among objects using inheritance and polymorphism.
		CO4	Execute different types of exceptions and perform generic programming.
		CO5	Use file handling for real world application.
		CO6	Apply appropriate design patterns to provide object-oriented solutions.
214449	**Soft Skill Lab**	CO1	Introspect about individual's goals, aspirations by evaluating one's SWOC and think creatively.
		CO2	Develop effective communication skills including Listening, Reading, Writing and Speaking.

		CO3	Constructively participate in group discussion, meetings and prepare and deliver Presentations.
		CO4	Write precise briefs or reports and technical documents.
		CO5	Practice professional etiquette, present oneself confidently and successfully handle personal interviews.
		CO6	Function effectively in multi- disciplinary and heterogeneous teams through the knowledge of team work, Inter- personal relationships, conflict management and leadership quality
214450(C)	**Audit Course 3: Language Study Japanese -Module I**	CO1	Converse with simple sentences in Japanese
		CO2	Recognize and read simple sentences in Japanese.
		CO3	Write simple sentences in Japanese.
		CO4	Be aware about Japanese society and people.

SE – 2019 Course

Semester – III

Course Code	Course Code	Course Outcomes	
207003	**Engineering Mathematics III**	CO1	Solve Linear differential equations, essential in modelling and design of computer-based systems.
		CO2	Apply concept of Fourier transform and Z-transform and its applications to continuous and discrete systems and image processing.
		CO3	Apply Statistical methods like correlation& regression analysis and probability theory for data analysis and predictions in machine learning.
		CO4	Solve Algebraic &Transcendental equations and System of linear equations using numerical techniques.
		CO5	Obtain Interpolating polynomials, numerical differentiation and integration, numerical solutions

			of ordinary differential equations used in modern scientific computing.
214451	**Processor Architecture**	CO1	Apprehend architecture and memory organization of PIC 18 microcontroller.
		CO2	Implement embedded C
		CO3	A use concept of timersand interrupts of PIC 18.
		CO4	Demonstrate real life applications using PIC 18.
		CO5	Analyze architectural details of ARM processor.
		CO6	Learn and implement the embedded C in real application.
214452	**Database Management System**	CO1	Apply fundamental elements of database management systems.
		CO2	Design ER-models to represent simple database application scenarios.
		CO3	Formulate SQL queries on data for relational databases.
		CO4	Improve the database design by normalization & to incorporate query processing.
		CO5	Apply ACID properties for transaction management and concurrency control.
		CO6	Analyze various database architectures and technologies.
214453	**Computer Graphics**	CO1	Apply mathematical and logical aspects for developing elementary graphics operations like scan conversion of points, lines, circle, and apply it for problem solving.
		CO2	Employ techniques of geometrical transforms to produce, position and manipulate Objects in 2 dimensional and 3-dimensional space respectively
		CO3	Describe mapping from a world coordinates to device coordinates, clipping, and projections in order to produce 3D images on 2D output device.
		CO4	Apply concepts of rendering, shading, animation, curves and fractals using computer graphics tools in

			design, development and testing of 2D, 3D modeling applications.
		CO5	Perceive the concepts of virtual reality.
214454	**Software Engineering**	CO1	Classify various software application domains.
		CO2	Analyze software requirements by using various modeling techniques.
		CO3	Translate the requirement models into design models.
		CO4	Apply planning and estimation to any project.
		CO5	Use quality attributes and testing principles in software development life cycle
		CO6	Discuss recent trends in Software engineering by using CASE and agile tools
214454	**Programming Skill Development Lab**	CO1	Apply concepts related to embedded C programming.
		CO2	Develop and Execute embedded C program to perform array addition, block transfer, sorting operations
		CO3	Perform interfacing of real-world input and output devices to PIC18FXXX microcontroller.
		CO4	Use source prototype platform like Raspberry-Pi/Beagle board/Arduino.
214456	**Database Management System Lab**	CO1	Install and configure database systems.
		CO2	Analyze database models & entity relationship models.
		CO3	Design and implement a database schema for a given problem-domain
		CO4	Implement relational database systems.
		CO5	Populate and query a database using SQL DDL / DML / DCL commands.
		CO6	Design a backend database of any one organization: CASE STUDY
214457	**Computer Graphics**	CO1	Apply line& circle drawing algorithms to draw the

		Lab		objects.
			CO2	Apply polygon filling methods for the object.
			CO3	Apply polygon clipping algorithms for the object.
			CO4	Apply the 2D transformations on the object.
			CO5	Implement the curve generation algorithms.
			CO6	Demonstrate the animation of any object using animation principles.
214458	**Project Based Learning**		CO1	Design solution to real life problems and analyze its concerns through shared cognition.
			CO2	Apply learning by doing approach in PBL to promote lifelong learning.
			CO3	Tackle technical challenges for solving real world problems with team efforts.
			CO4	Collaborate and engage in multi- disciplinary learning environments.
214459(B)	**Audit course 4 : Language Study Japanese : Module - II**		CO1	Have Japanese Communicative competence for primitive Social conversation in Japanese
			CO2	Comprehend Grammar of Japanese Script
			CO3	Translate simple sentences from Japanese to English and vice a versa
			CO4	Be aware about Japanese society and people

Department of Information Technology

Course Outcomes

TE – 2019 Course		
Semester –V		
Course Code	**Course Name**	**Course Outcomes**
314441	**Theory of Computation**	CO1 Construct finite automata and its variants to solve computing problems.
		CO2 Write regular expressions for the regular languages and finite automata.
		CO3 Identify types of grammar, design and simplify Context Free Grammar.
		CO4 Construct Pushdown Automata machine for the Context Free Language.
		CO5 To express the understanding of the decidability and decidability problems.
		CO6 To express the understanding of computational complexity.
314442	**Operating Systems**	CO1 Explain the role of Modern Operating Systems.
		CO2 Apply the concepts of process and thread scheduling.
		CO3 Illustrate the concept of process synchronization, mutual exclusion and the deadlock.
		CO4 Implement the concepts of various memory management techniques
		CO5 Make use of concept of I/O management and File system
		CO6 Understand Importance of System software
314443	**Machine Learning**	CO1 Apply basic concepts of machine learning and different types of machine learning algorithms.
		CO2 Differentiate various regression techniques and evaluate their performance
		CO3 Compare different types of classification models and their relevant application
		CO4 Illustrate the tree-based and probabilistic machine learning algorithms.

		CO5	Identify different unsupervised learning algorithms for the related real-world problems
		CO6	Apply fundamental concepts of ANN.
314444	**Human Computer Interaction**	CO1	Explain importance of HCI study and principles of user-centered design (UCD) approach.
		CO2	Develop understanding of human factors in HCI design.
		CO3	Develop understanding of models, paradigms, and context of interactions.
		CO4	Design effective user-interfaces following a structured and organized UCD process.
		CO5	Evaluate usability of a user-interface design.
		CO6	Apply cognitive models for predicting human-computer-interactions.
314445	**Elective-I - Advanced Database and Management System**	CO1	Differentiate relational and object-oriented databases.
		CO2	Illustrate parallel & distributed database architectures.
		CO3	Apply concepts of NoSQL Databases.
		CO4	Explain concepts of data warehouse and OLAP technologies.
		CO5	Apply data mining algorithms and various software tools.
		CO6	Comprehend emerging and enhanced data models for advanced applications.
303146	**Operating Systems Lab**	CO1	Apply the basics of Linux commands.
		CO2	Build shell scripts for various applications.
		CO3	Implement basic building blocks like processes, threads under the Linux.
		CO4	Develop various system programs for the functioning of OS concepts in user space like concurrency control, CPU Scheduling, Memory Management and Disk Scheduling in Linux.
		CO5	Develop system programs for Inter Process Communication in Linux.
303147	**Human Computer Interaction- Lab**	CO1	Differentiate between good design and bad design.
		CO2	Analyze creative design in the surrounding.
		CO3	Assess design based on feedback and constraint.
		CO4	Design paper-based prototypes and use wire frame.
		CO5	Implement user-interface design using web technology.

		CO6	Evaluate user-interface design using HCI evaluation techniques.
303148	**Laboratory Practice-I (Machine Learning)**	CO1	Implement different supervised and unsupervised learning algorithms.
		CO2	Evaluate performance of machine learning algorithms for real-world applications.
303148(B)	**Laboratory Practice-I (ADBMS)**	CO1	Apply advanced Database Programming Languages.
		CO2	Apply the concepts of NoSQL Databases.
		CO3	Install and configure database systems.
		CO4	Populate and query a database using MongoDB commands.
		CO5	Design data warehouse schema of any one real-time: CASE STUDY
		CO6	Develop small application with NoSQL Database for back-end.
303149	**Seminar**	CO1	Understand, interpret and summarize technical literature
		CO2	Demonstrate the techniques used in the paper.
		CO3	Distinguish the various techniques required to accomplish the task.
		CO4	Identify intended future work based on the technical review
		CO5	Prepare and present the content through various presentation tools and techniques in effective manner.
		CO6	Keep audience engaged through improved interpersonal skills.

TE – 2019 Course

Semester –VI

Course Code	Course Name	Course Outcomes	
314451	**Computer Network and Security**	CO1	Explain Responsibilities, services offered and protocol used at application layer of network
		CO2	Apply concepts of wireless network and different wireless standards.
		CO3	Recognize the Adhoc Network's MAC layer, routing protocol and Sensor network architecture.
		CO4	Implement the principal concepts of network security and Understand network security threats, security services, and countermeasures
		CO5	Apply basic cryptographic techniques in application development.

		CO6	Gain a good comprehension of the landscape of cyber security Vulnerabilities & describe typical threats to modern digital systems.
314452	**Data Science and Big Data Analytics**	CO1	Understand Big Data primitives
		CO2	Learn and apply different mathematical models for Big Data.
		CO3	Demonstrate Big Data learning skills by developing industry or research applications.
		CO4	Analyze and apply each learning model comes from a different algorithmic approach and it will perform differently under different datasets.
		CO5	Understand, apply and analyze needs, challenges and techniques for big data visualization.
		CO6	Learn different programming platforms for big data analytics.
314453	**Web Application Development**	CO1	Develop Static and Dynamic website using technologies like HTML, CSS, Bootstrap.
		CO2	Demonstrate the use of web scripting languages.
		CO3	Develop web application with Front End & Back End Technologies.
		CO4	Develop mobile website using JQuery Mobile.
		CO5	Deploy web application on cloud using AWS.
314454D	**Elective-II - Software Modeling and Design**	CO1	Understand basics of object oriented methodologies and Unified Modeling Language (UML).
		CO2	Apply analysis process, use case modeling, domain/class modeling
		CO3	Design and apply interaction and behavior modeling on a given system.
		CO4	Comprehend OO design process and business, access and view layer class design.
		CO5	Recognize the software design principles and patterns to be applied on system.
		CO6	Illustrate architectural design principles and guidelines in the various type of application development.
314455	**Internship**	CO1	Develop professional competence through industry internship.
		CO2	Apply academic knowledge in a personal and professional environment
		CO3	Build the professional network and expose students to future

			employees.
		CO4	Apply professional and societal ethics in their day-to-day life.
		CO5	Become a responsible professional having social, economic and administrative considerations.
		CO6	Make own career goals and personal aspirations.
314456	**Computer Networks& Security-Lab**	CO1	Design and configure small size network and associated networking commands.
		CO2	Understand various client/server environments to use application layer protocols.
		CO3	basic cryptographic techniques in software and system design.
		CO4	Apply methods for authentication, access control, intrusion detection.
314457	**DS & BDA-Lab**	CO1	Apply Big data primitives and fundamentals for application development.
		CO2	Explore different Big data processing techniques with use cases.
		CO3	Apply the Analytical concept of Big data using Python.
		CO4	Visualize the Big Data using Tableau.
		CO5	Design algorithms and techniques for Big data analytics
		CO6	Design and develop Big data analytic application for emerging trends.
314458	**Laboratory Practice-II - (Web Application Development)**	CO1	Develop Static and Dynamic responsive website using technologies HTML, CSS, Bootstrapand AJAX.
		CO2	Create Version Control Environment.
		CO3	Develop an application using front end and backend technologies.
		CO4	Develop mobile website using JQuery Mobile.
		CO5	Deploy web application on cloud using AWS
314458	**Laboratory Practice-II (SMD)** -	CO1	Develop use case model with the help of UML notations.
		CO2	Develop and implement analysis model and design model.
		CO3	Develop and implement Interaction and behavior Model.

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Department of Information Technology

Course Outcomes

BE – 2019 Course		
Semester –VII		
Course Code	**Course Name**	**Course Outcomes**
414441	**Information and Storage Retrieval**	CO1 Understand the concept of Information retrieval and to apply clustering in information retrieval.
		CO2 Use an indexing approach for retrieval of text and multimedia data.
		CO3 Evaluate performance of information retrieval systems.
		CO4 Apply the concepts of multimedia and distributed information retrieval.
		CO5 appropriate tools in analyzing the web information
		CO6 Simulate the working of a search engine and recommender system.
414442	**Software Project Management**	CO1 Apply the practices and methods for successful Software Project Management
		CO2 Create Design and Evaluate Project
		CO3 Analyze Project Schedule and calculate Risk Management with help of tools.
		CO4 Demonstrate different tools used for Project Tracking, Monitoring & Control.
		CO5 Identify Staff Selection Process and the issues related to Staff Management.
		CO6 Discuss and use modern tools for Software Project Management.
414443	**Deep Learning**	CO1 Understand the theoretical foundations, algorithms, and methodologies of Deep Learning.
		CO2 Apply the concepts of Convolution Neural Networks and use of popular CNN architectures
		CO3 Compare Feed Forward Neural Network and Recurrent Neural Network and learn modeling the time dimension using RNN and LSTM.
		CO4 Elaborate unsupervised deep learning algorithms like

			Auto encoders.
		CO5	Explore Representation Learning and Transfer Learning techniques using variants of CNN architecture
		CO6	Evaluate the performance of deep learning algorithms and to provide solution for various real-world applications.
414444	**Elective III - Smart Computing**	CO1	Demonstrate the knowledge of design of smart computing and its applications.
		CO2	Describe different generations of mobile and mobile computing projects
		CO3	Demonstrate the knowledge of design of Ubicomp and its applications.
		CO4	Explain smart devices and services used Ubicomp.
		CO5	Implement interfacing of various sensors, actuators to the development boards
		CO6	Compare various IoT communication technologies and smart computing applications.
414445	**Elective IV - Wireless Communications**	CO1	Articulate the fundamental concept of cellular system.
		CO2	Analyse the fundamentals of cellular systems.
		CO3	Illustrate multiple access technique for effective utilization of spectrum.
		CO4	Design and analyse the WAP Programming Model in networking environment.
		CO5	Learn and understand security issues, challenges and tools in wireless communication.
		CO6	Explore the emerging trends and applications in wireless communication.
414446	**Lab Practice III**	CO1	Understand the concept of Information retrieval and to apply clustering in information retrieval.
		CO2	Use appropriate indexing approach for retrieval of text and multimedia data. Evaluate performance of information retrieval systems
		CO3	Apply appropriate tools in analyzing the web information.
		CO4	Map the concepts of the subject on recent developments in the Information retrieval field.
414447	**Lab Practice IV**	CO1	Learn and Use various Deep Learning tools and packages.

		CO2	Build and train a deep Neural Network models for use in various applications
		CO3	Apply Deep Learning techniques like CNN, RNN Auto encoders to solve real word Problems.
		CO4	Evaluate the performance of the model build using Deep Learning.
414448	**Project Phase-I**	CO1	To apply knowledge of mathematics, science, and engineering to formulate the Problem statement.
		CO2	To design and conduct experiments, as well as to analyze and interpret data.
		CO3	Understand the professional and ethical responsibility.
		CO4	To communicate effectively
		CO5	Get broad education which is necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
		CO6	Recognition of the need for, and an ability to engage in life-long learning.
		CO7	To use the techniques, skills, and modern engineering tools necessary for engineering practices.
		CO8	To design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

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Department of Electrical Engineering

Course Outcomes

SE – 2019 Course			
Course Code	**Course Name**	**Course Outcomes**	
SemIII			
203141	**Power Generation Technologies**	CO1	Identify operations of thermal power plant with all accessories and cycles.
		CO2	Be aware of the principle of operation, components, layout, location, environmental and
		CO3	Identify and demonstrate the components of hydro power plant and calculation of turbine
		CO4	Find the importance of wind based energy generation along with its design, analysis and
		CO5	Apply solar energy in thermal and electrical power generation considering energy crisis,
		CO6	Understand the operation of electrical energy generation using biomass, tidal, geothermal,
207006	**Engineering Mathematics -III**	CO1	Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits.
		CO2	Solve problems related to Laplace transform, Fourier transform, Z-Transform and applications to Signal processing and Control systems.
		CO3	Perform vector differentiation and integration, analyze the vector fields and apply to Electro-Magnetic fields.
		CO4	Analyze conformal mappings, transformations and perform contour integration of
		CO5	complex functions in the study of electrostatics and signal processing.
203142	**Material Science**	CO1	Categorize and classify different materials from Electrical Engineering applications
		CO2	point of view.
		CO3	Explain and summarize various properties and characteristics of different classes of materials.
		CO4	Choose materials for application in various electrical equipment.
		CO5	Explain and describe knowledge of nanotechnology, batteries and solar cell materials.
		CO6	Test different classes of materials as per IS.

203143	Analog And Digital Electronics	CO1	Design logical, sequential and combinational digital circuit using K-Map.
		CO2	Demonstrate different digital memories and programmable logic families.
		CO3	Apply and analyze applications of OPAMP in open and closed loop condition.
		CO4	Design uncontrolled rectifier with given specifications
203144	Electrical Measurements and Instrumentation	CO1	Understand various characteristics of measuring instruments, their classification and range extension technique.
		CO2	Classify resistance, apply measurement techniques for measurement of resistance, inductance.
		CO3	Explain construction, working principle and use of dynamometer type wattmeter for measurement of power under balance and unbalance condition.
		CO4	Explain Construction, working principle of 1-phase and 3-phase induction, static energy meter and calibration procedures.
		CO5	Use of CRO for measurement of various electrical parameters, importance of transducers, their classification, selection criterion and various applications.
		CO6	Classify transducer and apply it for measurement of physical parameters in real time.
203150	Applications of Mathematics in Electrical Engineering	CO1	Apply fundamentals of mathematics in solving electrical engineering problem
		CO2	Analyze complex electrical engineering problem using mathematical techniques.
		CO3	Implement program and simulation for problems in electrical engineering.
		CO4	Demonstrate self lifelong learning skills with applications of mathematics in electrical engineering through software.
203151	Soft Skills	CO1	DoSWOT analysis.
		CO2	Develop presentation and take part in group discussion.
		CO3	Understand andImplement etiquettes in workplace and in society at large.
		CO4	Work in team with team spirit.
		CO5	Utilize the techniques for time management and stress management.
203152	Audit Course-III	CO1	Differentiate between types of solar Concentrators
		CO2	Apply software tool for solar concentrators

	Solar Thermal System	CO3	Design different types of Solar collectors and balance of plant
SemIV			
203145	**Power System I**	CO1	Recognize different patterns of load curve, calculate different factors associated with it and tariff structure for LT and HT consumers.
		CO2	Aware of features, ratings, application of different electrical equipment in power
		CO3	station and selection of overhead line insulators.
		CO4	Analyze and apply the knowledge of electrical and mechanical design of transmission lines.
		CO5	Identify and analyze the performance of transmission lines.
203146	**Electrical Machines I**	CO1	Evaluate performance parameters of transformer with experimentation and demonstrate construction along with specifications as per standards.
		CO2	Distinguish between various types of transformer connections as per vector groups with application and to perform parallel operation of single/three phase transformers.
		CO3	Select and draft specifications of DC machines and Induction motors for various applications along with speed control methods.
		CO4	Justify the need of starters in electrical machines with merits and demerits.
		CO5	Test and evaluate performance of DC machines and Induction motors as per IS standard.
203147	**Network Analysis**	CO1	Calculate current/voltage in electrical circuits using simplification techniques, Mesh, Nodal analysis and network theorems.
		CO2	Analyze the response of RLC circuit with electrical supply in transient and stead state.
		CO3	Apply Laplace transform to analyze behaviour of an electrical circuit.
		CO4	Derive formula and solve numerical of two port network and Design of filters
		CO5	Applyknowledge of network theory to find transfer function, poles and zeroes location to perform stability analysis and parallel resonance
203148	**Numerical Methods and Computer Programmin**	CO1	Demonstrate types of errors in computation and their causes of occurrence.
		CO2	Calculate root of algebraic and transcendental equations using various methods.

		CO3	Identify various types of equations and apply appropriate numerical method to solve different equations.
	g	CO4	Solve linear simultaneous equation using direct and indirect method.
		CO5	Develop algorithms and write computer programs for various numerical methods.
203149	Fundamentals of Microcontroller and Applications	CO1	Describe the architecture and features of various types of the microcontroller.
		CO2	Illustrate addressing modes and execute programs in assembly language for the microcontroller.
		CO3	Demonstrate programming proficiency using the various addressing modes and all types of instructions of the target microcontroller.
		CO4	Program using the capabilities of the stack, the program counter the internal and external memory, timer and interrupts and show how these are used to execute a programme.
		CO5	Write assemble assembly language programs on PC and download and run their program on the training boards.
		CO6	Interface input output devices and measure electrical parameters with 8051 in real time.
203152	Project Based Learning	CO1	Identify, formulate, and analyze the simple project problem.
		CO2	Apply knowledge of mathematics, basic sciences, and electrical engineering fundamentals to develop solutions for the project.
		CO3	Learn to work in teams, and to plan and carry out different tasks that are required during a project.
		CO4	Understand their own and their team-mate's strengths and skills.
		CO5	Draw information from a variety of sources and be able to filter and summarize the relevant points.
		CO6	Communicate to different audiences in oral, visual, and written forms.
203153	Audit Course-IV	CO1	Will be able to do design of Solar PV system for small and large installations
		CO2	Will be able to handle software tools for Solar PV systems

PRINCIPAL
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TE – 2019 Course			
Course Code	**Course Name**	**Course Outcomes**	
Sem –V			
311121	**Industrial And Technology Management**	CO1	Differentiate between different types of business organization and discuss the fundamentals of economics and management.
		CO2	Explain the importance of technology management and quality management.
		CO3	Describe the characteristics of marketing and its types.
		CO4	Discuss the qualities of a good leader.
303141	**Advance Microcontroller and its Applications**	CO1	Explain architecture of PIC18F458 microcontroller, its instructions and the addressing modes.
		CO2	Develop and debug program in assembly language or C language for specific applications
		CO3	Use of an IDE for simulating the functionalities of PIC microcontroller and its use for software and hardware development
		CO4	Interface a microcontroller to various devices.
		CO5	Effectively utilize advance features of microcontroller peripherals.
303142	**Electrical Machines II**	CO1	Explain construction & working principle of three phase synchronous machines
		CO2	Estimate regulation of alternator by direct and indirect methods.
		CO3	Demonstrate operation of synchronous motor at constant load and variable excitation (v curves & ∧ curves) & constant excitation and variable load.
		CO4	Explain Speed control methods of three phase induction motor.
		CO5	Plot circle diagram of ac series motor
		CO6	Obtain equivalent circuit of single phase induction motor by performing no load & blocked rotor test.
303143	**Power Electronics**	CO1	Develop characteristics of different power electronic switching devices
		CO2	Reproduce working principle of power electronic converters for different types of loads
		CO3	Analyse the performance of power electronic converters
303144	**Electrical Installation, Maintenance**	CO1	Classify distribution systems, its types and substations
		CO2	Design of different earthing systems for residential and industrial premises

Course Code	Course Name		Course Outcomes
	and Testing	CO3	Select methods of condition monitoring and testing of various Electrical Equipments
		CO4	Estimate and Costing of residential and industrial premises
303145	Seminar and Technical Communication	CO1	Relate with the current technologies and innovations in Electrical engineering.
		CO2	Improve presentation and documentation skill.
		CO3	Apply theoretical knowledge to actual industrial applications and research activity.
		CO4	Communicate effectively.

TE – 2019Course			
Course Code	**Course Name**		**Course Outcomes**
SemVI			
303146	Power System II	CO1	Solve problems involving modelling, design and performance evaluation of HVDC and EHVAC power transmission lines.
		CO2	Evaluate power flow in power transmission networks and apply power flow results to solve simple planning problems.
		CO3	Calculate currents and voltages in a faulted power system under both symmetrical and asymmetrical faults, and relate fault currents to circuit breaker ratings.
303147	Control System-I	CO1	Model physical system,
		CO2	Determine time response of linear system
		CO3	Analyse stability of LTI system
		CO4	Design PID controller for LTI system
303148	Utilization of Electrical Energy	CO1	Ensure that the knowledge acquired can be applied in various fields such as electric heating, illumination, chemical processes, and electric traction.
		CO2	Make the students aware about the importance of maximizing the energy efficiency by optimum utilization of electrical energy.
		CO3	Calculate tractive effort, power, acceleration and velocity of traction.
		CO4	Provide know how about Refrigeration, Air Conditioning
		CO5	Understand collection of technical information and delivery of this technical information through presentations.

Course Code	Course Name		Course Outcomes
		CO6	Develop self and lifelong learning skills, introduce professionalism for successful career.
303149	**Design of Electrical Machines**	CO1	Calculate main dimensions and Design of single phase and three phase transformer.
		CO2	Calculate main dimensions of three phase Induction motor.
		CO3	Determine the parameters of transformer.
		CO4	Determine parameters of three phase Induction motor.
303150	**Energy Audit and Management**	CO1	To get knowledge of BEE Energy policies, Electricity Acts.
		CO2	Use various energy measurement and audit instruments.
		CO3	Carry out preliminary energy audit of various sectors
		CO4	Enlist energy conservation and demand side measures for electrical, thermal and utility Systems.
		CO5	Solve simple problems on cost benefit analysis.
303151	**Electrical Workshop**	CO1	Integrate electrical/electronic circuits for useful applications
		CO2	Acquire hardware skills to fabricate circuits designed.
		CO3	Read data manuals/data sheets of different items involved in the circuits.
		CO4	Test and debug circuits.
		CO5	Produce the results of the testing in the form of report.

BE – 2019 Course

Course Code	Course Name	Course Outcomes	
Semester –VII			
40314	**Power System Operation and Control**	CO1	Identify and analyze the dynamics of power system and suggest means to improve stability of system.
		CO2	Comprehend the effect of reactive power on Power system and suggest the suitable means of reactive power management.
		CO3	Selection of appropriate FACTs devices
		CO4	Analyze the generation-load balance in real time operation and its effect on frequency and develop automatic control strategies with mathematical relations.
		CO5	Formulate objective functions for optimization tasks such as unit commitment and economic load dispatch and get solution using computational techniques.

		CO 6	Evaluate reliability indices of Power system
403142	**PLC and SCADA Applications**	CO 1	Develop block diagram of PLC and explain the working.
		CO 2	Classify input and output interfacing devices with PLC.
		CO 3	Develop architecture of SCADA and explain the importance of SCADA in critical infrastructure.
		CO 4	Execute, debug and test the programs developed for digital and analog operations.
		CO 5	Describe various SCADA protocols along with their architecture.
		CO 6	Observe development of various industrial applications using PLC and SCADA.
403143	**Fundamentals of Microcontroller MSP430 and its Applications [Open Elective]**	CO 1	Explain architecture of MSP430 microcontroller, its instructions and the addressing modes.
		CO 2	Develop and debug program in C language for specific applications.
		CO 3	Use of Code Composer Studio IDE for simulating the functionalities of MSP430 microcontroller
		CO 4	Interface microcontroller MSP430 to various sensing devices.
		CO 5	Develop IoT based application using MSP430.
403144	**Electric and Hybrid Vehicles**	CO 1	Review history, Social and environmental importance of Hybrid and Electric vehicles.
		CO 2	Describe the performance and selection of energy storage systems and Analyze battery management system.
		CO 3	Distinguish between the performance and architecture of various drive trains.
		CO 4	Describe the different Instrumentation and Control used for electric vehicles.
		CO 5	Differentiate between Vehicle to Home, Vehicle to Vehicle and Vehicle to Grid energy systems concepts.
403145	**Control System II**	CO 1	Recognize the importance of digital control system.
		CO 2	Derive pulse transfer function.
		CO 3	Analyze digital controllers.
		CO	Convert system in state space format.

Course Code	Course Name		Course Outcomes
		4	
		CO5	Solve state equation.
		CO6	Design observer for system.
403152	**Hydro Energy Systems**	CO1	Explain and differentiate various types of hydro electric generators; pico, micro and small hydro
BE – 2019 Course			

BE – 2019 Course

Course Code	Course Name		Course Outcomes
Semester – VIII			
403147	**Switchgear and Protection**	CO1	Describe arc interruption methods in circuit breaker.
		CO2	Derive expression for restriking voltage and RRRV in circuit breaker
		CO3	Explain construction and working of different high voltage circuit breakers such as ABCB, SF6 CB, and VCB.
		CO4	Classify and Describe different type of relays such as over current relay, Reverse power relay, directional over current relay, Differential relay, Distance relay, Static relay and numerical relay
		CO5	Describe various protection schemes used for transformer, alternator and busbar
		CO6	Describe transmission line protection schemes.
403148	**Power Electronic Controlled Drives**	CO1	Explain motor load dynamics and multi quadrant operation of drives
		CO2	Analyze operation of converter fed and chopper fed DC drives.
		CO3	Describe braking methods of D.C. and induction motor drive.
		CO4	Explain vector control for induction motor drives
		CO5	Describe synchronous motor drive.
		CO6	Identify classes and duty cycles of motor and applications of drives in industries
403149	**High Voltage Engineering**	CO1	Identify, describe and analyze the breakdown theories of solid, liquid and gaseous materials
		CO2	Describe as well as use different methods of generation of high AC, DC, impulse voltage and current.
		CO3	Demonstrate and use different methods of measurement of high AC, DC, impulse voltage and current.

		CO4	Identify the occurrence of overvoltage and to provide remedial solutions
		CO5	Demonstrate an ability to carry out different tests on high voltage equipment and devices as well as ability to design the high voltage laboratory with all safety measures
403150	**Smart Grid**	CO1	Apply the knowledge to differentiate between Conventional and Smart Grid.
		CO2	Identify the need of Smart Grid, Smart metering, Smart storage, Hybrid Vehicles, Home Automation, Smart Communication, and GIS
		CO3	Comprehend the issues of micro grid
		CO4	Solve the Power Quality problems in smart grid
		CO5	Apply the communication technology in smart grid
403150	**Illumination Engineering**	CO1	Define and reproduce various terms in illumination.
		CO2	Identify various parameters for illumination system design.
		CO3	Design indoor and outdoor lighting systems.
		CO4	Enlist state of the art illumination systems.
403151	**Project II**	CO1	Work in team and ensure satisfactory completion of project in all respect.
		CO2	Handle different tools to complete the given task and to acquire specified knowledge in area of interest.
		CO3	Provide solution to the current issues faced by the society.
		CO4	Practice moral and ethical value while completing the given task.
		CO5	Communicate effectively findings in verbal and written forms.

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SE – 2019 Course		
Course Code	**Course Name**	**Course Outcomes**
Semester – III		
207005	**Engineering Mathematics III**	CO1 Solve higher order linear differential equation using appropriate techniques for modelling, analyzing of electrical circuits and control systems
		CO2 Apply concept of Fourier transform & Z-transform and its applications to continuous & discrete systems, signal & image processing and communication systems
		CO3 Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-step iterative methods used in modern scientific computing
		CO4 Perform vector differentiation & integration, analyze the vector fields and apply to electro- magnetic fields & wave theory.
		CO5 Analyze Complex functions, Conformal mappings, Contour integration applicable to electrostatics, digital filters, signal and image processing.
204181	**Electronic Circuits**	CO1 Assimilate the physics, characteristics and parameters of MOSFET towards its application as amplifier.
		CO2 Design MOSFET amplifiers, with and without feedback, & MOSFET oscillators, for given specifications.
		CO3 Analyze and assess the performance of linear and switching regulators, with their variants, towards applications in regulated power supplies.
		CO4 Explain internal schematic of Op-Amp and define its performance parameters
		CO5 Explain internal schematic of Op-Amp and define its performance parameters.
		CO6 Understand and compare the principles of various data conversion techniques and PLL with their applications.
204182	**Digital Circuits**	CO1 Identify and prevent various hazards and timing problems in a digital design.
		CO2 Use the basic logic gates and various reduction techniques

			of digital logic circuit.
		CO3	Analyze, design and implement combinational logic circuits.
		CO4	Analyze, design and implement sequential circuits.
		CO5	Differentiate between Mealy and Moore machines.
		CO6	Analyze digital system design using PLD.
204183	**Electrical Circuits**	CO1	Analyze the simple DC and AC circuit with circuit simplification techniques.
		CO2	Formulate and analyze driven and source free RL and RC circuits.
		CO3	Formulate & determine network parameters for given network and analyze the given network using Laplace Transform to find the network transfer function.
		CO4	Explain construction, working and applications of DC Machines / Single Phase & Three Phase AC Motors.
		CO5	Explain construction, working and applications of special purpose motors & understand motors used in electrical vehicles.
		CO6	Analyze and select a suitable motor for different applications.
204184	**Data structures**	CO1	Solve mathematical problems using C programming language.
		CO2	Implement sorting and searching algorithms and calculate their complexity.
		CO3	Develop applications of stack and queue using array.
		CO4	Demonstrate applicability of Linked List.
		CO5	Demonstrate applicability of nonlinear data structures - Binary Tree with respect to its time complexity.
		CO6	Apply the knowledge of graph for solving the problems of spanning tree and shortest path algorithm.
			SE – 2019 Course
Course Code	**Course Name**		**Course Outcomes**
Semester – IV			
204191	**Signals & Systems**	CO1	Identify, classify basic signals and perform operations on

			signals.
		CO2	Identify, Classify the systems based on their properties in terms of input output relation and in terms of impulse response and will be able to determine the convolution between to signals.
		CO3	Analyze and resolve the signals in frequency domain using Fourier series and Fourier Transform.
		CO4	Resolve the signals in complex frequency domain using Laplace Transform, and will be able to apply and analyze the LTI systems using Laplace Transforms.
		CO5	Define and Describe the probability, random variables and random signals. Compute the probability of a given event, model, compute the CDF and PDF.
		CO6	Compute the mean, mean square, variance and standard deviation for given random variables using PDF.
204192	**Control Systems**	CO1	Determine and use models of physical systems in forms suitable for use in the analysis and design of control systems.
		CO2	Determine the (absolute) stability of a closed-loop control system
		CO3	Perform time domain analysis of control systems required for stability analysis
		CO4	Perform frequency domain analysis of control systems required for stability analysis
		CO5	Apply root-locus, Frequency Plots technique to analyze control systems
		CO6	Express and solve system equations in state variable form.
		CO7	Differentiate between various digital controllers and understand the role of the controllers in Industrial automation
204193	**Principles of Communication Systems**	CO1	To compute & compare the bandwidth and transmission power requirements by analyzing time and frequency domain spectra of signal required for modulation schemes under study.
		CO2	Describe and analyze the techniques of generation, transmission and reception of Amplitude Modulation Systems.
		CO3	Explain generation and detection of FM systems and

			compare with AM systems.
		CO4	Exhibit the importance of Sampling Theorem and correlate with Pulse Modulation technique (PAM, PWM, and PPM).
		CO5	Characterize the quantization process and elaborate digital representation techniques (PCM, DPCM, DM and ADM).
		CO6	Illustrate waveform coding, multiplexing and synchronization techniques and articulate their importance in baseband digital transmission.
204194	**Object Oriented Programming**	CO1	Describe the principles of object oriented programming.
		CO2	Apply the concepts of data encapsulation, inheritance in C++.
		CO3	Understand Operator overloading and friend functions in C++.
		CO4	Apply the concepts of classes, methods inheritance and polymorphism to write programs C++.
		CO5	Apply Templates, Namespaces and Exception Handling concepts to write programs in C++.
		CO6	Describe and use of File handling in C++.
204199	**Employability Skill Development**	CO1	Define personal and career goals using introspective skills and SWOC assessment. Outline and evaluate short-term and long-term goals.
		CO2	Develop effective communication skills (listening, reading, writing, and speaking), self- management attributes, problem solving abilities and team working & building capabilities in order to fetch employment opportunities and further succeed in the workplace
		CO3	Be a part of a multi-cultural professional environment and work effectively by enhancing inter-personal relationships, conflict management and leadership skills
		CO4	Comprehend the importance of professional ethics, etiquettes & morals and demonstrate sensitivity towards it throughout certified career
		CO5	Develop practically deployable skill set involving critical thinking, effective presentations and leadership qualities to hone the opportunities of employability and excel in the professional environment.
204200	**Project Based Learning η**	CO1	Identify the real-world problem (possibly of interdisciplinary nature) through a rigorous literature survey and formulate / set relevant aim and objectives.
		CO2	Contribute to society through proposed solution by strictly following professional ethics and safety measures.

		CO3	Propose a suitable solution based on the fundamentals of electronics and communication engineering by possibly the integration of previously acquired knowledge.
		CO4	Analyze the results and arrive at valid conclusion.
		CO5	Use of technology in proposed work and demonstrate learning in oral and written form.
		CO6	Develop ability to work as an individual and as a team member.

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TE – 2019 Course		
Course Code	**Course Name**	**Course Outcomes**
Semester –V		
304181	Digital Communication	CO1 Apply the statistical theory for describing various signals in a communication system.
		CO2 Understand and explain various digital modulation techniques used in digital communication systems and analyze their performance in presence of AWGN noise.
		CO3 Describe and analyze the digital communication system with spread spectrum modulation.
		CO4 Analyze a communication system using information theoretic approach.
		CO5 Use error control coding techniques to improve performance of a digital communication system.
304182	Electromagnetic Field Theory	CO1 Apply the basic electromagnetic principles and determine the fields (E & H) due to the given source.
		CO2 Apply boundary conditions to the boundaries between various media to interpret behavior of the fields on either sides.
		CO3 State, Identify and Apply Maxwell's equations (integral and differential forms) in both the forms (Static, time-varying or Time-harmonic field) for various sources, Calculate the time average power density using Poynting Theorem, Retarded magnetic vector potential
		CO4 Formulate, Interpret and solve simple uniform plane wave (Helmholtz Equations) equations, and analyze the incident/reflected/transmitted waves at normal incidence.
		CO5 Interpret and Apply the transmission line equation to transmission line problems with load impedance to determine input and output voltage/current at any point on the Transmission line, Find input/load impedance, input/load admittance, reflection coefficient, SWR, Vmax/Vmin, length of transmission line using Smith Chart
		CO6 Carry out a detailed study, interpret the relevance and applications of Electromagnetics.

304183	Database Management	CO1	Ability to implement the underlying concepts of a database system.
		CO2	Design and implement a database schema for a given problem-domain using data model
		CO3	Formulate, using SQL/DML/DDL commands, solutions to a wide range of query and update problems.
		CO4	Implement transactions, concurrency control, and be able to do Database recovery.
		CO5	Able to understand various Parallel Database Architectures and its applications.
		CO6	Able to understand various Distributed Databases and its applications.
304184	Microcontrollers	CO1	Understand the fundamentals of microcontroller and programming.
		CO2	Interface various electronic components with microcontrollers.
		CO3	Analyze the features of PIC 18F XXXX.
		CO4	Describe the programming details in peripheral support.
		CO5	Develop interfacing models according to applications
		CO6	Evaluate the serial communication details and interfaces.
304185	Digital Signal Processing	CO1	Interpret and process discrete/ digital signals and represent DSP system
		CO2	Analyze the digital systems using the Z-transform techniques.
		CO3	Implement efficient transform and its application to analyze DT signals.
		CO4	Design and implement IIR filters.
		CO5	Design and implement FIR filters.
		CO6	Apply DSP techniques for speech/ biomedical/ image signal processing.
304190	Skill Development	CO1	Student should recognize the need to engage in independent and life-long learning in required skill sets
		CO2	Student needs to experience the impact of industries on society by visiting different industries and understand the importance of industrial products for analog and digital circuits and systems.

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Dr. Vitthalrao Vikhe Patil Foundation's

Dr. Vithalrao Vikhe Patil
College of Engineering Ahmednagar

DTE College Code: EN-5161

Dr. Vithalrao Vikhe Patil
Foundation
Ahmednagar

Estt.1983

		CO3	Student has to make use of the modern electronic and IT Engineering Tools and Technologies for solving electronic engineering problems
		CO4	Student would be able to communicate effectively at different technical and administrative levels.
		CO5	Student will exhibit leadership skills both as an individual and as a member in a team in multidisciplinary environment.

TE – 2019Course

Course Code	Course Name	Course Outcomes	
Semester – VI			
304192	Cellular Networks	CO1	Understand fundamentals of wireless communications.
		CO2	Discuss and study OFDM and MIMO concepts.
		CO3	Elaborate fundamentals mobile communication.
		CO4	Describes aspects of wireless system planning.
		CO5	Understand of modern and futuristic wireless networks architecture.
		CO6	Summarize different issues in performance analysis
304193	Project Management	CO1	Apply the fundamental knowledge of project management for effectively handling the projects.
		CO2	Identify and select the appropriate project based on feasibility study and undertake its effective planning.
		CO3	Assimilate effectively within the organizational structure of project and handle project management related issues in an efficient manner.
		CO4	Apply the project scheduling techniques to create a Project Schedule Plan and accordingly utilize the resources to meet the project deadline.
		CO5	Identify and assess the project risks and manage finances in line with Project Financial Management Process.
		CO6	Develop new products assessing their commercial viability and develop skillsets for becoming successful entrepreneurs while being fully aware of the legal issues related to Product development and Entrepreneurship.
304194	Power Devices &	CO1	To differentiate based on the characteristic parameters

	Circuits		among SCR, GTO, MOSFET & IGBT and identify suitability of the power device for certain applications and understand the significance of device ratings.
		CO2	To design triggering / driver circuits for various power devices.
		CO3	To evaluate and analyze various performance parameters of the different converters and its topologies.
		CO4	To understand significance and design of various protections circuits for power devices.
		CO5	To evaluate the performance of uninterruptible power supplies, switch mode power supplies and battery.
		CO6	To understand case studies of power electronics in applications like electric vehicles, solar systems etc.
304195	Embedded Processors	CO1	Understand basics of Embedded C Programming and usage of Embedded C and study different software tools for programming microcontrollers.
		CO2	Get acquainted with various Embedded Processor architectures related to industrial application.
		CO3	Know about the programming of ARM 7 based microcontroller with on chip peripherals and external peripherals.
		CO4	Understand the architectures of ARM Cortex M4 Microcontrollers and its advantages over ARM 7 Microcontrollers.
		CO5	Implement the real world programming of ARM 7 based microcontroller with on chip peripherals and external peripherals.
		CO6	Recognize the interfacing of real world sensors and standard buses. Will also able to design different case studies.
304199	Internship	CO1	To develop professional competence through internship.
		CO2	To apply academic knowledge in a personal and professional environment
		CO3	To build the professional network and expose students to future employees.
		CO4	Apply professional and societal ethics in their day to day life.
		CO5	To become a responsible professional having social, economic and administrative considerations.

		CO6	To make own career goals and personal aspirations.
304200	Mini Project	CO1	Understand, plan and execute a Mini Project with team.
		CO2	Implement electronic hardware by learning PCB artwork design, soldering techniques, testing and troubleshooting etc.
		CO3	Prepare a technical report based on the Mini project.
		CO4	Deliver technical seminar based on the Mini Project work carried out.

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BE – 2019 Course			
Course Code	**Course Name**	**Course Outcomes**	
Semester –VII			
404181	**Radiation & Microwave Theory**	CO1	Apply the fundamentals of electromagnetic to derive free space propagation equation and distinguish various performance parameters of antenna.
		CO2	Identify various modes in the waveguide. Compare: coaxial line, rectangular waveguides & striplines and identify applications of the same.
		CO3	Explore construction and working of principles passive microwave devices/components.
		CO4	Explore construction and working of principles active microwave devices/component
		CO5	Analyze the structure, characteristics, operation, equivalent circuits and applications of various microwave solid state active devices
		CO6	Know the various microwave systems, device set ups of microwave measurement devices and Identify the effect of radiations on environmental sustainability
404182	**VLSI Design and Technology**	CO1	Develop effective HDL codes for digital design.
		CO2	Apply knowledge of real time issues in digital design
		CO3	Model digital circuit with HDL, simulate, synthesis and prototype in PLDs
		CO4	Design CMOS circuits for specified applications.
		CO5	Analyze various issues and constraints in design of an ASIC.
		CO6	Apply knowledge of testability in design and Build In Self Test (BIST) circuit
404183	**Cloud Computing**	CO1	Understand the basic concepts of Cloud Computing
		CO2	Describe the underlying principles of different Cloud Service Models.
		CO3	Classify the types of Virtualization.
		CO4	Examine the Cloud Architecture and understand the importance of Cloud Security

		CO5	: Develop applications on Cloud Platforms.
		CO6	Evaluate distributed computing and the Internet of Things.
404184	**Elective - 3 Embedded & RTOS**	CO1	Apply design metrics of Embedded systems to design real time applications to match recent trends in technology
		CO2	Apply Real time systems concepts
		CO3	Evaluate μCOS operating system and its services
		CO4	Apply Embedded Linux Development Environment and testing tools
		CO5	Analyze Linux operating system and device drivers
		CO6	Analyze the hardware – software co design issues for testing of real time Embedded system
404185 E	**Elective - 4 Electronic Product Development**	CO1	Understand and explain design flow of design of electronics product.
		CO2	Associate with various circuit design issues and testing.
		CO3	Inferring different software designing aspects and the Importance of product test & test specifications.
		CO4	Summarizing printed circuit boards and different parameters.
		CO5	Estimating assorted product design aspects.
		CO6	Exemplifying special design considerations and importance of documentation.
404188	**Project Phase – I**	CO1	Demonstrate a sound technical knowledge in field of E&TC in the form of project.
		CO2	Undertake real life problem identification, formulation and solution.
		CO3	Design engineering solutions to complex problems utilizing a systematic approach.
		CO4	Demonstrate the knowledge, effective communication skills and attitudes as professional engineer.

BE – 2019 Course			
Course Code	**Course Name**	**Course Outcomes**	
Semester – VIII			
404190	**Fiber Optic Communication**	CO1	Explain the working of components and measurement equipments in optical fiber networks.
		CO2	Calculate the important parameters associated with optical components used in fiber optic telecommunication systems.
		CO3	Compare and contrast the performance of major components in optical links.
		CO4	Evaluate the performance viability of optical links using the power and rise time budget analysis.
		CO5	Design digital optical link by proper selection of components and check its viability using simulation tools.
		CO6	Compile technical information related to state of art components, standards, simulation tools and current technological trends by accessing the online resources to update their domain knowledge.
404191	**Elective - 5 4. Embedded System Design**	CO1	Apply the design aspects of Embedded system
		CO2	Create and debug a firmware for the Embedded System using ARM Cortex M4.
		CO3	Develop a specific software code for the functionality of the Embedded System.
		CO4	Utilize an open source RTOS for embedded system design
		CO5	Design an advanced embedded system
		CO6	Explore Embedded Android system.
404193	**Innovation & Entrepreneurship**	CO1	Understand Innovation, Entrepreneurship and characteristics of an entrepreneur
		CO2	Develop a strong understanding of the Design Process and its application in variety of business settings.
		CO3	Generate sustainable ideas

		CO4	Explore various processes required to be an entrepreneur.
		CO5	Understand patents and its process of filing.
		CO6	Choose and use appropriate social media for marketing.
404194	**Digital Business Management**	CO1	Identify drivers of digital business
		CO2	Illustrate various approaches and techniques for E-business and management
		CO3	Prepare E-business plan
404188	**Project Phase-II**	CO1	Students will be able to Learn teamwork
		CO2	Students will be able to Be well aware about Implementation phase
		CO3	Students will be able to Get exposure of various types of testing methods and tools
		CO4	Students will be able to Understand the importance of documentation

Department of Mechanical

Engineering Course Outcome

(CO)

Second Year -2019 Course			
Course Code	**Course Name**	**Course Outcomes**	
Semester I			
202041	**Solid Mechanics**	C202041.1	DEFINE various types of stresses and strain developed on determinate and indeterminate members
		C202041.2	DRAW Shear force and bending moment diagram for various types of transverse loading and support
		C202041.3	COMPUTE the slope & deflection, bending stresses and shear stresses on a beam
		C202041.4	CALCULATE torsional shear stress in shaft and buckling on the column.
		C202041.5	APPLY the concept of principal stresses and theories of failure to determine stresses on a 2-D element
		C202041.6	UTILIZE the concepts of SFD & BMD, torsion and principal stresses to solve combined loading application based problems.
202042	**Solid Modeling**	C202042.1	UNDERSTAND basic concepts of CAD system, need and scope in Product Lifecycle Management

		C202042 .2	UTILIZE knowledge of curves and surfacing features and methods to create complex solid geometry
and **Drafting**		C202042 .3	CONSTRUCT solid models, assemblies using various modeling techniques & PERFORM mass property analysis, including creating and using a coordinate system
		C202042 .4	APPLY geometric transformations to simple 2D geometries
		C202042 .5	USE CAD model data for various CAD based engineering applications viz. production drawings, 3D printing, FEA, CFD, MBD, CAE, CAM, etc
		C202042 .6	USE PMI & MBD approach for communication
202043	**Engineering Thermodynamics**	C202043 .1	DESCRIBE the basics of thermodynamics with heat and work interactions
		C202043 .2	APPLY laws of thermodynamics to steady flow and non-flow processes
		C202043 .3	APPLY entropy, available and non available energy for an Open and Closed System
		C202043 .4	DETERMINE the properties of steam and their effect on performance of vapour power cycle
		C202043 .5	ANALYSE the fuel combustion process and products of combustion
		C202043 .6	SELECT various instrumentations required for safe and efficient operation of steam generator

202044	**Engineering Materials and Metallurg**	C202044. 1	COMPARE crystal structures and ASSESS different lattice parameters
		C202044. 2	CORRELATE crystal structures and imperfections in crystals with mechanical behaviour of materials.

	y	C202044.3	DIFFERENTIATE and DETERMINE mechanical properties using destructive and nondestructive testing of materials
		C202044.4	IDENTIFY & ESTIMATE different parameters of the system viz., phases, variables, component, grains, grain boundary, and degree of freedom. etc.
		C202044.5	ANALYSE effect of alloying element & heat treatment on properties of ferrous & nonferrous alloy
		C202044.6	SELECT appropriate materials for various applications.
203156	Electrical and Electronics Engineering	C203156.1	APPLY programming concepts to UNDERSTAND role of Microprocessor and Microcontroller in embedded systems
		C203156.2	DEVELOP interfacing of different types of sensors and other hardware devices with Atmega328 based Arduino Board
		C203156.3	UNDERSTAND the operation of DC motor, its speed control methods and braking
		C203156.4	DISTINGUISH between types of three phase induction motor and its characteristic features
		C203156.5	EXPLAIN about emerging technology of Electric Vehicle (EV) and its modular subsystems
		C203156.6	CHOOSE energy storage devices and electrical drives for EVs
202045	Geometric Dimensioning and Tolerancing Lab	C202045.1	SELECT appropriate IS and ASME standards for drawing
		C202045.2	READ & ANALYSE variety of industrial drawings
		C202045.3	APPLY geometric and dimensional tolerance, surface finish symbols in drawing
		C202045.4	EVALUATE dimensional tolerance based on type of fit, etc.

		C202045.5	SELECT an appropriate manufacturing process using DFM, DFA, etc.
Semester II			
207002	**Engineering Mathematics - III**	C207002.1	SOLVE higher order linear differential equations and its applications to model and analyze mass spring systems
		C207002.2	APPLY Integral transform techniques such as Laplace transform and Fourier transform to solve differential equations involved in vibration theory, heat transfer and related mechanical engineering applications
		C207002.3	APPLY Statistical methods like correlation, regression in analyzing and interpreting experimental data applicable to reliability engineering and probability theory in testing and quality control
		C207002.4	PERFORM Vector differentiation & integration, analyze the vector fields and APPLY to fluid flow problems
		C207002.5	SOLVE Partial differential equations such as wave equation, one and two dimensional heat flow equations

202047	**Kinematics of Machinery**	C202047.1	APPLY kinematic analysis to simple mechanisms
		C202047.2	ANALYZE velocity and acceleration in mechanisms by analytical method
		C202047.3	ANALYZE velocity and acceleration in mechanisms by graphical method
		C202047.4	SYNTHESIZE a four bar mechanism with analytical and graphical methods
		C202047.5	APPLY fundamentals of gear theory as a prerequisite for gear design

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		C202047.6	CONSTRUCT cam profile for given follower motion
202048	**Applied Thermodynamics**	C202048.1	DETERMINE COP of refrigeration system and ANALYZE psychrometric processes
		C202048.2	DISCUSS basics of engine terminology,air standard, fuel air and actual cycles
		C202048.3	IDENTIFY factors affecting the combustion performance of SI and CI engines
		C202048.4	DETERMINE performance parameters of IC Engines and emission control
		C202048.5	EXPLAIN working of various IC Engine systems and use of alternative fuels
		C202048.6	CALCULATE performance of single and multi stage reciprocating compressors and DISCUSS rotary positive displacement compressors
202049	**Fluid Mechanics**	C202049.1	DETERMINE various properties of fluid
		C202049.2	APPLY the laws of fluid statics and concepts of buoyancy
		C202049.3	IDENTIFY types of fluid flow and terms associated in fluid kinematics
		C202049.4	APPLY principles of fluid dynamics to laminar flow
		C202049.5	ESTIMATE friction and minor losses in internal flows and DETERMINE boundary layer formation over an external surface
		C202049.6	CONSTRUCT mathematical correlation considering dimensionless parameters, also ABLE to predict the performance of prototype using model laws
202050	**Manufacturing**	C202050.1	SELECT appropriate moulding, core making and melting practice and estimate pouring time, solidification rate and DESIGN riser size and location

	Processes		for sand casting process
		C202050.2	UNDERSTAND mechanism of metal forming techniques and CALCULATE load required for flat rolling
		C202050.3	DEMONSTRATE press working operations and APPLY the basic principles to DESIGN dies and tools for forming and shearing operations
		C202050.4	CLASSIFY and EXPLAIN different welding processes and EVALUATE welding characteristics
		C202050.5	DIFFERENTIATE thermoplastics and thermosetting and EXPLAIN polymer processing techniques
		C202050.6	UNDERSTAND the principle of manufacturing of fiber-reinforced composites and metal matrix composites
202051	**Machine Shop**	C202051.1	PERFORM welding using TIG/ MIG/ Resistance/Gas welding technique
		C202051.2	MAKE Fibre-reinforced Composites by hand lay-up process or spray lay-up techniques

		C202051.3	PERFORM cylindrical/surface grinding operation and CALCULATE its machining time
		C202051.4	DETERMINE number of indexing movements required and acquire skills to PRODUCE a spur gear on a horizontal milling machine
		C202051.5	PREPARE industry visit report
		C202051.6	UNDERSTAND procedure of plastic processing
202052	**Project Based**	C202052.1	IDENTIFY the real-world problem (possibly of interdisciplinary nature) through a rigorous literature survey and formulate / set relevant aims

Learning - II			and objectives
		C202052.2	ANALYZE the results and arrive at valid conclusions
		C202052.3	PROPOSE a suitable solution based on the fundamentals of mechanical engineering by possibly integration of previously acquired knowledge
		C202052.4	CONTRIBUTE to society through proposed solutions by strictly following professional ethics and safety measures
		C202052.5	USE of technology in proposed work and demonstrate learning in oral and written form
		C202052.6	DEVELOP ability to work as an individual and as a team member

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Department of Mechanical
Engineering Course Outcome
(CO)

Third Year -2019 Course		
Course Code	**Course Name**	**Course Outcomes**
Semester I		
302041	**Numerical & Statistical Methods**	C302041.1 — SOLVE system of equations using direct and iterative numerical methods
		C302041.2 — ESTIMATE solutions for differential equations using numerical techniques
		C302041.3 — DEVELOP solution for engineering applications with numerical integration
		C302041.4 — DESIGN and CREATE a model using a curve fitting and regression analysis
		C302041.5 — APPLY statistical Technique for quantitative data analysis
		C302041.6 — DEMONSTRATE the data, using the concepts of probability and linear algebra
302042	**Heat & Mass Transfer**	C302042.1 — ANALYZE & APPLY the modes of heat transfer equations for one dimensional thermal system
		C302042.2 — DESIGN a thermal system considering fins, thermal insulation and & Transient heat conduction
		C302042.3 — EVALUATE the heat transfer rate in natural and forced convection & validate with experimentation results
		C302042.4 — INTERPRET heat transfer by radiation between objects

			with simple geometries, for black and grey surfaces
		C302042.5	ABILITY to analyze the rate of mass transfer using Fick's Law of Diffusion and understands mass diffusion in different coordinate systems
		C302042.6	ANALYZE various performance parameters for existing heat exchanger and DEVELOP methodologies for designing a heat exchanger under prescribed conditions and for a particular application, with references TEMA standards
302043	Design of Machine Elements	C302043.1	DESIGN AND ANALYZE the cotter and knuckle Joints, levers and components subjected to eccentric loading.
		C302043.2	DESIGN shafts, keys and couplings under static loading conditions.
		C302043.3	ANALYZE different stresses in power screws and APPLY those in the procedure to design screw jack
		C302043.4	EVALUATE dimensions of machine components under fluctuating loads.
		C302043.5	EVALUATE & INTERPRET the stress developed on the different type of welded and threaded joints.
		C302043.6	APPLY the design and development procedure for different types of springs.

302044	Mechatronics	C302044.1	DEFINE key elements of mechatronics, principle of sensor and its characteristics.
		C302044.2	UTILIZE concept of signal processing and MAKE use of interfacing systems such as ADC, DAC, Digital I/O.
		C302044.3	DETERMINE the transfer function by using block diagram reduction technique
		C302044.4	EVALUATE Poles and Zero, frequency domain parameter for mathematical modeling for mechanical

			system.
		C302044.5	APPLY the concept of different controller modes to an industrial application.
		C302044.6	DEVELOP the ladder programming for industrial application.
302045	Elective-I(Advanced Forming & Joining Processes)	C302045 A.1	ANALYSE the effect of friction in metal forming deep drawing and IDENTIFICATION of surface defects and their remedies in deep drawing operations
		C302045 A.2	ASSESS the parameters for special forming operation and SELECT appropriate special forming operation for particular applications
		C302045 A.3	ANALYSE the effect of HAZ on microstructure and mechanical properties of materials
		C302045 A.4	CLASSIFY various solid state welding process and SELECT suitable welding processes for particular applications
		C302045 A.5	CLASSIFY various advanced welding process and SELECT suitable welding processes for particular applications
		C302045 A.6	INTERPRET the principles of sustainable manufacturing and its role in manufacturing industry
302045	Elective- I (Machining Science & Technology)	C302045 B.1	DEFINE metal cutting principles and mechanics of metal cutting and tool life
		C302045 B.2	DESCRIBE features of gear and thread manufacturing processes
		C302045 B.3	SELECT appropriate grinding wheel and demonstrate the various surface finishing processes
		C302045 B.4	SELECT appropriate jigs/fixtures and to draw the process plan for a given component
		C302045	SELECT & EVALUATE various parameters of process

		B.5	planning
		C302045 B.6	GENERATE CNC program for Turning / Milling processes and generate tool path using CAM software
302046	**Digital Manufacturing Laboratory**	C302046.1	DEVELOP a component using conventional machines, CNC machines and Additive Manufacturing Techniques
		C302046.2	ANALYZE cutting tool parameters for machining given job
		C302046.3	DEMONSTRATE simulation of manufacturing process using Digital Manufacturing Tools
		C302046.4	SELECT and DESIGN jigs and Fixtures for a given component.
		C302046.5	DEMONESTRATE different parameters for CNC retrofitting and reconditioning

302047	**Skill** **Development**	C302047.1	APPLY& DEMONSTRATE procedure of assembly & disassembly of various machines.
		C302047.2	DESIGN & DEVELOP a working/model of machine parts or any new product.
		C302047.3	EVALUATE fault with diagnosis on the machines, machine tools and home appliances.
		C302047.4	IDENTIFY & DEMONSTRATE the various activities performed in an industry such as maintenance, design of components, material selection
Semester-II			
302049	**Artificial Intelligence &Machine**	C302049.1	. DEMONSTRATE fundamentals of artificial intelligence and machine learning.

	Learnings	C302049.2	APPLY feature extraction and selection techniques.
		C302049.3	APPLY machine learning algorithms for classification and regression problems.
		C302049.4	DEVISE AND DEVELOP a machine learning model using various steps.
		C302049.5	EXPLAIN concepts of reinforced and deep learning.
		C302049.6	SIMULATE machine learning model in mechanical engineering problems.
302050	**Computer Aided Engineering**	C302050.1	DEFINE the use of CAE tools and DESCRIBE the significance of shape functions in finite element formulations.
		C302050.2	APPLY the various meshing techniques for better evaluation of approximate results.
		C302050.3	APPLY material properties and boundary condition to SOLVE 1-D and 2-D element stiffness matrices to obtain nodal or elemental solution.
		C302050.4	ANALYZE and APPLY various numerical methods for different types of analysis.
		C302050.5	EVALUATE and SOLVE non-linear and dynamic analysis problems by analyzing the results obtained from analytical and computational method.
		C302050.6	GENERATE the results in the form of contour plot by the USE of CAE tools.
302051	**Design of Transmission Systems**	C302051.1	APPLY the principle of Spur & Helical gear design for industrial application and PREPARE a manufacturing drawing with the concepts of GD&T.
		C302051.2	EXPLAIN and DESIGN Bevel & Worm gear considering design parameters as per design standards.

		C302051.3	SELECT & DESIGN Rolling and Sliding Contact Bearings from manufacturer's catalogue for a typical application considering suitable design parameters.
		C302051.4	DEFINE and DESIGN various types of Clutches, Brakes, used in automobile.
		C302051.5	APPLY various concept to DESIGN Machine Tool Gear box, for different applications
		C302051.6	ELABORATE various modes of operation, degree of hybridization and allied terms associated with hybrid electric vehicles.
302052	Elective II (Composite Materials)	C302052A.1	DEFINE & COMPARE composites with traditional materials
		C302052A.2	IDENTIFY & ESTIMATE different parameters of the Polymer Matrix Composite
		C302052A.3	CATEGORISE and APPLY Metal Matrix Process from possessions landscape
		C302052A.4	DETERMINE volume/weight fraction and strength of Composites
		C302052A.5	SELECT appropriate testing and inspection method for composite materials
		C302052A.6	SELECT composites materials for various applications
302053	Measurement Laboratory	C302053.1	EVALUATE causes of errors in Vernier calipers, micrometers by performing experiments in standard metrological conditions, noting deviations at actual and by plotting cause and effect diagram, to reduce uncertainty in measurement.
		C302053.2	ANALYZE strain measurement parameters by taking modulus of elasticity in consideration to acknowledge its usage in failure detection and force variations
		C302053.3	EXAMINE surface Textures, surface finish using equipment's like Talysurf and analyze surface finish requirements of metrological equipment's like

			gauges, jaws of vernier calipers, micrometers, magnifying glasses of height gauge and more, to optimize surface finish accuracy requirements and cost of measurement.
		C302053.4	MEASURE the dimensional accuracy using Comparator and limit gauges and appraise their usage in actual measurement or comparison with standards set to reduce measurement lead time.
		C302053.5	PERFORM Testing of Flow rate, speed and temperature measurements and their effect on performance in machines and mechanisms like hydraulic or pneumatic trainers, lathe machine etc. to increase repeatability and reproducibility.
		C302053.6	COMPILE the information of opportunities of entrepreneurships/business in various sectors of metrology like calibrations, testing, coordinate and laser metrology etc in an industry visit report.
302054	**Fluid Power &Control Laboratory**	C302054.1	DEFINE working principle of components used in hydraulic and pneumatic systems
		C302054.2	IDENTIFY & EXPLAIN various applications of hydraulic and pneumatic systems
		C302054.3	SELECT an appropriate component required for hydraulic and pneumatic systems using manufactures' catalogs
		C302054.4	SIMULATE & ANALYSE various hydraulic and pneumatic systems for industrial/mobile applications
		C302054.5	DESIGN a hydraulic and pneumatic system for the industrial applications
		C302054.6	DESIGN & DEMONESTRATE various IoT, PLC based controlling system using hydraulics and pneumatics
302055	**Internship/Mini project**	C302055.1	DEMONSTRATE professional competence through industry internship

		C302055.2	APPLY knowledge gained through internships to complete academic activities in a professional manner
		C302055.3	CHOOSE appropriate technology and tools to solve given problem
		C302055.4	DEMONSTRATE abilities of a responsible professional and use ethical practices in day to day life
		C302055.5	DEVELOP network and social circle, and DEVELOPING relationships with industry people
		C302055.6	ANALYZE various career opportunities and DECIDE career goals

PRINCIPAL
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Department of Civil Engineering

Course Outcome (CO)

First Year -2019Course			
Semester I			
Course Code	**Course Name**	**Course Outcomes**	
101007	Audit Course: Environmental Studies-I	CO1	Students will get the knowledge of various environmental issues and sustainability.
		CO2	Students will understand the ecosystem, role of organism and food chain.
		CO3	Get knowledge about conventional and non-conventional energy sources.
		CO4	Students can understand concept of biodiversity and its conservation.
101011	Engineering Mechanics	CO 1	Determine resultant of various force systems
		CO 2	Determine centroid, moment of inertia and solve problems related to friction
		CO 3	Determine reactions of beams, calculate forces in cables using principles of equilibrium
		CO 4	Solve trusses, frames for finding member forces and apply principles of equilibrium to forces in space

		CO 5	Calculate position, velocity and acceleration of particle using principles of kinematics
		CO 6	Calculate position, velocity and acceleration of particle using principles of kinetics and Work, Power, Energy
101011	Engineering Mechanics- Lab	CO 1	Determine resultant of various force systems
		CO 2	Determine centroid, moment of inertia and solve problems related to friction
		CO 3	Determine reactions of beams, calculate forces in cables using principles of equilibrium
		CO 4	Calculate position, velocity and acceleration of particle using principles of kinematics
		CO 5	Calculate position, velocity and acceleration of particle using principles of kinetics and Work, Power, Energy principle
101014	Audit Course-2: Environmental Studies-II	CO 1	Have an understanding of environmental pollution and the science behind those problems and potential solutions.
		CO 2	Have knowledge of various acts and laws and will be able to identify the industries that are violating these rules.
		CO 3	Assess the impact of ever increasing human population on the biosphere: social, economic issues and role of humans in conservation of natural resources.

		CO 4	Learn skills required to research and analyze environmental issues scientifically and learn how to use those skills in applied situations such as careers that may involve environmental problems and/or issues.
Second Year -2019 Course			
Semester I			
201001	Building Technology and Architectural Planning	CO 1	Identify types of building and basic requirements of building components
		CO 2	Make use of Architectural Principles and Building byelaws for building construction
		CO 3	Plan effectively various types of Residential Building forms according to their utility, functions with reference to National Building Code..
		CO 4	Plan effectively various types of Public Buildings according to their utility functions with reference to National Building Code.
		CO 5	Make use of Principles of Planning in Town Planning, Different Villages and Safety aspects
		CO 6	Understand different services and safety aspects
201002	Mechanics of Structures	CO 1	Understand concept of stress-strain and determine different types of stress, strain in determinate, indeterminate homogeneous and composite structures..
		CO 2	Calculate shear force and bending moment in determinate beams for different loading conditions and

			illustrate shear force and bending moment diagram.
		CO 3	Explain the concept of shear and bending stresses in beams and demonstrate shear and bending stress distribution diagram..
		CO 4	Use theory of torsion to determine the stresses in circular shaft and understand concept of Principal stresses and strains..
		CO 5	Analyze axially loaded and eccentrically loaded column.
		CO 6	Determine the slopes and deflection of determinate beams and trusses.
201003	Fluid Mechanics-I	CO 1	Understand the use of Fluid Properties, concept of Fluid statics, basic equation of Hydrostatics, measurement of fluid pressure, buoyancy & floatation and its application for solving practical problems.
		CO 2	Understand the concept of fluid kinematics with reference to Continuity equation and fluid dynamics with reference to Modified Bernoulli's equation and its application to practical problems of fluid flow
		CO 3	Understand the concept of Dimensional analysis using Buckingham's π theorem, Similarity & Model Laws and boundary layer theory and apply it for solving practical problems of fluid flow
		CO 4	Understand the concept of laminar and turbulent flow and flow through pipes and its application to determine major and minor losses and analyze pipe network using Hardy Cross method.

		CO 5	Understand the concept of open channel flow, uniform flow and depth-Energy relationships in open channel flow and make the use of Chezy's and Manning's formulae for uniform flow computation and design of most economical channel section.
		CO 6	Understand the concept of gradually varied flow in open channel and fluid flow around submerged objects, compute GVF profile and calculate drag and lift force on fully submerged body.
207001	Engineering Mathematics III	CO 1	Solve Higher order linear differential equations and its applications to modelling and analysing Civil engineering problems such as bending of beams, whirling of shafts and mass spring systems.
		CO 2	Solve System of linear equations using direct & iterative numerical techniques and develop solutions for ordinary differential equations using single step & multistep methods applied to hydraulics, geotechnics and structural systems
		CO 3	Apply Statistical methods like correlation, regression and probability theory in data analysis and predictions in civil engineering.
		CO 4	Perform Vector differentiation &integration, analyze the vector fields and apply to fluid flow problems.
		CO 5	Solve Partial differential equations such as wave equation, one and two dimensional heat flow equations.

207003	Engineering Geology	CO 1	Explain about the basic concepts of engineering geology, various rocks, and minerals both in lab and on the fields and their inherent characteristics and their uses in civil engineering constructions.
		CO 2	Exploring the importance of mass wasting processes and various tectonic processes that hampers the design of civil engineering projects and its implications on environment and sustainability.
		CO 3	Recognize effect of plate tectonics, structural geology and their significance and utility in civil engineering activities.
		CO 4	Incorporate the various methods of survey, to evaluate and interpret geological nature of the rocks present at the foundations of the dams, percolation tanks, tunnels and to infer site / alignment/ level free from geological defects.
		CO 5	Assess the Importance of geological nature of the site, precautions and treatments to improve the site conditions for dams, reservoirs, and tunnels.
		CO 6	Explain geological hazards and importance of groundwater and uses of common building stones.
201004	Building Technology and Architectural Planning - Lab	CO 1	Identify types of building and basic requirements of building components.
		CO 2	Explain types of masonry, formwork, casting procedure

			and necessity of underpinning and scaffolding.
		CO 3	Elucidate different types of flooring and roofing materials.
		CO 4	Describe types of doors, windows, arches and lintel.
		CO 5	Illuminate means of vertical circulation and protective coatings.
		CO 6	Explain different materials especially eco-friendly materials and safety measures to be adopted at any construction site.
201005	Mechanics of Structures - Lab	CO 1	to determine the mechanical properties of metal in tension ,shear torsion and impact
		CO 2	to know the properties of timber in compression and bending
		CO 3	to know the properties of bricks
		CO 4	to know the properties of tiles in flexural and abrasion
201006	Fluid Mechanics-I- Lab	CO 1	Use fluid properties, dimensional analysis for solving problems of fluid flow.
		CO 2	Solve fluid statics problems
		CO 3	Measure fluid pressure.

		CO 4	Calibrate discharge measuring instrument like venturi-meter, orifice meter
		CO 5	Design pipes to carry particular amount of discharge
		CO 6	Use fluid properties, dimensional analysis for solving problems of fluid flow.
207004	Engineering Geology - Lab	CO 1	Explain basic concepts, common rocks, minerals, their significance and application in civil engineering.
		CO 2	Recognize tectonic effects, Geological structures and their significance in Civil Engineering.
		CO 3	Recall geomorphology, stratigraphy and physiographic divisions of India.
		CO 4	Incorporate findings of Geological investigation, remote sensing and GIS techniques in civil engineering.
		CO 5	Infer Geological conditions, nature of rocks, and site suitability for construction of building, road, dam, tunnel and treatment to unfavourable rocks masses
		CO 6	Explain geological hazards, geo-hydrological characters of the rocks, mass wasting processes, and good building stones.
201009	Surveying	CO 1	Define and Explain basics of plane surveying and differentiate the instruments used for it.

		CO 2	Express proficiency in handling surveying equipment and analyse the surveying data from these equipment.
		CO 3	Describe different methods of surveying and find relative positions of points on the surface of earth.
		CO 4	Execute curve setting for civil engineering projects such as roads, railways etc.
		CO5	Articulate advancements in surveying such as space based positioning systems
		CO6	Differentiate map and aerial photographs, also interpret aerial photographs
	Audit Course: Awareness to Civil Engineering Practices	CO 1	Study different types of civil engineering industries and their functioning.
		CO 2	Applications of different documents, drawings, regulations in Civil Engineering industries.
		CO 3	Code of ethics to be practiced by a Civil Engineer and understand duties and responsibilities as a Civil Engineer
		CO 4	Student will able to find different safety practices on the site.
201008	Geotechnical Engineering	CO 1	Identify and classify the soil based on the index properties and its formation process
		CO 2	Explain permeability and seepage analysis of soil by construction of flow net.

		CO 3	Illustrate the effect of compaction on soil and understand the basics of stress distribution.
		CO 4	Express shear strength of soil and its measurement under various drainage conditions.
		CO5	Evaluate the earth pressure due to backfill on retaining structures by using different theories.
		CO6	Analysis of stability of slopes for different types of soils
201009	Surveying	CO 1	Define and Explain basics of plane surveying and differentiate the instruments used for it.
		CO 2	Express proficiency in handling surveying equipment and analyse the surveying data from these equipment.
		CO 3	Describe different methods of surveying and find relative positions of points on the surface of earth.
		CO 4	Execute curve setting for civil engineering projects such as roads, railways etc.
		CO5	Articulate advancements in surveying such as space based positioning systems
		CO6	Differentiate map and aerial photographs, also interpret aerial photographs
201010	Concrete Technology	CO 1	Able to select the various ingredients of concrete and its suitable proportion to achieved desired strength.

		CO 2	Able to check the properties of concrete in fresh and hardened state.
		CO 3	Get acquainted to concreting equipments, techniques and different types of special concrete.
		CO 4	Able to predict deteriorations in concrete and get acquainted to various repairing methods and techniques
201011	Structural Analysis		Understand the basic concept of static and kinematic indeterminacy and analysis of indeterminate beams.
			Analyze redundant trusses and able to perform approximate analysis of multi-story multi-bay frames.
			Implement application of the slope deflection method to beams and portal frames.
			Analyze beams and portal frames using moment distribution method.
			Determine response of beams and portal frames using structure approach of stiffness matrix method.
			Apply the concepts of plastic analysis in the analysis of steel structures.
201012	Project Management		Describe project life cycle and the domains of Project Management.
			Explain networking methods and their applications in planning and management

			Categorize the materials as per their annual usage and also Calculate production rate of construction equipment
			Demonstrates resource allocation techniques and apply it for manpower planning.
			Understand economical terms and different laws associated with project management
			Apply the methods of project selection and recommend the best economical project.
201003	Geotechnical Engineering- Lab	CO 1	Differentiate the different types of soil and their engineering properties and classify
		CO 2	Determine the soil properties in laboratory and develop a proficiency in handling
		CO 3	Develop an understanding of the influence of water flow on the engineering
		CO 4	Analyze engineering properties like compaction, permeability, soil shear strength.
201014	Surveying - Lab	CO 1	Operate and use surveying equipment.
		CO 2	Draw plan or map of the existing permanent features on the ground
		CO 3	Classify the ground features from the map or plan

		CO 4	Analyze temporary adjustments and check permanent adjustments of the Theodolite.
201015	Concrete Technology - Lab	CO 1	Understand chemistry, properties, and classification of cement, fly ash, aggregates and admixtures, and hydration of cement in concrete.
		CO 2	Prepare and test the fresh concrete
		CO 3	Test hardened concrete with destructive and non-destructive testing instruments
		CO 4	Design concrete mix of desired grade
201017	Project Based Learning	CO 1	Identify the community/ practical/ societal needs and convert the idea into a product/ process/ service.
		CO 2	Analyse and design the physical/ mathematical/ ICT model in order to solve identified problem/project.
		CO 3	Create, work in a team and applying the solution in practical way to specific problem.
Third Year			
Semester I			
301001	Hydrology and Water Resource Engineering	CO 1	Understand government organizations, apply & analyze

		CO 2	Understand, apply & analyze runoff, runoff hydrographs and gauging of streams
		CO 3	Understand, apply & analyze floods, hydrologic routing & Q-GIS software in hydrology.
		CO 4	Understand, apply & analyze reservoir planning, capacity of reservoir & reservoir economics.
		CO 5	Understand water logging & water management, apply & analyze ground water hydrology
		CO 6	Understand irrigation, piped distribution network and canal revenue, apply and analyze crop water requirement
301002	Water Supply Engineering	CO 1	Define identify, describe reliability of water sources, est various sectors
		CO 2	Ascertain and interpret water treatment method required to be adopted with respect to source and raw water characteristics
		CO 3	Design various components of water treatment plant and distribution system.
		CO 4	Understand and compare contemporary issues and advanced treatment operations and process available in the market, including packaged water treatment plants.

		CO 5	Design elevated service reservoir capacity and understand the rainwater harvesting.
		CO 6	Understand the requirement of water treatment plant for infrastructure and Government scheme.
301003	Design of Steel Structures	CO 1	Demonstrate knowledge about the types of steel structures, steel code provisions and design of the adequate steel section subjected to tensile force.
		CO 2	Determine the adequate steel section subjected to compression load and design of built up columns along with lacing and battening.
		CO 3	Design eccentrically loaded column for section strength and column bases for axial load and uniaxial bending
		CO 4	Design of laterally restrained and unrestrained beam with and without flange plate using rolled steel section.
		CO 5	Analyze the industrial truss for dead, live and wind load and design of gantry girder for moving load.
		CO 6	Understand the role of components of welded plate girder and design cross section for welded plate girder including stiffeners and its connections
301004	Engineering Economics and Financial Management	CO 1	Understand basics of construction economics
		CO 2	Develop an understanding of financial management in civil engineering projects
		CO 3	Prepare and analyze the contract account

		CO 4	Decide on right source of fund for construction projects
		CO 5	Understand working capital and its estimation for civil engineering projects
		CO 6	Illustrate the importance of tax planning & understand role of financial regulatory bodies
301005	Advanced Concrete Technology	CO 1	Understand the chemistry of cement and its effect on properties of concrete
		CO 2	Apply the knowledge of supplementary cementitious materials to produce sustainable concretes
		CO 3	Understand the mechanism of working of admixtures and their effect on properties of concrete
		CO 4	Evaluate the characteristic properties of fiber reinforced concrete
		CO 5	Understand the durability properties of concrete
		CO 6	Interpret the properties of concrete through advance testing methods
301006	Seminar	CO 1	Appraise the current civil engineering research / techniques / developments / interdisciplinary areas
		CO 2	Review and organize literature survey utilizing technical resources, journals etc.
		CO 3	Evaluate and draw conclusions related to technical content studied.

		CO 4	Demonstrate the ability to perform critical writing by preparing a technical report.
		CO 5	Develop technical writing and presentation skills.
301007	Hydrology and Water Resource Engineering Lab	CO 1	To impart knowledge of precipitation and abstractions in precipitation
		CO 2	To impart knowledge of rainfall-runoff relationship and flood using hydrograph theory and to solve problems related to runoff and flood discharge.
		CO 3	To introduce students the concept of Reservoir planning and yield of reservoir.
		CO 4	Study software applications in water resources engineering
301008	Water Supply Engineering Lab	CO 1	Engineers with the ability to analyse pH and alkalinity and hardness of drinking water
		CO 2	Engineers having the ability analyse chlorine demand and residual chlorine.
		CO 3	Engineers with the ability to analyze the water quality such as turbidity
		CO 4	Engineers having ability to find out iron content and fluoride content present in row water
		CO 5	Engineers with the ability to analyse ecoil bacteria present in drinking water/ row water

		CO 6	Engineers with the ability to calculate noise level
301009	Design of Steel Structures Lab	CO 1	Ability to understand concepts of connections and tension members, compression members.
		CO 2	Able to understand the concepts of built up sections, beams and girders.
		CO 3	Ability to do the analysis of roof truss
		CO 4	Ability to decide sections of roof truss
		CO 5	To understand concept of welded plate girder for application.
301011b	Audit Course I: Sustainable Energy Systems	CO 1	To demonstrate an overview of the main sources of renewable energy
		CO 2	To understand benefits of renewable and sustainable energy systems
Semester II			
301012	Waste Water Engineering	CO 1	Recall sanitation infrastructure, quantification and characterization of wastewater, natural purification of streams

		CO 2	Design preliminary and primary unit operations in waste water treatment plant
		CO 3	Understand theory and mechanism of aerobic biological treatment system and to design activated sludge process
		CO 4	Understand and design suspended and attached growth wastewater treatment systems
		CO 5	Explain and apply concept of contaminant removal by anaerobic, tertiary and emerging wastewater treatment systems
		CO 6	Compare various sludge management systems and explain the potential of recycle and reuse of wastewater treatment
301013	Design of Reinforced Concrete Structures	CO 1	Apply relevant IS provisions to ensure safety and serviceability of structures, understand the design philosophies and behavior of materials: steel & concrete
		CO 2	Recognize mode of failure as per LSM and evaluate moment of resistance for singly, doubly rectangular, and flanged sections
		CO 3	Design & detailing of rectangular one way and two-way slab with different boundary conditions
		CO 4	Design & detailing of dog legged and open well staircase
		CO 5	Design & detailing of singly/doubly rectangular/flanged beams for flexure, shear, bond and torsion.

		CO 6	Design & detailing of short columns subjected to axial load, uni-axial/bi-axial bending and their footings
301014	Remote Sensing and Geographic Information System	CO 1	Articulate fundamentals and principles of RS techniques
		CO 2	Demonstrate the knowledge of remote sensing and sensor characteristics
		CO 3	Distinguish working of various spaces-based positioning systems.
		CO 4	Analyze the RS data and image processing to utilize in civil engineering
		CO 5	Explain fundamentals and applications of RS and GIS
		CO 6	Acquire skills of data processing and its applications using GIS
301015a	Advanced Engineering Geology with Rock Mechanics	CO 1	Illustrate seismic zones, plate tectonics and civil engineering significance of major rock formations of India with their characteristics
		CO 2	Explain soil profile, geo-hydrological characters of various rock formations and necessity of geological studies in water conservation
		CO 3	Apply knowledge of geology in Infrastructural, Urban development and demonstrate importance of national wealth
		CO 4	Validate the suitability of rocks based on mechanical properties, R.Q.D. and geophysical exploration.

		CO 5	Explore subsurface Geology for civil engineering projects to suggest foundation treatments for various geological defects and channel erosion
		CO 6	Illustrate the suitability of proposed alignments for tunnels and bridges on the basis of Geological investigations
301015e	Architecture and Town Planning	CO 1	Apply the principles of architectural planning and landscaping for improving quality of life
		CO 2	Understand the confronting issues of the area and apply the acts.
		CO 3	Evaluate and defend the proposals
		CO 4	Appraise the existing condition and to develop the area for betterment
301016	Internship	CO 1	To develop professional competence through industry internship
		CO 2	To apply academic knowledge in a personal and professional environment
		CO 3	To build the professional network and expose students to future employees
		CO 4	Apply professional and societal ethics in their day to day life

		CO5	To become a responsible professional having social, economic and administrative considerations
		CO6	To make own career goals and personal aspirations
301018	Design of Reinforced Concrete Structures Lab	CO 1	Draw G+2 building covering all structural elements
		CO 2	Design and analyze all slabs and beams of typical floor
		CO 3	Design and analyze the columns
		CO 4	Design and analyze the footings.
		CO 5	Draw a structural plan by using drafting software.
		CO 6	understand the steel detailing of structural elements of under construction building through a study tour
301020e	Architecture and Town Planning Lab	CO 1	Students will be able to understand and analyze Development Plan with respect to different parameters.
		CO 2	Students will be able to make constructive use of neighbor-hood planning in city and township development
		CO 3	Students will be able to learn various schemes related to town planning that in-turn will be helpful in designing and developing a town.

		CO 4	Students will get the knowledge of different special zones that helps in developing the town and city.
		CO 5	Students will acquire the knowledge regarding various acts and amendments in regards to town planning.
		CO 6	Students will be able to make use of techniques like remote sensing and GPS in town planning effectively.
301021 b	Industrial Safety	CO 1	Analyze the safety problem with its solution

PRINCIPAL
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