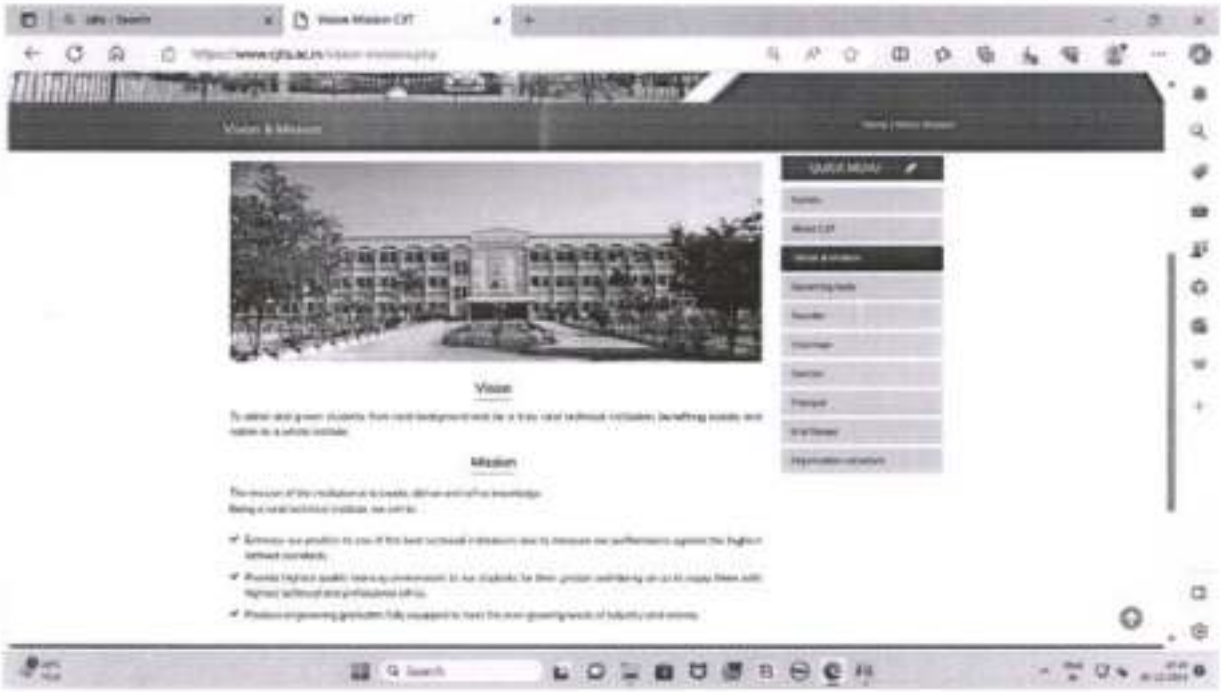
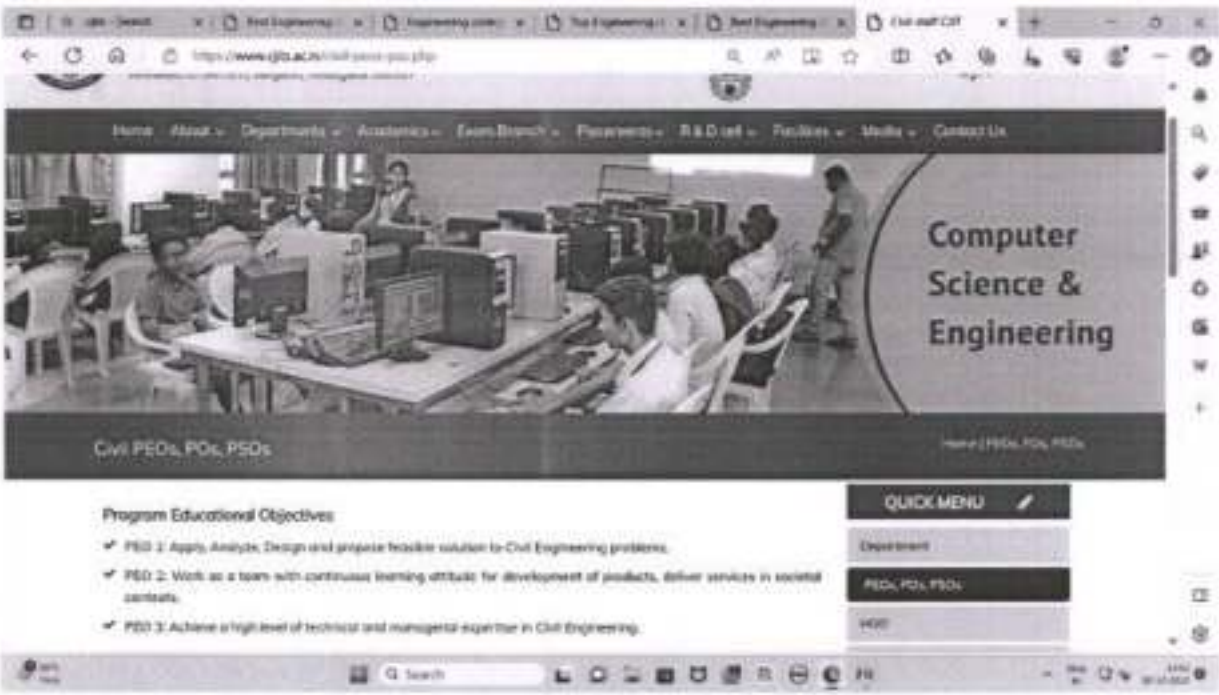


Vision

Mission

PO Program Outcomes



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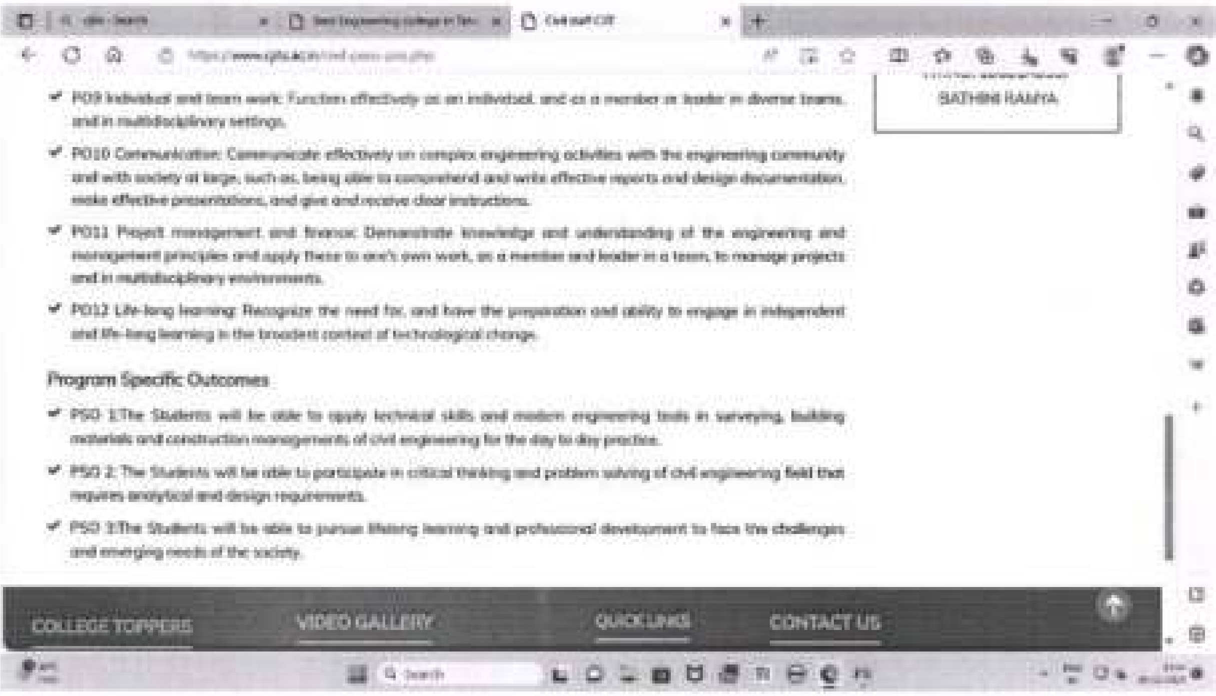

- PO9 Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO10 Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO11 Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO12 Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes

- PSO 1:The Students will be able to apply technical skills and modern engineering tools in surveying, building materials and construction managements of civil engineering for the day to day practice.
- PSO 2: The Students will be able to participate in critical thinking and problem solving of civil engineering field that requires analytical and design requirements.
- PSO 3:The Students will be able to pursue lifelong learning and professional development to face the challenges and emerging needs of the society.

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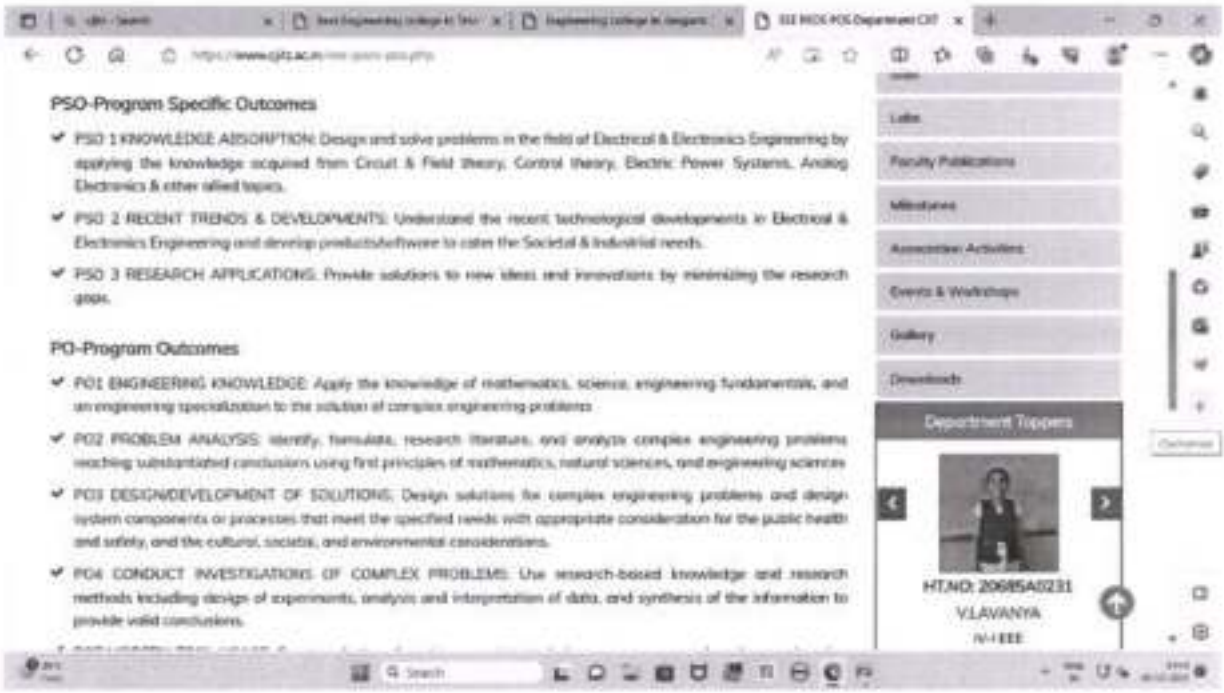

PSO-Program Specific Outcomes

- PSO 1 KNOWLEDGE ABSORPTION: Design and solve problems in the field of Electrical & Electronics Engineering by applying the knowledge acquired from Circuit & Field theory, Control theory, Electric Power Systems, Analog Electronics & other allied topics.
- PSO 2 RECENT TRENDS & DEVELOPMENTS: Understand the recent technological developments in Electrical & Electronics Engineering and develop productive/software to cater the Societal & Industrial needs.
- PSO 3 RESEARCH APPLICATIONS: Provide solutions to new ideas and innovations by minimizing the research gaps.

PO-Program Outcomes

- PO1 ENGINEERING KNOWLEDGE: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
- PO2 PROBLEM ANALYSIS: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
- PO3 DESIGN/DEVELOPMENT OF SOLUTIONS: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4 CONDUCT INVESTIGATIONS OF COMPLEX PROBLEMS: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

Labs
Faculty Publications
Milestones
Association Activities
Events & Workshops
Gallery
Downloads

Department Toppers

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PO-Program Outcomes

Department Toppers

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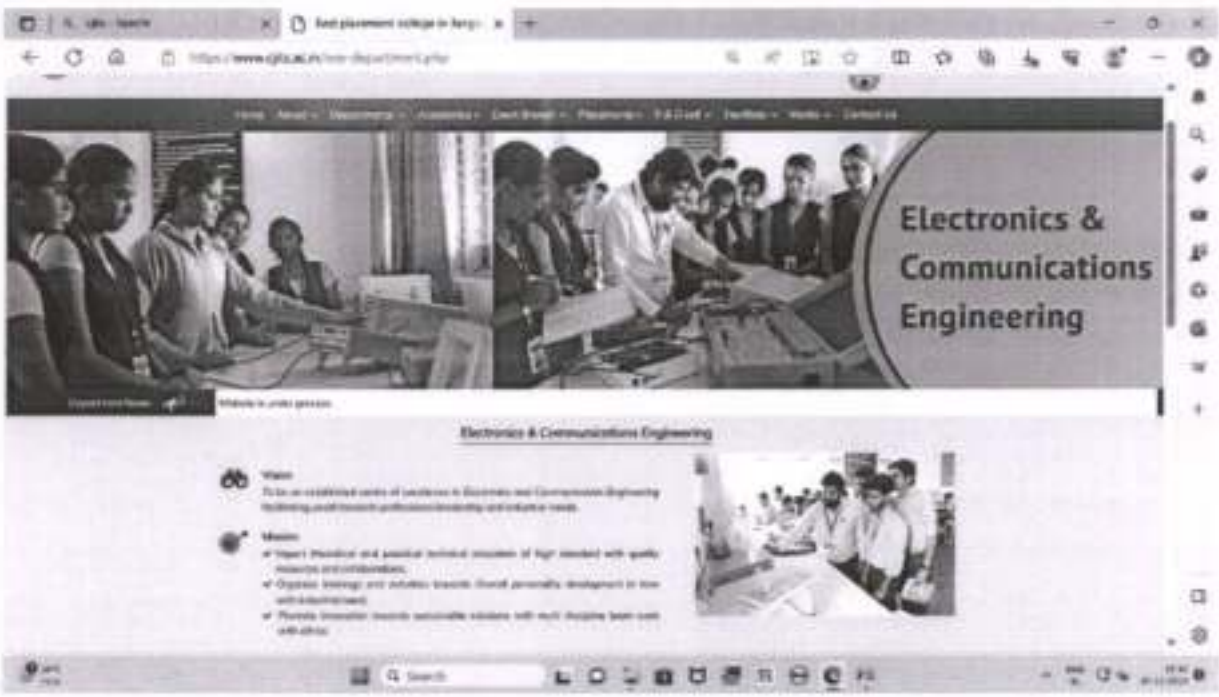

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- PO 9 INDIVIDUAL AND TEAM WORK : Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO 10 COMMUNICATION: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, give and receive clear instructions.
- PO 11 PROJECT MANAGEMENT AND FINANCE: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO 12 LIFE-LONG LEARNING: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

(1TNO 19CSE(A)423)

Mushini ramya

Programme Educational Objectives (PEOs)

- PEO-1 Graduates of B.Tech. (CSE) are able to integrate fundamentals and up to date approaches derived from the engineering sciences and practice to provide industrial solutions.
- PEO-2 Practice multidisciplinary projects and accomplish professional development with responsibility and leadership and use technical communication skills to improve the quality of life in society.
- PEO-3 Exhibit good citizenship and cultured interaction environment consciousness with continuous learning.

Program specific outcomes(PSOs)

- PSO1: Design & implementation of Signal Processing & Communication Systems.
- PSO2: The ability to Design Embedded Systems for lower end applications.
- PSO3: To be equipped with necessary Soft skills & Technical skills to work in industries.

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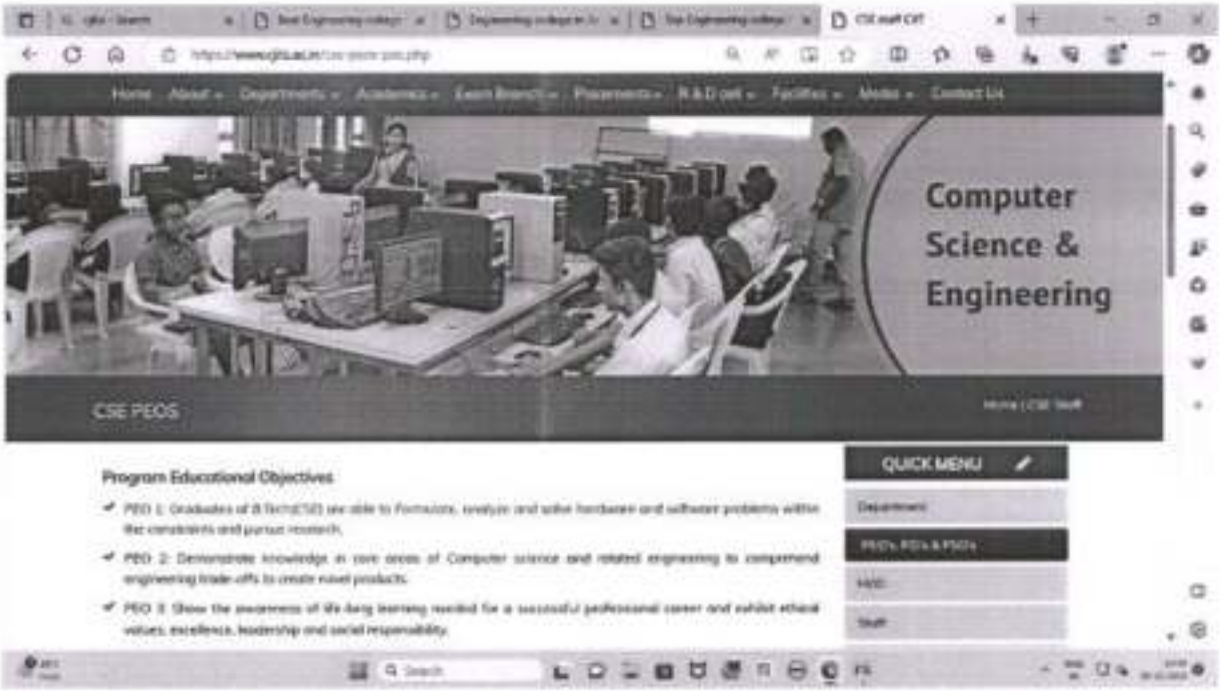

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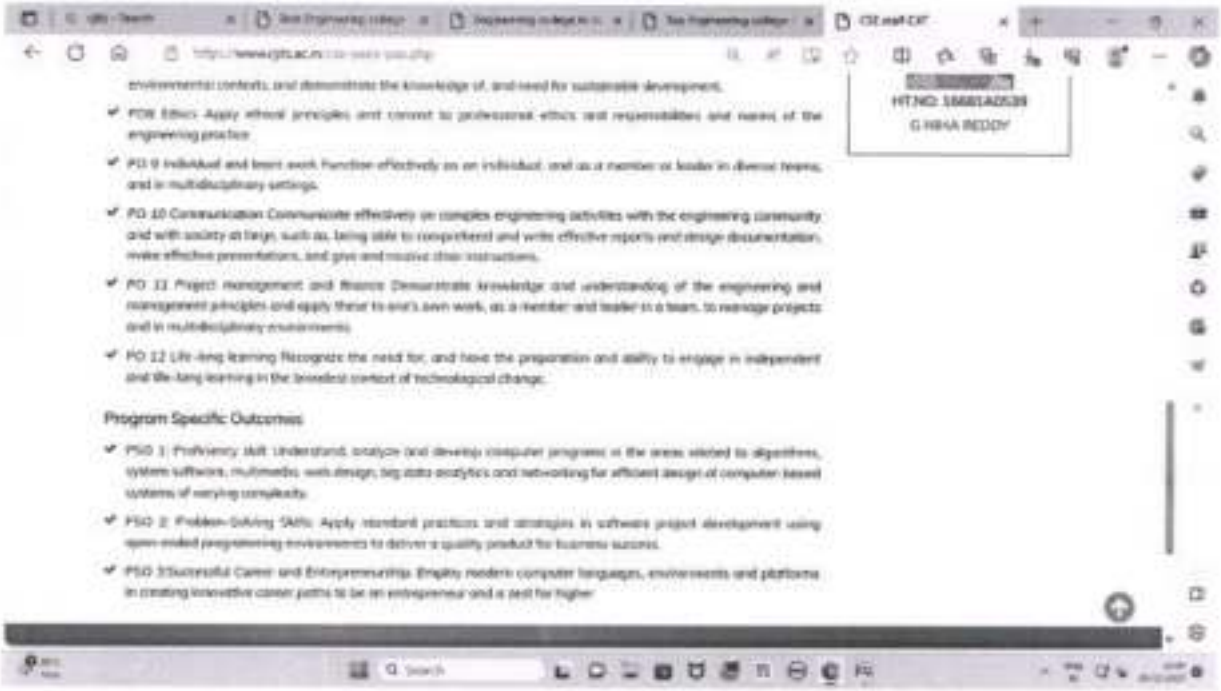

environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

- PO8 Ethics Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO 9 Individual and team work Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO 10 Communication Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO 11 Project management and finance Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO 12 Life-long learning Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes

- PSO 1: Proficiency Skill: Understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics and networking for efficient design of computer-based systems of varying complexity.
- PSO 2: Problem-Solving Skills: Apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.
- PSO 3:Successful Career and Entrepreneurship: Employ modern computer languages, environments and platforms in creating innovative career paths to be an entrepreneur and a zest for higher

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Civil Engineering I & II Sem Course Outcomes for the Academic Year 2022-23

S. No	Year/Sem	Course Name	Course Outcomes
1	II-I	Surveying and Geomatics	**CO1:** Describe the working principle of surveying instrument, measurement errors and corrective measures
			CO2: Apply the knowledge to calculate angles, distances and area
			CO3: Determine volumes, levels and setting out curves
			CO4: Determine the angles and Traversing errors by using the odolite
			CO5: Evaluate & recognize the different methods of calculations of heightsand distance using angular measurements
			CO6:Interpret survey data and compute areas and volumes, levels by different type of equipment and relate the knowledge to the modern equipment and methodologies
2	II-I	Engineering Geology	**CO1: Describe** geological importance in civil engineering point of view
			CO2: Recognize different types of minerals and rocks.
			CO3: Explain different structures present In the earth
			CO4: Define groundwater, earthquakes and landslides.
			CO5: Apply geophysical studies in the field.
			CO6: Select geological sites for dams, reservoirs and tunnels.
3	II-I	Strength of Materials-I	**CO1: Illustrate** the mechanical properties &principles of materials with its Behaviour under various loading conditions
			CO2: Develop diagrams for shear force &Bending Moment for different Beams &loading conditions.
			CO3: Assess the Flexural ,Shear stresses in Solid ,Hallow & Channel Sections
			CO4: Calculate the slope and deflection in beams by using methods like Doubleintegration,Macaulaymethod,Moment-areamethod,Conjugatebeam
			CO5: Evaluate the principal Stress & Strains at a point of a stressed Member & Draw the Mohr's Circle of Stress
			CO6: Predict the failure of materials using various theories of Failure & Their relative applications
4	II-I	Probability	**CO1: Compare** basic probability and solving problems of RV

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		and Statistics	**CO2: Analyze** the difference between Discrete probability and continuous probability
			CO3: Solve and **Analyze** problems of continuous probability distribution
			C04: Analyze experimental data with problems related to testing hypothesis
			CO5: Calculate pre defined curve with the given data
			CO6: Apply sampling distribution concept for small sample and large samples
5	**II-I**	**Fluid Mechanics**	**CO1**: Identify the properties and statistics of fluids
			CO2: Relate the kinematics and dynamics flows of fluids
			CO3: Solve the flow measurement in pipes, notches and weirs
			CO4: Conclude the losses, HGL,TEL line and network in pipe
			CO5:Classify the laminar and turbulent flows in pipes
			CO6: Analyze boundary layer concept.
6	**II-I**	**Surveying Lab**	**CO1**: Calculate the area & plot by chain and compass, also determine the distance between two inaccessible points
			CO2: Sketch the area and determine the levels by using different methods of plane and leveling.
			CO3: Analyze the **different angles & levels using Theodolite**
			CO4: Measure the Heights & Distances, Elevations and distance between two inaccessible points using tachometric principles & Total station.
			CO5: Determine the **area & contour using Total station**
			CO6: Prepare a stake out and curves using total station.
7	**II-I**	**Strength of Materials Lab**	**CO1: Configure & Operate** a data acquisition system using various testing machines of solid materials
			CO2: Estimate the elastic constants through compression test on springsAnd deflection test on beam
			CO3: Perform Tension, shear and torsion test on solid materials
			CO4: Determine the Toughness of the material using CHARPY and IZOD Test.
			CO5: Determine the Brinnell **and Rockwell hardness number of the given**

			specimen
			CO6: Compute and Analyze engineering values (e.g. stress or strain) from laboratory measurements
8	**II-I**	**Engineering Geology Lab**	**CO1: Describe** the different groups, Physical properties of minerals & Identify the crystal and crystal systems.
			CO2: Recognize the different properties of minerals
			C03: Examine the properties of Igneous Rocks
			CO4: Examine the properties of Sedimentary Rocks
			CO5:Examine the properties of Metamorphic Rocks
			CO6: Evaluate the topographical features, Identify symbols in maps & simple Structural geology Problems.
9	**II-II**	**Basic Electrical and Electronics Engineering**	**CO1: Analyze** and solve electrical circuits using network laws
			CO2: Identify components of Low Voltage Electrical Installations
			CO3: Analyze single phase and three phase transformers circuits.
			CO4: Illustrate the working principles of Electrical Machines, Understand different excitation of DC machines
			CO5: Design of PN Junction Diode and its applications
			CO6: Explanation about BJT and FET
10	**II-II**	**Basic Mechanical Engineering for Civil Engineers**	**CO1: Identify** the role of civil engineer in society and to relate the various disciplines of Civil Engineering.
			CO2: Explain different types of buildings, building components, building materials and building construction
			CO3: Summarize the basic infrastructure services MEP, HVAC, elevators, escalators and ramps

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			CO4: Analyze thermodynamic cycles and calculate its efficiency
			CO5: Illustrate the working and features of IC Engines
			CO6: Explain the working of power transmission elements
11	**II-II**	**Building Materials, Construction and Planning**	**CO1: Define** the basic terminology that is used I n the industry
			CO2: Categorize different building materials, properties and their uses
			CO3: Understand the prevention of damage measures and good workmanship.
			CO4: Explain different building services.
			CO5: List the construction materials.
			CO6: Explain different construction techniques.
12	**II-II**	**Strength of Materials-II**	**CO1: Judge** the effect of torsion in shafts and springs.
			CO2: Classify springs and solve deflection in spring.
			CO3: Analyze the crippling load and equivalent length for various types of columns of different end conditions.
			CO4: Analyze strength and stability of structural members subjected to Direct, and Direct and Bending stresses.
			CO5: Analyze the thin and thick cylindrical shells.
			CO6: Analyze the different methods of unsymmetrical bending analysis and concept of shear center.
13	**II-II**	**Hydraulics & Hydraulic Machinery**	**CO1: Apply** their knowledge of fluid mechanics in addressing problems in open channels.
			CO2: Understand and solve problems in uniform, gradually and rapidly varied flows in open channel in steady state conditions.
			CO3: Apply dimensional analysis and to differentiate the model, prototype and similitude conditions

			for practical problems.
			CO4: Apply their knowledge of hydraulics and hydraulic machinaryin addressing problems in hydraulic machinery.
			CO5: Analyze the hydraulic turbines & hydropower plant
			CO6: Analyze the pumps
14	**II-II**	**Structural Analysis-I**	**CO1: Define** stress parameters and state theories of analysis
			CO2: Understand determinacy and indeterminacy aspects to consider for a total structural system
			CO3: Apply Knowledge of mathematics, science and engineering
			CO4: Analyze the statically determinate bars and continuous beams
			CO5: Examine the stiffness parameters in beams and pin jointed trusses
			CO6: Formulate, and **solve** engineering problems with real time loading
15	**II-II**	**Computer aided Civil Engineering Drawing**	**CO1: Use** the Autocad commands for drawing 2D & 3D building drawings required for different civil engg applications.
			CO2: Plan and **draw** Civil Engineering Buildings as per aspect and orientation.
			CO3: Presenting drawings as per user requirements and **preparation** of technical report
			CO4: Use of Auto cad and basic drawing fundamentals
			CO5: Modified tools are used for designing new building models.
			CO6: Illustrate other tools (Layers, dimensions, texting etc.)
16	**II-II**		**CO1: Explain** the effect of fluid properties on a flow system.
			CO2: Examine types of fluid flow patterns and describe continuity equations

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			CO3: Analyze a variety of practical fluid flow, measuring devices and utilize fluid mechanics principles in design.
			CO4: Select and **analyze** appropriate turbines with reference to given situations in power plants.
			CO5: Estimate performance parameters of a given centrifugal and reciprocating pump.
			CO6: Demonstrate boundary layer concepts.
17	**II-II**		**CO1:Analyze** a given network by applying various electrical laws
			CO2: Evaluate the performance characteristics of DC &AC electrical machines
			CO3: Examine methods to measure 3-Φ active power and reactive power
			CO4: Determine the foreword and reverse bias of diode
			CO5: Explain the input and output waveforms for a full wave rectifier and half wave rectifier
			CO6: Explain the input and output characteristics if CE,CB,CC configuration
18		**Gender Sensitization Lab (C2210)**	**CO1: Define** Gender-Basic Gender Concepts and Terminology.
			CO2: Describe the critical perspective on the socialization of men and women.
			CO3: Determine the information about some key biological aspects of genders.
			CO4: Choose and expose the students to debates on the politics and economics of work.
			CO5: Justify and help students reflect critically on gender violence.
			CO6: Develop the students in a sense of appreciation of women in all walks of life.
19	**III-I**	**Sructural Analysis-II**	**CO1**:Determine horizontal thrust and bending moments of two hinged arches
			CO2: Analyze statically indeterminate beams and portal frames using classical methods
			CO3: Analyze the multi storey frames using approximate methods

			CO4: Analyze the cables and suspension bridges
			CO5: Analyze the beams, pin jointed determinate plane frames and portal frames by matrix methods
			CO6: Draw the influence line diagrams for indeterminate beams
20	**III-I**	**Geotechnical Engineering**	**CO1**: Describe **the formation of soil and classification of the soils**
			CO2: Differentiate **Index Properties of Soil**
			CO3: Examine **stress distribution in Soil by using different Theories**
			CO4:Categorize **the Compaction equipment used in Soil problems**
			CO5: Estimate **Degree of consolidation using1-D consolidation theory**
			CO6: Derive **the Shear strength of any type of Soil**
21	**III-I**	**Structural Engineering-I**	**CO1**: Design the singly reinforced, doubly reinforced and flanged sections.
			CO2: Design the one-way and two-way slabs
			CO3: Design the axially loaded, uniaxial and biaxial bending columns
			CO4: Design the isolated square, rectangular and circular footings
			CO5: Explain between concepts of limit state of collapse and limit state of serviceability
			CO6: Design types of staircase and design doglegged staircase.
22	**III-I**	**Transportation Engineering**	**CO1**: Apply **the knowledge of mathematics, science and engineering in the areas of trafficengineering, highway development and maintenance**
			C02: Design **of highway geometric**
			CO3: Design flexible and rigid highway pavements for varying traffic compositions
			C04: Analyze **intersections designs and traffic signal by Webster method**
			CO5: Design, conduct experiments to assess the suitability of the highway materials like soil,bitumen, aggregates and a variety of bituminous mixtures
			CO6: Differentiate between types of pavements, their construction, design principles
23	**III-I**	**Concrete Technology**	**CO1: Describe** The physical and chemical property of Cement and Admixtures
			CO2: Explain the different type of Aggregates their Physical and Mechanical property
			CO3: Examine the various fresh property of Concrete

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			CO4: Analyze the hardened property of concrete and NDT Tests
			CO5: Asses the Engineering property of special Concrete
			CO6: Develop the various method of Mix designs
24	**III-I**	**Engineering Economics and Accountancy**	**CO1: Illustrate** demand and Supply function
			CO2: Explain the concepts National Income & Inflation
			CO3: Analyze and solve capital budgeting techniques
			CO4: Analyze and solve Leverages with Problems
			CO5: Asses the financial Statements and Summarize
			CO6: Discuss on Industrial Policies
25	**III-I**	**Highway Engineering and Concrete Technology Lab**	**CO1: Test** the different properties of cement
			CO2: Examine the different properties of Fine aggregate.
			CO3: Examine the different properties of Course aggregate.
			CO4: Measure the Slump, compaction factor, Flow ability of fresh concrete
			CO5: Predict the compressive load, Flexure, Split tensile, Modulus of elasticity of concrete.
			CO6: Analyze the different properties of Bitumen concrete.
26	**III-I**	**Geotechnical Engineering Lab**	**CO1: Predict** the atter berg's limit, Field density by core cutter & sand replacement.
			CO2: Determine the specific gravity of soil & permeability of soil.
			CO3: Examine the Standard protractors compaction test, Coefficient of consolidation.
			CO4: Calculate the density of soil by unconfined compressive test.

			CO5: Assess the shear strength in direct shear and vane shear.
			CO6: Calculate the swell index DFSI.
27	**III-I**	**Advanced Communication Skills Lab**	**CO1**: Apply listening abilities of the students, and teach basic listening strategies.
			CO2: Sensitize students to the nuances of English speech sounds ,word accent, intonation and rhythm
			CO3: Evaluate students to learn and identity faulty pronunciation
			CO4: Communicate effectively using verbal and non-verbal communication skills
			CO5: Expose students to a number of different listening situations through activities
			CO6: Recognize culture-specific perspectives and values embedded in language make students interpret authentic texts of different genres
28	**III-II**	**Hydrology & Water Resources Engineering**	**CO1: Describe** the basic Knowledge of hydrology.
			CO2: Explain abstractions from rainfall
			CO3: Determine the importance of different types of Hydrographs.
			CO4: Explain importance and occurrence of Groundwater.
			CO5: Analyze the importance of irrigation and their types, methods of application of irrigation water.
			CO6: Determine the classification of canals, design of irrigation canals, IS standards for a canal design canal lining.
29	**III-II**	**Environmental Engineering**	**CO1: Define** characteristics of water and wastewater and their impacts
			CO2: Estimate quantities of water and waste water and plan convey and components
			CO3: Design components of water and wastewater treatment plants
			CO4: Understand the issues of air pollution and control

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			CO5: Tell about the knowledge of sewerage water.
			CO6:Design components of BOD & COD
30	**III-II**	**Foundation Engineering**	**CO1: Define** terminology in exploration and state earth pressure theories
			CO2: Understand the principles and methods of Soil Exploration
			CO3: Examine suitable soil exploration technique
			CO4: Conclude suitable location and depth for a foundation
			CO5: Decide the suitability of soils and check the stability of slopes
			CO6: Estimate pile load carrying capacity
31	**III-II**	**Structural Engineering-II**	**CO1: Explain** the fundamental of steel structures and limit state method
			CO2: Design and analysis the bolted and welded connections.
			CO3: Design and analysis of steel tension and compression members
			CO4: Design and analysis the beams including built-up section and beam connections
			CO5: Design the various components of welded plate girder including stiffeners
			CO6: Design and classify the structural steel components of industrial building.
32	**III-II**	**Pre stressed Concrete**	**CO1: Describe** the process of pre stressing
			CO2: Determine various pre stressing techniques
			CO3: Analyze design of pre stressed structural elements as per the IS code provisions
			CO4: Describe the basic properties of pre stressed concrete
			CO5: Design of pre stressed concrete members for shear

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			CO6: Calculate the pre stressed losses
33	**III-II**	**Industrial management for Engineers**	**CO1: Identify** the basic management concepts and Theories
			CO2: Apply the organization principles for different organization structures
			CO3: Analyze production systems and Value .analysis
			CO4: Asses the Statistical Quality Control
			CO5: Explain the need for ratio Job Evaluation in Modern Organization
			CO6: Estimate the PERT & CPM Techniques for Projects
34	**III-II**	**Environmental Engineering Lab**	**CO1: Describe** PH in water and their properties with different samples.
			CO2: Calculate Electrical Conductivity in water.
			CO3: Determine certain properties of water using the concepts of alkalinity and acidity.
			CO4: Test Water Quality.
			CO5: Examine and Estimate of water, waste water, and Industrial water.
			CO6: Examine Sound Level.
35	**III-II**	**Computer Aided Design Lab**	**CO1: Analyze**& design the determinant structures, fixed & continuous beams, plane frames in staad software.
			CO2: Analyze& design the space frame, residential building subjected to all loads.
			CO3: Analyze& design the roof truss, built up steel beams
			CO4: Prepare a design program for foundation using Excel spread sheet
			CO5: Analyze the Detailing of RCC beam and RCC slab

			CO6: Analyze the Detailing of Steel built up compression member.
36	**IV-I**	**Estimation, Costing and Project Management**	**CO1: Recognize** technical specifications for various works to be performed for a project
			CO2: Evaluate quantities of constituents, derive their cost rates and build up the overall cost of the structure.
			CO3: Select competitive bidding works and understand to submit a competitive bid proposal
			CO4: Summarize optimize construction of projects based on costs
			CO5: State construction projects are administered with respect to contract structures and issues
			CO6: Predict forward ideas and understandings to others with effective communication processes of estimation
37	**IV-I**	**Ground Improvement Techniques**	**CO1: Describe** PH in water and their properties with different samples.
			CO2: Calculate Electrical Conductivity in water.
			CO3: Determine certain properties of water using the concepts of alkalinity and acidity.
			CO4: Professional knowledge on the role of labor and labor laws.
			CO5: Understanding the laws relating to Intellectual Properties and there rights.
			CO6: Evaluate the Labor legislations and acts
38	**IV-I**	**Irrigation & Hydraulic Structures**	**CO1**: Know **types of water retaining structures for multiple purposes**
			CO2 Explain **The Characteristics Of Gravity Dam**
			CO3: Examine **The Earthen Dams ,Spillways And Energy Dissipations Works.**
			CO4: Discuss The Irrigation System And Its Requirements
			CO5: Design Of Diversion Head Works By Using Creep's Theory
			CO6: Design Of A Irrigation System Components
39	**IV-I**	**Principles of Entrepreneurship**	**CO1**: State the importance of entrepreneurship
			CO2: Discuss the Financing and Managing the new venture

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			CO3: Identify the Industrial financial Support
			CO4: State the production management
			CO5: State the marketing management
			CO6: Evaluate the Labor legislations and acts
40	**IV-I**	**Professional Practice law & Ethics**	**CO1**: Understanding basic purpose of profession, professional ethics and various moral and social issues.
			CO2: Awareness and importance of contracts and there essential elements of valid contracts, lawful and illegal agreements
			CO3:Acquiring knowledge on various roles of the Arbitration and conciliation, negotiation, mediation judicial proceedings and Lok Adalats.
			CO4: Professional knowledge on the role of labor and labor laws.
			CO5: Understanding the laws relating to Intellectual Properties and there rights.
			CO6: Excelling in competitive and challenging environment to contribute to industrial growth as well as personal knowledge over the laws relating to professional practice.
41	**IV-I**	**Industrial Oriented Mini Project**	**CO1: Apply** technical knowledge gained from previous courses
			CO2: Understand equipment usage in the laboratory concerned with the project
			CO3: Apply project management skills (Scheduling work, procuring parts and documenting expenditures and working within the confines of a dead line)
			CO4: Analyze develop and demonstrate methodology used for the experiments for the concerned projects in civil engineering
			CO5: Illustrate technical information by means of written and oral reports
			CO6: Select an extended independent investigation that results in the production of a project report.
42	**IV-I**	**Seminar**	**CO1: Judge** the current civil engineering research/techniques/developments inter disciplinary areas
			CO2: Examine and organize literature survey utilizing technical resources, journals
			CO3: Evaluate and draw conclusions related to technical content studied

			CO4:Demonstrate the ability to perform critical writing by preparing a technical report
			CO5: Develop technical writing and presentation skills
			CO6: Conclude results with good communication
43	**IV-1**	**Project Stage-I**	**CO1: Apply** technical knowledge gained from previous courses
			CO2: Understand equipment usage in the laboratory concerned with the project
			CO3: Apply project management skills (Scheduling work, procuring parts and documenting expenditures and working within the confines of a dead line)
			CO4: Analyze develop and demonstrate methodology used for the experiments for the concerned projects in civil engineering
			CO5 : Illustrate technical information by means of written and oral reports
			CO6: Select an extended independent investigation that results in the production of a project report.
44	**IV-II**	**Solid Waste Management (C421)**	**CO1: Identify** the physical and chemical composition of solid waste
			CO2: Identify the solid waste management rule 2016
			CO3: Analyze the functional elements solid waste management
			CO4: Understand the techniques and methods used in transformation, conservation, and recovery of materials from solid waste.
			CO5: Identify and design landfill waste disposal system
			CO6: Understand the type, nature and treatment of hazardous wastes.
45	**IV-II**	**Urban Transportation Planning (C422)**	**CO1: Differentiate** urban transportation planning.
			CO2: Design, conduct and administer surveys to provide the data required for transportation planning.
			CO3: Discuss modal split models for mode choice analysis.
			CO4: Measure Calibrate trip generation rates for specific types of land use and developments.

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			CO5: Formulate the analytical and comprehensive approach to select appropriate mode of Transportation and trip generation.
			CO6: List the basics of route assignment and their techniques.
46	**IV-II**	**Basics Of Power Plant Engineering (C423)**	**CO1: Describe** Different types of Power Plants, site selection criteria of each one of them.
			CO2: Understandthe Thermal Power Plant Operation, turbine governing, different types of high pressure boilers including supercritical and supercharged boilers, Fluidized bed combustion systems.
			CO3: Design of chimney in thermal power plants, knowledge of cooling tower operation, numerical on surface condenser design.
			CO4: Describe Different types of Nuclear power plants including Pressurized water reactor, Boiling water reactor, gas cooled reactor, liquid metal fast breeder reactor.
			CO5: Understand the Power Plant Economics, Energy Storage including compressed air energy and pumped hydro etc.
			CO6: Discuss environmental and safety aspects of power plant operation
47	**IV-II**	**Project Stage-II**	**CO1: Recommend** comprehensive use of the technical knowledge gained from previous courses
			CO2: Understand equipment usage in the laboratory concerned with the project
			CO3: Apply project management skills (Scheduling work, procuring parts and documenting expenditures and working within the confines of a dead line)
			CO4: Analyze develop and demonstrate methodology used for the experiments for the concerned projects in civil engineering
			CO5: Develop technical information by means of written and oral reports
			CO6: Examine an extended independent investigation that results in the production of a project report.

Electrical & Electronics Engineering I & II Sem Course Outcomes for the Academic Year 2022-23

S.No	Year/ Sem	Course Name	Course Outcomes
1	II-I	ELECTRICAL CIRCUIT ANALYSIS	**CO1:**Apply network theorems for the analysis of electrical circuits.
			CO2: Analyze the transient and steady-state response of electrical circuits
			CO3: Analyze circuits in the sinusoidal steady-state (single-phase and three-phase).
			CO4: Analyze two port circuit behaveour.
			CO5: Compare the circuit in a.c and d.c circuit
			CO6: Apply network theorems for the analysis of electrical circuits.
2	II-I	ELECTRICAL MACHINES - I	**CO1:**List out the advantages of 4-point starter over 3-point starter?
			CO2 What do you understand from the term armature reaction? Describe the role of compensating windings in dc generators?
			CO3 Explain the procedure of Hopkinson's Test? Mention its advantages and Disadvantages.
			CO4: Illustrate the working principle of single phase Transformer and also explain the constructional details.
			CO5:A DC series motor is running with a speed of 1000 RPM while taking a current of 30 Afrom the supply. If the load is changed such that the current drawn by the motor is increased to 70 A, estimate the speed of the motor on new load. The armature and series field winding resistances are 0.25 ohms and 0.35 ohms respectively. Assume theflux produced is proportional to the current. Take supply voltage as 260 V.
			CO6: Distinguish between GNA and MNA. Describe the role of interpoles in a DC generator.
3	II-I	ELECTROMAGNETIC FIELDS	**CO1:**State the basic lows of electric field and magnetic field.
			CO2: Discus the electric and magnetic fields for simple configurations under static conditions.
			CO3: Solve problems on Lorentz force equation and analyze the torque on a current loop in a magnetic field.
			CO4: Analyze time varying electric and magnetic fields
			CO5: Evaluate the propagation of Electromagnetic Waves.
			CO6: Analyze the scalar and vector magnetic potential, their

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			Limitations.
4	II-I	ENGINEERING MECHANICS	**CO1:**Define the knowledge of Mathematics & Mechanics in composition of Force system in different bodies
			CO2: Summarize different types of friction acting on surfaces.
			CO3: Calculate centre of gravity and area moment of inertia of composite bodies
			CO4: Solve practical problems on motion of bodies
			CO5: Evaluate Work and Energy equation to solve practical problems
			CO6: Apply D'alemberts Principle on rigid bodies in Motion
5	II-I	ANALOG ELECTRONICS	**CO1:**Determine the foreword and reverse bias of diode
			CO2:Studying the input and output wave forms for a full wave rectifier and half wave rectifier
			CO3: Studying the input and output characteristics if CE,CB,CC configuration
			CO4: Studying the h parameters of CE,CB,CC configuration
			CO5:Design different modes using 741 IC
			CO6:Study the operation of oscillators and power amplifiers
6	II-I	ELECTRICAL MACHINES LAB - I	**CO1:**List the concepts Start and control the Different DC Machines.
			CO2:Describe the concepts and performance of different machines using different testing methods
			CO3:Demonstrate different conditions required to be satisfied for self - excitation of DC Generators.
			CO4:Analyze the Performance curves of DC machines
			CO5:Evaluate the efficiency of different DC machines.
			CO6:Develop the ability to work effectively in groups to troubleshoot and analyze electrical machines.
7	II-I	ANALOG ELECTRONICS LAB	**CO1:**Determine the foreword and reverse bias of diode
			C02: Studying the input and output wave forms for a full wave rectifier and half wave rectifier
			CO3: Studying the input and output characteristics if CE,CB,CC configuration
			CO4:Studying the h parameters of CE,CB,CC configuration
			CO5:Design different modes using 741 IC
			CO6: Study the operation of oscillators and power amplifiers
			CO1: Analyze complex DC and AC linear circuits

8	II-I	ELECTRICAL CIRCUITS LAB	**CO2:**Apply concepts of electrical circuits across engineering
			CO3: Evaluate response in a given network by using theorems
			CO4: Design electrical systems by applying various Network Theorems
			CO5: Calculate three phase Active and Reactive power.
			CO6: Calculate the locus diagrams
9	II-II	LAPLACE TRANSFORMS, NUMERICAL METHODS & COMPLEX VARIABLES	**CO 1: Use** the Laplace transforms techniques for solving ODE's
			CO 2: Find the root of a given equation
			CO 3: Estimate the value for the given data using interpolation
			CO4: Find the numerical solutions for a given ODE's
			CO 5: Analyze the complex function with reference to their analyticity, integration **using Cauchy**'s integral and residue theorems
			CO 6: Taylor's and Laurent's series expansions of complex function
10	II-II	ELECTRICAL MACHINES – II	**CO 1:** List the various losses occurring in a three phaseinduction motor?
			CO 2: Explain the principle and operation of three phase induction motor?
			CO 3: Describe the constructional features of both slip ring and squirrel cage induction motor. Discuss the merits of one over the other.
			CO 4: A 3- Phase induction motor is wound for 4 poles and is supplied from 50Hz system. Calculate i) Synchronous speed ii) Rotor speed, when slip is 4% iii) Rotor frequency when rotor runs at 60 rpm.
			CO 5: Explain about the construction of circle diagram and from that explain how to find the performance of three phase inductionmotor?
			CO6: Design the torque slip characteristics of three phaseinduction motor?
11	II-II	DIGITAL ELECTRONICS	**CO1:** Understand working of logic families and logic gates.
			CO2: Apply Boolean algebra to design combinational functions using postulates
			CO3: Design and implement Sequential logic circuits
			CO4: Analyze the process of Analog to Digital conversion and Digital to Analog conversion

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			CO5: Implement Boolean Functions using PLDs
			CO6: Design the Memory cells using PLDs
12	II-II	CONTROL SYSTEMS	**CO1:** Design simple feedback controllers
			CO2: Design time response parameters of second order system.
			CO3: Understand the concept of stability
			CO4: Apply various time domain techniques to assess the system performance
			CO5: Apply various frequency domain techniques to assess the system performance
			CO6: Test system controllability and observability using state space representation and application
13	II-II	POWER SYSTEM - I	CO1: Illustrate the different types of Conventional power generating stations
			CO2: Describe the different types of Non-Conventional power generating stations
			CO3: Evaluate the power tariff methods.
			CO4: Explain the concept of Overhead Line Insulators, underground cables and corona.
			CO5: Calculate the electrical circuit parameters of transmission lines
			CO6: Analyze the AC distribution and dc distribution systems.
14	II-II	DIGITAL ELECTRONICS LAB	**CO1:** Understand working of logic families and logic gates.
			CO2: Design and implement Combinational and Sequential logic circuits.
			CO3: Understand the process of Analog to Digital conversion and Digital to Analog conversion.
			CO4: Able to use PLDs to implement the given logical problem.
			CO5: Impart to student the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines
			CO6: Implement synchronous state machines using flip-flops.
15	II-II	ELECTRICAL MACHINES LAB - II	**CO1:** Identify the different **machines and its characteristics**
			CO2: Describe the concepts and performance of AC machines using different testing methods
			CO3: Demonstrate different conditions required to be satisfied for Parallel
			CO4:operation of AC Machines
			CO5: Analyze **the Performance curves of AC machines**

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			CO6: Evaluate the efficiency and voltage regulation of AC machines
16	**II-II**	**CONTROL SYSTEMS LAB**	**CO1:** Analyze characteristics of various types of systems.
			CO2: Derive a Mathematical model for Various **Systems Using Suitable methods**
			CO3: Design and verify Lag, Lead, Lead-Lag compensators experimentally
			CO4: Analyze the effect of P, PI, PD and PID controllers on a control system
			CO5: Analyze and interpret stability (Bode, Root Locus, **Nyquist)of Linear Time Invariant system using suitable software**
			CO6: Analyze the effect of PLC Trainer Kit for the Verification of Logic Gates
17	**III-I**	**POWER ELECTRONICS**	**CO1:** State the difference between signal level and power level devices.
			CO2: Describe full wave rectifier circuits with different loads
			CO3: Analyze dc chopper circuits.
			CO4: Evaluate the operation & THD of single and three phase Inverter.
			CO5: Analyze the ac voltage controller with different load.
			CO6: Design half controlled and un controlled rectifiers.
18	**III-I**	**POWER SYSTEM-II**	**CO1:** Analyze Transmission line Performance.
			CO2: Apply Load compensation technique to control reactive power.
			CO3: Explain About Per unit quantities.
			CO4: Describe the concept of Travelling waves.
			CO5: Design over voltage protection and insulation coordination
			CO6: Calculate fault currents for symmetrical load.
19	**III-I**	**MEASUREMENTS AND INSTRUMENTATION**	**CO1:** Illustrate types of measuring **instruments, their construction, operation and characteristics**
			CO2: Analyze various Instrument transformers and different types of **Potentiometers.**
			CO3: Estimate types of energy meter and wattmeter and their error
			CO4: Classify various dc bridges and its operation
			CO5: Solve ac bridges and its operation.
			CO6: Explain Various types of transducers.

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20	III-I	HIGH VOLTAGE ENGINEERING (PROFESSIONAL ELECTIVE-I)	**CO1:** Explain the various theories of breakdown processes in solid, liquid and gaseous insulating materials
			CO2: Demonstrate generation of D.C., A.C., & Impulse voltages
			CO3: Demonstrate Measurement of D.C., A.C., & Impulse voltages
			CO4: Justify how over-voltages and over current arise in a power system
			CO5: Experiment Conduction of different tests on H. V. equipment and on insulating materials, as per the standards
			CO6: Estimate and control of electric field stress in high voltage engineering
21	III-I	BUSINESS ECONOMICS AND FINANCIALANALYSIS	**CO1:** Define and identify the business environment and sources of capital
			CO2: Illustrate demand and Supply function
			CO3: Analyze production Function and cost analysis
			CO4: Asses the financial Statements and Summarize
			CO5: Design the **Business establishment in organizations**
			CO6: Explain the need for ratio Analysis and interpret
22	III-I	POWER SYSTEM SIMULATION LAB	**CO1:** Analyze Transmission line Performance .
			CO2: Apply load compensation technique to control reactive power.
			CO3: Explain about Per unit quantities.
			CO4: Design over voltage protection and insulation coordination
			CO5: Calculate fault currents for symmetrical load.
			CO6: Describe the concept of Travelling waves.
23	III-I	POWER ELECTRONICS LAB	**CO1:** Conduct a suitable test which has low gate drive requirement lower **switching smaller snubber circuit requirements.**
			CO2: Draw the performance characteristics of SCR, MOSFET and IGBT.
			CO3: Perform a suitable test where the forward break-over voltage reduces with gate current.
			CO4: Analyze the circuit which is used in lower power high frequency applications.
			CO5: Justify the waveform which is used to vary the ac voltage smoothly and as desired
			CO6: Design the wave forms of a forced commutation circuit where variable dc output voltage obtained.
		MEASUREMENTS AND	**CO1:**Analyse the performance of various meters for calibration and test single Phase energy meter.

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24	III-I	INSTRUMENTATION LAB	**CO2:**Illustrate the calibration of power factor for various loads.
			CO3: Examine methods to measure 3-Φ active power and reactive power.
			CO4: Test the dielectric strength of oil
			CO5: Examine various methods to measure resistance, inductance and capacitance.
			CO6: Analyze the concept of transducers
25	III-I	ADVANCED COMMUNICATION SKILLS LAB	**CO1:**Use Formal Vocabulary & Body language during Role-plays/presentations/Group Discussions/Interviews.
			CO2: Recognize Problems/Solutions/ Usage of Words/ Gist/ Main/ Topic/Supporting/ Conclusion Sentences/Ideas from the passage.
			CO3: Prepare E-mails/Resumes/Letters/Technical/Project Reports
			CO4: Recall the Problems/ Solutions/Information/Ideas/Points while giving Seminars/Presentations/Debate/GD/Exams/Interviews.
			CO5: Test their speaking skills with clear Accent, stress& Intonation/Confidence level.
			CO6: Choose Proper Audio-Visual aids/ Formal Language during PPT Presentations/Seminars/ JAM/ Conversations.
26	III-II	Fundamentals of Internet of Things-OE-I (C321-I)	**CO1:**Determine Characteristics and Design of IOT
			CO2: Recognize Communication protocols and Sensor Networks of IOT
			CO3: Program and configure Arduino boards for various designs.
			CO4: Develop Programs and Interface Raspberry PI using Python
			CO5: Determine the possible solutions offered by SDN for IOT
			CO6: Infer the advantages of using IOT using various case studies for business solutions and to the society
27	III-II	Power Semi conducter Drives- PE-II (C322)	**CO1:**Identify the drawbacks of speed control of motor by conventional methods.
			CO2: Understand Ac motor drive speed–torque characteristics using different control strategies its merits and demerits
			CO3: Differentiate Phase controlled and chopper-controlled DC drives speed-torque characteristics merits and demerits
			CO4: Understand voltage source inverter and current source inverter
			CO5: Describe Slip power recovery schemes.
			CO6: Control of synchronous motor drives
			CO1: Represent & classify signals, Systems & identify LTI systems
			CO2: Derive Fourier series for continuous time signals

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28	III-II	SIGNALS AND SYSTEMS	**CO3: Find Fourier transform for different signals**
			CO4: Analyse the Continuous Time systems by performing Convolution
			CO5: Understand Discrete-time systems and LTI systems
			CO6: Analyse DT systems & their realization using Z-transforms
29	III-II	MICROPROCESSORS & MICROCONTROLLERS	**CO1**: Identify the Functional blocks of 8086 and 8051
			CO2: Discuss various addressing modes & instructions set of 8086 and 8051
			CO3: Generation of wave forms using DAC
			CO4: Demonstrate the Register structure of ARM
			CO5: Draw the Architectures of ARM, CORTEX and OMAP
			CO6: Compare CORTEX and OMAP processors
30	III-II	POWER SYSTEM PROTECTION	**CO1**: Compare and contrast electromagnetic, thermal relays
			CO2: Apply technology to protect various power system component
			CO3: Apply different relaying schemes for protection of AC machines and bus bar zone
			CO4: Compare and contrast static, microprocessor based relays
			CO5: Analyze quenching mechanisms used in air, oil and vacuum circuit breakers
			CO6: Analyze different neutral grounding methods for protection of power system components
31	III-II	POWER SYSTEM OPERATION AND CONTROL	**CO1**: To understand bus classification and develop Nodal admittance matrix.
			CO2: To evaluate load flow methods for various requirements of power system.
			CO3: To understand the operation and control of power systems
			CO4 : To understand and analyze load frequency control of single and two area systems
			CO5: To understand and analyze whether the power system is stable or instable.
			CO6: To describe load forecasting techniques and understand the need of computer control of power system.
32	III-II	POWER SYSTEM LAB	**CO1**: Analyze the performance of transmission line
			CO2: Able to do Experiment in various protection of generator, feeder and transmission Line using relays and circuit breakers
			CO3: Able to conduct testing about the various electromagnetic relays
			CO4: Be competent in use of static and digital relays
			CO5: Develop simulation model for load flows

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			CO6: Testing of CT, PT's and Insulator strings
33	**III-II**	**MICROPROCESSORS & MICROCONTROLLERS LAB**	**CO1**: Apply the fundamentals of microprocessors & microcontrollers to write assembly language programming.
			CO2: Apply the programming knowledge for arithmetic operations in 8086.
			CO3: Develop the programs for Logical operations
			CO4: Develop the programs for string manipulation programs
			CO5: Apply the programming knowledge for arithmetic operations in 8051
			CO6: Design different I/O devices interfaced to 8051&8086.
34	**III-II**	**SIGNALS AND SYSTEMS LAB**	**CO1**: Represent & classify signals, Systems & identify LTI systems
			CO2: Derive Fourier series for continuous time signals
			CO3: Find Fourier transform for different signals
			CO4: Analyse the Continuous Time systems by performing Convolution
			CO5: Understand Discrete-time systems and LTI systems
			CO6: Analyse DT systems & their realization using Z-transforms
35	**IV-I**	**PRINCIPLES OF ENTREPRENEURSHIP (OPEN ELECTIVE-II)**	**CO1**: Describe the nature of Entrepreneurships
			CO2: Identify the Entrepreneurial concepts and managing the New venture
			CO3: Discuss the Industrial financial Support
			CO4: Summarize the production and marketing Management
			CO5: Evaluate the labour legislation Act
			CO6: Explain about legislation acts of India
36	**IV-I**	**HVDC TRANSMISSION (PROFESSIONAL ELECTIVE-IV)**	**CO1**: Explain necessity of DC transmission over AC and modern trends in DC transmission
			CO2: Analyze Graetz circuit for rectifier and inverter modes
			CO3: Interpret HVDC system control and describe various sources of reactive power
			CO4: Assess modeling of AC-DC system under steady state
			CO5: Describe various converter faults and protection methods

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			CO6: Illustrate design objectives of filter and state different types of harmonics
37	IV-I	FUNDAMENTALS OF MANAGEMENT FOR ENGINEERS	CO1: Identify the basic management concepts
			CO2: Differentiate the different types of plans Understand
			CO3: The organization principles for different organization structures
			CO4: Evaluate and choose the different leadership styles to reach org goals
			CO5: Formulate different controlling techniques for complex organizations
			CO6: Classify the motivational theories suitable for HR Issues
38	**IV-I**	**ELECTRICAL &ELECTRONICS DESIGN LAB**	**CO1**: Enhance practical knowledge related to Electrical
			CO2: Describe Fabrication of Basic electrical circuit elements/networks
			CO3: Demonstrate Trouble shoot the electrical circuits
			CO4: Choose hardware skills such as soldering ,wiring etc.
			CO5: Evaluate debugging skills
			CO6: Design filter circuit for application
39	**IV-I**	**INDUSTRIAL ORIENTED MINI PROJECT/ SUMMER INTERNSHIP**	**CO1**: Ability to develop simulation model and implement an investigative project for a given general objectives and guidelines
			CO2: In-depth skill to use some laboratory, modern tools and techniques.
			CO3: Ability to analyze data to produce useful information and to draw conclusions by systematic deduction.
			CO4: Facilitate significant individualized interactions between faculty members and students through a multi-term research experience
			CO5: Ability to communicate results, concepts, analyses and ideas in written and oral form.
			CO6: Conduct an extended independent investigation that results in the production of a project report.
40	**IV-I**	**SEMINAR**	**CO1**: Ability to develop simulation model and implement an investigative project for a given general objectives and guidelines
			CO2: In-depth skill to use some laboratory, modern tools and techniques.
			CO3: Ability to analyze data to produce useful information and to draw conclusions by systematic deduction.
			CO4: Facilitate significant individualized interactions between faculty members and students through a multi-term research experience
			CO5: Ability to communicate results, concepts, analyses and ideas in written and oral form.
			CO6: Conduct an extended independent investigation that results in the production

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			of a project report.
41	IV-I	PROJECT STAGE – I	**CO1**: Ability to develop simulation model and implement an investigative project for a given general objectives and guidelines
			CO2: In-depth skill to use some laboratory, modern tools and techniques.
			CO3: Ability to analyze data to produce useful information and to draw conclusions by systematic deduction.
			CO4: Facilitate significant individualized interactions between faculty members and students through a multi-term research experience
			CO5: Ability to communicate results, concepts, analyses and ideas in written and oral form.
			CO6: Conduct an extended independent investigation that results in the production of a project report.
42	IV-II	ENVIRONMENTAL IMPACT ASSESSMENT (OPEN ELECTIVE-III)	**CO1**: Identify the environmental attributes to be consider for the eia study
			CO2: Identify the methodology to prepare rapid eia
			CO3: illustrate eia reports and environmental management plan
			CO4: Explain the various types of environmental protection act
			CO5: Discuss case study of environmental development activity
			CO6: Identify the case studies of industrial activities
43	IV-II	POWER QUALITY & FACTS (PROFESSIONAL ELECTIVE-V)	**CO1**: escribe the concept of voltage sag transformation from up-stream (higher voltages) to down-stream (lower voltage)
			CO2: Discuss the Concept of improving the power quality to sensitive load by various mitigating custom power devices
			CO3: Analyse the control circuits of Shunt Controllers SVC & STATCOM for various functions viz. Transient stability Enhancement, voltage instability prevention and power oscillation damping
			CO4: Explain the Power and control circuits of Series Controllers GCSC, TSSC and TCSC
			CO5: Explain the concept of Unified Power Flow Controller Basic operating principle
			CO6: Describe the concept of voltage sag transformation from up-stream (higher voltages) to down-stream (lower voltage)
44	IV-II	ELECTRICAL DISTRIBUTION SYSTEMS	**CO1**: To understand the difference between transmission and distribution systems and design considerations of feeders.
			CO2: To evaluate the rating of distribution substation and analyze optimal location of substations

		(PROFESSIONAL ELECTIVE-VI)	**CO3**: To calculate voltage drop and power loss in distribution feeders
			CO4: To understand distribution system protection and coordination of protective devices
			CO5: To understand and analyze compensation for power factor improvement.
			CO6: To describe the importance of voltage control in distribution system.
45	**IV-II**	**PROJECT STAGE – II**	**CO1**: Ability to develop simulation model and implement an investigative project for a given general objectives and guidelines
			CO2: In-depth skill to use some laboratory, modern tools and techniques.
			CO3: Ability to analyze data to produce useful information and to draw conclusions by systematic deduction.
			CO4: Facilitate significant individualized interactions between faculty members and students through a multi-term research experience
			CO5: Ability to communicate results, concepts, analyses and ideas in written and oral form.
			CO6: Conduct an extended independent investigation that results in the production of a project report.

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Department of Mechanical Engineering

CO SUMMARY

Academic Year 2022-23

Course Name (Code)	CO's No.	Course outcome
Mathematics-1 (C111)	C111.1	Analyze the consistency in solving the system of linear equations
	C111.2	Solve Eigen values and Eigen vectors and reducing the Q.F. into canonical form by orthogonal transformation
	C111.3	Analyze the nature of sequence and series
	C111.4	Demonstrate geometrical approach to the mean value theorems
	C111.5	Evaluation of improper integrals using beta and gamma functions
	C111.6	Illustrate maxima and minima of function of two variable
Applied Physics (C112)	C112.1	Describe the Quantum behaviour of matter in its micro levels
	C112.2	Explain various engineering applications of Semiconducting materials
	C112.3	Apply knowledge of semiconductor Physics in working of Optoelectronic devices
	C112.4	Discuss the applications of lasers in fields of Science and Technology
	C112.5	Explain working of optical fibers in communication field
	C112.6	Classify the Magnetic materials and dielectric materials
Programming for Problem Solving (C113)	C113.1	Demonstrate problem solving skills by developing Algorithms.
	C113.2	Define the fundamental concepts in c programming Data Types, Files, Functions, Recursion r
	C113.3	Analyze the code and test a given logic in c programming language.
	C113.4	Demonstrate the use of sequential, selection and repetition statements
	C113.5	State the use of Arrays, pointers, strings and structures to write c program
	C113.6	Compare various searching and Sorting techniques

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Engineering Graphics (C114)	**C114.1**	Develop concepts on Engineering Drawing in order to become professionally efficient . (Create)
	C114.2	understand the theory of projections
	C114.3	improve their spatial imagination skills to develop new products
	C114.4	Draw the interpret, sectioned views and developments of various solids.
	C114.5	Draw the projections of intersecting solids and perform free hand sketching
	C114.6	Prepare 2D and 3D drawings using AutoCAD
Applied Physics Lab (C115)	**C115.1**	Determine Work function of metals
	C115.2	Determine Energy gap Hall-Coefficient of Semiconducting materials
	C115.3	Draw the Voltage-Current Characteristics of Optoelectronic devices
	C115.4	Study the Characteristics of lasers in fields of Science and Technology
	C115.5	Analyze the transmission losses of optical fibers in communication field
	C115.6	Calculate the time constant, quality factors in Electric circuits
Program for Problem Solving Lab(C116)	**C116.1**	State algorithms for programs
	C116.2	Discuss debugging of errors
	C116.3	Demonstrateprograms in arrays ,strings, functions etc Apply
	C116.4	Analyze the usage of pointers to different types
	C116.5	Assess the usage of structures and unions
	C116.6	Develop a program that demonstrates all file operations.
Environmental Science (C117)	**C117.1**	Get the information about ecosystem and also about its functions like Food chain, Ecological pyramids etc.,
	C117.2	Get the knowledge about the different types of resources like land, water, mineral and energy and also about the effects of environment by the usage of these resources
	C117.3	Gain the knowledge about the ecosystem diversity, its values and also about the importance of the endemic species.
	C117.4	Get the complete information about the different methods of protecting the environment.

	C117.5	Gain the knowledge about the different types of pollutions and their control technologies.
	C117.6	Gain the knowledge about different types of pollution and their treatment techniques like waste water treatment, Bio medical waste management etc.,
Mathematics -II (C121)	C121.1	Identify whether the given differential equation of first order is exact or not.
	C121.2	Solve higher differential equation with constant coefficients
	C121.3	Apply the concept to find areas, volumes, centre of mass and Gravity for cubes, sphere and rectangular parallelepiped
	C121.4	Explain gredients,potential functions,directional derivatives of functions of several variables.
	C121.5	Evaluate the line, surface and volume integrals and converting them from one to another .
	C121.6	Apply Gauss, Greens and Stokes theorems
Chemistry (C122)	C122.1	describe the mocular structure, electrical properties crystal field splitting
	C122.2	Express the hardness in various water treatments
	C122.3	Apply the concepts of electrochemistry in batteries
	C122.4	Predict the corrosion theories, affecting factors and it's control
	C122.5	Evaluate the Stereo isomers and reaction pathways
	C122.6	Compose molecule structures with various spectroscopic techniques
Basic Electrical Engineering (C123)	C123.1	Analyze and solve electrical circuits using network laws and theorem
	C123.2	Analyze and solve single phase and Three Phase AC electrical circuits along with phasor
	C123.3	Compare the Ideal and Practical transformers in different aspects
	C123.4	Illustrate the working principles of DC And AC Electrical Machines
	C123.5	Illustrate the components of Low Voltage Electrical Installations
	C123.6	Analyze Construction and working principles of self excited DC Motor and give applications of various DC Machines

Engineering Workshop (C124)	**C124.1**	Design and modeling the different prototypes in carpentry trade like lap and dovetail joint
	C124.2	Design and model of various basic prototypes in fitting trade like square and straight fit
	C124.3	Design and model of various prototypes of Tin smithy such as round tin and rectangle tray
	C124.4	Reframing the House wiring techniques by the help of House wiring study
	C124.5	Execute the new form of metals by using by Black smithy also can see the change in there strengths after heat treatment
	C124.6	Differentiate metal frames by the use of Welding process.
English(C125)	**C125.1**	Develop writing skills with a focus on accuracy to develop error free English
	C125.2	Develop word power to enable to use them in speaking and writing.
	C125.3	Develop reading skills with a focus on developing reading comprehension skills.
	C125.4	Enhance listening and speaking skills
	C125.5	Develop listening skills and demonstrate the same.
	C125.6	Acquire the nuances of behavioral etiquette in a multicultural environment.
Engineering Chemistry Lab(C126)	**C126.1**	Determine the hardness and chloride contents in water
	C126.2	Apply instrumentation techniques like conductometry,potentiometry
	C126.3	Justify the rate constant to study kinetics of reaction
	C126.4	Synthesize drug molecules like aspirin, paracetamol
	C126.5	Calculate Rf values for organic molecules by TLC techniques
	C126.6	Analyse physical properties like acid value, adsorption, viscosity,surface tension and partition coefficient.
English Language and Communications Skills Lab(C127)	**C127.1**	Use English language skills effectively in spoken and written forms.
	C127.2	List out the words and how to pronounce the new words
	C127.3	Describe how to develop the English language skills
	C127.4	Demonstrate the understanding of nuances of English language through audio-visual experience and group activities

	C127.5	Express neutralization of accent for intelligibility
	C127.6	Classify speaking skills with clarity and confidence which in turn enhances their employability skills
Basic Electrical Engineering Lab(C128)	C128.1	Analyze a given network by applying various electrical laws
	C128.2	Test the response of electrical circuits for different excitations
	C128.3	Calculate, measure and know the relation between basic electrical parameters
	C128.4	Analyze the performance characteristics of DC electrical machines
	C128.5	Asses the performance characteristics of AC electrical machines
	C128.6	Examine methods to measure 3-Φ active power and reactive power
Probability & Statistics and complex numbers(C211)	C211.1	Recall the counting principle, axiom basic concepts of probability formula on mean, variance, covariance of discrete and continuous random variable concept of sampling distribution and linear regression analysis
	C211.2	Demonstrate understanding of various probability model and then their properties used for discrete continuous random variable, prediction, confidence interval, various estimators and concept of hypothesis testing.
	C211.3	Solve the probability problems using discrete and continuous random variable, problem related to prediction & confidence interval
	C211.4	Apply method of estimation, linear correlation & regression analysis, goodness of fit and for independence of attributes.
	C211.5	Test the hypothesis for normal, chi-square, t and F distribution, draw conclusion using prediction & confidence interval and by the process of estimation
	C211.6	Define strong weak correlation between variable, choose appropriate method for solution of problem and test of hypothesis for distribution under
Mechanics of Solids(C212)	C212.1	Analyze the behavior of the solid bodies subjected to various types of loading;
	C212.2	Apply knowledge of materials and structural elements to the analysis of simple structures;
	C212.3	Undertake problem identification, formulation and solution using a range of analytical methods;
	C212.4	Analyze and interpret laboratory data relating to behavior of structures and the materials they are made of, and undertake associated laboratory work individually and in teams.

	C212.5	Expectation and capacity to undertake lifelong learning
	C212.6	Predict the behaviour of a given member under the proposed loading conditions.
Production Technology(C214)	**C214.1**	**Understand** the idea for selecting materials for patterns.
	C214.2	Allowances of patterns used in casting and **analyze** the.
	C214.3	**Design** core, core print and gating system in metal casting processes.
	C214.4	**Understand** the arc, gas, solid state and resistance welding processes.
	C214.5	**Develop process**-maps for metal forming processes using plasticity principles
	C214.6	Apply appropriate manufacturing techniques for economic production
Thermodynamics (C215)	**C215.1**	Understand and differentiate between different thermodynamic systems and processes.
	C215.2	Understand and apply the laws of Thermodynamics
	C215.3	types of systems undergoing various processes and to perform thermodynamic analysis
	C215.4	Understand and analyze the Thermodynamic cycles and evaluate performance parameters.
	C215.5	Analyze the problems desigin of the systems.
	C215.6	Apply the laws of thermodynamics to various real life systems
Production Technology lab(C216)	**C216.1**	Understanding the properties of moulding sands and pattern making
	C216.2	Fabricate joints using gas welding and arc welding
	C216.3	Evaluate the quality of welded joints
	C216.4	Basic idea of press working tools and performs moulding studies on plastics.
	C216.5	Explain the working mechanism and design guidelines of different combinational and sequential circuits.
	C216.6	Assess and improve the quality, reliability and safety of manufacturing processes and systems

Machine Drawing Practice(C217)	**C217. 1**	Preparation of engineering and working drawings with dimensions and bill of material during design and development. Developing assembly drawings using part drawings of machine components
	C217. 2	Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.
	C217. 3	Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features
	C217. 4	Title boxes, their size, location and details - common abbreviations and their liberal usage
	C217. 5	Types of Drawings – working drawings for machine parts.
	C217. 6	To create/draw details and assembly of mechanical systems.
MSM & MOS LAB(C218)	**C218. 1**	Analyze the behavior of the solid bodies subjected to various types of loading
	C218. 2	Apply knowledge of materials and structural elements to the analysis of simple structures.
	C218. 3	Undertake problem identification, formulation and solution using a range of analytical methods
	C218. 4	Analyze and interpret laboratory data relating to behavior of structures and the materials they are made of, and undertake associated laboratory work individually and in teams
	C218. 5	Expectation and capacity to undertake lifelong learning.
	C218. 6	Interpret the results obtained.
Constitution of India(C219)	**C219. 1**	Historical perspective of the Constitution of India
	C219. 2	Scheme of the fundamental rights
	C219. 3	Parliamentary Form of Government in India – The constitution powers and status of the President of India
	C219. 4	The historical perspectives of the constitutional amendments in India

	C219.5	The Directive Principles of State Policy – Its importance and implementation
	C219.6	Scope of the Right to Life and Personal Liberty under Article 21
Basic Electrical & Electronics Engineering(C221)	C221.1	Use the Laplace transforms techniques for solving ODE's
	C221.2	Find the root of a given equation. Estimate the value for the given data using interpolation
	C221.3	Find the numerical solutions for a given ODE's
	C221.4	Evaluate the complex function with reference to their analyticity
	C221.5	Find the Integration using Cauchy's Integral and residue theorems.
	C221.6	Taylor's and Laurent's series expansions of complex Function
Kinematics OF Machinery(C222)	C222.1	Illustrate the student conversant with commonly used mechanism for industrial application.
	C222.2	Analyze the velocity and acceleration of a mechanisms analytically and synthesis of problems.
	C222.3	Construct the cam profile and analyze effect of friction in different mechanisms.
	C222.4	Determine the static and dynamic forces for mechanical systems and flywheels
	C222.5	Design gear mechanisms for a given motion or a given input/output motion or force relationship
	C222.6	Demonstrate an understanding of kinematic synthesis of mechanisms.
Thermal Engineering-1(223)	C223.1	should be able to evaluate the performance of IC engines and compressors under the given operating conditions
	C223.2	Apply the laws of Thermodynamics to evaluate the performance of Refrigeration and air-conditioning cycles.
	C223.3	Understand the functionality of the major components of the IC Engines
	C223.4	effects of operating conditions on their performance
	C223.5	Design and optimize various thermal engineering systems.
	C223.6	Develop an understanding of steam power as a whole.

FMHMS(C224)	**C224.1**	Able to explain the effect of fluid properties on a flow system
	C224.2	Able to identify type of fluid flow patterns and describe continuity equation.
	C224.3	To analyze a variety of practical fluid flow and measuring devices and utilize Fluid Mechanics principles in design.
	C224.4	To select and analyze an appropriate turbine with reference to given situation in power plants.
	C224.5	Able to demonstrate boundary layer concepts.
	C224.6	Evaluate the dimensional analysis to predict physical parameters that influence the flow in fluid mechanics.
ICS(C225)	**C225.1**	To identify various elements and their purpose in typical instruments, to identify various errors that would occur in instruments.
	C225.2	Analysis of errors so as to determine correction factors for each instrument.
	C225.3	To understand static and dynamic characteristics of instrument and should be able to determine loading response time.
	C225.4	For given range of displacement should be able to specify transducer, it accurate and loading time of that transucer.
	C225.5	To understand dynamic charcterstics of instrument and should be able to determine loading response time.
	C225.6	Classify, choose the temperature sensors. Use RTD, thermocouple, IC for temperature measurement
BEEE LAB(C226)	**C226.1**	Evaluate the Amplitude Modulation Techniques & Applications of different Amplitude Modulation Systems
	C226.2	Implement and measure the performance of various AM & FM modulation and demodulation techniques
	C226.3	Perform various Multiplexing and Demultiplexing techniques(TDM & FDM)
	C226.4	Implement various Analog Pulse Modulation techniques
	C226.5	Apply the different Digital modulation methods in the communication systems
	C226.6	Determination of efficiency of a single-phase transformer by direct load test

FMHMS Lab(C227)	**C227.1**	Able to explain the effect of fluid properties on a flow system
	C227.2	Able to identify type of fluid flow patterns and describe continuity equation
	C227.3	To analyze a variety of practical fluid flow and measuring devices and utilize fluid mechanics principles in design.
	C227.4	To select and analyze an appropriate turbine with reference to given situation in power plants.
	C227.5	Able to demonstrate boundary layer concepts
	C227.6	Prepare professional quality textual and graphical file of laboratory.
ICS Lab(C228)	**C228.1**	able to Characterize and calibrate measuring devices
	C228.2	Identify and analyze errors in measurement.
	C228.3	Analyze measured data using regression analysis
	C228.4	Calibration of Pressure Gauges, temperature, LVDT, capacitive transducer, rotameter
	C228.5	the study of KOM & DOM are necessary to have an idea while designing the various machine members like shafts, bearings, gears, belts & chains and various I.C. Engine Component
	C228.6	
Gender sensitization Lab(C229)	**C229.1**	Understand Gender and Women's Studies as an academic field of study, concepts of sex etc
	C229.2	Recognize the intersections between gender and other social and cultural identities etc
	C229.3	Analyze the ways in which societal institutions and power structures impact
	C229.4	Demonstrate adequate skills in listening, speaking, and writing effectively
	C229.5	Evaluate and interpret information from a variety of sources including print and electronic media, film, video, and other information technologies.
	C229.6	Articulate connections between global, regional, and local issues, and their relationship to women's experiences and to human rights, with an awareness of the importance of context.
DOM(C311)	**C311.1**	the study of KOM & DOM are necessary to have an idea while designing the various machine members like shafts, bearings, gears, belts & chains and various I.C. Engine Component
	C311.2	Apply basic principales of mechansims in mechanical systems
	C311.3	perform static and dynamic analysis of simple mechanisam
	C311.4	model and analyze mechanical systems subjected to vibrations

	C311.5	provied alernate design solutions based on requirement.
	C311.6	Predict the dimensions, masses of various components of a given mechanism.
DMM-I(C312)	C312.1	The students knowledge about the principles of design, material selection, component behavior subjected to loads, and criteria of failure
	C312.2	Understands the concepts of principal stresses, stress concentration in machine members and fatigue loading
	C312.3	Design on the basis of strength and rigidity and analyze the stresses and strains induced in a machine element.
	C312.4	Design on the basis of strength and rigidity and analyze the stresses and srain induced in a machine elements.
	C312.5	Understants the concepts of stress conentration in machine members and fatigue loading
	C312.6	To identify, define and solve real-life engineering design problems.
MMT(C313)	C313.1	Identify techniques to minimize the errors in measurement
	C313.2	CO.2 dentify methods and devices for measurement of length, angle, gear & thread parameters, surface roughness and geometric features of parts.
	C313.3	Understand working of lathe, shaper, planer, drilling, milling and grinding machines.
	C313.4	Comprehend speed and feed mechanisms of machine tools.
	C313.5	Estimate machining times for machining operations on machine tools
	C313.6	Develop an ability of problem solving and decision making by identifying and analyzing the cause for variation and recommend suitable corrective actions for quality improvement
Business economics Financial Analysis(C314)	C314.1	Define and identify the business environment and sources of capital
	C314.2	Illustrate demand and Supply function
	C314.3	Analyse production Function and cost analysis
	C314.4	Asses the financial Statements and Summarize
	C314.5	Design the Business establishment in organizations
	C314.6	Explain the need for ratio Analysis and interpret

Thermal Engineering-II(C315)	**C315.1**	Develop state – space diagrams based on the schematic diagrams of process flow of steam and gas turbine plants
	C315.2	Apply the laws of Thermodynamics to analyse thermodynamic cycles
	C315.3	Differentiate between vapour power cycles and gas power cycles
	C315.4	infer from property charts and tables and to apply the data for the evaluation of performance parameters of the steam and gas turbine plants
	C315.5	Understand the functionality of major components of steam and gas turbine plants and to do the analysis of these components
	C315.6	Develop an understanding of steam power as a whole.
OR(C316)	**C316.1**	Define the fundamental terminologies related to operations research.
	C316.2	Differentiate amongst various models and methods used in operations research.
	C316.3	Apply the concepts of various models in real life situations (related problems
	C316.4	Analyze the given scenario using the methods learned in the course
	C316.5	Recommend the choice that should be made by the organization based on reasoned argument
	C316.6	Formulate the model and plan the course of action to be taken by the management in the given/real-life situation to maximize the objective function.
TE LAB (C317)	**C317.1**	Know the Categories and functions of various Data communication Networks
	C317.2	Design and analyze various error detection techniques.
	C317.3	Demonstrate the mechanism of routing the data in network layer
	C317.4	Know the significance of various Flow control and Congestion control Mechanisms
	C317.5	Know the Functioning of various Application layer Protocols.
Advanced Communication Skills Lab(C318)	**C318.1**	Develop listening abilities of the students, and teach and teach basic listening strategies.
	C318.2	SensitizestudentstothenuancesofEnglishspeechsounds,wordaccent,intonationandrhythm
	C318.3	Develop students to learn and identity faulty pronunciation
	C318.4	Communicate effectively using verbal and non-verbal communication skills
	C318.5	Expose students to a number of different listening situations through activities
	C318.6	Recognize culture-specific perspectives and values embedded in language make students interpret authentic texts of different genres

K&D LAB (C318)	**C318.1**	Understand types of motion
	C318.2	Analyze forces and torques of components in linkages
	C318.3	Understand static and dynamic balance
	C318.4	Understand forward and inverse kinematics of open-loop mechanisms
	C318.5	Knowledge about journal bearing design using different empirical relations.
Intellectual Property Rights(C3110)	**C319.1**	Distinguish and Explain various forms of IPRs
	C319.2	Identify criteria's to fit one's own intellectual work in particular form of IPRs.
	C319.3	Apply statutory provisions to protect particular form of IPRs
	C319.4	Analyse rights and responsibilities of holder of Patent, Copyright, Trademark, Industrial Designetc.
	C319.5	Identify procedure to protect different forms of IPRs national level.
	C319.6	Identify procedure to protect different forms of IPRs international level.
DMM-II(C321)	**C321.1**	Knowledge about journal bearing design using different empirical relations.
	C321.2	Estimation of life of rolling element bearings and their selection for given service conditions
	C321.3	Acquaintance with design of the components as per the standard
	C321.4	recommended procedures which is essential in design and development of machinery in industry.
	C321.5	To gain knowledge about designing the commonly used important machine members
	C321.6	To identify, define and solve real-life engineering design problems

HEAT TRANSFER(C322)	**C322.1**	Understand the basic modes of heat transfer
	C322.2	Understand and analyze heat transfer through extended surfaces
	C322.3	Understand one dimensional transient conduction heat transfer
	C322.4	Understand concepts of continuity, momentum and energy equations
	C322.5	Interpret and analyze forced and free convective heat transfer
	C322.6	Analyse different type of heat exchangers.
CAD/CAM(C323)	**C323.1**	**Understand** geometric transformation techniques in CAD.
	C323.2	**Develop** mathematical models to represent curves and surfaces. Model engineering components using solid modeling techniques.
	C323.3	**Develop** programs for CNC to manufacture industrial components.
	C323.4	To **understand** the application of computers in various aspects of Manufacturing.
	C323.5	**Design,** Proper planning, Manufacturing cost, Layout & Material Handling system.
	C323.6	Evaluate design and optimize it using CAD, CAE software and validate and rate the design with the standard
Professional Elective - II(UMP)(C324)	**C324.1**	Understand the basic techniques of Unconventional Machining processes modeling
	C324.2	Estimate the material removal rate .
	C324.3	Formulate FE characteristic equations for two dimensional elements and analyze plain stress, plain strain, axisymmetric and plate bending problems
	C324.4	Estimate the material removal rate
	C324.5	Study Unconventional machining processes.
	C324.6	Estimate the material cutting force
FINITE ELEMENT METHOD(C326)	**C326.1**	Apply finite element method to solve problems in solid mechanics, fluid mechanics and heat transfer
	C326.2	Formulate and solve problems in one dimensional structures including trusses, beams and frames.
	C326.3	Formulate FE characteristic equations for two dimensional elements and analyze plain stress, plain strain, axisymmetric and plate bending problems
	C326.4	Understand the application of FEA in heat transfer problem

	C326.5	Learn how to do analysis learn the various concepts and types of analysis
	C326.6	Solve the Impulse response of first order and second order systems
HT LAB (C328)	C327.1	Perform steady state conduction experiments to estimate thermal conductivity of different materials
	C327.2	Perform transient heat conduction experiment
	C327.3	Estimate heat transfer coefficients in forced convection, free convection, condensation and correlate with theoretical values
	C327.4	Obtain variation of temperature along the length of the pin fin under forced and free convection
	C327.5	Perform radiation experiments: Determine surface emissivity of a test plate and StefanBoltzmann's constant and compare with theoretical value
	C327.6	Prepare professional quality textual and graphical file of laboratory.
CAD/CAM Lab(C328) HT LAB (C328)	C328.1	understand and handle design problems
	C328.2	To be able to apply CAD in real life applications
	C328.3	To be understand the basic principles of different types of analysis
	C328.4	Write the G and M codes for various machining operations like facing, turning, threading etc.
	C328.5	Create assemblies and assembly models using CAD
	C327.1	Perform steady state conduction experiments to estimate thermal conductivity of different materials
Advanced Communication Skills Lab(C318)	C329.1	Develop listening abilities of the students, and teach and teach basic listening strategies.
	C329.2	SensitizestudentstothenuancesofEnglishspeechsounds,wordaccent,intonationandrhythm
	C329.3	Develop students to learn and identity faulty pronunciation
	C329.4	Communicate effectively using verbal and non-verbal communication skills
	C329.5	Expose students to a number of different listening situations through activities
	C329.6	Recognize culture-specific perspectives and values embedded in language make students interpret authentic texts of different genres

Environmental Science(C329)	C3210.1	State the information about ecosystem and also about its functions like Food chain, Ecological pyramids etc.
	C3210.2	Explain about different types of resources like land, water, mineral and energy and also about the effects of environment by the usage of these resources.
	C3210.3	Analyze the diversity, its values and also about the importance of the endemic species. Analyze
	C3210.4	Design different types of pollutions and their control technologies
	C3210.5	Evaluate the different types of pollution and their treatment techniques like waste water treatment, Bio medical waste management etc…
	C3210.6	Sketch the complete information about EIA- Environmental Impact Assessment in which the student will get the knowledge about the projects and the process involved in getting the projects
R&AC (C411)	C411.1	Differentiate between different types of refrigeration systems
	C411.2	application as well as conventional and unconventional refrigeration systems.
	C411.3	Thermodynamically analyse refrigeration and air conditioning systemsevaluate performance parameters.
	C411.4	Apply the principles of Psychometrics to design the air conditioning loads for the industrial applications.
	C411.5	Evaluate cooling and heating loads in air conditioning system
	C411.6	Create capacity to compute heating/cooling load
AMT(C412)	C412.1	Explain the role of automation in manufacturing and robotics industry.
	C412.2	Describe the group technology and flexible manufacturing techniques in the automated production line and manufacturing system.
	C412.3	Understand the computer aided process planning and shop floor manufacturing activities.
	C412.4	Develop CNC programs and apply in industry for manufacturing.
	C412.5	Understand the concept automated guided vehicle and automated storage system in material handling.
	C412.6	display an awareness of residual stresses that may occur during additive manufacturing and their effects
AUTOMOBILE ENGINEERING (C413)	C413.1	Understand the biosystems and medical systems from an engineering perspective
	C413.2	Discuss the origin of bio potentials, constructional features of sensing electrodes & their usage for measurement of bio potentials
	C413.3	Identify the techniques to acquire record and primarily understand physiological activity of the human body through cell potential, ECG, EEG, BP and blood flow measurement and EMG

	C413.4	Understand the working of various medical instruments and critical care equipment.
	C413.5	Know the imaging techniques including CT, PET, SPECT and MRI used in diagnosis of various medical conditions.
	C413.6	Discuss the origin of bio potentials, constructional features of sensing electrodes & their usage for measurement of bio potentials
POE(C414)	**C414.1**	Describe the Nature of Entrepreneurship
	C414.2	Identify the Financing &Managing the new venture
	C414.3	Discuss the Industrial financial Support
	C414.4	Summarizing the production & marketing management
	C414.5	Evaluate the Labour legislations
	C414.6	Summarizing the industrial dispute act
INDUSTRIAL ROBOTICS(415)	**C415.1**	understand the basic components of robots.
	C415.2	Programme a robot to perform tasks in industrial applications. Design intelligent robots using sensors
	C415.3	Analyze forces in links and joints of a robot.
	C415.4	Differentiate types of robots and robot grippers.
	C415.5	Model forward and inverse kinematics of robot manipulators.
	C415.6	Perform task programming of robot
PRODUCTION PLANNING CONTROL(C421)	**C421.1**	Evaluate the basic principle of RADAR System.
	C421.2	Design of CW and Frequency Modulated Radar. FM-CW Radar e
	C421.3	Identify the each and every block of MTI and Pulse Doppler Radar.
	C421.4	Describe the Tracking Radar principle
	C421.5	Demonstrate the basic principle of Receiver and also extraction of signal in Noise
	C421.6	Calculate Noise Figure and Noise Temperature in Radar Receivers and can describe antennas used for Radars.
PE-VI(INDUSTRIAL MANAGEMENT) (C422)	**C422.1**	Understand the need of low power circuit design
	C422.2	To attain the knowledge of sources of power dissipation
	C422.3	To understand the low power design approaches
	C422.4	To Design the Low -Voltage Low-Power Adders
	C422.5	To Design the Low Voltage Low-Power Multipliers
	C422.6	To understand Low-Voltage Low-Power Memories

OE-III(POWER PLANT ENGINEERING) (C423)	**C423.1**	Define fundamentals of DBMS
	C423.2	Discuss retrieval and management of data
	C423.3	Demonstrate Schema refinement by normal forms
	C423.4	Classify concurrency control techniques
	C423.5	Assess hash based indexing and tree based indexing
	C423.6	Design a dynamic index structure B+ tree
Project (C424)	**C424.1**	Apply relevant knowledge and skills, within the main area, to a given problem.
	C424.2	Reflect on, evaluate and critically assess one's own and others' scientific results.
	C424.3	Identify one's need for further knowledge and continuously develop knowledge.
	C424.4	Work cooperatively with others to achieve shared goal by motivating team-mates with a clear sense of direction, values and ethics.
	C424.5	Write concisely & convey meaning in a manner appropriate to different readers and verbally express ideas easily understood by others who are unfamiliar with the topic
	C424.6	Design an innovative product by applying current knowledge and adopt to emerging applications of engineering & technology .

Electronics and Communication Engineering I&II Sem Course Outcomes for the Academic Year (2022-23)

S.No	Year/ Sem	Course Name	Course Outcomes
1	II-I	ELECTRONICDEVICESA ND CIRCUITS	**CO1:** Explain the characteristics of various Diode parameters.
			CO2: Explain the characteristics of various Transistors parameters
			CO3: Explain the characteristics of Transistor configuration.
			CO4: Describe the Transistor parameters and configurations.
			CO5: Describe the various Diodes Applications.
			CO6: Compute the Transistor configurations s based problems
2	II-I	NETWORK ANALYSIS AND TRANSMISSI ON LINES	**CO1:**Compare circuit matrices of linear graphs and describe magnetic circuits.
			CO2: Examine the Steady state and transient analysis of RLC Circuits.
			CO3: Explain the characteristics of two port network parameters.
			CO4: Describe the transmission line parameters and configurations.
			CO5: Describe the transmission line parameters and configurations.
			CO6: Compute the smith chat and impedance matching device
3	II-I	DIGITAL SYSTEM DESIGN	**CO1:**Develop a digital logic and apply it to solve real life problems
			CO2: Explain Numerical information in different forms and Boolean Algebra theorems
			CO3: Develop Competence in combinational logic problem formulation and logic Optimization

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			CO4:Develop Competence in analysis of synchronous and asynchronous sequential circuits
			CO5:Analyze and solve various engineering problems with finite state machine
			CO6:Design and analyze logic gates with different technologies
4	II-I	SIGNALS AND SYSTEMS	CO1:Differentiate various signal functions.
			CO2:Use any arbitrary signal in time and frequency domain
			CO3:Explain the Concepts of Signals and Systems
			CO4:Analyze the signals with different transform technique
			CO5:Design the Time invariant Systems
			CO6:Justify the applications related to signals and systems
5	II-I	PROBABLITY THEORY AND STOCHASTIC PROCESS	CO1:Explain the random experiments, event, probabilities and random variables
			CO2:Define Single and Multiple Random Variable Transformation
			CO3:Categorise the expectations of single and multiple random variables
			CO4:Explain the concept of random processes and their time domain description
			CO5:Analyse the spectral characteristics of random processes, and filtered random processes
			CO6:Design Shannon-fano coding and Huffmann coding for digital signals/symbols
6	II-I	ELECTRONIC DEVICES AND CIRCUITS LAB	CO1:Determine the foreword and reverse bias of diode
			CO2:Illustrate the characteristics of a special purpose diode
			CO3:Calculate the parameters of the input and output wave forms for a full wave rectifier and half wave rectifier
			CO4:Demonstrate the input and output characteristics if CE,CB,CC configuration

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			CO5: Create the CE,CB,CC amplifier for different gains
			CO6: Compare the Analysis of CS,CD,CG amplifier
7	II-I	DIGITAL SYSTEM DESIGN LAB	**CO1:**Demonstrate the fundamental concepts and techniques used in digital electronics
			CO2: Design and analyze Logic gates with different technologies
			CO3: Develop competence in analysis of synchronous and asynchronous sequential circuits
			CO4: Analyze the simple De-Morgan's Theorems using GATES
			CO5: Analyse the working mechanism and design guidelines of different combinational and sequential circuit
			CO6: Develop competence in analysis of synchronous and asynchronous sequential circuits
8	II-I	BASIC SIMULATION LAB	**CO1:**Demonstrate the procedures, algorithms and concepts require to solve specific problem
			CO2: Analyze the concepts of algebra, calculus and numerical solutions using MATLAB software
			CO3: Develop the knowledge in MATLAB and can apply for project works
			CO4: Analyze the simple mathematical functions using MATLAB
			CO5: Experiment and visualize the simple plots using MATLAB Software
			CO6: Demonstrate the easy operations using MATLAB Software
9	II-II	LAPLACE TRANSFORMS,NUMERICALMETHODS& COMPLEXVARIABLES	**CO1:**Analyze the consistency in solving the system of linear equations
			CO2: Caliculate Eigen values and Eigen vectors and reducing the Q.F. into canonical form by orthogonal transformation
			CO3: Analyze the nature of sequence and series
			CO4: Demonstrate geometrical approach to the mean value theorems

			CO5: Evaluate improper integrals using beta and gamma functions
			CO6: Caliculate maxima and minima of function of two variable
10	II-II	ELECTRO MAGNETIC FIELDS AND WAVES	**CO1:**Understand the fundamental electromagnetic laws and concepts.
			CO2: Analyze field potentials due to static charges and static magnetic fields.
			CO3: List Maxwell's equations in integral, differential and phasor forms and explain their physical significance
			CO4: Understand the principles of electromagnetic wave propagation in lossy and in lossless media
			CO5: Solve simple problems estimation of electric and magnetic quantities based on concepts and laws.
			CO6: Analyze transmission line problems and understand the application of Electromagnetic waves in real world problems.
11	II-II	ANALOG AND DIGITAL COMMUNICATIONS	**CO1:**Analyze the amplitude modulation and demodulation techniques
			CO2: Understand the effect of noise present in continuoos wave and angle modulation techniques
			CO3: Analyze and design radio frequency transmitters and receivers
			CO4: Design the various pulse modulation techniques
			CO5: Understand the concepts of digital modulation techniques
			CO6: Analyze the digital base band transmission techniques
12	II-II	LINEAR IC	**CO1:**Describe the functionality of op-amp.
			CO2: Analyze operational amplifier circuits applications like integrator ,differentiator

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		APPLICAITONS	**CO3:**Design filters using operational amplifier
			CO4: Describe timers locked loops
			CO5: Describe phased locked loops.
			CO6: Describe Digital to analog &Analog to digital converters
13	II-II	ELECTRONIC CIRCUIT ANALYSIS	**CO1:**Identify the characteristics of multistage amplifiers
			CO2: Describe the utilization of feedback amplifiers
			CO3: Determine the frequency of oscillators
			CO4: Analyse the power amplifiers
			CO5: Design multivibrators
			CO6: Compare astable and monostable
14	II-II	ANALOG AND DIGITAL COMMUNICATIONS LAB	**CO1:**Evaluate the Amplitude Modulation Techniques & Applications of different Amplitude Modulation Systems
			CO2: Illustrate nt and measure the performance of various AM & FM modulation and demodulation techniques
			CO3: Test various Multiplexing and Demultiplexing techniques(TDM & FDM)
			CO4: Demonstrate various Analog Pulse Modulation techniques
			CO5: Apply the different Digital modulation methods in the communication systems
			CO6: Design the Binary modulation techniques
15	II-II	IC APPLICATIONS LAB	**CO1:**Demonstrate the fundamentals of integrated circuits and Op-Amp
			CO2: Design Op-Amp circuits for basic applications.

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			CO3: Design filters and oscillators using Op-Amp
			CO4: Design Different Wave form generators using IC 741
			CO5: Design different Devices using IC 555 and IC 565.
			CO6: Choose appropriate regulator based on the type of application.
16	II-II	ELECTRONIC CIRCUIT ANALYSIS LAB	**CO1:**Determine the gain of CE Amplifier
			CO2: Describe the characteristics of a two stage Amplifier
			CO3: Calculate the parameters of the negative feedback amplifiers
			CO4: Demonstrate the input and output signals of power amplifiers with efficiency
			CO5: Design the monostable multivibrator
			CO6: Compare the Analysis of RC & LC Oscillators
17	III-I	MICROPROCESSORS AND MICROCONTROLLERS	**CO1:**Identify the Functional blocks of 8086 and 8051
			CO2: Discuss various addressing modes of 8086 and 8051
			CO3: Generate wave forms using DAC
			CO4: Demonstrate the Register structure of ARM
			CO5: Design the Architectures of ARM, CORTEX and OMAP
			CO6: Compare CORTEX and OMAP processors
18	III-I	DATA COMMUNICATIONS AND NETWORKS	**CO1:**Describe the Categories and functions of various Data communication Networks
			CO2: Discuss various error detection techniques.
			CO3: Demonstrate the mechanism of routing the data in network layer

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			CO4: Analyze various Flow control and Congestion control Mechanisms
			CO5: Develop the Functioning of various Application layer Protocols
			CO6: Compare various wireless and wired protocols
19	III-I	CONTROL SYSTEMS	**CO1:**Design simple feedback controllers
			CO2: Design time response parameters of second order system.
			CO3: Understand the concept of stability
			CO4: Apply various time domain techniques to assess the system performance
			CO5: Apply various frequency domain techniques to assess the system performance
			CO6: Test system controllability and observability using state space representation and application
20	III-I	BUSINESS ECONOMICE AND FINANCIAL ANALYSIS	**CO1:**Define and identify the business environment and sources of capital
			CO2: Illustrate demand and Supply function
			CO3: Analyze production Function and cost analysis
			CO4: Assess the financial Statements and Summarize
			CO5: Design the Business establishment in organizations
			CO6: Explain the need for ratio Analysis and interpret
21	III-I	ELECTRONIC MEASUREMENTS AND INSTRUMENTS	**CO1:**Measure electrical parameters with different meters
			CO2: Describe different types of signal generators& signal analysers for analysing real time signals
			CO3: Measure various signals using oscillope

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			CO4: Describe transdusers based on their operation
			CO6: Measure passive element values using various bridges
			CO6: Measure different physical parameters using transures
22	III-I	MICROPROCESSORS AND MICROCONTROLLS LAB	**CO1:**Apply the fundamentals of microprocessors & microcontrollers to write assembly language programming
			CO2: Apply the programming knowledge for arithmetic operations in 8086
			CO3: Develop the programs for Logical operations
			CO4: Develop the programs for string manipulation programs
			CO5: Apply the programming knowledge for arithmetic operations in 8051
			CO6: Design different I/O devices interfaced to 8051&8086
23	III-I	DATA COMMUNICATIONS AND NETWORKS LAB	**CO1:**Categorize the functions of various Data communication Networks
			CO2: Demonstrate and analyze various error detection techniques.
			CO3: Demonstrate the mechanism of routing the data in network layer
			CO4: Analyze various Flow control and congestion control mechanisms
			CO5: Develop the Functioning of various Application layer Protocols.
			CO6: Compare various wireless and wired protocols
24	III-I	ADVANCED COMMUNICATION SKILLS LAB	**CO1:**Develop listening abilities of the students, and teach and teach basic listening strategies.
			CO2: Develop studentstothenuancesofEnglishspeechsounds,wordaccent,intonationandrhythm
			CO3: Develop students to learn and identity faulty pronunciation

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			CO4: Use effectively using verbal and non-verbal communication skills
			CO5: Defend students to a number of different listening situations through activities
			CO6: Recognize culture-specific perspectives and values embedded in language make students interpret authentic texts of different genres
25	III-I	ANTENNAS AND PROPOGATION	**CO1:**Describe the utilization of antenna parameters
			CO2: Identify the antenna array requirements
			CO3: Determine the parameters of helical antenna
			CO4: Analyse the microstrip patch antenna
			CO5: Design Yagiuda Antenna
			CO6: Compare wave propagations
26.	III-II	DIGITAL SIGNAL PROCESSING	**CO1:**Interpret, represent and process discrete/digital signals and systems
			CO2: Understand time domain and frequency domain analysis of discrete time signals and systems
			CO3: Understand DFT for the analysis of digital signals & systems
			CO4: Demonstrate and analyze DSP systems like FIR and IIR Filter
			CO5: Understand multi rate signal processing of signals through systems
			CO6: Use Applications of DSP
27	III-II	VLSI DESIGN	**CO1:**Demonstrate the Fabrication of IC using Mentor graphics tools.
			CO2: Calculate compute electrical properties of MOS circuits.
			CO3: Design various gates, adders, Multipliers using stick diagrams and layouts.

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			CO4: Develop Subsystems with CMOS Technology.
			CO5: Demonstrate semiconductor IC design such as PLA's, PAL, FPGA, CPLDs.
			CO6: Demonstrate differential strategies for testing of IC's and CMOS testing.
28	III-II	EMBEDDED SYSTEM DESIGN(PROFESSIONAL ELECTIVE-II)	**CO1:**Understand the selection procedure of Processors in the embedded system
			CO2: Understand Memory according to the type of Interface
			CO3: Design Procedure for embedded firmware
			CO4: Show the role of real time operating systems in embedded systems
			CO5: Understand multiprocessing and multi tasking
			CO6: Understand methods to choose an RTOS
29	III-II	INDUSTRIAL MANAGEMENT	**CO1:**Identify the basic management concepts and Theories
			CO2: Apply the organization principles for different organization structures
			CO3: Analyse production systems and Value
			CO4: Assess the Statistical Quality Control
			CO5: Explain the need for ratio Job Evaluation in Modern Organization
			CO6: Estimate the PERT & CPM Techniques for Projects
30	III-II	DIGITAL SIGNAL PROCESSING LAB	**CO1:**Demonstrate the characteristics of continuous- time and discrete-time signals
			CO2: Analyse signals using the Discrete Fourier Series, Discrete Fourier Transform and Fast fourier transform
			CO3: Design different IIR and FIR Filter for a given Sequence
			CO4: Generate the Narrow Band Signal and DTMF signals through Filtering

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			CO5: Estimate Interpolation and Decimation Process
			CO6: Solve the Impulse response of first order and second order systems
31	III-II	E-CAD LAB	**CO1:**Demonstrate Verilog hardware description languages.
			CO2: Design various logic gates using HDL
			CO3: Use the concepts of Boolean algebra for the analysis &design of various combinational logic circuits
			CO4: Use the concepts of Boolean algebra for the analysis &design of various Sequential logic circuits
			CO5: Design Entry, simulation of flip-flop circuits with test bench & functional verification
			CO6: Demonstrate Scripts using PERL
32	III-II	SCRIPTING LANGUAGES LAB	**CO1:**Demonstrate the Finite state machine
			CO2: Demonstrate the basics of Linux OS
			CO3: Use of Linux environment and write programs for automation
			CO4: Demonstrate the concepts of Scripting Languages
			CO5: Create and Run scripts using Ruby/TCL
			CO6: Demonstrate Scripts using PERL
33	IV-I	MICROWAVE AND OPTICAL COMMUNICATION	**CO1:**Calculate power generation at MicrowaveFrequency
			CO2: Discuss the principles of SolidStateDevices
			CO3: Explain the need for SolidState microwavesources
			CO4: Evaluate the S-parameters in microwave Component

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			CO5: Calculate the measurement procedure of Microwaveparameters
			CO6: Design OpticalFiber System Link Budget
34	IV-I	NETWORK SECURITY AND CRYPTOGRAPHY (PROFESSIONAL ELECTIVE-IV)	**CO1:**Demonstrate the characteristics of continuous- time and discrete-time signals
			CO2: Analyse signals using the Discrete Fourier Series, Discrete Fourier Transform and Fast fourier transform
			CO2:Discuss the principles of Solid State Devices
			CO4: Apply various methods for segmenting image and identifying image components
			CO5: Summarize different reshaping operations on the image and their practical applications
			CO6: Identify image representation techniques that enable encoding and decoding image
35	IV-I	DIGTIAL IMAGE PROCESSING (PROFESSIONAL ELECTIVE-III)	**CO1:**Compare different methods for image acquisition,storage and representation in digital devices and computers.
			CO2: Appreciate role of image transforms in representing, highlighting and modifying image features
			CO3: Interpret the mathematical principles in digital image enhancement and apply them in spatial domain and frequency domain.
			CO4: Apply various methods for segmenting image and identifying image components
			CO5: Summarize different reshaping operations on the image and their practical applications
			CO6: Identify image representation techniques that enable encoding and decoding image
36	IV-I	PRINCIPLES OF ENTERPRENEUR SHIP	**CO1:**Describe the Nature of Entrepreneurship
			CO2: Identify the Financing &Managing the new venture
			CO3: Discuss the Industrial financial Support

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			CO4: Summarize the production & marketing management
			CO5: Evaluate the Labour legislations
			CO6: Summarize the industrial dispute act
37	IV-I	PROFESSIONAL PRACTICE LAW AND ETHICS	**CO1:**Understand basic purpose of profession, professional ethics and various moral and social issues.
			CO2: Describe Awareness and importance of contracts and there essential elements of valid contracts, lawful and illegal agreements
			CO3: Develop knowledge on various roles of the Arbitration and conciliation, negotiation, mediation judicial proceedings and Lok Adalats.
			CO4: Explain Professional knowledge on the role of labor and labor laws.
			CO5: Understand the laws relating to Intellectual Properties and there rights.
			CO6: Develop in competitive and challenging environment to contribute to industrial growth as well as personal knowledge over the laws relating to professional practice.
38	IV-I	MICROWAVE AND OPTICAL COMMUNICATION LAB	**CO1:**Demonstrate the construction, operating principle and mathematical analysis of microwave tubes
			CO2: Examine the construction and operating principle of an 8-cavity magnetron, Gunn diode, IMPATT and TRAPATT
			CO3: Calculate the scattering parameters for various microwave junctions
			CO4: Calculate various microwave parameters using a microwave bench set-up
			CO5: Evaluate types of microwave solid state devices used in the transit time devices
			CO6: Design the type of the microwave measurement devices & its features
39	IV-I	INDUSTRIAL	**CO1:**Analyze the technical content and prepare a well-documented report.

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		ORIENTED MINI PROJECT/ SUMMERINTERNSHIP	**CO2:**Evaluate time estimation of the project used in industry.
			CO3: Demonstrate the Students will able to understand software evaluation used with industry.
			CO4: Analyse about the different research areas in the field of Electronics & Communications.
			CO5: Apply the theoretical concepts to design real time applications.
			CO6: Categorise the problems faced by the industry in designing new technologies.
40	IV-I	SEMINAR	**CO1:**Analyze the technical content and prepare a well-documented report.
			CO2: Express effective seminar presentation by exhibiting the presentation skills with confidence in a logical sequence.
			CO3: Identify and understand assumptions, theses, and arguments that exist in the work of authors
			CO4: Identify problem identification, formulation and solution.
			CO5: Explain the current and upcoming technologies.
			CO6: Identify meaningful questions and originate plausible theses.
41	IV-I	PROJECT STAGE-I	**CO1:**Apply relevant knowledge and skills, within the main area, to a given problem.
			CO2: Evaluate and critically assess one's own and others' scientific results.
			CO3: Justify one's need for further knowledge and continuously develop knowledge.
			CO4: Demonstrate work cooperatively with others to achieve shared goal by motivating team-mates with a clear sense of direction, values and ethics.
			CO5: Demonstrate concisely & convey meaning in a manner appropriate to different readers and verbally express ideas easily understood by others who are unfamiliar with the topic

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			CO6: Design an innovative product by applying current knowledge and adopt to emerging applications of engineering & technology .
42	IV-II	RADAR SYSTEM	**CO1:**Evaluate the basic principle of RADAR System.
			CO2: Design of CW and Frequency Modulated Radar. FM-CW Radar
			CO3: Identify the each and every block of MTI and Pulse Doppler Radar.
			CO4: Describe the Tracking Radar principle
			CO5: Demonstrate the basic principle of Receiver and also extraction of signal in Noise
			CO6: Calculate Noise Figure and Noise Temperature in Radar Receivers and can describe antennas used for Radars.
43	IV-II	PE-VI(Low power VLSI Design	**CO1:**Understand the need of low power circuit design
			CO2: Describe the knowledge of sources of power dissipation
			CO3: Understand the low power design approaches
			CO4: Design the Low -Voltage Low-Power Adders
			CO5: Design the Low Voltage Low-Power Multipliers
			CO6: Understand Low-Voltage Low-Power Memories
44	IV-II	OE-III(DBMS)	**CO1:**Define fundamentals of DBMS
			CO2: Discuss retrieval and management of data
			CO3: Demonstrate Schema refinement by normal forms
			CO4: Classify concurrency control techniques
			CO5: Assess hash based indexing and tree based indexing

			CO6: Design a dynamic index structure B+ tree
45	IV-II	PROJECT STAGE – II	**CO1:**Apply relevant knowledge and skills, within the main area, to a given problem.
			CO2: Evaluate and critically assess one's own and others' scientific results.
			CO3: Justify one's need for further knowledge and continuously develop knowledge.
			CO4: Demonstrate work cooperatively with others to achieve shared goal by motivating team-mates with a clear sense of direction, values and ethics.
			CO5: Demonstrate concisely & convey meaning in a manner appropriate to different readers and verbally express ideas easily understood by others who are unfamiliar with the topic
			CO6: Design an innovative product by applying current knowledge and adopt to emerging applications of engineering & technology .

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Computer & Science Engineering I & II Sem Course Outcomes for the Academic Year 2022-23

S. No	Year / Sem	Course Name	Course Outcomes
1	II-I	Analog and Digital Electronics	**CO1:**Describethecharacteristics&applicationsofvariouscomponents
			CO2: Explain the BJT configurations &applications of amplifier
			CO3: Design and analyze FETS and digital circuits.
			CO4: Explain various logic gates & its applications
			CO5: Design and analyze combinational circuits
			CO6: Explain sequential circuits &its applications
2	II-I	Data Structures (CS302PC)	**CO1:**Recall the Concept of ADT.
			CO2: Analyze the data structures that efficiently model the information in a problem.
			CO3: Infer the efficiency trade-offs among different data structure implementations or combinations.
			CO4: Determine the application of algorithms for sorting and pattern matching.
			CO5: Design programs using a variety of data structures, including hash tables, binary and general tree structures, search trees, tries, heaps, graphs, and AVL-trees.
			CO6: Evaluate the different Sorting and Searching Techniques.
3	II-I	Computer Oriented Statistical Methods (MA303BS)	**CO1:**Identify the concepts of Probability and distributions to some case studies.
			CO2: Evaluate the Mathematical expectation and discrete probability distribution.
			CO3: Apply Continuous Normal Distribution and fundamental sampling distributions
			CO4: Analyze testing hypothesis of sample mean and sample proportion
			CO5: Evaluate probability after n-cycles of events
			CO6: Explain the concepts of stochastic process markov chains
4	II-I	Computer Organization and Architecture	**CO1:**Discuss about the functional units of digital computersystem.
			CO2: Apply the knowledge of the processors internal registers and operations.
			CO3: Discuss about the basics instruction sets and their impact on processor design.
			CO4: Identify and manipulate representations of numbers stored in digital computer.
			CO5: Demonstrate on the various memory systems and I/O Communication.
			CO6: Justify the pipelined execution and parallel processing.
5	II-I	Object Oriented Programming	**CO1:**Define object-oriented principles
			CO2: Discuss C++ classes and data abstraction
			CO3: Demonstrate reusability Concept
			CO4: Compare and contrast in functions and constructors

		using C++ (CS305PC)	CO5:Evaluate the use of console I/O streams with file I/O streams
6	II-I	Analog and Digital Electronics Lab (CS306ES)	CO1:Identify the characteristics of various components, Electronic Devices like Cathode ray Oscilloscope, Signal generators, Digital Trainer Kit, Multi meters and components like Resistors, Capacitors, Op amp and Integrated Circuit.
			CO2:Describe the utilization of components and verifies the design of both analog and digital circuits using simulators.
			CO3:Design and analyze small signal amplifier circuits.
			CO4:Evaluate the Boolean algebra and minimize combinational functions
			CO5:Design combinational and sequential circuits
			CO6:Illustrate the logic families and realization of logic gates.
7	II-I	Data Structures Lab (CS307PC)	CO1:Demonstrate the concepts of linear and non-linear data structures.
			CO2:Build Linear and nonlinear data structures using arrays and linked list
			CO3:Analyze the concepts of static and dynamic data structure algorithms
			CO4:Apply different sorting and searching algorithms.
			CO5:Evaluate time complexity of different data structure algorithms.
			CO6:Predict the suitable data structure and algorithm to solve a real world problem.
8	II-I	IT Workshop Lab (CS308PC)	CO1:Apply the knowledge for computer assembling and software installation like OS.
			CO2:Solve trouble shooting problems
			CO3:Create presentations and budget sheets by using different excel tools
			CO4:Predict the tools for preparation of documentation
			CO5:Evaluate the usage of web browsers, email, new groups and discussion forums.
			CO6:Build tools and modules to enable the students in crafting professional word document.
9	II-I	C++ Programming Lab (CS309PC	CO1:Generate object-oriented programming concepts using C++ language
			CO2:Measure the principles of data abstraction, inheritance and polymorphism
			CO3:Demonstrate the use of reusability
			CO4:Compare static polymorphism and dynamic polymorphism
			CO5:Evaluate Handling of Formatted I/O and Unformatted I/O
			CO6:Generate object-oriented programming concepts using C++ language
10	II-I	Gender Sensitization Lab (*MC309)	CO1:Developed a better understanding of important issues related to gender in contemporary India.
			CO2:Sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender
			CO3:Describe, how gender discrimination works in our society and how to counter it.
			CO4:Categorize the gendered division of lab or and its relation to politics and economics
			CO5:Develop a sense of appreciation of women in all walks of life
			CO6:Demonstrate hoe the Men and women students and professionals will be better equipped to work and live

			together as equals
11	II-II	Ordinary Differential Equations and Vector Calculus (MA201BS)	CO1:Identify whether the given differential equation of first order is exact or not Problems.
			CO2:Solve higher differential equation and apply the concept of differential equation to real world
			CO3:Use the Laplace transforms techniques for solving ODE's
			CO4:Explain gradients ,potential functions ,directional derivatives of functions of several variables
			CO5:Evaluate the line, surface and volume integrals and converting them from one to another
			CO6:Apply Gauss ,Greens and Stokes theorems
12	II-II	Applied Physics (PH202BS)	CO1:Explain the concept of Quantum mechanics and solids
			CO2:Identify the role of semiconductor devices in science and Engineering
			CO3:Express the properties of dielectric, magnetic materials and their energy applications
			CO4:Analyze the features and applications of Nan o materials
			CO5:Discuss various aspects of laser in diverse fields
			CO6:Illustrate different Optical fibres in communication system
13	II-II	Engineering Workshop (ME203ES)	CO1:Study and practice on machine tools and their operations
			CO2:To study commonly used carpentry joints.
			CO3:Identify and apply suitable tools for different trades of engineering processes including drilling, material removing, measuring, chiselling
			CO4:Apply basic electrical engineering knowledge for house wiring practice
			CO5:Practice on manufacturing of components using workshop trades including plumbing, fitting, carpentry, foundry, house wiring Apply basic tools knowledge for foundry practice
			CO6:Identify and apply suitable tools for different trades of engineering processes including drilling, material removing, measuring, chiselling
14	II-II	English for Skill Enhancement (EN204HS)	CO1:Recall principle soft English grammar to enhance language skills.
			CO2:Express confidently in various contexts and different cultures.
			CO3:Use English Language effectively in spoken and written forms
			CO4:Compare facts and analyze to reach conclusions.
			CO5:Assess English Language effectively in spoken and written forms.
			CO6:DevelopbasicproficiencyinEnglishincludingreadingandlisteningcomprehension.
15	II-II	Electronic Devices and Circuits (EC205ES)	CO1:Understand the basic Knowledge of PN diode.
			CO2:Able to Design the Circuits of diode applications.
			CO3:Understand the Configurations of BJT
			CO4:Comparison of BJT and FET devices.
			CO5:Understand the basic Knowledge of Zener diode.

			CO6: Get the Basic Knowledge of SCR, UJT, LED etc…..
16	**II-II**	**Python Programming Laboratory (CS206ES)**	**CO1:**List of various python IDE's
			CO2: Understand Strings, Lists, Tuples and Dictionaries in Python
			CO3: Verify programs using modular approach, file I/O, Python standard library
			CO4: Analyze differ libraries used for the application development.
			CO5: Implement Digital Systems using Python
			CO6: Develop the application specific codes using python.
17	**II-II**	**Applied Physics Laboratory (PH207BS)**	**CO1:**Determine of Planck's constant using Photoelectric effect
			CO2: Determine n-type or p-type semiconducting materials by Hall-Effect
			CO3: Sketch the Voltage-Current Characteristics of Semiconductors and Optoelectronic devices
			CO4: Apply the Knowledge of lasers and Optical fibers in fields of Science and Technology
			CO5: Analyze various Properties of Dielectric and magnetic materials
			CO6: Evaluate Quality factor in Electric circuits.
18	**II-II**	**English Language and Communicatio n Skills Laboratory (EN208HS)**	**CO1:**Use English language skills effectively in spoken and written forms.
			CO2: Create words and how to pronounce the new words
			CO3: Evaluate how to develop the English language skills
			CO4: Demonstrate the understanding of nuances of English language through audio-visual experience and group activities
			CO5: Apply neutralization of accent for intelligibility
			CO6: Classify speaking skills with clarity and confidence which in turn enhances their employability skills
19	**II-II**	**IT Workshop (CS209ES)**	**CO1:**Apply the knowledge for computer assembling and software installation like OS.
			CO2: Solve trouble shooting problems
			CO3: Create presentations and budget sheets by using different excel tools
			CO4: Predict the tools for preparation of documentation
			CO5: Evaluate the usage of web browsers, email, new groups and discussion forums.
			CO6: Build tools and modules to enable the students in crafting professional word document.
20	**II-II**	**Environmental Science (*MC210)**	**CO1:**Get the information about ecosystem and also about its functions like Food chain, Ecological pyramids etc.,
			CO2: Get the knowledge about the different types of resources like land, water, mineral and energy and also about the effects of environment by the usage of these resources
			CO3: Gain the knowledge about the ecosystem diversity, its values and also about the importance of the endemic species.
			CO4: Get the complete information about the different methods of protecting the environment.
			CO5: Gain the knowledge about the different types of pollutions and their Control technologies.
			CO6: Gain the knowledge about different types of pollution and their treatment techniques like waste water

			treatment, Bio medical waste management etc.,
21	III-I	Formal Languages & Automata Theory (CS501PC)	**CO1:**Explain the concept of abstract machines and their power to recognize languages.
			CO2: Use finite-state machines for modelling and solving computing problems
			CO3: Design context-free grammar for formal languages
			CO4: Translate grammar to Green back's Normal form and Chomsky's Normal Form
			CO5: Distinguish between decidability and un decidability
			CO6: Design Turing Machines to solve computational problems
22	III-I	Software Engineering (CS502PC)	**CO1:**Define the fundamental Concepts in software engineering
			CO2: Demonstrate various process models
			CO3: Develop the SRS document for project.
			CO4: Identify different types of risks in software development.
			CO5: Differentiate testing strategies and it's working
			CO6: Estimate the quality of software process
23	III-I	Computer Networks (CS503PC)	**CO1:**Demonstrate the TCP/IP and OSI fashions with merits and demerits,transmission media
			CO2: Evaluate error control and flow control techniques
			CO3: Illustrate a network and schedule flow of information among Routers with various Routing Algorithms
			CO4: Formulate Connection Management and Flow control mechanisms.
			CO5: Examine different Application Layer protocols.
			CO6: Analyze an efficient computer network with highest throughput
24	III-I	Web Technologies (CS504PC)	**CO1:**Identify the tags in HTML and XML
			CO2: Describe the development of web application with PHP, JSP and Servlet
			CO3: Demonstrate the Connectivity of JDBC-ODBC with PHP, JSP Servlet
			CO4: Analyze dynamic web application with PHP, JSP Servlet
			CO5:Apply JSP concepts to **create** dynamic web pages by reducing the code complexity and store data in database.
			CO6: Develop solution to **complex** problems using appropriate method, technologies, framework, web services and content management.
25	III-I	Principles of Programming Languages (CS515PE)	**CO1:**Explain the skills for expressing syntax and semantics informal notation.
			CO2: Discuss about Language Evaluation Criteria.
			CO3: Identify and apply a suitable programming paradigm for a given computing application.
			CO4: Determine the concepts of ADT and OOP.
			CO5: Define programming paradigms of modern programming languages.
			CO6: Explain the concepts of scripting Languages.
26	III-I	Computer	**CO1:**Define the fundamental concepts of Computer Graphics

		Graphics (CS521PE)	**CO2:**Outline various 2D, 3D geometric transformations and viewing
			CO3: Compare and contrast various object representations
			CO4: List various algorithms to detect hidden surfaces and rendering.
			CO5: Describe the design of animation scenes
			CO6: Determine the intermediate coordinates with the help of various algorithms
27	**III-I**	**Software Engineering Lab (CS505PC)**	**CO1:**Analyze the end-user requirements into system and software requirements
			CO2: Generate high-level design of the system from the software requirements
			CO3: Develop a simple testing report documents
			CO4: Illustrate the usage of any design phase case tool
			CO5: Design a different UML Diagrams by using any case tool
			CO6: Develop a test-case for any application
28	**III-I**	**Computer Networks & Web Technologies Lab (CS506PC)**	**CO1:**Predict data link layer farming methods
			CO2: Evaluate error detection and error correction codes.
			CO3: Analyze routing and congestion issues in network design.
			CO4: Analyse the concepts of PHP and develop PHP programs.
			CO5: Design static websites using HTML Create web pages with advanced interactivity Using JavaScript.
			CO6: Develop XML program to display student information & Design dynamic websites that meet specified needs and interests.
29	**III-I**	**Advanced Communicatio n Skills Lab (EN508HS)**	**CO1:**Develop listening abilities of the students, and teach and teach basic listening strategies.
			CO2: Synthesize students to the nuances of English speech sounds, word accent intonation and rhythm
			CO3: Analyze the students to learn and identity faulty pronunciation
			CO4: Apply the Communication skills effectively in verbal and non-verbal communication.
			CO5: Measure the students with number of different listening situations through activities
			CO6: Analyze the culture-specific perspectives and values embedded in language make students interpret authentic texts of different genres
30	**III-I**	**Intellectual Property Rights (*MC510)**	**CO1:**Identify different types of Intellectual Properties (IPs), the right of ownership, scope of protection as well as the ways to create and to extract value from IP
			CO2: Recognize the crucial role of IP in organizations of different industrial sectors for the purposes of product and technology development.
			CO3: Identify activities and constitute IP infringements and the remedies available to the IP owner and describe the precautious steps to be taken to prevent infringement of proprietary rights in products and technology development.
			CO4: Illustrate the processes of Intellectual Property Management (IPM) and various approaches for IPM and conducting IP and IPM auditing and explain how IP can be managed as a strategic resource and suggest IPM strategy.

			CO5: Analyze to anticipate and subject to critical analysis arguments relating to the development and reform of intellectual property right institutions and their likely impact on creativity and innovation.
			CO6: Demonstrate a capacity to identify, apply and assess ownership rights and marketing protection under intellectual property law as applicable to information, ideas, new products and product marketing;
31	III-II	Machine Learning (CS601PC)	**CO1:** Discuss the concepts of Computational Intelligence like Machine Learning
			CO2: Apply Machine Learning Techniques to address the real time problems.
			CO3: Categorize the Neural Networks and its usage in Machine Learning
			CO4: Define how to evaluate models generated from data.
			CO5: Demonstrate the algorithms to real problem, optimize the models learned
			CO6: Illustrate the data as well as identify the trends related
32	III-II	Compiler Design (CS602PC)	**CO1:**Explain the concepts and different phases of compilation with compile time error handling.
			CO2: Describe language tokens using regular expressions, context free grammar and finite automata and design lexical analyzer for a language and knowledge of patterns, tokens & regular expressions for lexical analysis.
			CO3: Compare top down with bottom up parsers, and develop appropriate parser to produce parseTree representation of the input. Acquire skills in using LEX tool &YACC tool.
			CO4: Evaluate intermediate code for Statements in high level language and implement LL and LR parsers.
			CO5: Assess syntax directed translation schemes for a given context free grammar and designalgorithms to do code optimization.
			CO6: Formulate optimization techniques to Intermediate code and generate machine code for high level language programs and design algorithms to generate machine code.
33	III-II	Design and Analysis of Algorithms (CS603PC)	**CO1:**Describe the notations for analysis of the performance of algorithms.
			CO2: State the data structure disjoint sets
			CO3: Classify the major algorithmic techniques in Dynamic Programming
			CO4: Differentiate the concepts of Greedy Method.
			CO5: Estimate the applications of Branch and Bound.
			CO6: Analyse the problems that are P, NP and NP complete.
34	III-II	Software Testing Methodologies (CS615PE)	**CO1:**Define the fundamental Concepts of software bugs and path testing
			CO2: Outline about the various transaction flow, data flow and domain testing techniques
			CO3: Compare and contrast various path, path product and regular expressions
			CO4: List the various types of states graphs and transition testing testability tips
			CO5: Describe the graph matrices and software testing application tools
			CO6: Determine the deletion of nodes in the graph using various types of node reduction algorithms
35	III-II	Fundamentals of Internet of Things (Open	**CO1:**Demonstrate Characteristics and Design of IOT
			CO2: Discuss Communication protocols and Sensor Networks of IOT
			CO3: Design and configure Arduino boards for various designs.
			CO4: Create Programs and Interface Raspberry PI using Python

		Elective – I EC600OE)	CO5:Illustrate the possible solutions offered by SDN for IOT
			CO6:Classify the advantages of using IOT using various case studies for business solutions and to the society
36	IV-I	Cryptography & Network Security (CS701PC)	CO1:Identify the security issues in the network and resolve it
			CO2:Analyze the vulnerabilities in any computing system and hence be able to design a security solution
			CO3:Evaluate security mechanisms using rigorous approaches by key ciphers and hash functions
			CO4:Describe key management issues and algorithms
			CO5:Illustrate security issues in wireless LAN and WEB
			CO6:Derive various network security applications, IPsec, Firewall, IDS, Web Security, Email Security and Malicious Software etc.
37	IV-I	Data Mining (CS702PC)	CO1:List out Data Mining Functionalities
			CO2:Discuss about pre-processing methods for any given raw data
			CO3:Illustrate interesting patterns from large amounts of data
			CO4:Classify the methods for data classification and predictions
			CO5:Evaluate the categories of major clustering methods.
			CO6:Design an algorithm to mine multimedia and web data streams
38	IV-I	Cloud Computing (CS714PE)	CO1:Determine applications of various computing paradigms
			CO2:Recognize the principles and characteristics of cloud computing.
			CO3:Analyze the role of cloud computing architecture and management in finding the business solutions.
			CO4:Differentiate various cloud service models and their pros and cons.
			CO5:Determine the possible solutions offered by various cloud service providers in the market
			CO6:Infer the advantage of using cloud computing model for business solutions and Energy sustainability to the society
39	IV-I	Software Process & Project Management (CS725PE)	CO1:Analyze knowledge on software process management
			CO2:Develop managerial skills for software project development
			CO3:Understand and improve knowledge on software economics
			CO4:Evaluate the conventional and evolution of software
			CO5:Analyze the major and Minor milestones, artifacts and metrics from management and technical perspective.
			CO6:Describe the Economics for the Next Generation Software.
40	IV-I	Principles of Entrepreneurship (CS735OE)	CO1:State the importance of Entrepreneurship
			CO2:Discuss the financing and managing the new venture
			CO3:Identify the industrial financial support
			CO4:State the production management
			CO5:State the marketing management
			CO6:Evaluate the labor legislations and acts
41	IV-I	Cryptogra	CO1:Illustrate computer security principles and discuss ethical issues for theft of information. Identify threat models and common computer network security goals

		phy & Network Security Lab (CS706PC)	**CO2:**Apply the cryptographic algorithms for data communication
			CO3: Compare the performance of various security algorithms
			CO4: Apply the Digital signature for secure data transmission
			CO5: Evaluate the different open source tools for network security and analysis
			CO6: Demonstrate intrusion detection system using network security tool.
42	**IV-I**	**Industrial Oriented Mini Project/ Summer Internship (CS704PC)**	**CO1:**Create an Industrial environment and culture, utilizing the infrastructure within the institution.
			CO2: Design laboratories to industrial standard, thereby giving exposure to industrial housekeeping standards.
			CO3: Builds hands on experience on, troubleshooting, maintenance, fabrication, innovation, record keeping, documentation etc. thereby enhancing the skill and competency part of technical education.
			CO4: Formulate the concept of entrepreneurship.
			CO5: Analyze the innovative thinking and thereby preparing students for main project
			CO6: Set up self-maintenance cell within departments to ensure optimal usage of infrastructure facilities.
43	**IV-I**	**Seminar (CS705PC)**	**CO1:**Interprets the critical thinking skills and inquiring skills through application-oriented project development in CS & IT in a team-work environment;
			CO2: Identify recent technical topics from interested domains.
			CO3: Develop communications skills and public speaking skills through written and oral presentations
			CO4: Analyze the applicability of modern software tools and technology.
			CO5: Develop Presentation and Communication skills.
			CO6: Develop Technical report preparation skills.
44	**IV-I**	**Project Stage – I (CS706PC)**	**CO1:**Examines the programming language concepts, particularly Java and object-oriented concepts or go through research activities.
			CO2: Analyses the Plan, design and implement a software project or gather knowledge over the field of research and design or plan about the proposed work.
			CO3: Demonstrate the ability to locate and use technical information from multiple sources.
			CO4: Demonstrate the ability to communicate effectively in speech and writing.
			CO5: Integrates the work as a team and to focus on getting a working project done on time with each student being held accountable for their part of the project
			CO6: Predicts the software development cycle with emphasis on different processes - requirements, design, and implementation phases.
45	**IV-II**	**Organizational Behavior (SM801MS)**	**CO1:**Identify the foundations of OB and deals with Perception and Attribution
			CO2: Asses the individual differences in personality, Attitude & support Motivational Theories
			CO3: AnalyzetheGroupdynamicswithdecisionmakingskillsandinterpersonalcommunication
			CO4: Desc3ibe the Power and Politics

			CO5: Evaluate the leadership style sand Quality of work life
			CO6: Create awareness of works tress and develop the conflict management techniques
46	**IV-II**	**Distributed Systems(CS812PE)**	**CO1:**Design principles in distributed systems and the architectures for Distributed systems.
			CO2: State various distributed algorithms related to clock synchronization, Concurrency control ,dead lock detection ,load balancing ,voting etc
			CO3: Analyse fault tolerance and recovery in distributed systems and Algorithms for the same.
			CO4: Analyse the design and functioning of existing distributed system sand File systems.
			CO5: Describe different distributed algorithms over current distributed platforms
			CO6: Illustrate practical experience of inter-process communication in a Distributed environment
47	**IV-II**	**Environmental Impact Assessment (CS813OE)**	**CO1:** Identify the environmental attributes to be consider for the EIA study
			CO2: Identify the methodology to prepare rapid EIA
			CO3: Illustrate EIA reports and environmental management plan
			CO4: Identify the environmental attributes
			CO5: Discuss case study of environmental development activity
			CO6: Identify the case studies of industrial activities
48	**IV-II**	**Project Stage – II(CS802PC)**	**CO1:**Assess thetechnicalknowledgeacquiredinthepreviossemestersforsolvingrealworldproblems.
			CO2: Apply new technologies &design techniques (platform ,data base ,etc) Concerned for devising a solution for a given problem statement.
			CO3: Applyprojectmanagementskills(schedulingwork,procuringparts,anddocumenting,Expendituresandworkingwithintheconfinesofadeadline)
			CO4: Decide with team mates, sharing due and fair credits and collectively Apply effort for making the project successful.
			CO5: Demonstrate technical in formation by means of written and or all reports.
			CO6: Demonstrate the knowledge, skills and attitudes of a professional engineer.

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M.TECH ELECTRICAL POWER SYSTEMS(EPS) I & II Sem Course Outcomes for the Academic Year 2022-23

S. No	Year/Sem	Course Name	Course Outcomes
1	I-I	Modern Power System Analysis	**CO1**: **Utilize** the representation of basic components and single line diagram of power system for understanding the restructuring ofsystem.
			CO2 Examine the optimal power flow solution using FACTS devicesto solve power flow analysis problems using various methods.
			CO3: **Analyse** the new bus voltages contingency by adding/removal oflines for illustrating the various techniques for contingency evaluation and analysis.
			CO4 Evaluate the operating states and security monitoring of powersystems to describe its contingency analysis.
			CO5: **Understand** the importance of power flow analysis in planningand operation of power systems.
			CO6: **Apply** the various algorithms for state estimation to estimatedifferent components and states of power systems.
2	I-I	ECONOMIC OPERATION OF POWER SYSTEMS	CO1: **Compute** the cost of generation, economic dispatch of poweramong thermal units using incremental cost curves and coordinate equation using iteration method
			CO2: **Solve** the unit Commitment problem with various constraints using conventional optimization techniques and general transmission line loss formula
			CO3:**Illustrate** the Optimal scheduling of Thermal and Hydro powerstations for ideal economic operation of power systems
			CO4:**Categorize** single area load frequency control and two area load frequency control to minimize the transient deviations and steadystate error to zero
			CO5 :**Analyse** the importance of Reactive power control and Power Factor in power systems for efficient and reliable operation of power systems.
			CO6: **Identify** the different types of compensating equipment forreducing reactive power to improve system's efficiency
3	I-I	HYBRID ELECTRIC VEHICLES	CO1: **Summarize** the basics of electric and hybrid electric vehicles,their architecture, technologies and fundamentals
			CO2 **Analyze** the use of different power electronics devices andelectrical machines in hybrid electric vehicles.
			CO3: **Demonstrate** the use of different energy storage devices used forhybrid electric vehicles, their technologies and control and selectappropriate technology

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			CO4: **Interpret** working of different configurations of electric vehiclesand its components, hybrid vehicle configuration, performance analysis and Energy Management strategies in HEVs.
			CO5 **Develop** the electric propulsion unit and its control for hybridelectric vehicles.
			CO6: **Describe** aptitude towards future trends in Hybrid Electric Vehicles.
4	I-I	**HVDC Transmission and FACTS**	CO1: **Explain the basic fundamentals of FACTS controllers.**
			CO2: **Interpret** the enhancement of stability using static shunt andseries compensation.
			CO3 **Model and Design** of coordinating multiple FACTS controllersUPFC and IPFC using control techniques.
			CO4 **Develop** the knowledge of HVDC transmission and HVDCconverters and the applicability and advantage of HVDC transmission over conventional AC transmission.
			CO5: **Simplify and Solve** mathematical problems related to rectifierand inverter control methods and learn about different control schemes as well as starting and stopping of DC links.
			CO6:**Explain and compare** advantages of DC over AC transmission systems.
5	I-I	**INTERNET OF THINGS LABORATORY**	CO1: **List** the different IOT applications and importance of IOT in presentscenario .
			CO2: **List** the application of Arduino forNode MCU
			CO3: **Know** the different sensors available to measure the current and voltage
			CO4: **Design** the digital voltmeter and ammeter for both AC and DCcircuits
			CO5: **Design** a digital frequency meter to measure the frequency in an ACcircuit.
			CO6: **Measure** the power and energy consumption in a home using Arduino
6	I-I	**POWER SYSTEM COMPUTATIONAL LABORATORY**	CO1: **Understand** the concept of Admittance matrix for the formulation ofvarious inspection and transformation methods.
			CO2: **Develop** the programming for load flow algorithms.
			CO3: **Analyze** the characteristics of fast decoupled loaf flow methods fordeveloping algorithm.
			CO4: **Categorize** the transient and short circuit analysis for analysing theperformance of the system.
			CO5: **Categorize** the transient and short circuit analysis for analysing theperformance of the system.
			CO6: **Analyze** the various iterative methods applicable for state estimationof the power system.
7	I-I	**Digital Protection of Power System**	CO1: **Illustrate** the significance of protection systems and elements involvedin protection of the power system.
			CO2: **Develop** the structures, mathematical models and formulae of digitalrelays for mathematical analysis of the system.
			CO3: **Identify** the basic components of digital relay and signal conditioningsubsystems for implementation of digital protection.
			CO4: **Develop** the mathematical models for analysis of the relying algorithms to address the various types of faults in the power system.
			CO5: **Categorize** the digital relying algorithms to minimize the transientdeviations and steady

			state error to zero
			CO6: **Analyze** the various algorithms applicable for protection ofTransformers and transmission lines.
8	I-II	**POWER SYSTEM DYNAMICS AND STABILITY**	CO1: **Illustrate** the significance of power system stability and approachfor analysis of multi machine system.
			CO2: **Develop** the state space equations, unit conversions, equivalentcircuits for mathematical analysis of the synchronous machines.
			CO3: **Develop** basic components of digital relay and signal conditioning subsystems for the implementation of digital protection.
			CO4: **Identify** the types of excitation and voltage control configurationsto address the effects of voltage changes and reactive power.
			CO5: Illustrate the significance of governing system for excitationand prime mover control.
			CO6: Explain the methods to enhance the small signal stability of thepower system.
9	I-II	**INDUSTRIAL LOAD MODELLING AND CONTROL**	**CO1: Apply** knowledge of engineering science including electrical circuits, control systems and electrical machines in industrial loadmodelling and control.
			CO2: **Determine** the industrial load management in a power systemsupply specific amount of demand.
			CO3: **Outline** the interruptible load control, Direct load control, controls power quality impacts for minimising transmission linelosses and energy saving in industries.
			CO4: **Analyze** the cooling and heating loads, cool storage, controlstrategies in an industrial power system.
			CO5: **Design** a capacitive power unit in industrial load for impartingknowledge of various controllers with its evolution, principle of operation and applications.
			CO6: **Determine** the optimal operating strategies of power capacitorsfor integrated load management and industries with economic justification.
10	I-II	**POWER QUALITY**	**CO1: Identify** the Power Quality problem by applying the techniquesto mitigate them.
			CO2: Analyze the methodology to improve the power quality forsensitive loads by various custom power devices.
			CO3: Analyze the difference between failure, outage and Interruptionsfor reliability evaluation to power quality
			CO4: Analyze e the voltage sag and swell basedpower quality problem in Single phase and three phase system for deenergization of large load
			CO5: Identify the Power Quality problems in Industry power systemsfor harmonic distortions

			in the nonlinear loads.
			CO6: **Evaluate** power quality monitoring and classification mitigatingtechniques for the quality of voltage and current produced by a power plant.
11	I-II	ARTIFICIAL INTELLIGENCE LABORATORY	CO1: **Develop** a neural network based model for Load flow analysis.
			CO2: **Analyze** the state estimations using neural network.
			CO3: **Analyze** contingency technique to predict the effect of outages like failures ofequipment , transmission line u sing ANN
			CO4: **Apply** the power system security using neural network.
			CO5: **Determine** automatic Generation Control for single area system and twoarea systems using Fuzzy Logic Method.
			CO6: **Analyze** the transient and small signal stability analysis of Single-Machine-Infinite Bus (SMIB) system using Fuzzy Logic
12	I-II	POWER SYSTEMS LABORATORY	CO1: **Determine** earth resistance by using crank type earth tester.
			CO2: **Develop** the programming for load flow algorithms.
			CO3: **Analyze** the characteristics of fast decoupled loaf flow methods fordeveloping algorithm.
			CO4: **Categorize** the transient and short circuit analysis for analysing theperformance of the system.
			CO5: **Analyze** the transient and short circuit analysis for analysing theperformance of the system.
			CO6: **Analyze** the various iterative methods applicable for stateestimation of the power system.
13	I-II	RESEARCH METHODOLOGY AND IPR	CO1: **Interpret** the technique of determining a research problem for acrucial part of the research study
			CO2: **Examine** the way of methods for avoiding plagiarism in research
			CO3: **Apply** the feasibility and practicality of research methodology fora proposed project
			CO4: **Make use of** the legal procedure and document for claimingpatent of invention.
			CO5: **Identify** different types of intellectual properties, the right of ownership, scope of protection to create and extract value from IP
			CO6: **Defend** Defend the intellectual property rights throughout theworld with the involvement of World Intellectual Property Organization
14	I-II	SCADA SYSTEM AND APPLICATIONS	CO1: **Illustrate** the significance of protection systems and elements involvedin protection of the power system.
			CO2: **Develop** the structures, mathematical models and formulae of digitalrelays for mathematical analysis of the system.
			CO3: **Identify** the basic components of digital relay and signal conditioningsubsystems for implementation of digital protection.

			CO4: **Develop** the mathematical models for analysis of the relying algorithms to address the various types of faults in the power system.
			CO5: **Categorize** the digital relying algorithms to minimize the transientdeviations and steady state error to zero
			CO6: **Analyze** the various algorithms applicable for protection ofTransformers and transmission lines.

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