



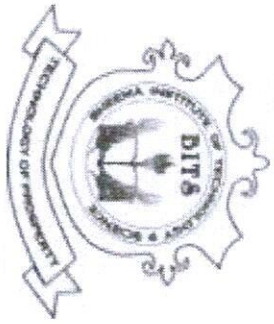
BHEEMA INSTITUTE OF TECHNOLOGY & SCIENCE

(Sponsored by Bheema Educational Society)
(Approved by AICTE & Affiliated to JNTUA ,Anantapuramu)
Alur Road, ADONI-518301. (Kurnool Dist.) A.P.
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COs for all courses (A.Y 2022-23)

S.No.	Subject	Page No.
1	CE Course Outcomes	1-7
2	EEE Course Outcomes	8-14
3	ME Course Outcomes	15-23
4	ECE Course Outcomes	24-31
5	CSE Course Outcomes	32-38
6	CASE Course Outcomes	39-41
7	HE Course Outcomes	42-43
8	CSE Course Outcomes	44-45
9	EPS Course Outcomes	46-47
10	AMFS Course Outcomes	48-49


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COURSE OUTCOMES FOR THE ACADEMIC YEAR 2022-23


CIVIL ENGINEERING I & II Sem Course outcomes for the academic year 2022-23

S. NO.	Year/ Sem	Course name	Course outcomes
1	II-I	Probability and Statistics for Civil Engineering (20A54301)	<p>CO 1: Understand the concepts of probability, sampling distributions, test of hypothesis and Curve fitting</p> <p>CO 2: Explain the characteristics through correlation and regression tools.</p> <p>CO 3: Apply Probability theory to find the chances of happening of events.</p> <p>CO 4: Understand various probability distributions and calculate their statistical moments.</p> <p>CO 5: Solve the problems on testing of hypothesis on large samples and small samples and fitting</p>
2	II-I	Advanced Strength of Materials (20A01301)	<p>CO 1: Determine deflection at any point on a beam under simple and combined loads</p> <p>CO 2: Apply energy theorems for analysis of indeterminate structures</p> <p>CO 3: Analyze indeterminate structures with yielding of supports</p> <p>CO 4: Analyze beams and portal frames using slope deflection and moment distribution methods</p> <p>CO 5: Analyze bending moment, normal thrust and radial shear in the arches</p>
3	II-I	Fluid Mechanics and Hydraulic Machines (20A01302T)	<p>CO 1: Familiarize basic terms used in fluid mechanics</p> <p>CO 2: Understand the principles of fluid statics, kinematics and dynamics</p> <p>CO 3: Understand flow characteristics and classify the flows and estimate various losses in flow through channels</p> <p>CO 4: Analyze characteristics for uniform and non-uniform flows in open channels.</p> <p>CO 5: Design different types of turbines, centrifugal and multistage pumps.</p>
4	II-I	SURVEYING (20A01303T)	<p>CO 1: Calculate angles, distances and levels</p> <p>CO 2: Identify data collection methods and prepare field notes</p> <p>CO 3: Understand the working principles of survey instruments</p> <p>CO 4: Estimate the volumes of earth work</p> <p>CO 5: Able to use modern survey instruments.</p> <p>CO 1: Define the Organizational Behaviour, its nature and scope.</p> <p>CO 2: Understand the nature and concept of Organizational behaviour</p> <p>CO 3: Apply theories of motivation to analyse the performance problems</p>


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		ORGANISATIONNA L BEHAVIOUR (20A52302)	CO 4: Analyse the different theories of leadership CO 5: Evaluate group dynamics CO 6: Develop as powerful leader
5	II-I	Basic Civil Engineering Laboratory (20A01304)	CO 1: Identify tools and equipment used and their respective functions. CO 2: Identify different types of materials and their basic properties. CO 3: Use and take measurements with the help of basic measuring tools/equipment. CO 4: Select proper tools for a particular operation. CO 5: Select materials and tools to make a job as per given specification/drawing
7	II-I	FLUID MECHANICS AND HYDRAULIC MACHINES LAB	CO: By performing the various tests in this laboratory the student will be able to know the principles of discharge measuring devices and head loss due to sudden contraction and expansion in pipes and working principles of various pumps and motors.
8	II-I	SURVEYING LAB (20A01303P)	CO: By performing the various tests in this laboratory the student will be able to know the principles of surveying in chain surveying, compass surveying, plane table surveying, levelling, theodolite surveying and total station
9	II-I	Application Development with Python (20A05305)	CO 1: Identify the issues in software requirements specification and enable to write SRS documents for software development CO 2: Explore the use of Object oriented concepts to solve Real-life problems CO 3: Design database for any real-world problem CO 4: Solve mathematical problems using Python programming language
10	II-I	Universal Human Values (20A52201)	CO 1: Students are expected to become more aware of themselves, and their surroundings (family, society, nature) CO 2: They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human CO 3: They would have better critical ability CO 4: They would also become sensitive to their commitment towards what they have understood (human values, human CO 5: It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.
11	II-II	Mathematical Modeling & Optimization Techniques (20A54401)	CO 1: Know about the classifications and stages of mathematical modeling CO 2: Understand building of mathematical models CO 3: Study the behavior of mathematical models CO 4: formulate a linear programming problem and solve it by various methods CO 5: give an optimal solution in assignment jobs, give transportation of items from sources to
12	II-II	Engineering Geology (20A01401T)	CO 1: Gain basic knowledge on characteristics of rocks and CO 2: Gain basic knowledge on characteristics of minerals. CO 3: Identify and differentiate rocks using geological classification. CO 4: Carry out geo physical investigations for infrastructural projects CO 5: Apply concepts of structural geology for civil engineering structures. CO 1: Determine deflection at any point on a beam under simple and combined loads CO 2: Apply energy theorems for analysis of indeterminate structures


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13	II-II	STRUCTURAL ANALYSIS -I (20A01402)	<p>CO 3: Analyze indeterminate structures with yielding of supports</p> <p>CO 4: Analyze beams and portal frames using slope deflection and moment distribution methods</p> <p>CO 5: Analyze bending moment, normal thrust and radial shear in the arches</p> <p>CO 1: Understand various ingredients of concrete and their role.</p> <p>CO 2: Examine knowledge on the fresh and hardened properties of concrete.</p> <p>CO 3: Examine the behavior of concrete with response to stresses developed</p> <p>CO 4: Design concrete mixes using various methods.</p> <p>CO 5: Perceive special concretes for accomplishing performance levels.</p> <p>CO 1: Understand about quality of water and purification process</p> <p>CO 2: Select appropriate technique for treatment of wastewater.</p> <p>CO 3: Assess the impact of air pollution</p> <p>CO 4: Understand consequences of solid waste and its management</p> <p>CO 5: Design domestic plumbing systems</p>
14	II-II	Concrete Technology (20A01403T)	<p>CO 1: Understand various ingredients of concrete and their role.</p> <p>CO 2: Examine knowledge on the fresh and hardened properties of concrete.</p> <p>CO 3: Examine the behavior of concrete with response to stresses developed</p> <p>CO 4: Design concrete mixes using various methods.</p> <p>CO 5: Perceive special concretes for accomplishing performance levels.</p> <p>CO 1: Understand about quality of water and purification process</p> <p>CO 2: Select appropriate technique for treatment of wastewater.</p> <p>CO 3: Assess the impact of air pollution</p> <p>CO 4: Understand consequences of solid waste and its management</p> <p>CO 5: Design domestic plumbing systems</p>
15	II-II	Environmental Engineering - I (20A01404T)	<p>CO 1: Understand about quality of water and purification process</p> <p>CO 2: Select appropriate technique for treatment of wastewater.</p> <p>CO 3: Assess the impact of air pollution</p> <p>CO 4: Understand consequences of solid waste and its management</p> <p>CO 5: Design domestic plumbing systems</p>
16	II-II	ENGINEERING GEOLOGY LAB	<p>CO : At the end of the course the students will be able to classify various types of rocks, their properties and they will be familiar with interpretation of geological maps.</p>
17	II-II	Concrete Materials Lab(20A01405)	<p>CO 1: To find the characteristics of fine and coarse aggregates</p> <p>CO 2: To understand the workability behaviour of concrete through various tests</p>
18	II-II	ENVIRONMENTAL ENGINEERING LAB (20A01404P)	<p>CO: At the end of the course, the student will be able to Understand about quality of water standards</p>
19	II-II	Soft Skills (20A52401)	<p>CO 1: Memorize various elements of effective communicative skills</p> <p>CO 2: Interpret people at the emotional level through emotional intelligence</p> <p>CO 3: apply critical thinking skills in problem solving</p> <p>CO 4: analyse the needs of an organization for team building</p> <p>CO 5: Judge the situation and take necessary decisions as a leader</p> <p>CO 6: Develop social and work-life skills as well as personal and emotional well-being</p> <p>CO 1: Define the concepts related to design thinking.</p> <p>CO 2: Explain the fundamentals of Design Thinking and innovation</p> <p>CO 3: Apply the design thinking techniques for solving problems in various sectors</p> <p>CO 4: Analyse to work in a multidisciplinary environment</p> <p>CO 5: Evaluate the value of creativity</p> <p>CO 6: Formulate specific problem statements of real time issues</p> <p>CO 1: Classify the basic concepts of reinforced concrete analysis and design.</p> <p>CO 2: Classify the behavior and various modes of failure of reinforced concrete members.</p> <p>CO 3: Analyze and design various reinforced concrete members such as beams, columns, footings and slabs</p> <p>CO4: Draw the section and reinforcement details for columns using IS code provisions,</p>
20	II-II	Design Thinking for Innovation (20A99401)	<p>CO 1: Define the concepts related to design thinking.</p> <p>CO 2: Explain the fundamentals of Design Thinking and innovation</p> <p>CO 3: Apply the design thinking techniques for solving problems in various sectors</p> <p>CO 4: Analyse to work in a multidisciplinary environment</p> <p>CO 5: Evaluate the value of creativity</p> <p>CO 6: Formulate specific problem statements of real time issues</p> <p>CO 1: Classify the basic concepts of reinforced concrete analysis and design.</p> <p>CO 2: Classify the behavior and various modes of failure of reinforced concrete members.</p> <p>CO 3: Analyze and design various reinforced concrete members such as beams, columns, footings and slabs</p> <p>CO4: Draw the section and reinforcement details for columns using IS code provisions,</p>
21	III-I	DESIGN OF REINFORCED CONCRETE STRUCTURES	<p>CO 1: Classify the basic concepts of reinforced concrete analysis and design.</p> <p>CO 2: Classify the behavior and various modes of failure of reinforced concrete members.</p> <p>CO 3: Analyze and design various reinforced concrete members such as beams, columns, footings and slabs</p> <p>CO4: Draw the section and reinforcement details for columns using IS code provisions,</p>


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	(20A01501)	CO5: Draw the section and reinforcement details for the footings and stair cases. CO 1: Carry out soil classification CO 2: Solve any practical problems related to soil stresses permeability and seepage CO 3: Estimate the stresses under any system of foundation loads CO 4: Solve practical problems related to consolidation settlement and time rate of settlement CO 5: Determine the shear strength of soil
22	III-I GEOTECHNICAL ENGINEERING (20A01502T)	CO 1: Identify the alternate waste and sustainable materials for low-cost housing construction as per appropriate standards CO 2: Understand the properties and utilisation of glass and plastic materials in building construction CO 3: Evaluate various types of thermal and acoustic insulation materials CO 4: Identify various structural components and their functions CO 5: Understand the finishing works meant for flooring, roofs and walls
23	III-I BUILDING MATERIALS AND CONSTRUCTION (20A01503)	CO 1: To demonstrate the behaviour of arches and their methods of analysis CO 2: To use various classical methods for analysis of indeterminate structures CO 3: Ability to analyse the beam and frames for vertical and horizontal loads and draw SFD and BMD CO 4: To determine the effect of support settlements for indeterminate structures. Able to CO 5: Calculate forces in members of truss due to load by stiffness method. CO 6: Ability to analyse and perform plastic analysis on various structural elements. CO 1: Ability to perform simultaneous material and energy balances. CO 2: Student learn about various electrochemical and energy systems CO 3: Knowledge of solid, liquid and gaseous fuels CO 4: To know the energy demand of world, nation and available resources to fulfill the demand CO 5: To know about the conventional energy resources and their effective utilization CO 6: To acquire the knowledge of modern energy conversion technologies CO 7: To be able to understand and perform the various characterization techniques of fuels CO 8: To be able to identify available nonconventional (renewable) energy resources and techniques to utilize them effectively CO 1: Achieve skill sets to prepare computer aided engineering drawings CO 2: Utilize the power and precision of AutoCAD as a drafting and design tool CO 3: Apply basic CAD concepts to develop and construct accurate 2D geometry through creation of basic geometric CO 4: A student will know what is plan and how it should be drawn in auto CAD software. CO 5: Able to Convert 3D solid models into 2D drawing-different views, sections CO 1: Identify various soils based on their characteristics. CO 2: Evaluate permeability and seepage of soils. CO 3: Determine plasticity characteristics of various soils. CO 4: To perform tests to determine shear strength CO 5: Understand the consolidation process and thereby predicting the settlement of soils. CO 1: To impart the practical knowledge in detailing and drawing of various components of building and Different types of CO 2: Interpret the symbols, signs and conventions from the given drawing.
24	III-I STRUCTURAL ANALYSIS – II (20A01504a)	
25	III-I CHEMISTRY OF ENERGY MATERIALS (20A51501)	
26	III-I COMPUTER AIDED DRAFTING LAB (20A01506)	
27	III-I GEOTECHNICAL ENGINEERING LAB (20A01502P)	
	BUILDING PLANNING AND	


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28	III-I	DRAWING (20A01507)	and functions among the buildings. CO 4: The student is expected to learn the skills of drawing building elements and plan various types of buildings as per CO 5: Student should be able to plan various buildings as per the building by-laws CO 1: Learn the basic elements of a steel structure CO 2: Learn the fundamentals of structural steel fasteners CO 3: Able to design basic elements of steel structure like tension members, compression members, beams and beam-columns CO 4: Able to design column splices and bases. CO 5: Able to design the various steel structures.
29	III-II	DESIGN OF STEEL STRUCTURES (20A01601)	CO 1: Understand the importance of Highway Development in Social and Economic Development of a Nation CO 2: Understand the concepts of Geometric Design of various Highway Infrastructure elements like Super-elevation, Sight CO 3: Understanding Basic Traffic Parameters and Surveys needed for Collecting Data about them CO 4: Understand the need for Road Intersections and their design elements CO 5: Familiar with types of Road Intersections and their design elements
30	III-II	HIGHWAY ENGINEERING (20A01602)	CO 1: Design head and cross regulator structures and also Identify various types of reservoir and their design aspects. CO 2: Design head and cross regulator structures and also Identify various types of reservoir and their design aspects. CO 3: By the Establishes the understanding of cross drainage works and its design. CO 4: Students understood all type of dams and reservoirs and their designs CO 5: Students understood Spillways, Gates & Energy dissipaters.
31	III-II	HYDROLOGY AND IRRIGATION ENGINEERING (20A01603)	CO 1: Able to understand different soil exploration techniques. CO 2: Able to analyze the earth slope stability. CO 3: Able to estimate earth pressure using various theories. CO 4: Able to estimate the contact pressure distribution below shallow footing and allowable bearing pressure. CO 5: Able to analyze the load carrying capacity of pile foundation and well foundation.
32	III-II	FOUNDATION ENGINEERING (20A01604b)	CO 1: To understand the fundamentals of various materials. CO 2: To exploit the physics of semiconducting materials CO 3: To familiarize with the working principles of semiconductor-based devices. CO 4: To understand the behaviour of dielectric and piezoelectric materials. CO 5: To identify the magnetic materials and their advanced applications.
33	III-II	PHYSICS OF ELECTRONIC MATERIALS AND DEVICES (20A56701)	CO 1: Understand the details of STAAD.Pro software package CO 2: To prepare input data of STAAD.Pro CO 3: Run STAAD.Pro for analysis and desing of structures CO 4: Design different components of structures CO 5: Expertise in functionalities like model generation and editing; loading analysis; concrete design etc.
34	III-II	DESIGN STUDIO LAB WITH STAAD PRO (20A01606)	CO 1: Categorize the test on materials used Civil Engineering Building & Pavement constructions CO 2: Identify engineering properties of aggregate. CO 3: Identify the grade & properties of bitumen. CO 4: Examine the tests performed for Bitumen mixes.
35	III-II	HIGHWAY MATERIALS LAB (20A01607)	


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			CO 5: The students will be able to select the most appropriate materials for highway construction based on material Characteristics, engineering properties, design requirements, cost, availability, and expected service life. CO 1: To determine the consistency and fineness of cement. CO 2: To understand the non-destructive testing procedure on concrete. CO 3: To determine the workability of cement concrete by compaction factor, slump and Vee-Bee tests CO 4: Ability to know the setting times of cement. CO 5: To determine the specific gravity of fine aggregate and coarse aggregate.
36	III-II	CONCRETE TECHNOLOGY LAB (20A01608)	CO 1: Simulate construction schedules and logistics using BIM to communicate and evaluate project activities CO 2: Apply BIM for buildability scenario forecasting, including interference management and clash detection CO 3: Assess low/zero-carbon and renewable technologies CO 4: Apply BIM and low/zero carbon technology to evaluate building environmental performance CO 5: The course provides a comprehensive overview of the main BIM applications currently in use, in order to develop a critical
37	III-II	BIM FUNDAMENTALS FOR CIVIL ENGINEERS (20A01609)	CO 1: Understand IPR law & Cyber law CO 2: Discuss registration process, maintenance and litigations associated with trademarks CO 3: Illustrate the copy right law CO 4: Enumerate the trade secret law
38	III-II	INTELLECTUAL PROPERTY RIGHTS AND PATENTS (20A99601)	CO 1: To enable the student to analyse shallow and deep foundations when subjected to various types of loadings. CO 2: To enable the student to analyse slopes, retaining walls and well foundations.
39	IV-I	GEOTECHNICAL ENGINEERING - II (19A01701)	CO 1: Understand basics on methods and types of estimation. CO 2: Formulate specifications and tender documents. CO 3: Prepare contract agreements CO 4: Determine rate analysis of different items. CO 5: Valuation of buildings.
40	IV-I	ESTIMATION AND COSTING (19A01702)	CO 1: Comparing with ground, air and satellite based sensor platforms. CO 2: Interpret the aerial photographs and satellite imageries. CO 3: Create and input spatial data for GIS application. CO 4: Apply RS and GIS concepts in water resources engineering. CO 5: Applications of various satellite data.
41	IV-I	REMOTE SENSING & GIS (19A01703c2)	CO 1: To distinguish between various alternate sources of energy for different suitable application requirements CO 2: To differentiate between solar thermal and PV system energy generation strategies


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42	IV-I	RENEWABLE ENERGY SYSTEMS (19A02704a)	<p>CO 3: To understand about wind energy system</p> <p>CO 4: To get exposed to the basics of Geo Thermal Energy Systems</p> <p>CO 5: To know about various diversified energy scenarios of ocean, biomass and fuel cell</p>
43	IV-I	CHEMISTRY OF NANOMATERIALS AND APPLICATIONS (19A51704a)	<p>CO 1: Understand the state of art synthesis of nano materials</p> <p>CO 2: Characterize nano materials using ion beam, scanning probe methodologies, position sensitive atom probe and</p> <p>CO 3: Analyze nanoscale structure in metals, polymers and ceramics</p> <p>CO 4: Analyze structure-property relationship in coarser scale structures</p> <p>CO 5: Understand structures of carbon nano tubes</p>
44	IV-I	ORGANISATIONAL BEHAVIOUR (19A52701a)	<p>CO 1: Understand the nature and concept of Organizational behavior</p> <p>CO 2: Apply theories of motivation to analyze the performance problems</p> <p>CO 3: Analyze the different theories of leadership</p> <p>CO 4: Evaluate group dynamics</p> <p>CO 5: Develop as powerful leader</p>
45	IV-I	CONCRETE TECHNOLOGY LAB (19A01404P)	<p>CO 1: To find the characteristics of fine and coarse aggregates</p> <p>CO 2: To evaluate the properties of the binding materials for their suitability in building construction.</p> <p>CO 3: To understand the workability behaviour of concrete through various tests</p> <p>CO 4: To evaluate the strength of hardened concrete through destructive and non destructive tests</p>
46	IV-I	COMPUTER	<p>CO 1: Design various civil engineering structural elements.</p> <p>CO 1: Know the basic principles of watershed management.</p>
47	IV-II	WATER SHED MANAGEMENT (19A01801e2)	<p>CO 2: Know the river basin management practices</p> <p>CO 3: Understand better different approaches for conservation of water.</p> <p>CO 4: Identify sustainable watershed approach for resources management, prevention of soil erosion etc.,</p> <p>CO 5: Different methods of rainwater harvesting management systems and role of GIS.</p>
48	IV-II	(19A03802a) ENERGY CONSERVATION AND MANAGEMENT	<p>CO 1: Explain energy utilization and energy auditing methods.</p> <p>CO 2: Analyze electrical systems performance of electric motors and lighting systems. (</p> <p>CO 3: Examine energy conservation methods in thermal systems. (</p> <p>CO 4: Estimate efficiency of major utilities such as fans, pumps, compressed air systems, hvac and d.g. systems</p> <p>CO 5: Elaborate principles of energy management, programs, energy demand and energy pricing</p>


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ELECTRICAL & ELECTRONICS ENGINEERING I & II Sem Course outcomes for the academic year 2022-23

Course outcomes

S. NO.	Year/Se	Course name	Course outcomes
1	II-I	Complex variables and Transforms (20A54302)	<p>CO 1: Understand the analyticity of complex functions and conformal mappings</p> <p>CO 2: Apply cauchy's integral formula and cauchy's integral theorem to evaluate improper integrals along contours.</p> <p>CO 3: Understand the usage of Laplace transforms, Fourier transforms and z transforms.</p> <p>CO 4: Evaluate the Fourier series expansion of periodic functions</p> <p>CO 5: Understand the use of Fourier transforms and apply z transforms to solve difference equations.</p>
2	II-I	ELECTRICAL CIRCUIT ANALYSIS (20A02301T)	<p>CO 1: Understand the analysis of three phase balanced and unbalanced circuits and to measure active and reactive powers in three</p> <p>CO 2: To get knowledge about how to determine the transient response of R-L, R-C, R-L-C series circuits for D.C and A.C</p> <p>CO 3: Applications of Fourier transforms to electrical circuits excited by non-sinusoidal sources are known.</p> <p>CO 4: To design filters and equalizers.</p>
3	II-I	DC MACHINES & TRANSFORMERS (20A02302T)	<p>CO 1: Understand the concepts of magnetic circuits, principle and operations of DC machines, starters and single and three phase</p> <p>CO 2: Analyze armature reaction, parallel operation, speed control and characteristics of DC machines. Also analyze the performance characteristics with the help of OC and SC tests of transformer</p> <p>CO 3: Evaluate generated emf, back emf, speed, efficiency and regulations of DC machines and</p> <p>CO 4: Design winding diagrams of DC machines and equivalent circuit of transformer.</p>
4	II-I	DIGITAL LOGIC DESIGN (20A04303T)	<p>CO 1: Understand the properties of Boolean algebra. other logic operations. and minimization of Boolean functions using</p> <p>CO 2: Make use of the concepts to solve the problems related to the logic circuits.</p> <p>CO 3: Analyze the combinational and sequential logic circuits.</p> <p>CO 4: Develop digital circuits using HDL, and Compare various Programmable logic devices</p> <p>CO 5: Design various logic circuits using Boolean algebra, combinational and sequential logic circuits.</p>
5	II-I	ORGANISATIONAL BEHAVIOUR (20A52302)	<p>CO 1: Define the Organizational Behaviour, its nature and scope.</p> <p>CO 2: Understand the nature and concept of Organizational behaviour</p> <p>CO 3: Apply theories of motivation to analyse the performance problems</p> <p>CO 4: Analyse the different theories of leadership</p> <p>CO 5: Evaluate group dynamics</p> <p>CO 6: Develop as powerful leader</p>
6	II-I	Electrical Circuit Analysis Lab (20A02301P)	<p>CO 1: Understand and experimentally verify various resonance phenomenon.</p> <p>CO 2: Understand and analyze various current locus diagrams.</p> <p>CO 3: Apply and experimentally analyze two port network parameters</p>
7	II-I	DC MACHINES & TRANSFORMERS LAB (20A02302P)	<p>CO 1: Able to conduct and analyze load test on DC shunt generator</p> <p>CO 2: Able to understand and analyze magnetization characteristics of DC shunt generator</p> <p>CO 3: Able to understand and analyze speed control techniques and efficiency of DC machines</p> <p>CO 4: Able to understand to predetermine efficiency and regulation of single-phase Transformers</p>


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8	II-I	DIGITAL LOGIC DESIGN LAB (20A04303P)	CO 1: Understand the pin configuration of various digital ICs used in the lab CO 2: Conduct the experiment and verify the properties of various logic circuits. CO 3: Analyze the sequential and combinational circuits. CO 4: Design of any sequential/combinational circuit using Hardware/ HDL.
9	II-I	Application Development with Python (20A05305)	CO 1: Identify the issues in software requirements specification and enable to write SRS documents for software development CO 2: Explore the use of Object oriented concepts to solve Real-life problems CO 3: Design database for any real-world problem CO 4: Solve mathematical problems using Python programming language
10	II-I	Universal Human Values (20A52201)	CO 1: Students are expected to become more aware of themselves, and their surroundings (family, society, nature) CO 2: They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human CO 3: They would have better critical ability CO 4: They would also become sensitive to their commitment towards what they have understood (human values, human CO 5: It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real
11	II-II	Numerical Methods & Probability Theory (20A54402)	CO 1: Apply numerical methods to solve algebraic and transcendental equations CO 2: Derive interpolating polynomials using interpolation formulae CO 3: Solve differential and integral equations numerically CO 4: Apply Probability theory to find the chances of happening of events. CO 5: Understand various probability distributions and calculate their statistical constants.
12	II-II	ANALOG ELECTRONIC CIRCUITS (20A04404T)	CO 1: List various types of feedback amplifiers, oscillators and large signal amplifiers CO 2: Explain the operation of various electronic circuits and linear Ics CO 3: Apply various types of electronic circuits to solve engineering problems CO 4: Analyze various electronic circuits and regulated power supplies for proper understanding CO 5: Justify choice of transistor configuration in a cascade amplifier CO 6: Design electronic circuits for a given specification
13	II-II	POWER ELECTRONICS (20A02401T)	CO 1: Understand the operation, characteristics and usage of basic Power Semiconductor Devices. CO 2: Understand different types of Rectifier circuits with different operating conditions. CO 3: Understand DC-DC converters operation and analysis of their characteristics. CO 4: Understand the construction and operation of voltage source inverters, Voltage Controllers and Cyclo Converters. CO 5: Apply all the above concepts to solve various numerical problem solving
14	II-II	AC MACHINES (20A02402T)	CO 1: Understand the basics of ac machine windings, construction, principle of working, equivalent circuit of induction and CO 2: Analyze the phasor diagrams of induction and synchronous machine, parallel operation of alternators, synchronization and CO 3: Apply the concepts to determine V and inverted V curves and power circles of synchronous motor. CO 4: Analyze the various methods of starting in both induction and synchronous machines.
15	II-II	ELECTROMAGNETIC FIELD THEORY	CO 1: Understand the concept of electrostatics CO 2: Understand the concepts of Conductors and Dielectrics CO 3: Understand the fundamental laws related to Magneto Statics

		(20A02403T)	CO 4: Understand the concepts of Magnetic Potential and Time varying Fields
		ANALOG ELECTRONIC CIRCUITS LAB (20A04404P)	CO 1: Analyze various amplifier circuits. CO 2: Design multistage amplifiers. CO 3: Design OPAMP based analog circuits. CO 4: Understand working of logic gates. CO 5: Design and implement Combinational and Sequential logic circuits.
16	II-II	ELECTRONIC CIRCUITS LAB (20A04404P)	CO 1: Understand and analyze various characteristics of power electronic devices with gate firing circuits and forced commutation CO 2: Analyze the operation of single-phase half & fully-controlled converters and inverters with different types of loads. CO 3: Analyze the operation of DC-DC converters, single-phase AC Voltage controllers, cyclo converters with different loads. CO 4: Create and analyze various power electronic converters using PSPICE software.
17	II-II	POWER ELECTRONICS LAB (20A02401P)	CO 1: Analyze and apply load test, no-load and blocked-rotor tests for construction of circle diagram and equivalent circuit CO 2: Predetermine regulation of a three-phase alternator by synchronous impedance & n.m.f methods. CO 3: Predetermine the regulation of Alternator by Zero Power Factor method Xd and Xq determination of salient pole CO 4: Evaluate and analyze V and inverted V curves of 3 phase synchronous motor
18	II-II	AC MACHINES LAB (20A02402P)	CO 1: Simulation of various circuits using PSPICE software. CO 2: Simulation of single-phase half & fully-controlled converters, and inverters CO 3: Simulation of single-phase AC Voltage controllers with different loads.
19	II-II	CIRCUITS SIMULATION AND ANALYSIS	CO 1: Define the concepts related to design thinking. CO 2: Explain the fundamentals of Design Thinking and innovation CO 3: Apply the design thinking techniques for solving problems in various sectors CO 4: Analyse to work in a multidisciplinary environment CO 5: Evaluate the value of creativity
20	II-II	Design Thinking for Innovation (20A99401)	CO 6: Formulate specific problem statements of real time issues CO 1: Remember and understand the concepts of conventional and nonconventional power generating systems. CO 2: Apply the economic aspects to the power generating systems. CO 3: Analyse the transmission lines and obtain the transmission line parameters and constants. CO 4: Design and develop the schemes to improve the generation and capability of transmission line to meet the day-to-day power
21	III-I	POWER SYSTEM ARCHITECTURE (20A02501)	CO 1: Understand the concepts of control systems classification, feedback effect, mathematical modelling, time response and frequency response characteristics, state space analysis CO 2: Apply the concepts of Block diagram reduction, Signal flow graph method and state space formulation for obtaining mathematical and Root locus, Bode, Nyquist, Polar plots for stability calculations, controllability and observability and CO 3: Analyse time response analysis, error constants, and stability characteristics of a given mathematical model using different CO 4: Design and develop different compensators, controllers and their performance evaluation for various conditions. Implement them in solving various engineering applications.
22	III-I	CONTROL SYSTEMS (20A02502T)	CO 1: Able to Understand the working of various instruments and equipments used for the measurement of various electrical engineering parameters like voltage, current, power, phase etc in industry as well as in power generation, transmission and CO 2: Able to analyze and solve the varieties of problems and issues coming up in the vast field of electrical measurements.


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23	III-I	MEASUREMENTS & SENSORS (20A02503T)	CO 3: Analyse the different operation of extension range ammeters and voltmeters, DC and AC bridge for measurement of parameters and different characteristics of periodic and aperiodic signals using CRO. CO 4: Design and development of various voltage and current measuring meters and the varieties of issues coming up in the field
24	III-I	SWITCHGEAR AND PROTECTION (20A02504a)	CO 1: Understand the operation of different circuit breakers. CO 2: Analyze the concepts of different relays which are used in real time power system operation. CO 3: Apply various protective schemes for Transformers, Rotating machines, Bus bars, Feeders. CO 4: Develop the practical applications of power system operation and planning.
25	III-I	CHEMISTRY OF ENERGY MATERIALS (20A51501)	CO 1: Ability to perform simultaneous material and energy balances. CO 2: Student learn about various electrochemical and energy systems CO 3: Knowledge of solid, liquid and gaseous fuels CO 4: To know the energy demand of world, nation and available resources to fulfill the demand CO 5: To know about the conventional energy resources and their effective utilization CO 6: To acquire the knowledge of modern energy conversion technologies CO 7: To be able to understand and perform the various characterization techniques of fuels CO 8: To be able to identify available nonconventional (renewable) energy resources and techniques to utilize them effectively
26	III-I	CONTROL SYSTEMS LAB (20A02502P)	CO 1: Get the knowledge of feedback control and transfer function of DC servo motor. CO 2: Model the systems and able to design the controllers and compensators. CO 3: Get the knowledge about the effect of poles and zeros location on transient and steady state behavior of second order systems and can implement them to practical systems and MATLAB CO 4: Determine the performance and time domain specifications of first and second order systems.
27	III-I	MEASUREMENTS AND SENSORS LAB (20A02503P)	CO 1: Calibrate various electrical measuring instruments CO 2: Accurately determine the values of inductance and capacitance using AC bridges CO 3: Compute the coefficient of coupling between two coupled coils CO 4: Accurately determine the values of very low resistances
28	III-I	SOFT SKILLS (20A52401)	CO 1: Memorize various elements of effective communicative skills CO 2: Interpret people at the emotional level through emotional intelligence CO 3: apply critical thinking skills in problem solving CO 4: analyse the needs of an organization for team building CO 5: Judge the situation and take necessary decisions as a leader CO 6: Develop social and work-life skills as well as personal and emotional well-being
29	III-II	POWER SYSTEM ANALYSIS (20A02601)	CO 1: Remember and understand the concepts of per unit values, Y Bus and Z bus formation, load flow studies, symmetrical and CO 2: Apply the concepts of good algorithm for the given power system network and obtain the converged load flow solution and experiment some of these methods using modern tools and examine the results. CO 3: Analyse the symmetrical faults and unsymmetrical faults and done the fault calculations, analyse the stability of the system and improve the stability. Demonstrate the use of these techniques through good communication skills. CO 4: Develop accurate algorithms for different networks and determine load flow studies and zero, positive and negative sequence impedances to find fault calculations.

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30	III-II DIGITAL COMPUTING PLATFORMS (20AA02602T)	<p>CO 1: Understand the basic architecture & pin diagram of 8086 microprocessor, 8051 Microcontroller, DSP Processor and FPGA</p> <p>CO 2: Apply the concepts to design Assembly language programming to perform a given task, Interrupt service routines for all</p> <p>CO 3: Design Real time applications by writing Assembly Language Programs for the Digital Signal Processors, Xilinx programming for Spartan FPGA boards and use Interrupts for real-time control applications</p> <p>CO 4: Analyse various real time systems by using various controllers</p> <p>CO 1: Formulate difference equations for the given discrete time systems</p> <p>CO 2: Apply FFT algorithms for determining the DFT of a given signal</p> <p>CO 3: Compare FIR and IIR filter structures</p> <p>CO 4: Design digital filter (FIR & IIR) from the given specifications</p> <p>CO 5: Outline the concept of multirate DSP and applications of DSP.</p>
31	III-II DIGITAL SIGNAL PROCESSING (20AA04502T)	<p>CO 1: Understand the necessity of HVDC systems as emerging transmission networks</p> <p>CO 2: Understand the necessity of reactive power compensation devices</p> <p>CO 3: Design equivalent circuits of various HVDC system configurations</p> <p>CO 4: Design and analysis of various FACTS devices</p> <p>CO 1: To understand the fundamentals of various materials.</p> <p>CO 2: To exploit the physics of semiconducting materials</p> <p>CO 3: To familiarize with the working principles of semiconductor-based devices.</p> <p>CO 4: To understand the behaviour of dielectric and piezoelectric materials.</p> <p>CO 5: To identify the magnetic materials and their advanced applications.</p> <p>CO 1: Get the practical knowledge on calculation of sequence impedance, fault currents, voltages and sub transient reactance's.</p> <p>CO 2: Get the practical knowledge on how to draw the equivalent circuit of three winding transformer.</p> <p>CO 3: Get the knowledge on development of MATLAB program for formation of Y and Z buses.</p> <p>CO 4: Get the knowledge on development of MATLAB programs for Gauss-Seidel and Fast Decouple Load Flow studies.</p> <p>CO 5: Get the knowledge on development of SIMULINK model for single area load frequency problem.</p>
32	III-II HVDC AND FACTS (20AA02604a)	<p>CO 1: To understand the fundamentals of various materials.</p> <p>CO 2: To exploit the physics of semiconducting materials</p> <p>CO 3: To familiarize with the working principles of semiconductor-based devices.</p> <p>CO 4: To understand the behaviour of dielectric and piezoelectric materials.</p> <p>CO 5: To identify the magnetic materials and their advanced applications.</p> <p>CO 1: Get the practical knowledge on calculation of sequence impedance, fault currents, voltages and sub transient reactance's.</p> <p>CO 2: Get the practical knowledge on how to draw the equivalent circuit of three winding transformer.</p> <p>CO 3: Get the knowledge on development of MATLAB program for formation of Y and Z buses.</p> <p>CO 4: Get the knowledge on development of MATLAB programs for Gauss-Seidel and Fast Decouple Load Flow studies.</p> <p>CO 5: Get the knowledge on development of SIMULINK model for single area load frequency problem.</p>
33	III-II PHYSICS OF ELECTRONIC MATERIALS AND DEVICES (20AA56701)	<p>CO 1: To understand the fundamentals of various materials.</p> <p>CO 2: To exploit the physics of semiconducting materials</p> <p>CO 3: To familiarize with the working principles of semiconductor-based devices.</p> <p>CO 4: To understand the behaviour of dielectric and piezoelectric materials.</p> <p>CO 5: To identify the magnetic materials and their advanced applications.</p> <p>CO 1: Get the practical knowledge on calculation of sequence impedance, fault currents, voltages and sub transient reactance's.</p> <p>CO 2: Get the practical knowledge on how to draw the equivalent circuit of three winding transformer.</p> <p>CO 3: Get the knowledge on development of MATLAB program for formation of Y and Z buses.</p> <p>CO 4: Get the knowledge on development of MATLAB programs for Gauss-Seidel and Fast Decouple Load Flow studies.</p> <p>CO 5: Get the knowledge on development of SIMULINK model for single area load frequency problem.</p>
34	III-II POWER SYSTEMS ANALYSIS LAB (20AA02601P)	<p>CO 1: Understand the basic concepts to write assembly language programming on 8086 Microprocessors.</p> <p>CO 2: Design various device configurations and Interfacing of various devices with 8086.</p> <p>CO 3: Understand the basic concepts to write programming on 8051 Microcontroller.</p> <p>CO 4: Design various Interfacing circuitry with 8051 Microcontroller with its peripheral devices</p> <p>CO 1: Implement various DSP Algorithms using software packages.</p> <p>CO 2: Implement DSP algorithms with Digital Signal Processor.</p> <p>CO 3: Analyze and observe magnitude and phase characteristics (Frequency response Characteristics) of digital IIR-Butterworth,</p> <p>CO 4: Analyze and observe magnitude and phase characteristics (Frequency response Characteristics) of digital FIR filters using</p> <p>CO 5: Analyze digital filters using Software Tools.</p> <p>CO 1: Understand the basic concepts of Electrical Engineering.</p> <p>CO 2: Apply the concepts to design MATLAB models.</p> <p>CO 3: Analyse various Electrical engineering applications through MATLAB.</p>
35	III-II DIGITAL COMPUTING PLATFORMS LAB (20AA02602T)	<p>CO 1: Understand the basic concepts to write assembly language programming on 8086 Microprocessors.</p> <p>CO 2: Design various device configurations and Interfacing of various devices with 8086.</p> <p>CO 3: Understand the basic concepts to write programming on 8051 Microcontroller.</p> <p>CO 4: Design various Interfacing circuitry with 8051 Microcontroller with its peripheral devices</p> <p>CO 1: Implement various DSP Algorithms using software packages.</p> <p>CO 2: Implement DSP algorithms with Digital Signal Processor.</p> <p>CO 3: Analyze and observe magnitude and phase characteristics (Frequency response Characteristics) of digital IIR-Butterworth,</p> <p>CO 4: Analyze and observe magnitude and phase characteristics (Frequency response Characteristics) of digital FIR filters using</p> <p>CO 5: Analyze digital filters using Software Tools.</p> <p>CO 1: Understand the basic concepts of Electrical Engineering.</p> <p>CO 2: Apply the concepts to design MATLAB models.</p> <p>CO 3: Analyse various Electrical engineering applications through MATLAB.</p>
36	III-II DIGITAL SIGNAL PROCESSING LAB (20AA04502P)	<p>CO 1: Understand the basic concepts to write assembly language programming on 8086 Microprocessors.</p> <p>CO 2: Design various device configurations and Interfacing of various devices with 8086.</p> <p>CO 3: Understand the basic concepts to write programming on 8051 Microcontroller.</p> <p>CO 4: Design various Interfacing circuitry with 8051 Microcontroller with its peripheral devices</p> <p>CO 1: Implement various DSP Algorithms using software packages.</p> <p>CO 2: Implement DSP algorithms with Digital Signal Processor.</p> <p>CO 3: Analyze and observe magnitude and phase characteristics (Frequency response Characteristics) of digital IIR-Butterworth,</p> <p>CO 4: Analyze and observe magnitude and phase characteristics (Frequency response Characteristics) of digital FIR filters using</p> <p>CO 5: Analyze digital filters using Software Tools.</p> <p>CO 1: Understand the basic concepts of Electrical Engineering.</p> <p>CO 2: Apply the concepts to design MATLAB models.</p> <p>CO 3: Analyse various Electrical engineering applications through MATLAB.</p>
37	III-II APPLICATIONS OF SOFT COMPUTING	<p>CO 1: Understand the basic concepts to write assembly language programming on 8086 Microprocessors.</p> <p>CO 2: Design various device configurations and Interfacing of various devices with 8086.</p> <p>CO 3: Understand the basic concepts to write programming on 8051 Microcontroller.</p> <p>CO 4: Design various Interfacing circuitry with 8051 Microcontroller with its peripheral devices</p> <p>CO 1: Implement various DSP Algorithms using software packages.</p> <p>CO 2: Implement DSP algorithms with Digital Signal Processor.</p> <p>CO 3: Analyze and observe magnitude and phase characteristics (Frequency response Characteristics) of digital IIR-Butterworth,</p> <p>CO 4: Analyze and observe magnitude and phase characteristics (Frequency response Characteristics) of digital FIR filters using</p> <p>CO 5: Analyze digital filters using Software Tools.</p> <p>CO 1: Understand the basic concepts of Electrical Engineering.</p> <p>CO 2: Apply the concepts to design MATLAB models.</p> <p>CO 3: Analyse various Electrical engineering applications through MATLAB.</p>

		TOOLS IN ELECTRICAL	CO 4: Develop real time models using MATLAB. CO 1: Understand IPR law & Cyber law
38	III-II	INTELLECTUAL PROPERTY RIGHTS AND PATENTS	CO 2: Discuss registration process, maintenance and litigations associated with trademarks CO 3: Illustrate the copy right law CO 4: Enumerate the trade secret law
39	IV-I	MEASUREMENTS & SENSORS (19A02701)	CO 1: Able to Understand the working of various instruments and equipments used for the measurement of various electrical engineering parameters like voltage, current, power, phase etc in industry as well as in power generation, transmission and CO 2: Able to analyze and solve the varieties of problems and issues coming up in the vast field of electrical measurements. CO 3: Analyse the different operation of extension range ammeters and voltmeters, DC and AC bridge for measurement of CO 4: Design and development of various voltage and current measuring meters and the varieties of issues coming up in the field
40	IV-I	POWER SYSTEM PROTECTION (19A02702)	CO 1: Distinguish between the principles of operation of electromagnetic relays, static relays and microprocessor based relays CO 2: Determine the unprotected percentage of generator winding under fault occurrence CO 3: Design the protection system for transformers CO 4: Identify various types of the relays in protecting feeders, lines and bus bars CO 5: Solve numerical problems for arc interruption and recovery in circuit breakers CO 6: Demonstrate the protection of a power system from over voltages
41	IV-I	POWER SYSTEM OPERATION AND CONTROL (19A02703a)	CO 1: To be able to understand to deal with problems in Power System as Power System Engineer CO 2: To be able to Understand to deal with AGC problems in Power System CO 3: To be able to understand to deal the problems in hydro electric and hydro thermal problems CO 4: To understand the complexity of reactive power control problems and to deal with them CO 5: To understand the necessity of voltage regulator aspects and determine over voltage management problems in the modern power system era.
42	IV-I	AIR POLLUTION AND CONTROL (19A01704a)	CO 1: Identify the sources of air pollution CO 2: Understand the composition and structure and structure of atmosphere. CO 3: Know about the general characteristics of stack emissions and their behavior CO 4: Know about the general characteristics of stake emission and their behavior CO 5: Know about the noise sources, mapping, prediction equations etc., CO 1: Understand the state of art synthesis of nano materials


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43	CHEMISTRY OF NANOMATERIALS AND APPLICATIONS (19A51704a)	CO 2: Characterize nano materials using ion beam, scanning probe methodologies, position sensitive atom probe and spectroscopic ellipsometry. CO 3: Analyze nanoscale structure in metals, polymers and ceramics CO 4: Analyze structure-property relationship in coarser scale structures CO 5: Understand structures of carbon nano tubes CO 1: Understand the nature and concept of Organizational behavior CO 2: Apply theories of motivation to analyze the performance problems CO 3: Analyze the different theories of leadership CO 4: Evaluate group dynamics CO 5: Develop as powerful leader
44	ORGANISATIONAL BEHAVIOUR (19A52701a)	CO 1: Get the practical knowledge on calculation of sequence impedance, fault currents, voltages and sub transient reactance's. Get the practical knowledge on how to draw the equivalent circuit of three winding transformer. CO 2: Get the knowledge on development of MATLAB program for formation of Y and Z buses. CO 3: Get the knowledge on development of MATLAB programs for Gauss-Seidel and Fast Decouple Load Flow studies. CO 4: Get the knowledge on development of SIMULINK model for single area load frequency problem. CO 1: Calibrate various electrical measuring instruments CO 2: Accurately determine the values of inductance and capacitance using AC bridges CO 3: Compute the coefficient of coupling between two coupled coils CO 4: Accurately determine the values of very low resistances CO 1: To get exposed to latest technology of ESS CO 2: To understand the Principle, features and benefits of ESS CO 3: To understand about marketing and management strategies of ESS in working environment in future CO 4: To distinguish wide variety of applications of BEES for practical applications new and renewable energy sources CO 1: An ability to apply knowledge of mathematics, science, and engineering CO 2: Design a system, component or process to meet desired needs with in realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability CO 3: An ability to identify, formulate, and solve engineering problems
45	POWER SYSTEMS & SIMULATION LAB (19A02705)	CO 1: Get the practical knowledge on calculation of sequence impedance, fault currents, voltages and sub transient reactance's. Get the practical knowledge on how to draw the equivalent circuit of three winding transformer. CO 2: Get the knowledge on development of MATLAB program for formation of Y and Z buses. CO 3: Get the knowledge on development of MATLAB programs for Gauss-Seidel and Fast Decouple Load Flow studies. CO 4: Get the knowledge on development of SIMULINK model for single area load frequency problem. CO 1: Calibrate various electrical measuring instruments CO 2: Accurately determine the values of inductance and capacitance using AC bridges CO 3: Compute the coefficient of coupling between two coupled coils CO 4: Accurately determine the values of very low resistances CO 1: To get exposed to latest technology of ESS CO 2: To understand the Principle, features and benefits of ESS CO 3: To understand about marketing and management strategies of ESS in working environment in future CO 4: To distinguish wide variety of applications of BEES for practical applications new and renewable energy sources CO 1: An ability to apply knowledge of mathematics, science, and engineering CO 2: Design a system, component or process to meet desired needs with in realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability CO 3: An ability to identify, formulate, and solve engineering problems
46	MEASUREMENTS LAB (19A02706)	CO 1: Calibrate various electrical measuring instruments CO 2: Accurately determine the values of inductance and capacitance using AC bridges CO 3: Compute the coefficient of coupling between two coupled coils CO 4: Accurately determine the values of very low resistances CO 1: To get exposed to latest technology of ESS CO 2: To understand the Principle, features and benefits of ESS CO 3: To understand about marketing and management strategies of ESS in working environment in future CO 4: To distinguish wide variety of applications of BEES for practical applications new and renewable energy sources CO 1: An ability to apply knowledge of mathematics, science, and engineering CO 2: Design a system, component or process to meet desired needs with in realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability CO 3: An ability to identify, formulate, and solve engineering problems
47	ENERGY STORAGE SYSTEMS (19A02801d)	CO 1: Calibrate various electrical measuring instruments CO 2: Accurately determine the values of inductance and capacitance using AC bridges CO 3: Compute the coefficient of coupling between two coupled coils CO 4: Accurately determine the values of very low resistances CO 1: To get exposed to latest technology of ESS CO 2: To understand the Principle, features and benefits of ESS CO 3: To understand about marketing and management strategies of ESS in working environment in future CO 4: To distinguish wide variety of applications of BEES for practical applications new and renewable energy sources CO 1: An ability to apply knowledge of mathematics, science, and engineering CO 2: Design a system, component or process to meet desired needs with in realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability CO 3: An ability to identify, formulate, and solve engineering problems
48	GLOBAL WARMING AND CLIMATE CHANGES	CO 1: Calibrate various electrical measuring instruments CO 2: Accurately determine the values of inductance and capacitance using AC bridges CO 3: Compute the coefficient of coupling between two coupled coils CO 4: Accurately determine the values of very low resistances CO 1: To get exposed to latest technology of ESS CO 2: To understand the Principle, features and benefits of ESS CO 3: To understand about marketing and management strategies of ESS in working environment in future CO 4: To distinguish wide variety of applications of BEES for practical applications new and renewable energy sources CO 1: An ability to apply knowledge of mathematics, science, and engineering CO 2: Design a system, component or process to meet desired needs with in realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability CO 3: An ability to identify, formulate, and solve engineering problems



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MECHANICAL ENGINEERING I & II Sem Course outcomes for the academic year 2022-23


S. NO.	Year/Se	Course name	Course outcomes
1	II-I	Complex variables, Transforms & Partial Differential Equations (20A54303)	CO 1: Understand the analyticity of complex functions and conformal mappings. CO 2: Apply cauchy's integral formula and cauchy's integral theorem to evaluate improper integrals along contours CO 3: Understand the usage of Laplace transforms. CO 4: Evaluate the Fourier series expansion of periodic functions. CO 5: Formulate/solve/classify the solutions of partial differential equations and also find the solution of one-dimensional wave equation and heat equation.
2	II-I	Fluid Mechanics and Hydraulic Machines (20A01302T)	CO 1: Familiarize basic terms used in fluid mechanics CO 2: Understand the principles of fluid statics, kinematics and dynamics CO 3: Understand flow characteristics and classify the flows and estimate various losses in flow through channels CO 4: Analyze characteristics for uniform and non-uniform flows in open channels. CO 5: Design different types of turbines, centrifugal and multistage pumps.
3	II-I	Manufacturing Processes (20A03301T)	CO 1: Demonstrate different metal casting processes and gating systems. CO 2: Classify working of various welding processes. CO 3: Evaluate the forces and power requirements in rolling process. CO 4: Apply the principles of various forging operations. CO 5: Outline the manufacturing methods of plastics, ceramics and powder metallurgy. CO 6: Identify different unconventional processes and their applications.
4	II-I	Thermodynamics (20A03302)	CO 1: Understand the importance of thermodynamic properties related to conversion of heat energy into work. CO 2: Apply the laws of thermodynamics to boilers, heat pumps, refrigerators, heat engines, compressors and nozzles. CO 3: Utilize steam properties to design steam based components. CO 4: Analyze thermodynamic relations and air standard cycles. CO 1: Evaluate stresses and strains


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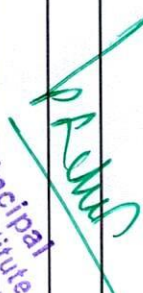
5	II-I Mechanics of Materials (20A01305T)	<p>CO 2: To draw the SF and BM diagrams for various beams under different loading conditions</p> <p>CO 3: Determine the resistance and deformation in machine members subjected to torsional loads and springs.</p> <p>CO 4: Analyze and design thin, thick cylinders.</p> <p>CO 5: Analysis of stresses in curved bars.</p>
6	II-I MECHANICS AND FLUID HYDRAULIC MACHINES LAB (20A01302P)	<p>CO: By performing the various tests in this laboratory the student will be able to know the principles of discharge measuring devices and head loss due to sudden contraction and expansion in pipes and working principles of various pumps and motors.</p>
7	II-I Manufacturing Processes Lab (20A03301P)	<p>CO 1: Fabricate different types of components using various manufacturing techniques.</p> <p>CO 2: Adapt unconventional manufacturing methods.</p>
8	II-I Mechanics of Materials Lab (20A01305P)	<p>CO : By performing the various tests in this laboratory the student will be able to know the structural behavior of various structural elements when subjected to external loads</p> <p>CO 1: Identify the issues in software requirements specification and create to write DRS documents for software development problems</p>
9	II-I Application Development with Python (20A05305)	<p>CO 2: Explore the use of Object oriented concepts to solve Real-life problems</p> <p>CO 3: Design database for any real-world problem</p> <p>CO 4: Solve mathematical problems using Python programming language</p>
10	II-I ENVIRONMENTAL SCIENCE (20A99201)	<p>CO 1: Grasp multidisciplinary nature of environmental studies and various renewable and nonrenewable resources</p> <p>CO 2: Understand flow and bio-geo-chemical cycles and ecological pyramids</p> <p>CO 3: Understand various causes of pollution and solid waste management and related preventive measures.</p> <p>CO 4: About the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation.</p> <p>CO 5: Casus of population explosion, value education and welfare programmes.</p>
11	II-II Numerical Methods & Probability theory(20A54402)	<p>CO 1: Apply numerical methods to solve algebraic and transcendental equations</p> <p>CO 2: Derive interpolating polynomials using interpolation formulae</p> <p>CO 3: Solve differential and integral equations numerically</p>


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			<p>CO 4: Apply probability theory to find the chances of happening of events.</p> <p>CO 5: Understand various probability distributions and calculate their statistical constants.</p> <p>CO 1: Understand the working of IC engines with combustion process.</p> <p>CO 2: Select compressors for different applications.</p> <p>CO 3: Use T-s diagram in vapour power and gas power cycles.</p> <p>CO 4: Evaluate the relative performance of different steam turbines</p> <p>CO 5: Select appropriate refrigerant for different applications.</p> <p>CO 1: Design of critical dimension and problem solving capacity of various mechanical engineering problems related to kinematics of machines</p> <p>CO 2: Understand the basic principles of mechanisms in mechanical engineering</p> <p>CO 3: Assess various concepts of mechanisms like straight line motion mechanisms, Steering gear mechanisms and working principles of power elements (Gears, gear trains, Cams) and design related problems effectively</p> <p>CO 4: Examine the velocity and acceleration diagram for a given mechanism</p> <p>CO 5: Utilize analytical, mathematical and graphical aspects of kinematics of Machines for effective design</p> <p>CO 6: Construct the cam profile for a given motion</p> <p>CO 7: Analyze various gear trains</p> <p>CO 1: Choose cutting processes and variables.</p> <p>CO 2: Relate tool wear and tool life.</p> <p>CO 3: Calculate the machining parameters for different machining processes.</p> <p>CO 4: Identify methods to generate different types of surfaces.</p> <p>CO 5: Explain work-holding requirements.</p> <p>CO 6: Design jigs and fixtures.</p> <p>CO 1: Define the Organizational Behaviour, its nature and scope.</p> <p>CO 2: Understand the nature and concept of Organizational behaviour</p> <p>CO 3: Apply theories of motivation to analyse the performance problems</p> <p>CO 4: Analyse the different theories of leadership</p> <p>CO 5: Evaluate group dynamics</p>
12	II-II	Applied Thermodynamics (20A03401T)	
13	II-II	KINETICS OF MACHINERY (20A03402)	
14	II-II	Manufacturing Technology (20A03403T)	
15	II-II	ORGANISATIONAL BEHAVIOUR (20A52302)	


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			CO 6: Develop as powerful leader
16	II-II	Applied Thermodynamics Lab (20A03401P)	CO 1: Explain different working cycles of engine CO 2: Describe various types of combustion chambers in IC engines CO 3: Illustrate the working of refrigeration and air conditioning systems CO 4: Evaluate heat balance sheet of IC engine.
17	II-II	Manufacturing Technology Lab (20A03403P)	CO 1: Implement the concept of machining with various machine tools. CO 2: Get hands on experience on various machine tools and machining operations.
18	II-II	Computer Aided Machine Drawing (20A03404)	CO 1: Demonstrate the conventional representations of materials and machine components. CO 2: Model riveted, welded and key joints using CAD system. CO 3: Create solid models and sectional views of machine components. CO 4: Generate solid models of machine parts and assemble them. CO 5: Translate 3D assemblies into 2D drawings. CO 6: Create manufacturing drawing with dimensional and geometric tolerances.
19	II-II	Soft Skills (20A52401)	CO 1: Memorize various elements of effective communicative skills CO 2: Interpret people at the emotional level through emotional intelligence CO 3: apply critical thinking skills in problem solving CO 4: analyse the needs of an organization for team building CO 5: Judge the situation and take necessary decisions as a leader CO 6: Develop social and work-life skills as well as personal and emotional well-being
20	II-II	Design Thinking for Innovation (20A99401)	CO 1: Define the concepts related to design thinking. CO 2: Explain the fundamentals of Design Thinking and innovation CO 3: Apply the design thinking techniques for solving problems in various sectors CO 4: Analyse to work in a multidisciplinary environment CO 5: Evaluate the value of creativity
			CO 1: Apply the basics of geometric representation and transformations in CAD/CAM. CO 2: Choose geometric modelling methods for building CAD models.


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<p>21 III-I</p> <p>CAD/CAM (20A03501)</p>	<p>CO 3: Compare NC, CNC and DNC.</p> <p>CO 4: Develop manual and computer aided part programming for turning and milling operations.</p> <p>CO 5: Summarize the principles of robotics AR, VR and AI in CIM.</p> <p>CO 1: Estimate safety factors of machine members subjected to static and dynamic loads.</p>
<p>22 III-I</p> <p>DESIGN OF MACHINE MEMBERS (20A03502)</p>	<p>CO 2: Design fasteners subjected to variety of loads</p> <p>CO 3: Select of standard machine elements such as keys, shafts, couplings, springs and bearings.</p> <p>CO 4: Design clutches brakes and spur gears.</p> <p>CO 1: List various measuring instruments used in metrology.</p>
<p>23 III-I</p> <p>METROLOGY AND MEASUREMENTS (20A03503T)</p>	<p>CO 2: Examine geometry of screw threads and gear profiles.</p> <p>CO 3: Measure force, torque and pressure.</p> <p>CO 4: Calibrate various measuring instruments.</p> <p>CO 1: Outline sources of energy, power plant economics, and environmental aspects</p> <p>CO 2: Explain power plant economics and environmental considerations</p>
<p>24 III-I</p> <p>POWER PLANT ENGINEERING (20A03504c)</p>	<p>CO 3: Describe working components of a steam power plant</p> <p>CO 4: Illustrate the working mechanism of Diesel and Gas turbine power plants</p> <p>CO 5: summarize types of renewable energy sources and their working principle</p> <p>CO 6: Demonstrate the working principle of nuclear power plants</p> <p>CO 1: Ability to perform simultaneous material and energy balances.</p> <p>CO 2: Student learn about various electrochemical and energy systems</p>
<p>25 III-I</p> <p>CHEMISTRY OF ENERGY MATERIALS (20A51501)</p>	<p>CO 3: Knowledge of solid, liquid and gaseous fuels</p> <p>CO 4: To know the energy demand of world, nation and available resources to fulfill the demand</p> <p>CO 5: To know about the conventional energy resources and their effective utilization</p> <p>CO 6: To acquire the knowledge of modern energy conversion technologies</p> <p>CO 7: To be able to understand and perform the various characterization techniques of fuels</p> <p>CO 8: To be able to identify available nonconventional (renewable) energy resources and techniques to utilize them effectively</p>
<p>26 III-I</p> <p>METROLOGY AND MEASUREMENTS</p>	<p>surface roughness.</p> <p>CO 2: Measure effective diameter of thread profile.</p> <p>CO 3: Conduct different machine alignment tests.</p>


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	LAB (20A035034)	CO 4: Measure temperature, displacement, and pressure.
27	COMPUTER AIDED MODELING LABORATORY III-I	CO 1: Students will be able to design different parts of mechanical equipment's CO 2: Students will be able to apply their skills in various designing and Manufacturing Industries.
28	INNOVATION THROUGH IoT (20A03507) III-I	CO 1: Write a program of Raspberry Pi/Arduino for IoT applications CO 2: Understand the relationship between IoT, Cloud services and Software agents CO 3: Explain the troubleshooting methods in IoT based systems CO 4: Apply the design thinking concepts to any type of IoT based applications CO 5: Define a problem statement by conducting the survey CO 6: Design a creative solution for a specified problem.
29	DYNAMICS OF MACHINERY (20A03601) III-II	CO 1: Determine the forces acting on various linkages when a mechanism is subjected to external forces. CO 2: Identify and correct the unbalances of rotating body CO 3: Analyze the vibratory motion of SDOF systems. CO 4: Reduce the magnitude of vibration and isolate vibration of dynamic systems CO 5: Determine dimensions of Governors for speed control.
30	FINITE ELEMENT METHODS (20A03602) III-II	CO 1: Understand the concepts behind variational methods and weighted residual methods in FEM. element. CO 3: Develop element characteristic equation procedure and generation of global stiffness equation will be applied. CO 4: Able to apply Suitable boundary conditions to a global structural equation, and reduce it to a solvable form.
31	HEAT TRANSFER (20A03603) III-II	heat transfer and fluid flow. CO 1: Apply the concepts of different modes of heat transfer. CO 2: Apply knowledge of conduction heat transfer in the design of insulation of furnaces and pipes. CO 3: Analyse free and forced convection phenomena in external and internal flows. CO 4: Design of thermal shields using the concepts of black body and non-black body radiation. CO 5: Apply the basics of mass transfer for applications in diffusion of gases.
	PRODUCTION AND OPERATIONS MANAGEMENT	CO 1: Demonstrate the operations and supply management to the sustainability of an enterprise CO 2: Identify the need for forecasting and understand different forecasting methods CO 3: Identify various production and plant layouts

32	III-II	(20A03604b)	<p>CO 4: Examine the quality control of the production</p> <p>CO 5: Apply Just in Time (JIT) basic principles and applications</p> <p>CO 6: Recommend the production schedule for productivity</p> <p>CO 7: Design, analyze and implement single machine, parallel machine, flow shop and job shop scheduling algorithms</p>
33	III-II	<p>PHYSICS OF ELECTRONIC MATERIALS AND DEVICES (20A56701)</p>	<p>CO 1: To understand the fundamentals of various materials.</p> <p>CO 2: To exploit the physics of semiconducting materials</p> <p>CO 3: To familiarize with the working principles of semiconductor-based devices.</p> <p>CO 4: To understand the behaviour of dielectric and piezoelectric materials.</p> <p>CO 5: To identify the magnetic materials and their advanced applications.</p>
34	III-II	<p>COMPUTER AIDED DESIGN LABORATORY COMPUTER AIDED MANUFACTURING LABORATORY (20A03607)</p>	<p>CO : Ability to solve engineering problems using the commercial software's such as ANSYS, SIMUFACT, ABAQUS, SIMULIA, Mathematical, MATLAB, GNU Octave, Scilab, MAPLE/ COMSOL.</p> <p>CO 1: Use and understanding of Preparatory and Miscellaneous (G& M) codes to generate or edit a program which will operate a CNC Lathe/ Milling and Drilling.</p> <p>CO 2: Apply mathematical methods to calculate World/ Joint/ Tool coordinates in robotics.</p> <p>CO 3: Apply the programming concepts of Robots for simple applications in material handling and assembly</p>
35	III-II	<p>HEAT TRANSFER LAB (20A03603P)</p>	<p>CO 1: Explain different modes of heat transfer</p> <p>CO 2: Identify parameters for measurement for calculating heat transfer</p> <p>CO 3: Determine effectiveness of heat exchanger</p> <p>CO 4: Design new equipment related to heat transfer</p> <p>CO 5: Apply principles of heat transfer in wide application in industries.</p>
36	III-II	<p>3D PRINTING PRACTICE (20A03608)</p>	<p>CO 1: Explain different types of 3d Printing techniques</p> <p>CO 2: Identify parameters for powder binding and jetting process</p> <p>CO 3: Determine effective use of ABS material for 3D Printing</p> <p>CO 4: Apply principles of mathematics to evaluate the volume of material require.</p>
37	III-II	<p>INTELLECTUAL PROPERTY RIGHTS AND PATENTS (20A99601)</p>	<p>CO 1: Understand IPR law & Cyber law</p> <p>CO 2: Discuss registration process, maintenance and litigations associated with trademarks</p> <p>CO 3: Illustrate the copy right law</p> <p>CO 4: Enumerate the trade secret law</p>
38	III-II		

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39	IV-I	OPERATIONS RESEARCH (19A03701)	<p>CO 1: Develop mathematical models for practical problems</p> <p>CO 2: Apply linear programming to transportation problems.</p> <p>CO 3: Solve games using various techniques.</p> <p>CO 4: Solve production scheduling and develop inventory policies.</p> <p>CO 5: Apply optimality conditions for constrained and unconstrained nonlinear problems.</p> <p>CO 6: apply dynamic programming methods.</p>
40	IV-I	METROLOGY AND MEASUREMENTS (19A03702T)	<p>CO 1: List various measuring instruments used in metrology.</p> <p>CO 2: Examine geometry of screw threads and gear profiles.</p> <p>CO 3: Measure force, torque, temperature, pressure and sound.</p> <p>CO 4: Calibrate various measuring instruments.</p>
41	IV-I	SOLAR AND WIND ENERGY (19A03703d)	<p>CO 1: Develop design and operation of solar heating and cooling systems</p> <p>CO 2: Apply the principles of solar thermo photovoltaics</p> <p>CO 3: Apply different statistical models for wind data analysis</p> <p>CO 4: Make use of power curve for energy estimation</p> <p>CO 5: Plan the wind farm</p>
42	IV-I	AIR POLLUTION AND CONTROL (19A01704a)	<p>CO 1: Identify the sources of air pollution</p> <p>CO 2: Understand the composition and structure of atmosphere.</p> <p>CO 3: Know about the general characteristics of stack emissions and their behavior</p> <p>CO 4: Know about the general characteristics of stake emission and their behavior</p> <p>CO 5: Know about the noise sources, mapping, prediction equations etc.,</p>
43	IV-I	ORGANISATIONAL BEHAVIOUR (19A52701a)	<p>CO 1: Understand the nature and concept of Organizational behavior</p> <p>CO 2: Apply theories of motivation to analyze the performance problems</p> <p>CO 3: Analyze the different theories of leadership</p> <p>CO 4: Evaluate group dynamics</p> <p>CO 5: Develop as powerful leader</p>
44	IV-I	METROLOGY AND MEASUREMENT	<p>CO 1: Apply different instruments to measure length, width, depth, bore diameters, internal and external diameters, tool angles, and surface texture.</p> <p>CO 2: Measure effective diameter of thread profile.</p>


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44	IV-I	LABORATORY (19A03702P)	CO 3 : Conduct different machine alignment tests. CO 4: Measure temperature, displacement, and pressure.
45	IV-I	INTRODUCTION TO CAD/CAM LAB (19A03602P)	CO 1 : Generate CAD models. CO2: Write CNC programs for various machining operations.
46	IV-I	INTERNET OF THINGS LABORATORY (19A05406P)	CO 1: Choose the sensors and actuators for an IoT application CO 2: Select protocols for a specific IoT application CO 3: Utilize the cloud platform and APIs for IoT application CO 4: Experiment with embedded boards for creating IoT prototypes CO 5: Design a solution for a given IoT application
47	IV-II	REFRIGERATION AND AIR CONDITIONING (19A03801c)	CO 1: Summarize the various refrigeration and air conditioning equipments and it's working. CO 2: Apply the basic knowledge to operate the refrigeration systems. CO 3: Evaluate the cop for vapour absorption system.
48	IV-II	GLOBAL WARMING AND CLIMATE CHANGES (19A01802b)	CO 1: An ability to apply knowledge of mathematics, science, and engineering CO 2: Design a system, component or process to meet desired needs with in realistic constraints such as economic ,environmental ,social ,political ,ethical ,health and safety , manufacturability and sustainability CO 3: An ability to identify, formulate, and solve engineering problems


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ELECTRONICS & COMMUNICATION ENGINEERING I & II Sem Course outcomes for the academic year 2022-23

S. NO	Year/Sem	Course name	Course outcomes
1	II-I	Complex variables and Transforms (20A54302)	<p>CO 1: Understand the analyticity of complex functions and conformal mappings</p> <p>CO 2: Apply cauchy's integral formula and cauchy's integral theorem to evaluate improper integrals along contours.</p> <p>CO 3: Understand the usage of Laplace transforms, Fourier transforms and z transforms.</p> <p>CO 4: Evaluate the Fourier series expansion of periodic functions</p> <p>CO 5: Understand the use of Fourier transforms and apply z transforms to solve difference equations.</p>
2	II-I	SIGNALS AND SYSTEMS (20A04301T)	<p>CO 1: Understand the mathematical description and representation of continuous-time and discrete-time signals and systems. Also</p> <p>CO 2: Apply sampling theorem to convert continuous-time signals to discrete-time signals and reconstruct back, different</p> <p>CO 3: Analyze the frequency spectra of various continuous-time and discrete-time signals using different transform methods.</p> <p>CO 4: Classify the systems based on their properties and determine the response of them.</p>
3	II-I	ELECTRICAL ENGINEERING (20A02303T)	<p>CO 1: Able to acquire knowledge about how to determine the transient response of R-L, R-C, R-L-C series circuits for D.C and</p> <p>CO 2: Able to solve the problems on R L C circuits for different excitations using different approaches</p> <p>CO 3: Analyze the complex circuits of R L C circuits</p> <p>CO 4: Able to solve the problems the e.m.f. generated on DC Generator</p> <p>CO 5: Able to acquire knowledge about how to determine the efficiency and regulation of single phase transformer and</p>
4	II-I	ANALOG CIRCUITS (20A04302T)	<p>CO 1: Understand the characteristics of differential amplifiers, feedback and power amplifiers.</p> <p>CO 2: Examine the frequency response of multistage and differential amplifier circuits using BJT & MOSFETs at low and high</p> <p>CO 3: Investigate different feedback and power amplifier circuits based on the application</p> <p>CO 4: Derive the expressions for frequency of oscillation and condition for oscillation of RC and LC oscillator circuits.</p> <p>CO 5: Evaluate the performance of different tuned amplifiers and multivibrators</p>
5	II-I	ORGANISATIONAL BEHAVIOUR (20A52302)	<p>CO 1: Define the Organizational Behaviour, its nature and scope.</p> <p>CO 2: Understand the nature and concept of Organizational behaviour</p> <p>CO 3: Apply theories of motivation to analyse the performance problems</p> <p>CO 4: Analyse the different theories of leadership</p> <p>CO 5: Evaluate group dynamics</p> <p>CO 6: Develop as powerful leader</p>
6	II-I	SIMULATION LAB (20A04301P)	<p>CO 1: Learn how to use the MATLAB software and know syntax of MATLAB programming.</p> <p>CO 2: Understand how to simulate different types of signals and system response.</p> <p>CO 3: Find the Fourier Transform of a given signal and plot amplitude and phase characteristics.</p> <p>CO 4: Analyze the response of different systems when they are excited by different signals and plot power spectral density of</p> <p>CO 5: Generate/Simulate different random signals for the given specifications</p>
7	II-I	ELECTRICAL ENGINEERING	<p>CO 1: To determine the various parameters experimentally</p> <p>CO 2: To understand various characteristics of DC generators and DC motors</p>


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		LAB (20A02303P)	CO 3: To predetermine the efficiency and regulation of a $1-\phi$ transformer
			CO 1: Know about the usage of equipment/components/software tools used to conduct the experiments in analog circuits.
			CO 2: Conduct the experiment based on the knowledge acquired in the theory about various analog circuits using BJT/MOSFETs
			CO 3: Analyze the given analog circuit to find required important metrics of it theoretically.
			CO 4: Draw the relevant graphs between important metrics of the system from the observed measurements.
			CO 5: Compare the experimental results with that of theoretical ones and infer the conclusions.
			CO 6: Design the circuit for the given specifications.
			CO 1: Identify the issues in software requirements specification and enable to write SRS documents for software development
			CO 2: Explore the use of Object oriented concepts to solve Real-life problems
			CO 3: Design database for any real-world problem
			CO 4: Solve mathematical problems using Python programming language
			CO 1: Students are expected to become more aware of themselves, and their surroundings (family, society, nature)
			CO 2: They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human
			CO 3: They would have better critical ability
			CO 4: They would also become sensitive to their commitment towards what they have understood (human values, human life, at least a beginning would be made in this direction.
			CO 1: Understanding the concepts of Probability, Random Variables, Random Processes and their characteristics learn how to
			CO 2: Formulate and solve the engineering problems involving random variables and random processes.
			CO 3: Analyze various probability density functions of random variables
			CO 4: Derive the response of linear system for Gaussian noise and random signals as inputs.
			CO 1: Understand the properties of Boolean algebra, other logic operations, and minimization of Boolean functions using
			CO 2: Make use of the concepts to solve the problems related to the logic circuits.
			CO 3: Analyze the combinational and sequential logic circuits
			CO 4: Develop digital circuits using HDL, and Compare various Programmable logic devices:
			CO 5: Design various logic circuits using Boolean algebra, combinational and sequential logic circuits.
			CO 1: Explain basic laws of electromagnetic fields and know the wave concept
			CO 2: Solve problems related to electromagnetic fields.
			CO 3: Analyze electric and magnetic fields at the interface of different media.
			CO 4: Derive Maxwell's equations for static and time varying fields.
			CO 5: Analogy between electric and magnetic fields.
			CO 6: Describes the transmission lines with equivalent circuit and explain their characteristic with various lengths.
			CO 1: Recognize/List the basic terminology used in analog and digital communication techniques for transmission of signals.
			CO 2: Explain/Discuss the basic operation of different analog and digital communication systems at baseband and passband level.
			CO 3: Compute various parameters of baseband and passband transmission schemes by applying basic engineering knowledge.
			CO 4: Analyze/Investigate the performance of different modulation & demodulation techniques to solve complex problems in the
8	II-I	ANALOG CIRCUITS LAB (20A04302P)	
9	II-I	Application Development with Python (20A05305)	
10	II-I	Universal Human Values (20A52201)	
11	II-II	PROBABILITY THEORY AND STOCHASTIC PROCESSES	
12	II-II	DIGITAL LOGIC DESIGN (20A04303T)	
13	II-II	ELECTROMAGNETIC WAVES AND TRANSMISSION LINES (20A04401)	
14	II-II	COMMUNICATION SYSTEMS (20A04402T)	

			CO 5: Evaluate/Assess the performance of all analog and digital modulation techniques to know the merits and demerits of each
			CO 1: List out the characteristics of Linear and Digital Ics
			CO 2: Discuss the various applications of linear & Digital Ics.
			CO 3: Solve the application based problems related to linear and digital Ics
			CO 4: Analyze various applications based circuits of linear and digital Ics.
			CO 5: Design the circuits using either linear Ics or Digital Ics from the given specifications.
15	II-II	LINEAR AND DIGITAL IC APPLICATIONS (20A04403T)	CO 1: Understand the pin configuration of various digital Ics used in the lab:
			CO 2: Conduct the experiment and verify the properties of various logic circuits.
			CO 3: Analyze the sequential and combinational circuits.
			CO 4: Design of any sequential/combinational circuit using Hardware/ HDL.
			CO 1: Know about the usage of equipment/components/software tools used to conduct the experiments in analog and digital
			CO 2: Conduct the experiment based on the knowledge acquired in the theory about modulation and demodulation schemes to
			CO 3: Analyze the performance of a given modulation scheme to find the important metrics of the system theoretically.
			CO 4: Draw the relevant graphs between important metrics of the system from the observed measurements
			CO 5: Compare the experimental results with that of theoretical ones and infer the conclusions.
17	II-II	COMMUNICATIO N SYSTEMS LAB (20A04402P)	CO 1: Understand the pin configuration of each linear/ digital IC and its functional diagram
			CO 2: Conduct the experiment and obtain the expected results.
			CO 3: Analyze the given circuit/designed circuit and verify the practical observations with the analyzed results
			CO 4: Design the circuits for the given specifications using linear and digital Ics.
			CO 5: Acquaintance with lab equipment about the operation and its use.
18	II-II	LINEAR AND DIGITAL IC APPLICATIONS LAB (20A04403P)	CO 1: Memorize various elements of effective communicative skills
			CO 2: Interpret people at the emotional level through emotional intelligence
			CO 3: apply critical thinking skills in problem solving
			CO 4: analyse the needs of an organization for team building
			CO 5: Judge the situation and take necessary decisions as a leader
			CO 6: Develop social and work-life skills as well as personal and emotional well-being
19	II-II	Soft Skills (20A52401)	CO 1: Define the concepts related to design thinking.
			CO 2: Explain the fundamentals of Design Thinking and innovation
			CO 3: Apply the design thinking techniques for solving problems in various sectors
			CO 4: Analyse to work in a multidisciplinary environment
			CO 5: Evaluate the value of creativity
			CO 6: Formulate specific problem statements of real time issues
20	II-II	Design Thinking for Innovation (20A99401)	CO 1: Identify open and closed loop control system
			CO 2: Formulate mathematical model for physical systems
			CO 3: Use standard test signals to identify performance characteristics of first and second-order systems
			CO 4: Analyze stability of the closed and open loop systems
21	III-I	CONTROL SYSTEMS ENGINEERING (20A04501)	


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			CO 5: Design closed-loop control system to satisfy dynamic performance specifications using frequency response, root-locus, and
			CO 1: Formulate difference equations for the given discrete time systems
22	III-I	DIGITAL SIGNAL PROCESSING (20A04502T)	CO 2: Apply FFT algorithms for determining the DFT of a given signal
			CO 3: Compare FIR and IIR filter structures
			CO 4: Design digital filter (FIR & IIR) from the given specifications
			CO 5: Outline the concept of multirate DSP and applications of DSP.
23	III-I	MICROPROCESSORS AND MICROCONTROL LERS (20A04503T)	CO 1: Distinguish between microprocessors & microcontrollers
			CO 2: Develop assembly language programming
			CO 3: Describe interfacing of 8086 with peripheral devices
			CO 4: Design applications using microcontrollers
24	III-I	MACHINE LEARNING (20A05602T)	CO 1: Identify machine learning techniques suitable for a given problem
			CO 2: Solve the problems using various machine learning techniques
			CO 3: Apply Dimensionality reduction techniques
			CO 4: Design application using machine learning techniques
			CO 1: Understand the basics of instructions sets and their impact on processor design.
25	III-I	COMPUTER ARCHITECTURE & ORGANIZATION (20A04504a)	CO 2: Demonstrate an understanding of the design of the functional units of a digital computer system.
			CO 3: Evaluate cost performance and design trade-offs in designing and constructing a computer processor including memory.
			CO 4: Design a pipeline for consistent execution of instructions with minimum hazards.
			CO 5: Recognize and manipulate representations of numbers stored in digital computers.
			CO 1: Ability to perform simultaneous material and energy balances.
			CO 2: Student learn about various electrochemical and energy systems
			CO 3: Knowledge of solid, liquid and gaseous fuels
			CO 4: To know the energy demand of world, nation and available resources to fulfill the demand
			CO 5: To know about the conventional energy resources and their effective utilization
			CO 6: To acquire the knowledge of modern energy conversion technologies
			CO 7: To be able to understand and perform the various characterization techniques of fuels
			CO 8: To be able to identify available nonconventional (renewable) energy resources and techniques to utilize them effectively
26	III-I	CHEMISTRY OF ENERGY MATERIALS (20A51501)	CO 1: Implement various DSP Algorithms using software packages.
			CO 2: Implement DSP algorithms with Digital Signal Processor.
		DIGITAL SIGNAL	

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27	III-I PROCESSING LAB (20A04502P)	<p>Chebyshev filters. window techniques.</p> <p>CO 5: Analyze digital filters using Software Tools.</p> <p>CO 1: Formulate problems and implement algorithms using Assembly language.</p>
28	III-I MICROPROCESSORS AND MICROCONTROL LERS LAB (20A04503P)	<p>CO 2: Develop programs for different applications.</p> <p>CO 3: Interface peripheral devices with 8086 and 8051.</p> <p>CO 4: Use Assembly/Embedded C programming approach for solving real world problems</p>
29	III-I PCB DESIGN AND PROTOTYPE DEVELOPMENT (20A04509)	<p>CO 1: Understand a single layer and multilayer PCB</p> <p>CO 2: Create and fabricate a PCB</p> <p>CO 3: Evaluate and test a PCB</p>
30	III-II ANTENNAS&MICROWAVE ENGINEERING (20A04601T)	<p>CO 1: Learn about the antenna's basics and wire antennas.</p> <p>CO 2: Gain knowledge on few types of antennas, their operation and applications.</p> <p>CO 3: Understand the uses of antenna arrays and analyze waveguides and resonators</p> <p>CO 4: Analyze various microwave components and understand the principles of different microwave sources.</p> <p>CO 5: Gain knowledge on microwave semiconductor devices and microwave measurements.</p>
31	III-II VLSI DESIGN (20A04602T)	<p>CO 1: Acquire qualitative knowledge about the fabrication process of integrated circuit using MOS transistors,</p> <p>CO 2: Draw the layout of any logic circuit which helps to understand and estimate parasitic of any logic circuit</p> <p>CO 3: Design building blocks of data path using gates.</p> <p>CO 4: Design simple memories using MOS transistors and can understand design of large memories</p> <p>CO 5: Understand the concept of testing and adding extra hardware to improve testability of system</p>
32	III-II COMMUNICATION NETWORKS (20A04603T)	<p>CO 1: Understand the basics of data communication, networking, internet and their importance.</p> <p>CO 2: Analyze the services and features of various protocol layers in data networks.</p> <p>CO 3: Differentiate wired and wireless computer networks</p> <p>CO 4: Analyse TCP/IP and their protocols.</p> <p>CO 5: Recognize the different internet devices and their functions.</p> <p>CO 1: Identify hardware and software components of an embedded system</p>


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33	III-II	EMBEDDED SYSTEM DESIGN (20A04604b)	<p>CO 2: Learn the basics of OS and RTOS multitasking environment</p> <p>CO 4: Design simple embedded system-based applications</p>
34	III-II	PHYSICS OF ELECTRONIC MATERIALS AND DEVICES (20A56701)	<p>CO 1: To understand the fundamentals of various materials.</p> <p>CO 2: To exploit the physics of semiconducting materials</p> <p>CO 3: To familiarize with the working principles of semiconductor-based devices.</p> <p>CO 4: To understand the behaviour of dielectric and piezoelectric materials.</p> <p>CO 5: To identify the magnetic materials and their advanced applications.</p>
35	III-II	(20A04601P) ANTENNAS & MICROWAVE ENGINEERING LAB	<p>CO 1: Understand the working, different microwave components and sources in a microwave bench</p> <p>CO 2: Verify the characteristics of various microwave components using microwave bench setup</p> <p>CO 3: Design and study of various antennas</p> <p>CO 4: Analyze performance characteristics of Antennas</p>
36	III-II	VLSI DESIGN LAB (20A04602P)	<p>CO 1: Design any logic circuit using CMOS transistor.</p> <p>CO 2: Use different software tools for analysis of circuits.</p> <p>CO 3: Design layouts to the CMOS circuits.</p> <p>CO 4: Use different software tools for analog layout</p>
37	III-II	COMMUNICATION NETWORKS LAB (20A04603P)	<p>CO 1: Familiarize with the network simulation tools</p> <p>CO 2: Usage of the network simulators to study the various aspects that effect network performance</p>
38	III-II	RF SYSTEM DESIGN (20A04607)	<p>CO 1: Verify the basic principles and design aspects involved in high frequency communication systems components conclusion and match with theoretical concepts.</p> <p>CO 3: Design and develop RF components using microstrip technology</p> <p>CO 4: Apply knowledge of basic RF Electronics for realizing any RF system.</p>
39	III-II	INTELLECTUAL PROPERTY RIGHTS AND PATENTS (20A99601)	<p>CO 1: Understand IPR law & Cyber law</p> <p>CO 2: Discuss registration process, maintenance and litigations associated with trademarks</p> <p>CO 3: Illustrate the copy right law</p> <p>CO 4: Enumerate the trade secret law.</p>

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40	IV-I	Microwave Engineering and Optical Communications (19A04701T)	<p>CO 1: Understand the wave propagation in waveguides, principle of operation of optical sources, detectors, microwave active and passive devices. Also remember various types of fibers, modes, configurations and signal degradations</p> <p>CO 2: Apply the boundary conditions of the waveguides to solve for field expressions in waveguides.</p> <p>CO 3: Derive the field expressions for different modes of the waveguides, and Scattering matrix for passive microwave devices. Analyze signal degradation in optical fibers and compare the performance of various optical sources and detectors</p> <p>CO 4: Differentiate Linear beam tubes and crossed field tubes in terms of operation and performance.</p> <p>CO 1: Identify the design for testability methods for combinational & sequential CMOS circuits. Understand CMOS fabrication flow, technology scaling, sheet resistance, square capacitance and propagation delays in CMOS circuits.</p>
41	IV-I	VLSI DESIGN (19A04702T)	<p>CO 2: Apply the design Rules and draw layout of a given logic circuit and basic circuit concepts to MOS circuits.</p> <p>CO 1: Analyze various types of images mathematically</p> <p>CO 2: Compare image enhancement methods in spatial and frequency domains.</p> <p>CO 3: Demonstrate various segmentation algorithms for given image.</p> <p>CO 4: Justify DCT and wavelet transform techniques for image compression.</p> <p>CO 5: Describe various color models for color image processing.</p>
42	IV-I	IMAGE PROCESSING (19A04703d)	<p>CO 1: Identify the sources of air pollution</p> <p>CO 2: Understand the composition and structure of atmosphere.</p> <p>CO 3: Know about the general characteristics of stack emissions and their behavior</p> <p>CO 4: Know about the general characteristics of stake emission and their behavior</p> <p>CO 5: Know about the noise sources, mapping, prediction equations etc.,</p>
43	IV-I	AIR POLLUTION AND CONTROL (19A01704a)	<p>CO 1: Understand the nature and concept of Organizational behavior</p> <p>CO 2: Apply theories of motivation to analyze the performance problems</p> <p>CO 3: Analyze the different theories of leadership</p> <p>CO 4: Evaluate group dynamics</p> <p>CO 5: Develop as powerful leader</p>
44	IV-I	ORGANISATIONAL BEHAVIOUR (19A52701a)	<p>CO 1: Understand the nature and concept of Organizational behavior</p> <p>CO 2: Apply theories of motivation to analyze the performance problems</p> <p>CO 3: Analyze the different theories of leadership</p> <p>CO 4: Evaluate group dynamics</p> <p>CO 5: Develop as powerful leader</p>

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45	IV-I	MICROWAVE AND OPTICAL COMMUNICATIONS LAB (19A04701P)	<p>CO 1: Understand the mode characteristics of Reflex Klystron oscillator and negative resistance characteristics of Gunn Oscillator.</p> <p>CO 2: Determine the Scattering matrix of given passive device experimentally and verify the same theoretically. Also determine numerical aperture and bending losses of a given optical fiber</p> <p>CO 3: Analyze the radiation characteristics to find the directivity and HPBW of a given antenna.</p>
46	IV-I	VLSI DESIGN LABORATORY (19A04702P)	<p>CO 1: Understand how to use FPGA/CPLD hardware tools in the lab.</p> <p>CO 2: Develop HDL code for the given problem/experiments, and simulate the given circuit using various simulators and verify the results.</p> <p>CO 3: Analyze the obtained results of the given experiment/problem.</p> <p>CO 4: Design and implement the experiments using FPGA/CPLD hardware tools.</p>
47	IV-II	(19A04801b) INTRODUCTION TO INTERNET OF THINGS	<p>CO 1: Examine the application areas of IoT</p> <p>CO 2: Illustrate revolution of Internet in Mobile Devices, Cloud & Sensor Networks</p> <p>CO 3: Examine communication protocols used in IoT</p> <p>CO 4: Make use of python programming to implement Internet of Things</p> <p>CO 5: Design IoT applications using Raspberry Pi</p>
48	IV-II	GLOBAL WARMING AND CLIMATE CHANGES (19A01802b)	<p>CO 1: An ability to apply knowledge of mathematics, science, and engineering</p> <p>CO 2: Design a system, component or process to meet desired needs with in realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability</p> <p>CO 3: An ability to identify, formulate, and solve engineering problems</p>



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COMPUTER SCIENCE & ENGINEERING I & II Sem Course outcomes for the academic year 2022-23

S.NO	Sem/Sec	Course name	Course outcomes
1	II-I	Discrete Mathematics & Graph theory(20A54304)	CO 1: Apply mathematical logic to solve problems. CO 2: Understand the concepts and perform the operations related to sets, relations and functions. CO 3: Gain the conceptual background needed and identify structures of algebraic nature. CO 4: Apply basic counting techniques to solve combinatorial problems. CO 5: Formulate problems and solve recurrence relations. CO 6: Apply Graph Theory in solving computer science problems
2	II-I	DIGITAL ELECTRONICS & MICROPROCESSOR	CO 1: Design any Logic circuit using basic concepts of Boolean Algebra. CO 2: Design any Logic circuit using basic concepts of PLDs. CO 3: Design and develop any application using 8086 Microprocessor. CO 1: Analyze the complexity of algorithms and apply asymptotic notations. CO 2: Apply non-linear data structures and their operations. CO 3: Understand and apply greedy, divide and conquer algorithms. CO 4: Develop dynamic programming algorithms for various real-time applications. CO 5: Illustrate Backtracking algorithms for various applications.
3	II-I	Advanced Data Structures & Algorithms (20A05301T)	CO 1: Solve real-world problems using OOP techniques CO 2: Apply code reusability through inheritance, packages and interfaces CO 3: Solve problems using java collection framework and I/O classes. CO 4: Develop applications by using parallel streams for better performance. CO 5: Develop applets for web applications. CO 6: Build GUIs and handle events generated by user interactions. CO 7: Use the JDBC API to access the database
4	II-I	Object Oriented Programming Through Java (20A05302T)	CO 1: Understand computer architecture concepts related to the design of modern processors, memories and I/Os CO 2: Identify the hardware requirements for cache memory and virtual memory CO 3: Design algorithms to exploit pipelining and multiprocessors CO 4: Understand the importance and trade-offs of different types of memories. CO 5: Identify pipeline hazards and possible solutions to those hazards
5	II-I	Computer Organization (20A05303)	CO 1: Design any Logic circuit using basic concepts of Boolean Algebra. CO 2: Design any Logic circuit using basic concepts of PLDs. CO 3: Design and develop any application using 8086 Microprocessor. CO 4: Design and develop any application using 8051 Microcontroller. CO 1: Understand and apply data structure operations. CO 2: Understand and apply non-linear data structure operations. CO 3: Apply Greedy, divide and conquer algorithms
6	II-I	DIGITAL ELECTRONICS & MICROPROCESSORS LAB(20a04304P	CO 1: Design any Logic circuit using basic concepts of Boolean Algebra. CO 2: Design any Logic circuit using basic concepts of PLDs. CO 3: Design and develop any application using 8086 Microprocessor. CO 4: Design and develop any application using 8051 Microcontroller. CO 1: Understand and apply data structure operations. CO 2: Understand and apply non-linear data structure operations. CO 3: Apply Greedy, divide and conquer algorithms
7	II-I	Advanced Data Structures and Algorithms	CO 1: Design any Logic circuit using basic concepts of Boolean Algebra. CO 2: Design any Logic circuit using basic concepts of PLDs. CO 3: Design and develop any application using 8086 Microprocessor. CO 4: Design and develop any application using 8051 Microcontroller. CO 1: Understand and apply data structure operations. CO 2: Understand and apply non-linear data structure operations. CO 3: Apply Greedy, divide and conquer algorithms


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		ALGORITHMS Lab(20A05301P)
8	II-I	Object Oriented Programming Through Java Lab (20A05302P)
9	II-I	Web Application Development (20A05304)
10	II-I	ENVIRONMENTAL SCIENCE (20A99201)
11	II-II	Deterministic & Stochastic Statistical Methods (20A54404)
12	II-II	DATABASE MANAGEMENT SYSTEMS (20A05401T)
13	II-II	OPERATING SYSTEMS (20A05402T)

CO 4: Develop dynamic programming algorithms for various real-time applications
CO 5: Illustrate and apply backtracking algorithms, further able to understand non-deterministic algorithms.
CO 1: Recognize the Java programming environment
CO 2: Develop efficient programs using multithreading.
CO 3: Design reliable programs using Java exception handling features.
CO 4: Extend the programming functionality supported by Java.
CO 5: Select appropriate programming constructs to solve a problem.
CO 1: Construct web sites with valid HTML, CSS, JavaScript
CO 2: Create responsive Web designs that work on phones, tablets, or traditional laptops and widescreen monitors.
CO 3: Develop websites using jQuery to provide interactivity and engaging user experiences
CO 4: Embed Google chart tools in a website for better visualization of data.
CO 5: Design and develop web applications using Content Management Systems like WordPress
CO 1: Grasp multidisciplinary nature of environmental studies and various renewable and nonrenewable resources.
CO 2: Understand flow and bio-geo- chemical cycles and ecological pyramids.
CO 3: Understand various causes of pollution and solid waste management and related preventive measures.
CO 4: About the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation.
CO 5: Casus of population explosion, value education and welfare programmes.
CO 1: Apply logical thinking to problem-solving in context.
CO 2: Employ methods related to these concepts in a variety of data science applications.
CO 3: Use appropriate technology to aid problem-solving and data analysis.
CO 4: The Bayesian process of inference in probabilistic reasoning system.
CO 5: Demonstrate skills in unconstrained optimization.
CO 1: Design a database for a real-world information system
CO 2: Define transactions that preserve the integrity of the database
CO 3: Generate tables for a database
CO 4: Organize the data to prevent redundancy
CO 5: Pose queries to retrieve the information from the database.
CO 1: Realize how applications interact with the operating system
CO 2: Analyze the functioning of a kernel in an Operating system.
CO 3: Summarize resource management in operating systems
CO 4: Analyze various scheduling algorithms
CO 5: Examine concurrency mechanism in Operating Systems
CO 6: Apply memory management techniques in the design of operating systems
CO 7: Understand the functionality of the file system
CO 8: Compare and contrast memory management techniques
CO 9: Understand deadlock prevention and avoidance.




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			CO 10: Perform administrative tasks on Linux based systems. CO 1: Obtain basic software life cycle activity skills. CO 2: Design software requirements specifications for given problems. CO 3: Implement structure, object oriented analysis and design for given problems. CO 4: Design test cases for given problems. CO 5: Apply quality management concepts at the application level. CO 1: Define the Organizational Behaviour, its nature and scope. CO 2: Understand the nature and concept of Organizational behaviour CO 3: Apply theories of motivation to analyse the performance problems CO 4: Analyse the different theories of leadership CO 5: Evaluate group dynamics CO 6: Develop as powerful leader CO 1: Design database for any real world problem CO 2: Implement PL/SQL programs CO 3: Define SQL queries CO 4: Decide the constraints CO 5: Investigate for data inconsistency CO 1: Trace different CPU Scheduling algorithms (L2). CO 2: Implement Bankers Algorithms to Avoid and prevent the Dead Lock (L3). CO 3: Evaluate Page replacement algorithms (L5). CO 4: Illustrate the file organization techniques (L4) CO 5: Illustrate shared memory process (L4). CO 6: Design new scheduling algorithms (L6) CO 1: Acquaint with historical and modern software methodologies CO 2: Understand the phases of software projects and practice the activities of each phase CO 3: Practice clean coding CO 4: Take part in project management CO 5: Adopt skills such as distributed version control, unit testing, integration testing, build management, and deployment CO 1: Install and use R for simple programming tasks. CO 2: Extend the functionality of R by using add-on packages CO 3: Extract data from files and other sources and perform various data manipulation tasks on them. CO 4: Explore statistical functions in R. CO 5: Use R Graphics and Tables to visualize results of various statistical operations on data. CO 6: Apply the knowledge of R gained to data Analytics for real-life applications. CO 1: Define the concepts related to design thinking. CO 2: Explain the fundamentals of Design Thinking and innovation
14	II-II	Software Engineering (20A05403T)	
15	II-II	ORGANISATIONAL BEHAVIOUR (20A52302)	
16	II-II	Database Management Systems Laboratory (20A05401P)	
17	II-II	OPERATING SYSTEMS LAB (20A05402P)	
18	II-II	SOFTWARE ENGINEERING LAB (20A05403P)	
19	II-II	Exploratory Data Analytics with R (20A05404)	

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		(20A05502P)	CO 3: Design chatbot and virtual assistant
28	III-I	Advanced Web Application Development (20A05506)	CO 1: Create dynamic websites using PHP and MySQL CO 2: Handle Authentication using Sessions, JWT. CO 3: Secure Web applications from common attacks like Injection, XSS. CO 4: Integrate Libraries to dynamically generate documents, spreadsheets, pdfs, etc. CO 5: Host Websites in traditional web hosting platforms and also Cloud based infrastructure
29	III-II	COMPILER DESIGN (20A05601T)	CO 1: Differentiate the various phases of a compiler CO 2: Design code generator CO 3: Apply code optimization techniques CO 4: Identify the tokens and verify the code
30	III-II	MACHINE LEARNING (20A05602T)	CO 1: Identify machine learning techniques suitable for a given problem CO 2: Solve the problems using various machine learning techniques CO 3: Design application using machine learning techniques
31	III-II	INTERNET OF THINGS (20A05603T)	CO 1: Understand general concepts of Internet of Things. CO 2: Apply design concept to IoT solutions CO 3: Analyze various M2M and IoT architectures CO 4: Evaluate design issues in IoT applications CO 5: Create IoT solutions using sensors, actuators and Devices
32	III-II	SOFTWARE TESTING (20A05604a)	CO 1: Understand the basic testing procedures. CO 2: Develop reliable software CO 3: Design test cases for testing different programming constructs CO 4: Test the applications by applying different testing methods and automation tools
33	III-II	PHYSICS OF ELECTRONIC MATERIALS AND DEVICES (20A56701)	CO 1: To understand the fundamentals of various materials. CO 2: To exploit the physics of semiconducting materials CO 3: To familiarize with the working principles of semiconductor-based devices. CO 4: To understand the behaviour of dielectric and piezoelectric materials. CO 5: To identify the magnetic materials and their advanced applications.
34	III-II	COMPILER DESIGN LAB (20A05601P)	CO 1: Design, develop, and implement a compiler for any language CO 2: Use LEX and YACC tools for developing a scanner and a parser CO 3: Design and implement LL and LR parsers
35	III-II	MACHINE LEARNING LAB (20A05602P)	CO 4: Design algorithms to perform code optimization in order to improve the performance of a program in terms of space and CO 1: Understand the Mathematical and statistical prospectives of machine learning algorithms through python programming CO 2: Appreciate the importance of visualization in the data analytics solution.
36	III-II	INTERNET OF THINGS LAB (20A05603T)	CO 3: Derive insights using Machine learning algorithms CO 1: Know the various IoT sensors and understand the functionality CO 2: Design and analyze IoT experiments and transfer the data to IoT Clouds CO 3: Design the IoT systems for real time applications


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	(20A52401)		CO 4: Understand Drones and Perform Internet of Drones Experiments CO 1: Memorize various elements of effective communicative skills CO 2: Interpret people at the emotional level through emotional intelligence CO 3: apply critical thinking skills in problem solving CO 4: analyse the needs of an organization for team building CO 5: Judge the situation and take necessary decisions as a leader CO 6: Develop social and work-life skills as well as personal and emotional well-being
37	III-II	SOFT SKILLS (20A52401)	CO 1: Understand IPR law & Cyber law CO 2: Discuss registration process, maintenance and litigations associated with trademarks CO 3: Illustrate the copy right law CO 4: Enumerate the trade secret law
38	III-II	INTELLECTUAL PROPERTY RIGHTS AND PATENTS	CO 1: Understand IPR law & Cyber law CO 2: Discuss registration process, maintenance and litigations associated with trademarks CO 3: Illustrate the copy right law CO 4: Enumerate the trade secret law
39	III-II	INTELLECTUAL PROPERTY RIGHTS AND PATENTS	CO 1: Understand IPR law & Cyber law CO 2: Discuss registration process, maintenance and litigations associated with trademarks CO 3: Illustrate the copy right law CO 4: Enumerate the trade secret law
40	IV-I	Internet of Things (19A05701T)	CO 1: Choose the sensors and actuators for an IoT application CO 2: Select protocols for a specific IoT application CO 3: Utilize the cloud platform and APIs for IoT applications CO 4: Choose the sensors and actuators for an IoT application CO 5: Design a solution for a given IoT application
41	IV-I	Software Testing (19A05702T)	CO 1: Outline the procedure for Cloud deployment CO 2: Distinguish different cloud service models and deployment models CO 3: Compare different cloud services. CO 4: Design applications for an organization which use cloud environment.
42	IV-I	Cloud Computing (19A05703a)	CO 1: Outline the procedure for Cloud deployment CO 2: Distinguish different cloud service models and deployment models CO 3: Compare different cloud services. CO 4: Design applications for an organization which use cloud environment.
43	IV-I	Numerical Methods for Engineers (19A54704a)	CO 1: Apply numerical methods to solve algebraic and transcendental equations. CO 2: Understand fitting of several kinds of curves. CO 3: Derive interpolating polynomials using interpolation formulae. CO 4: Solve differential and integral equations numerically.
44	IV-I	Organizational Behavior (19A52701a)	CO 1: Understand the nature and concept of Organizational behavior CO 2: Apply theories of motivation to analyze the performance problems CO 3: Analyze the different theories of leadership CO 4: Evaluate group dynamics


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			CO 5:Develop as powerful leader
			CO 1:Demonstrate the basic testing procedures.
			CO 2:formulate test cases and test suites
			CO 3:Make use of the Selenium and Bugzilla tools to perform testing
			CO 4:Construct and test simple programs.
			CO 5:Demonstrate bug tracking
			CO 1:Choose the sensors and actuators for an IoT application
			CO 2:Select protocols for a specific IoT application
			CO 3:Utilize the cloud platform and APIs for IoT application
			CO 4:Experiment with embedded boards for creating IoT prototypes
			CO 5:Design a solution for a given IoT application
			CO 1:List the design issues for Adhoc and sensor networks
			CO 2: Analyze the use of TCP in Wireless networks.
			CO 3:Justify the need for new MAC Protocols for Adhoc networks.
			CO 4: Extend the existing protocols to make them suitable for Adhoc Networks.
			CO 5:Evaluate the performance of Protocols in Adhoc and sensor networks.
			CO 6:Design new Protocols for Adhoc and Sensor networks.
			CO 1:An ability to apply knowledge of mathematics, science, and engineering
			CO 2:Design a system, component or process to meet desired needs with in realistic constraints
			CO 3:An ability to identify, formulate, and solve engineering problems
45	IV-I	Software Testing Lab (19A05702P)	
46	IV-I	Internet of Things Lab (19A05701P)	
47	IV-II	AD HOC AND SENSOR NETWORKS (19A05801c)	
48	IV-II	GLOBAL WARMING AND CLIMATE	

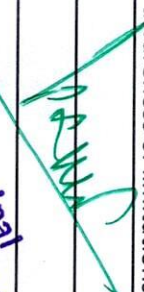

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COMPUTER AIDED STRUCTURAL ENGINEERING I, II & III Sem Course outcomes for the academic year 2022-23

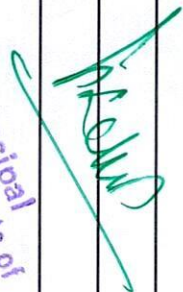
S. NO	Sem	Course name	Course outcomes
1	I	THEORY OF ELASTICITY (21D35101)	<p>CO 1: Apply elastic analysis to study the fracture mechanics.</p> <p>CO 2: Apply linear elasticity in the design and analysis of structures such as beams, plates, shells and sandwich composites.</p> <p>CO 3: Apply hyper elasticity to determine the response of elastomer-based objects.</p> <p>CO 4: Analyze the structural sections subjected to torsion.</p>
2	I	MATRIX METHOD OF STRUCTURAL ANALYSIS (21D35102)	<p>CO 1: Distinguish determinate and indeterminate structures.</p> <p>CO 2: Identify the method of analysis for indeterminate structures.</p> <p>CO 3: Apply matrix methods of analysis for continuous beams.</p> <p>CO 4: Apply matrix methods of analysis for rigid and pin jointed frames.</p>
3	I	COMPUTER AIDED NUMERICAL METHODS (21DBS103)	<p>CO 1: To solve nonlinear algebraic equations numerically.</p> <p>CO 2: To solve simultaneous linear equations numerically.</p> <p>CO 3: To numerically integrate continuous and discrete functions.</p> <p>CO 4: To numerically solve ordinary and partial differential equations that are initial value or boundary value problems.</p>
4	I	DESIGN OF PRESTRESSED CONCRETE (21D35104b)	<p>CO 1: To understand the basic concepts about pressurised concrete and analysis of prestress</p> <p>CO 2: Estimate the effective losses in prestress</p> <p>CO 3: Analyse the effect of pressurising force in the behaviour of beams in flexure</p> <p>CO 4: To design shear, torsion and transmission length in pressurised concrete members</p> <p>CO 5: Design of compression and tension members as per codes of practice</p>
5	I	CAD LABORATORY I (21D35105)	<p>CO 1: Analyze and design the structural components like beams, slabs and columns,</p> <p>CO 2: Analyze and design retaining wall and shear wall.</p> <p>CO 3: Analyze for earthquake loading & wind loading of framed buildings.</p> <p>CO 4: Analyze and design pin jointed, rigid jointed plane structures.</p>
6	I	ADVANCED STRUCTURAL ENGINEERING LABORATORY (21D35106)	<p>CO 1: Achieve Knowledge of design and development of experimenting skills.</p> <p>CO 2: Understand the principles of design of experiments</p> <p>CO 3: Design and Develop analytical skills.</p>


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		(21D352100)	CO 4: Summarize the testing methods and equipments.
7	I	RESEARCH METHODOLOGY AND IPR (21DRM101)	CO 1: Analyze research related information CO 2: Follow research ethics CO 3: Understand research ethics CO 4: Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need creation of new and better products, and in turn brings about, economic growth and social benefits.
8	I	ENGLISH FOR RESEARCH PAPER WRITING (21DAC101a)	CO 1: Understand the significance of writing skills and the level of readability CO 2: Analyze and write title, abstract, different sections in research paper CO 3: Develop the skills needed while writing a research paper
9	II	STRUCTURAL DYNAMICS (21D35201)	CO 1: Write equation of motion for single and multi degree of freedom systems CO 2: Understand the impact of damping on characteristics of vibrating system CO 3: Gain Knowledge about arbitrary and pulse excitation CO 4: Understand applications of Numerical methods in dynamics CO 5: Analyse in various theories of failure and plasticity
10	II	FINITE ELEMENT METHODS FOR STRUCTURAL ENGINEERING (21D35202)	CO 1: Analyse and build FEA models for various Engineering problems. CO 2: Able to identify information requirements and sources for analysis, design and evaluation CO 3: Use professional-level finite element software to solve engineering problems. CO 4: Interpret results obtained from FEA software solutions, not only in terms of conclusions but also awareness of limitations.
11	II	ARTIFICIAL NEURAL NETWORKS (21D35203a)	CO 1: Model Neuron and Neural Network, and to analyze ANN learning, and its applications CO 2: Perform Pattern Recognition, Linear classification. CO 3: Develop different single layer/multiple layer Perception learning algorithms CO 4: Design of another class of layered networks using deep learning principles
		ADVANCED	CO 1: To be familiar with the properties of concrete making materials CO 2: Identify the influence and compatibility of chemical, mineral admixtures in concrete


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12	II	CONCRETE TECHNOLOGY (21D21103a)	<p>CO 3: Update the knowledge on recent advances in special concretes.</p> <p>CO 4: Know about various methods of concrete</p> <p>CO 5: Analyse the performance of concrete structure through microstructure analysis</p> <p>CO 1: To build MATLAB codes for solution of simultaneous linear equations.</p> <p>CO 2: To create 1D Finite Element problems in a computational scheme.</p> <p>CO 3: To design codes for numerical integration techniques & statistical methods.</p> <p>CO 4: To propose computational techniques for solving monte carlo and finite difference methods.</p>
13	II	CAD LABORATORY II (21D35205)	<p>CO 1: Assess the workability of cement concrete and its suitability, quality of concrete</p> <p>CO 2: Assess the quality of fine and coarse aggregates after testing the aggregates according to IS specifications.</p> <p>CO 3: Test the quality of cement concrete by conducting compressive strength on concrete cubes.</p> <p>CO 4: Design different grades of mix design and also assess the fineness of cement, flash, silica</p>
14	II	ADVANCED CONCRETE LABORATORY (21D35206)	<p>CO 1: Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life</p> <p>CO 2: The person who has studied Geeta will lead the nation and mankind to peace and prosperity</p> <p>CO 3: Study of Neetishatakam will help in developing versatile personality of students</p> <p>CO 1: Illustrate the measurement of earthquakes and their effect on engineering structures</p> <p>CO 2: Analyse the free and forced vibration response of single degree and multi degree of freedom and continuous systems</p> <p>CO 3: Apply the basic principles of conceptual design of Earthquake Resistant buildings</p> <p>CO 4: Learn the various seismic control methods</p>
15	II	PERSONALITY DEVELOPMENT THROUGH LIFE (21DAC201c)	<p>CO 1: Know the cost management process and types of costs</p> <p>CO 2: Learn and apply different costing methods under different project contracts</p> <p>CO 3: To understand relationship of Cost-Volume and Profit and pricing decisions.</p> <p>CO 4: Prepare budgets and measurement of divisional performance.</p> <p>CO 5: Acquires knowledge on various types of project contracts, stages to execute projects and controlling project cost.</p>
16	III	EARTHQUAKE RESISTANT DESIGN OF (21D35301a)	<p>CO 1: Know the cost management process and types of costs</p> <p>CO 2: Learn and apply different costing methods under different project contracts</p> <p>CO 3: To understand relationship of Cost-Volume and Profit and pricing decisions.</p> <p>CO 4: Prepare budgets and measurement of divisional performance.</p> <p>CO 5: Acquires knowledge on various types of project contracts, stages to execute projects and controlling project cost.</p>
17	III	COST MANAGEMENT OF ENGINEERING PROJECTS (21DOE301a)	<p>CO 1: Know the cost management process and types of costs</p> <p>CO 2: Learn and apply different costing methods under different project contracts</p> <p>CO 3: To understand relationship of Cost-Volume and Profit and pricing decisions.</p> <p>CO 4: Prepare budgets and measurement of divisional performance.</p> <p>CO 5: Acquires knowledge on various types of project contracts, stages to execute projects and controlling project cost.</p>



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HIGHWAY ENGINEERING I, II & III Sem Course outcomes for the academic year 2022-23

S. NO.	Sem	Course name	Course outcomes
1	I	HIGHWAY INFRASTRUCTURE DESIGN (21D93101)	<p>CO 1: Design the longitudinal and cross-sectional elements of a highway.</p> <p>CO 2: Design the horizontal and vertical alignment of roads.</p> <p>CO 3: Design the intersections, interchanges, and parking facilities.</p> <p>CO 4: Design the facilities for bicyclists and pedestrians.</p>
2	I	URBAN TRANSPORTATION PLANNING (21D93102)	<p>CO 1: Identify Urban transportation problems and understand the principles of planning.</p> <p>CO 2: Organize and conduct various types of surveys</p> <p>CO 3: Apply travel demand estimation techniques</p> <p>CO 4: Plan sustainable urban mobility and evaluate alternate improvements.</p> <p>CO 5: Identify design issues in metropolitan cities.</p>
3	I	PROJECT MANAGEMENT (21D93103b)	<p>CO 1: Understand the concepts of Organization, Management, Leadership and Team work and Project Management Information System</p> <p>CO 2: Apply the concepts of Cost estimation, Resource Planning, Break-even Analysis and Life Cycle Analysis to real life projects</p> <p>CO 3: Understand Laws of Contracts, Documentation, Arbitration and Quality Management related issues</p> <p>CO 4: Grasp the use of Tools for Project Scheduling and Monitoring</p> <p>CO 5: To understand the practices of Human Resources management and Inventory management</p>
4	I	PAVEMENT MATERIALS and PROPERTIES (21D93104a)	<p>CO 1: Understand the materials required for Pavement Construction and their properties</p> <p>CO 2: Characterize the pavement materials including soil, aggregate, cement, asphalt mixtures, cement concrete.</p> <p>CO 3: Understand the concepts of Soil stabilization and Bitumen Modification</p> <p>CO 4: Familiarize with the different types of Concretes</p> <p>CO 5: Understand the basic of cement & cement concrete mix characterization.</p>
5	I	PAVEMENT MATERIALS TESTING LAB (21D93105)	<p>CO 1: Characterize the pavement materials.</p> <p>CO 2: Perform quality control tests on pavements and pavement materials.</p> <p>CO 3: Conduct test on Aggregate & bitumen.</p>
6	I	TRAFFIC STUDIES LAB (21D93106)	<p>CO 1: Gain Knowledge about various traffic surveys</p> <p>CO 2: Analyze traffic parameters from various studies.</p>
7	I	RESEARCH METHODOLOGY AND IPR (21DRM101)	<p>CO 1: Analyze research related information</p> <p>CO 2: Follow research ethics</p> <p>CO 3: Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas,</p> <p>CO 4: Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasize the need</p> <p>CO 5: Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to</p>
8	I	ENGLISH FOR RESEARCH PAPER WRITING	<p>CO 1: Understand the significance of writing skills and the level of readability</p> <p>CO 2: Analyze and write title, abstract, different sections in research paper</p> <p>CO 3: Develop the skills needed while writing a research paper</p> <p>CO 1: Understand the need & scope of Project Formulation.</p>

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9	II	HIGHWAY PROJECT FORMULATION & ECONOMICS (21D93201)	<p>CO 2: Understand the costs and savings involved in 'Highway Projects</p> <p>CO 3: Learn Economic Evaluation Methods of Highway Projects</p> <p>CO 4: Understand the concepts of Accident Costs and Travel time Savings</p> <p>CO 5: Learn to deal with Project Analysis for Environmental Impact Assessment.</p>
10	II	PAVEMENT CONSTRUCTION MAINTENANCE and MANAGEMENT (21D93202)	<p>CO 1: Understand the Pavement Management Systems</p> <p>CO 2: Understand Serviceability Concept and evaluation Methods</p> <p>CO 3: Learn the Concepts of Quality Control and Assessment</p> <p>CO 4: Familiarize about construction of various components of Pavements like Sub-base, Base and shoulders</p> <p>CO 5: Learn the Design Concepts of Bituminous Roads and concrete Roads</p>
11	II	ROAD SAFETY ENGINEERING (21D93203b)	<p>CO 1: To understand the basic causes of road accidents</p> <p>CO 2: To conduct accident investigations and identify black spots</p> <p>CO 3: To design & plan road geometrics incorporating road safety</p> <p>CO 4: To understand the importance of Road Signs and Markings</p> <p>CO 5: To conduct Road Safety Audit</p>
12	II	GIS APPLICATIONS in TRANSPORTATION ENGINEERING (21D93204B)	<p>CO 1: Understand the basics of GIS</p> <p>CO 2: Understand the Geographic Data and its collection.</p> <p>CO 3: Able to Process and analyse GIS data.</p> <p>CO 4: Able to use GIS Tool for developing alternative Transportation Plans</p> <p>CO 5: Understand the applications of GIS in 'Transportation Engineering.</p>
13	II	ADVANCED PAVEMENT TRAFFIC ANALYSIS AND SOFTWARE LAB	<p>CO 1: Design and assess various pavement components</p> <p>CO 2: Analyze pavement failures and their characteristics</p> <p>CO 1: Apply Software Tools like MX Roads and VISSIM for Traffic Analysis</p> <p>CO 2: Conduct Road Safety Audit.</p>
14	II	PERSONALITY DEVELOPMENT THROUGH LIFE ENVIRONMENTAL IMPACT ASSESSMENT for TRANSPORTATION PROJECTS	<p>CO 3: Analyse Bottleneck Situations in 'the real field</p> <p>CO 1: Study of Shrimad-Bhagwad-Geeta will help the student to develop his personality and achieve the highest goal in life</p> <p>CO 2: The person who has studied Geeta will lead the nation and mankind to peace and prosperity</p> <p>CO 3: Study of Neetishatakam will help in developing versatile personality of students</p> <p>CO 1: Understand the relation between Human Activities and Environment</p> <p>CO 2: Get acquainted with various indicators of different Environmental systems</p> <p>CO 3: Learn the concepts of Environmental Impact assessment of Transportation Projects</p> <p>CO 4: Apply the concepts of EIA to actual case studies</p> <p>CO 5: Understand the issues related to Industrial Development and Environmental Impact</p>
15	II	COST MANAGEMENT OF ENGINEERING PROJECTS (21DOE301a)	<p>CO 1: Know the cost management process and types of costs</p> <p>CO 2: Learn and apply different costing methods under different project contracts</p> <p>CO 3: To understand relationship of Cost-Volume and Profit and pricing decisions.</p> <p>CO 4: Prepare budgets and measurement of divisional performance.</p> <p>CO 5: Acquires knowledge on various types of project contracts, stages to execute projects and controlling project cost..</p>
16	III		
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COMPUTER SCIENCE & ENGINEERING I, II & III Sem Course outcomes for the academic year 2022-23

S. NO.	Sem	Course name	Course outcomes
1	I	Advanced Data Structures and Algorithms (21D58101)	<p>CO 1: Understand the implementation of symbol table using hashing techniques</p> <p>CO 2: Apply advanced abstract data type (ADT) and data structures in solving real world problem</p> <p>CO 3: Effectively combine the fundamental data structures and algorithmic techniques in building a solution to a given problem</p> <p>CO 4: Develop algorithms for text processing applications</p>
2	I	ADVANCED COMPUTER NETWORKS (21D58102)	<p>CO 1: Analyse computer network architectures and estimate quality of service</p> <p>CO 2: Design application-level protocols for emerging networks</p> <p>CO 3: Analyse TCP and UDP traffic in data networks</p> <p>CO 4: Design and analyse medium access methods, routing algorithms and IPv6 protocol for data networks</p> <p>CO 5: Analyse Data Center Networks and Optical Networks</p>
3	I	Analyze Data Center Networks and Optical Networks (21D58103b)	<p>CO 1: Discuss about software development process models</p> <p>CO 2: Identify the contemporary issues and discuss about coding standards</p> <p>CO 3: Recognize the knowledge about testing methods and comparison of various testing techniques.</p> <p>CO 4: Use the concept and standards of quality and getting knowledge about software quality assurance group.</p>
4	I	INFORMATION SECURITY (21D58104c)	<p>CO 1: Provide security of the data over the network.</p> <p>CO 2: Do research in the emerging areas of cryptography and network security.</p> <p>CO 3: Implement various networking protocols.</p> <p>CO 4: Protect any network from the threats in the world</p>
5	I	ADVANCED DATA STRUCTURES AND ALGORITHMS LAB (21D58105)	<p>CO 1: Implement divide and conquer techniques to solve a given problem.</p> <p>CO 2: Implement hashing techniques like linear probing, quadratic probing, random probing and double hashing/rehashing.</p> <p>CO 3: Perform Stack operations to convert infix expression into post fix expression and evaluate the post fix expression.</p> <p>CO 4: Differentiate graph traversal techniques Like Depth First Search, Breadth First Search. Identify shortest path to other vertices using</p>
6	I	ADVANCED COMPUTER NETWORKS LAB (21D58106)	<p>CO 1: Develop programs for client-server applications</p> <p>CO 2: Perform packet sniffing and analyze packets in network traffic.</p> <p>CO 3: Implement error detecting and correcting codes</p> <p>CO 4: Implement network security algorithms</p>
7	I	RESEARCH METHODOLOGY AND IPR (21DRM101)	<p>CO 1: Analyze research related information</p> <p>CO 2: Follow research ethics</p> <p>CO 3: Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be controlled by ideas,</p> <p>CO 4: Understanding that when IPR would take such important place in growth of individuals & nation, it is need less to emphasize the need</p> <p>CO 5: Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to</p>
8	I	ENGLISH FOR RESEARCH PAPER WRITING	<p>CO 1: Understand the significance of writing skills and the level of readability</p> <p>CO 2: Analyze and write title, abstract, different sections in research paper</p> <p>CO 3: Develop the skills needed while writing a research paper</p>

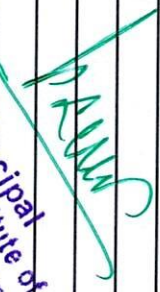

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9	II	ADVANCED OPERATING SYSTEMS (21D58201)	<p>CO 1: To explain the functionality of a large software system by reading its source.</p> <p>CO 2: To revise any algorithm present in a system.</p> <p>CO 3: Inter process communication mechanism</p> <p>CO 4: Android mobiles inner process system</p>
10	II	INTERNET OF THINGS (21D58202)	<p>CO 1: Choose the sensors and actuators for an IoT application</p> <p>CO 2: Select protocols for a specific IoT application</p> <p>CO 3: Utilize the cloud platform and APIs for IoT applications</p> <p>CO 4: Experiment with embedded boards for creating IoT prototypes</p> <p>CO 5: Design a solution for a given IoT application</p> <p>CO 6: Establish a startup</p>
11	II	SERVICE ORIENTED ARCHITECTURE (21D58203b)	<p>CO 1: Comprehend the need for SOA and its systematic evolution</p> <p>CO 2: Apply SOA technologies to enterprise domain</p> <p>CO 3: Design and analyse various SOA patterns and techniques</p> <p>CO 4: Compare and evaluate best strategies and practices of SOA</p>
12	II	DISTRIBUTED SYSTEMS (21D58204b)	<p>CO 1: Design trends in distributed systems.</p> <p>CO 2: Apply network virtualization.</p> <p>CO 3: Apply remote method invocation and objects</p>
13	II	ADVANCED OPERATING SYSTEMS LAB (21D58205)	<p>CO 1: To revise any algorithm present in a system.</p> <p>CO 2: To design a new algorithm to replace an existing one.</p> <p>CO 3: To appropriately modify and use the data structures of the linux kernel for a different software system</p>
14	II	INTERNET OF THINGS LAB (21D58206)	<p>CO 1: The students will be thorough about the technology behind the IoT and associated technologies</p> <p>CO 2: The students will be able to use the IoT technologies in practical domains of society</p> <p>CO 3: The students will be able to gain knowledge about the state of the art methodologies in IoT application domains.</p>
15	II	PERSONALITY DEVELOPMENT THROUGH LIFE	<p>CO 1: Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life</p> <p>CO 2: The person who has studied Geeta will lead the nation and mankind to peace and prosperity</p> <p>CO 3: Study of Neetishatakam will help in developing versatile personality of students</p>
16	III	DATA ANALYTICS (21D58301c)	<p>CO 1: Understand the ideas of statistical approaches to learning</p> <p>CO 2: Understand the significance of exploratory data analysis (EDA) in data science and apply basic tools (plots, graphs, summary statistics)</p> <p>CO 3: Apply basic machine learning algorithms (Linear Regression, k-Nearest Neighbors (k-NN), k-means, Naive Bayes) for predictive</p>
17	III	BUSINESS ANALYTICS (21DOE301c)	<p>CO 1: Students will demonstrate knowledge of data analytics.</p> <p>CO 2: Students will demonstrate the ability of think critically in making decisions based on data and deep analytics.</p> <p>CO 3: Students will demonstrate the ability to use technical skills in predicative and prescriptive modeling to support business decision-</p> <p>CO 4: Students will demonstrate the ability to translate data into clear, actionable insights.</p>


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ELECTRICAL POWER SYSTEMS I, II & III Sem Course outcomes for the academic year 2022-23

S. NO.	Sem	Course name	Course outcomes
1	I	ADVANCED POWER SYSTEM PROTECTION (21D07101)	<p>CO 1: Describe the construction of static relay and identify the advantages of static relay over electromagnetic relay Analyse the</p> <p>CO 2: Explore the operation of rectifier bridge comparators, instantaneous comparators, phase comparators, multi input comparators,</p> <p>CO 3: Describe instantaneous, definite time and inverse definite minimum time over current relays.</p> <p>CO 4: Analyze the concept of power swings on distance relays and to identify the microprocessor based protective relays and their</p>
2	I	POWER SYSTEM SECURITY AND STATE ESTIMATION (21D07102)	<p>CO 1: Understand the concepts of network matrices, power flow methods, contingency analysis, state estimation, and need and conditions</p> <p>CO 2: Analyze the bus admittance/impedance matrices methods, power system security, sensitivity factors, state estimation and electricity</p> <p>CO 3: Apply the methods for evaluating the bus matrices, sparsity, DC power flow, AC power flow, estimating a value and Available Transfer</p> <p>CO 4: Develop the methods for state estimation, method to identify network problems and methods for congestion management.</p>
3	I	ENERGYAUDITING AND MANAGEMENT (21D07103a)	<p>CO 1: Understand the current energy scenario and importance of energy conservation</p> <p>CO 2: Acquire the knowledge about different energy efficient devices</p> <p>CO 3: Measure efficiency in renewable energy resources.</p> <p>CO 4: Identify the equipment and areas of a system where energy conservation and Audit is necessary</p>
4	I	SMART GRID TECHNOLOGIES (21D07104b)	<p>CO 1: Understand the importance of smart grid technology functions over the present grid.</p> <p>CO 2: Apply the knowledge about the measurement system and communication technology of Smart grid.</p> <p>CO 3: Determine the quality, efficiency and security of power supply</p> <p>CO 4: Impart an understanding of economics, policies and technical regulations for DG integration.</p>
5	I	MACHINES & POWER SYSTEMS LAB (21D07105)	<p>CO 1: Understand the concept of different experiments</p> <p>CO 2: Analyze the data for and compute the data to obtain results.</p> <p>CO 3: Apply the computational results to solve the original power system problems.</p> <p>CO 4: Develop advanced relays to identify various faults.</p>
6	I	POWER SYSTEMS SIMULATION LAB (21D07106)	<p>CO 1: Understand the coding in simulation</p> <p>CO 2: Analyze the power system data for load-flow and stability studies.</p> <p>CO 3: Apply computational methods for large scale power system studies.</p> <p>CO 4: Develop software for power system industry to solve various issues.</p>
7	I	RESEARCH METHODOLOGY AND IPR (21DRM101)	<p>CO 1: Analyze research related information</p> <p>CO 2: Follow research ethics</p> <p>CO 3: Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas,</p> <p>CO 4: Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need</p> <p>CO 5: Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to</p>
8	II	POWER SYSTEM STABILITY & CONTROL (21D07201)	<p>CO 1: Understand the concepts of single and multi-machine systems connected to infinite bus bar.</p> <p>CO 2: Analyze system responses to small disturbances and concept of dynamic stability and power system stabilizers.</p> <p>CO 3: Apply the various stability methods to evaluate the stability of the system.</p> <p>CO 4: Design the state space model equations for excitation systems and methods for finding voltage and angle instability</p> <p>CO 1: Understand various control techniques for the purpose of identifying the scope and for selection of specific FACTS controllers.</p>


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9	II	FACTS CONTROLLERS (21D07202)	<p>CO 2: Remember different types of controllable VAR generation and variable impedance techniques.</p> <p>CO 3: Design simple converters using FACTS controllers.</p> <p>CO 4: Understand the operation of Unified Power Controller and Hybrid Arrangements.</p>
10	II	REACTIVE POWER COMPENSATION & MANAGEMENT (21D07203c)	<p>CO 1: Understand the importance of load compensation in symmetrical as well as unsymmetrical loads</p> <p>CO 2: Analyze various compensation methods in transmission lines</p> <p>CO 3: Design model for reactive power coordination</p> <p>CO 4: Distinguish demand side reactive power management & user side reactive power management</p>
11	II	POWER QUALITY (21D07204a)	<p>CO 1: Understand the fundamentals & terminology of power quality.</p> <p>CO 2: Apply the concept of power frequency disturbances, types of transients & transient waveforms.</p> <p>CO 3: Analyze the harmonic methodology & Electromagnetic Interference concepts.</p> <p>CO 4: Remember the necessity of grounding and methods of grounding.</p> <p>CO 5: Understand different techniques of measuring & solving power quality problems</p>
12	II	RENEWABLE ENERGY SYSTEMS LAB (21D07205)	<p>CO 1: To observe the I-V and P-V curves and Series and Parallel connection of Solar systems</p> <p>CO 2: To study the sun tracking and MPPT Charge Controllers of Solar systems</p> <p>CO 3: To analyze Power, Voltage & Frequency Measurement of Wind Generator</p> <p>CO 4: To Understand the Effect of temperature variation and Irradiation on Photovoltaic Array</p>
13	II	FACTS DEVICES & SIMULATION LAB (21D07206)	<p>CO 1: Understand Load balancing using compensators.</p> <p>CO 2: Apply load balancing using Compensators.</p> <p>CO 3: Analyse load flow incorporating SVC & STATCOM.</p> <p>CO 4: Develop a Simulation model for STATCOM & UPFC.</p>
14	II	PERSONALITY DEVELOPMENT THROUGH LIFE	<p>CO 1: Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life</p> <p>CO 2: The person who has studied Geeta will lead the nation and mankind to peace and prosperity</p> <p>CO 3: Study of Neetishatakam will help in developing versatile personality of students</p>
15	III	RESTRUCTURED POWER SYSTEMS (21D07301a)	<p>CO 1: Understand the differences between the conventional power system operation and the restructured one and basics concepts of market power, electricity pricing and competitive environment.</p> <p>CO 2: Analyze the concepts of Independent System Operator (ISO) and Open Access Same-Time Information System (OASIS).</p> <p>CO 3: Apply the methods to find Available Transfer Capability (ATC) and to allocate the Transmission cost.</p> <p>CO 4: Develop power markets and market architectural aspects and short time Price forecasting</p>
16	III	WASTE TO ENERGY (21D0E301e)	<p>CO 1: To know about overview of Energy to waste and classification of waste.</p> <p>CO 2: To acquire knowledge on bio mass pyrolysis, gasification, combustion and conversion process in detail.</p> <p>CO 3: To gain knowledge on properties of biogas, biomass resources and programmes to convert waste to energy</p>



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ADVANCED MANUFACTURING SYSTEMS I, II & III Sem Course outcomes for the academic year 2022-23

S. NO.	Sem	Course name	Course outcomes
1	I	AUTOMATION IN MANUFACTURING (21D87101)	<p>CO 1: Understand to know what is automation, types of automation, components of automation, strategies and levels of automation</p> <p>CO 2: Understand to know what is automation, types of automation, components of automation, strategies and levels of automation</p> <p>CO 3: Understand the types of flow lines, quantitative analysis of flow lines, how the assembly is carried out on automated flow line without interruption and how to balance the line and flexible assembly lines</p> <p>CO 4: Understand automated transfer and storage system, recognize the equipments used in automated transfer and storage system.</p>
2	I	COMPUTER AIDED MANUFACTURING (21D87102)	<p>CO 1: Describe basic concepts of CAM application and understand CAM wheel</p> <p>CO 2: Prepare CNC programs for manufacturing of different geometries on milling and lathe machines.</p> <p>CO 3: Prepare logic diagram for different application of automation.</p> <p>CO 4: Classify different components using different techniques of group technology.</p> <p>CO 5: Select layouts of FMS for industrial applications.</p> <p>CO 6: Describe Robot for preliminary industrial applications like pick and place.</p> <p>CO 7: Identify application of PPC, JIT, MRP-I, MRP-II, and Expert system to CAM.</p>
3	I	SPECIAL MANUFACTURING PROCESSES (21D87103b)	<p>CO 1: Describe the principle and operation of common manufacturing and rapid prototyping processes for product development.</p> <p>CO 2: Decide on the use of appropriate manufacturing processes in the manufacture of a product at the design stage.</p> <p>CO 3: Develop a prototype with modern prototyping techniques.</p> <p>CO 4: Apply up-to-date technology in manufacturing products with considerations of safety and environmental factors.</p> <p>CO 5: Apply the reverse engineering process for product development.</p> <p>CO 6: Appreciate and report on the common practice in the product development industry.</p>
4	I	ADVANCED CAD (21D87104b)	<p>CO 1: Understand the concepts of wireframe, surface and solid modelling</p> <p>CO 2: Understand part modelling and part data exchange standards (VDA,IGES and STEP)</p> <p>CO 3: Develop knowledge in 2D-Transformations, 3D Transformations.</p> <p>CO 4: Understand the Assembly Modelling, Assembly tree, and Assembly Methods.</p> <p>CO 5: The Students become experts on Visualization and computer animation Techniques.</p>
5	I	AUTOMATION LABORATORY (21D87105)	<p>CO 1: Demonstrate the pick and place Aristo Robot.</p> <p>CO 2: Demonstrate the working of workspace software.</p> <p>CO 3: Check the circuit designs whether working properly or not by using Automation studio software.</p>
6	I	METAL CUTTING LABORATORY.	<p>CO 1: Demonstrate the machining processes</p> <p>CO 2: Check the MRR in different processes</p> <p>CO 1: Analyze research related information</p> <p>CO 2: Follow research ethics</p>
7	I	METHODOLOGY AND IPR (21DRM101)	<p>CO 3: Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas,</p> <p>CO 4: Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need</p> <p>CO 5: Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to</p> <p>CO 1: Understand the significance of writing skills and the level of readability</p>
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8	I	RESEARCH PAPER WRITING	<p>CO 2: Analyze and write title, abstract, different sections in research paper</p> <p>CO 3: Develop the skills needed while writing a research paper</p>
9	II	SIMULATION OF MANUFACTURING SYSTEMS (21D87201)	<p>CO 1: Students gain knowledge on various types of simulation and simulation languages steps in simulation and applications of simulation.</p> <p>CO 2: Students gain knowledge on parameter estimation and hypothesis.</p> <p>CO 3: Students can build simulation model and also can validation and verify model.</p> <p>CO 4: Can Generation of random variants and variables.</p>
10	II	QUALITY ENGINEERING IN MANUFACTURING	<p>CO 1: Applications of the user friendly software packages to simulate the manufacturing entities.</p> <p>CO 2: Analyze the data by using different performance analysis techniques.</p> <p>CO 3: Modelling various operators in manufacturing systems</p>
11	II	MATERIAL SCIENCE & TECHNOLOGY (21D87203a)	<p>CO 1: Students will get knowledge on mechanism of plastic deformation and strengthening mechanism.</p> <p>CO 2: Students will be able to learn the structure, properties and applications of modern metallic materials, smart materials non-metallic</p> <p>CO 3: Students will be able to understand the importance of advanced composite materials in application to sophisticated machine and</p>
12	II	PRODUCTION & OPERATIONS MANAGEMENT (21D87204a)	<p>CO 1: Understand the principles of production and operations Management</p> <p>CO 2: Understand the operations process, be able to analyze and solve problems pertaining to operations.</p> <p>CO 3: Understand some of the mathematical models of production management.</p> <p>CO 4: Appraise how other functional areas of business are integrated with Operations Management.</p>
13	II	MANUFACTURING SIMULATION LABORATORY	<p>CO : To learn various softwares to design.</p>
14	II	ADVANCED CAD/CAM LABORATORY (21D87206)	<p>CO 1: Understand the concepts of wire frame, surface and modeling</p> <p>CO 2: Understand part modeling and part data exchange standars (VDA,IGES and STEP)</p> <p>CO 3: Develop knowledge in 2D-Transformations, 3D Transformations.</p> <p>CO 4: Understand the Assembly Modeling, Assembly tree, and Assembly Methods.</p> <p>CO 5: The Students become experts on Visualization and computer animation Techniques.</p>
15	II	PERSONALITY DEVELOPMENT THROUGH LIFE	<p>CO 1: Study of Shrimad-Bhagwad-Geeta will help the student to develop his personality and achieve the highest goal in life</p> <p>CO 2: The person who has studied Geeta will lead the nation and mankind to peace and prosperity</p> <p>CO 3: Study of Neetishatakam will help in developing versatile personality of students</p> <p>CO 1: Develop an understanding on quality management philosophies and framework</p> <p>CO 2: Develop in-depth knowledge on various tools and techniques of quality management.</p> <p>CO 3: Learn the applications of quality tools and techniques.</p> <p>CO 4: Develop analytical skills for investigating and analyzing quality management issues in the industry and suggest implement able</p>
16	III	TOTAL QUALITY MANAGEMENT (21D87301a)	<p>CO 1: Understand the various concepts, terminologies of Signal condition</p> <p>CO 2: Understand the basics electronic interface subsystems</p> <p>CO 3: Understand and apply various precision mechanical systems</p> <p>CO 4: Understand various applications of microcontrollers overview</p> <p>CO 5: Understand the controlling of programmable logic and programmable motion.</p>
17	III	MECHATRONICS (21DOE301h)	


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