Muffakham Jah
College of Engineering and Technology
(The Sultan-Ul-Uloom Education Society)
Affiliated to Osmania University Recognised by AICTE
Banjara Hills, Hyderabad 500034

The Program outcomes and Program Specific outcomes are listed here for ready reference. These are circulated and explained to students on the first day of class

Program Outcomes

PO 1: Engineering knowledge: *Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.*

PO 2: Problem analysis: *Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.*

PO 3: Design/development of solutions: *Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.*

PO 4: Conduct investigations of complex problems: *Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.*

PO 5: Modern tool usage: *Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.*

PO 6: The engineer and society: *Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.*

PO 7: Environment and sustainability: *Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.*

PO 8: Ethics: *Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.*

PO 9: Individual and team work: *Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.*

PO 10: Communication: *Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.*

PO 11: Project management and finance: *Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.*

PO 12: Life-long learning: *Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.*

Program Specific Outcomes

PSO 1: *Function in construction industry for planning and execution of Civil Engineering projects like Multistoried buildings, Bridges and Water retaining structures etc.*

PSO 2: *Function as consultants for the design of infrastructural projects*

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List of Course Outcomes for all the Courses of CIVIL 2020-2021

Sl.No.	Course Code	Subject	CO code	CO
				SEMESTER I
1	MC112CE	Environmental Sciences	1	State the efficient use of natural resources.
			2	Knowledge on the role of ecology as the basis of environmental science
			3	State the importance of bio-diversity & means to conserve it.
			4	Assess the environmental risks associated to various pollutions and understand the environmental laws & policies.
			5	Discuss the current environmental issues & relate the disasters & its management techniques.
2	MC113PY	Essence of Indian Traditional Knowledge	1	Understand philosophy of Indian culture.
			2	Distinguish the Indian languages and literature.
			3	Learn the philosophy of ancient, medieval and modern India.
			4	Acquire the information about the fine arts in India.
			5	Know the contribution of scientists of different eras
3	BS102MT	Mathematics -I	1	Find the nature of sequences and series
			2	Evaluate multiple integrals
			3	Apply this knowledge to solve the curriculum problems
4	BS105CH	Chemistry	1	Apply concept of electrode potential in identifying feasibility of electrochemical reaction; illustrate electro analytical techniques and working of batteries
			2	Identify the mechanism of corrosion of materials on basis of electrochemical approach and devise corrosion control methods.
			3	Estimate the physical & chemical parameters of quality of water and explain the process of water treatment
			4	Explain the influence of chemical structure on properties of materials and their choice in engineering applications.
			5	Classify chemical fuels and grade them through qualitative analysis
			6	Relate the concept of green chemistry to modify engineering processes and materials
5	ES107CS	Programming for Problem Solving	1	Formulate simple algorithms for arithmetic and logical problems.
			2	Translate the algorithms to programs (in c language).
			3	Test and execute the programs and correct syntax and logical errors
			4	Implement conditional branching, iteration and recursion
			5	Decompose a problem into functions and synthesize a complete program using divide and conquer approach
			6	Use arrays, pointers and structures to formulate algorithms and programs
			7	Apply programming to solve matrix addition and multiplication problems and searching and sorting problems
			8	Apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.
		PRACTICALS		
6	BS153CH	Chemistry Lab	1	Apply the principles of Colourimetry and Electrochemistry in quantitative estimations.
			2	Estimate the rate constants of reactions from concentration of reactants/ products as a function of time.

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			3	Synthesize small drug molecules.
7	ES115CS	Programming for Problem Solving Lab	1	Choose appropriate data type for implementing programs in C language
			2	Design and implement modular programs involving input output operations, decision making and looping constructs.
			3	Implement search and sort operations on arrays
			4	Apply the concept of pointers for implementing programs on dynamic memory management and string handling.
			5	Design and implement programs to store data in structures and files.
8	ES157ME	Workshop	1	Demonstrate an understanding of and comply with workshop safety regulations.
			2	Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiselling.
			3	Study and practice on machine tools and their operations
			4	Undertake jobs connected with Engineering Workshop trades including fitting, carpentry, sheet metal, house wiring, welding, smithy and foundry
			5	Apply basic electrical engineering knowledge for house wiring practice
SEMESTER II				
9	MC111PO	Indian Constitution	1	Know the background of the present constitution of India.
			2	Understand the working of the union, state and local levels.
			3	Gain consciousness on the fundamental rights and duties.
			4	Be able to understand the functioning and distribution of financial resources between the centre and states.
			5	Be exposed to the reality of hierarchical Indian social structure and the ways the grievances of the deprived sections can be addressed to raise human dignity in a democratic way
10	HS101EG	English	1	Read, understand, and interpret a variety of written texts
			2	Use appropriate vocabulary and correct grammar
			3	Undertake guided and extended writing with confidence.
11	BS103MT	Mathematics II	1	Solve system of linear equations and eigen value problems
			2	Solve certain first order and higher order differential equations
			3	Solve basic problems of Beta Gamma and Legender's Function
			4	Apply Laplace Transforms; solve ordinary Differential Equations by using it.
12	BS104PH	Physics	1	Distinguish materials based on band theory of solids
			2	Classify semiconductors on the basis doping and to estimate conductivity and learn transport phenomenon in semiconductors
			3	Appreciate use of optical absorption by semiconductors.
13	ES106EE	Basic Electrical Engineering	1	To analyse Electrical circuits to compute and measure the parameters of Electrical Energy
			2	To comprehend the working principles of Electrical DC Machines.
			3	To Identify and test various Electrical switchgear, single phase transformers and assess the ratings needed in given application
			4	To comprehend the working principles of electrical AC machines

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PRACTICALS				
14	HS151EG	English Lab	1	Listen, understand, and interpret formal and informal spoken language
			2	Speak English with acceptable pronunciation, stress, and intonation
			3	Present themselves with confidence in formal situations
			4	Participate in individual and group activities with relative ease
15	BS152PH	Physics Lab	1	Conduct experiments, take measurements independently.
			2	Write appropriate laboratory reports
			3	Compute and compare the experimental results and draw relevant conclusions.
			4	Use the graphical representation of data and estimate results from graphs
16	ES154EE	Basic Electrical Engineering Lab	1	Get an exposure to common electrical components and their ratings
			2	Analyse the performance of DC and AC Machines
			3	Comprehend the usage of common electrical measuring instruments
			4	Test the basic characteristics of transformers and electrical machines
17	ES156CE	Engineering Graphics and Design Lab	1	Draw various geometric shapes and scales using AutoCAD
			2	Draw the projections of points, lines, planes and solids using AutoCAD
			3	Draw the sections of solids using AutoCAD
			4	Draw the development of surfaces using AutoCAD
			5	Draw the isometric projections of the solid using AutoCAD
			6	Draw the orthographic projections of the three dimensional (3-D) objects using AutoCAD
SEMESTER III				
18	MC112CE	Environmental Sciences	1	State the efficient use of natural resources.
			2	Knowledge on the role of ecology as the basis of environmental science
			3	State the importance of bio-diversity & means to conserve it.
			4	Assess the environmental risks associated to various pollutions and understand the environmental laws & policies.
			5	Discuss the current environmental issues & relate the disasters & its management techniques.
19	MC113PY	Essence of Indian Traditional Knowledge	1	Understand philosophy of Indian culture.
			2	Distinguish the Indian languages and literature.
			3	Learn the philosophy of ancient, medieval and modern India.
			4	Acquire the information about the fine arts in India.
			5	Know the contribution of scientists of different eras
20	MC204CE	Overview of Civil Engineering	1	Understand the relevance of civil engineering in the society & describe the uses of various construction materials
			2	Explain the new technology/concepts of architecture in planning
			3	Remember the basics of surveying, transportation and geotechnical systems
			4	Remember the basics of environmental, water resources and structural engineering systems
			5	Remember the various software used in the field of civil engineering
		Industrial	1	Understanding of key concepts, theoretical perspectives, and trends in industrial psychology.
			2	Evaluate the problems thorough and systematic competency model.

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21	HS203MP	Industrial Psychology	3	Analyse the problems present in environment and design a job analysis method.
			4	Create a better work environment for better performance.
			5	Design a performance appraisal process and form for the human behavior.
22	BS206BZ	Biology for Engineers	1	Apply biological engineering principles, procedures needed to solve real-world problems
			2	Understand the fundamentals of living things, their classification, cell structure and biochemical constituents
			3	Apply the concept of plant, animal and microbial systems and growth in real life situations
			4	Comprehend genetics and the immune system.
			5	Know the cause, symptoms, diagnosis and treatment of common diseases
			6	Apply basic knowledge of the applications of biological systems in relevant industries
23	ES211CE	Engineering Mechanics	1	Analyze the effect of a system of forces on a body.
			2	Analyze the static equilibrium of bodies in 2D and 3D and the effect of friction and its governing laws on bodies in equilibrium.
			3	Determine the Centroid, Center of gravity, Moment of Inertia and Mass moment of inertia of different plane and solid bodies.
			4	Apply the laws of motion to study the kinematic parameters of a moving rigid body.
			5	Solve the problems involving translation and rotation of rigid bodies by applying principles of kinetics, work-energy and impulse momentum.
			6	Analyze and solve impact problems using principles of impulse momentum.
24	ES213ME	Energy Science and Engineering	1	Understand the basics of various sources of energy
			2	Analyse the present status of conventional energy sources.
			3	Understand the working principles of Renewable Energy systems
			4	Design and develop waste heat recovery systems
			5	Relate energy economics, standards and future challenges
25	PC221CE	Solid Mechanics	1	Apply the fundamental concepts of stress and strain in the analysis and design of axially loaded members.
			2	Analyse determinate beams to determine shear forces, bending moments and determine the bending stress distribution in beams.
			3	Determine the shear stress distribution in a beams and also the stresses in beams subjected to combined axial and bending loads.
			4	Evaluate the stresses and strains of circular members subjected to torsion and calculate the power required for torsional revolutions of shafts.
			5	Analyse the combined stresses at a point to evaluate principal stresses, and their applications in evaluating failure criteria in various materials and pressure vessels
26	PC222CE	Engineering Geology	1	Identify various minerals, rocks and analyse geological structures
			2	Explain rock weathering, classify various soils and understand hydrogeology
			3	Classify landforms based on their geomorphology and evaluate the engineering properties of rocks.
			4	Examine rocks for their suitability in various construction applications

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			5	Investigate and identify the geological problems in dams, reservoirs and tunnels, and explain the geological causes of earthquakes, tsunamis and landslides
27	PC223CE	Surveying & Geomatics	1	Understand the basic principles of surveying.
			2	Computation of lengths, areas, bearings of given field work
			3	Understand the basic working principles of theodolite and total station
			4	Computation of setting out data for horizontal and vertical curves by various methods
			5	Understand and learn the basic concepts related to Photogrammetry, RS and GPS
PRACTICALS				
28	PC251CE	Engineering Geology Lab	1	Identify the physical and engineering properties of minerals and rocks (Exp 1-3)
			2	Analyse and measure structural aspects of rocks using models (Exp 4,5,10)
			3	Carry out field experiment and studies such as VES (Exp 6)
			4	Perform studies such as Stereoscopic study of photographs, seismic refraction survey and Slake durability test (Exp 7, 8, 12)
			5	Study the topographical and GSI maps (Exp 9, 11)
29	PC252CE	Surveying Lab	1	Compute lengths, areas and bearings of the given field work
			2	Understand the basic working principles of theodolite and total station
			3	Compute setting out data for setting out of horizontal curves by various methods
			4	Understandand learn the basic concepts related to GPS
SEMESTER IV				
30	MC111PO	Indian Constitution	1	Know the background of the present constitution of India.
			2	Understand the working of the union, state and local levels.
			3	Gain consciousness on the fundamental rights and duties.
			4	Be able to understand the functioning and distribution of financial resources between the centre and states.
			5	Be exposed to the reality of hierarchical Indian social structure and the ways the grievances of the deprived sections can be addressed to raise human dignity in a democratic way
31	HS201EG	Effective Technical Communication in English	1	Handle technical communication effectively
			2	Use different types of professional correspondence
			3	Use various techniques of report writing
			4	Acquire adequate skills of manual writing
			5	Enhance their skills of information transfer and presentations
32	HS202CM	Finance and Accounting	1	Evaluate the financial performance of the business unit
			2	Take decisions on selection of projects
			3	Take decisions on procurement of finances
			4	. Analyse the liquidity, solvency and profitability of the business unit
			5	Evaluate the overall financial functioning of an enterprise
33	BS205MT	Mathematics - III / PDE	1	Solve field problems in engineering involving PDEs.

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33	BS203MT	III (TDE, Probability &	2	Formulate and solve problems involving random variables and apply statistical methods for analysing experimental data.
34	ES212ME	Elements of Mechanical Engineering	1	State and differentiate various classifications of IC engines and reciprocating air compressors with specific focus on similarities and differences between (i) 2 stroke and 4 stroke engines and (ii) CI and SI engines. Subsequently, the student would be able to compute the performance parameters of the engines and gas turbines.
			2	Compare various types of heat transfer, analyse the governing equations, understand the applications of heat exchangers and solve related problems
			3	Demonstrate the working principles of hydraulic turbines and pumps
			4	Classify different types of power transmission systems like gears, gear trains, belts, ropes etc. with emphasis on their kinematic mechanisms and solve related problems
			5	Understand various manufacturing processes like, welding, , machining, etc. and recognize their suitability for manufacturing of different industrial products
35	PC231CE	Mechanics of Materials & Structures	1	Evaluate the crippling load of columns for various end conditions using different formulas
			2	Calculate the deflections of determinate beams due to transverse loads by various methods
			3	Analyse statically indeterminate beams such as propped cantilever, fixed beams and continuous beams and draw the shear force and bending moment diagrams
			4	Analyse the beams and frames and to find deflections by energy principle
			5	Analyse the three hinged and two hinged arches, cables and suspension bridges
35	PC232CE	Fluid Mechanics	1	Classify the fluids based on their properties
			2	Solve problems on pressure calculations, hydrostatic forces on bodies and buoyancy
			3	Relate types of flows with the corresponding mathematical equations
			4	Apply Euler's, Bernoulli's and Momentum equation to solve fluid dynamic problems
			5	Apply principles of fluid dynamics to make flow measurement calculations
36	PC233CE	Material Testing & Evaluation	1	Know the properties of basic materials using in civil engineering
			2	Remember the constituents required for making concrete
			3	Analyse the characteristics and properties of concrete
			4	Apply the concepts of mix design for making concrete
			5	Implement various special concretes and concreting methods based on the scenario
PRACTICALS				
37	PC261CE	Solid Mechanics Lab	1	Evaluate Young's modulus, rigidity modulus, hardness number, flexural rigidity and impact strength of given specimens
			2	Find the cracking stress and compressive strength of bricks
			3	Determine the stiffness of close coiled helical springs
			4	. Find the deflection of a beam
38	PC262CE	Material Testing & Evaluation	1	Determine the physical properties of constituent materials of concrete.
			2	Apply the mix design of concrete
			3	Determine the workability of concrete

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		Lab	4	Determine the mechanical behavior of concrete subjected to Tension, compression, flexure by means of experiments
SEMESTER V				
39	PC 302 CE	STRUCTURAL ANALYSIS - I	1	Understand the advantage of statically indeterminate structure over the statically determinate structure.
			2	Understand basic methods for the analysis of statically indeterminate beams and frames and know the difference between different methods.
			3	Evaluate the displacements and redundant forces using energy principles.
			4	Understand the analysis of structural elements subjected to moving loads & the analysis of road/railway bridges and gantry girders, arches
			5	Explain the concepts involved in the analysis of suspension cable bridges.
40	PC322CE	HYDRAULIC ENGINEERING	1	To introduce the students to various hydraulic engineering problems in open channel flows
			2	Ability to understand energy loss principles
			3	Ability to relate the theory and practice problems in hydraulic engineering
41	PC323CE	STRUCTURAL ENGINEERING DESIGN AND	1	Provide a solid background of principles of structural design of Reinforced Concrete Members.
			2	Provide Hands- on- experience and skill to design structural Reinforced Concrete elements
			3	Develop an understanding of real-world design problems.
42	PC504CE	Hydraulic Machines	1	Application of basic principles in the design of Hydraulic Machines
			2	Assimilation of turbine/pump laws and constants for the hydraulic design
			3	Knowledge about selection of hydraulic turbines and pumps
43	PC505CE	Transportation Engineering -I	1	Express the fundamentals of highway planning and perform geometric design of a transportation facility
			2	Compute key elements on various traffic studies, present and analyse traffic data
			3	Interpret basic concepts of material characterization as per standard specifications including mix designs
			4	Design flexible and rigid pavements as per IRC guidelines
			5	Employ various construction techniques adopted in field, identify the causes of various pavement failures and suggest appropriate treatment
44	PC506CE	Environmental Engineering	1	To understand the impact of engineering solutions in a global, economic, environmental and societal context
			2	Ability to design environmental engineering systems that include considerations such as risk, uncertainty, sustainability and environmental impacts.
			3	Ability to speak before a group, effectively convey information to technical and non-technical audiences
45	PC507CE	Water Resources Engineering - I	1	Awareness about water rights and water quality management principles
			2	Application of principles of planning and design to different types of water retention and regulatory systems
			3	Knowledge regarding the fixation of different levels of reservoirs
PE -I				
46	PE502CE	Hydropower Engineering	1	Planning for hydro power development projects
			2	Application of principles involved in the design of surge tanks and penstocks
47	PE503CE	Infrastructure	1	To explain professional issues related to power sector infrastructure needs and maintenance strategies
			2	To describe and evaluate roads, railways, waterways and airways infrastructure in any country

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47	PE505CE	Engineering	3	To distinguish different types of communications systems and postal services in the context of infrastructure. To demonstrate importance of housing sector and privatization in the present day context
47	PE504CE	Soft Computing Skills in CE	1	Competence in understanding the optimization principles
			2	Able to solve simple numerical problems and applications using L.P., D.P
			3	The students will be able to understand some of the soft computing techniques like Neural Network, Fuzzy Logic techniques in water Resources
PRACTICALS				
48	PC551CE	Fluid Mechanics - II Lab	1	Competence in understanding floe phenomenon in open channels
			2	Ability to analyze the force acting due to jets concept and it's application in hydraulic machines
			3	Competence in working principles of hydraulic pumps and turbines
49	PC552CE	Transportation Engineering Lab	1	Characterize the pavement materials
			2	Perform quality control tests on pavement material and pavements
			3	Conduct traffic studies for estimation of traffic flow characteristics
50	PC553CE	Environmental Engineering Lab	1	Conduct experiments, take measurements and analyze the data through hands on experience in order to demonstrate understanding of the concepts of Environmental Engineering, while working in small groups.
			2	Demonstrate writing skills through clear laboratory reports
			3	Compare the experimental results with those introduced in lecture, draw relevant conclusions and substantiate them satisfactorily.
			4	Transfer their experience to individual performance of experiments and demonstrate effective oral skills.
SEMESTER VI				
51	PC601CE	Steel Structures	1	Explain provisions of IS – 800-2007 and Design Bolted and Welded Connections.
			2	Design tension members
			3	Design laterally restrained and unrestrained Beams.
			4	Design roof Trusses.
			5	Design Compression members and Bases.
52	PC602CE	Structural Engineering Design & Detailing - I	1	Learn IS codal provisions and basics of design of steel structures
			2	Design of different types of connections
			3	Design of tension, compression members, column bases and beams
			4	Design of roof trusses
53	PC603CE	Theory of Structures -II	1	Draw influence line diagrams for Reaction, S.F, B.M with different type of loading acting on statically determinate beams, arches and trusses.
			2	Analyse cable suspension bridges along with three hinged stiffening girder for static loads
			3	Analyse beams, Frames and truss with S.I not exceeding three using Flexibility method.
			4	Analyse beams, Frames and truss with S.I not exceeding three using Stiffness method.
			5	Analyse beams, Frames and truss with S.I not exceeding three using Direct Element Method & introduction to software packages.
		Water Resources	1	Assimilation of the various concepts of canal design

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54	PC604CE	Water Resources Engineering II	2	Application of design aspects of different types of weirs and regulatory systems
			3	Knowledge regarding the different types of cross drainage structures
55	PC605CE	Soil Mechanics	1	Competence in understanding the soil and the mechanisms associated with it
			2	Ability to analyze the systems involving soil mechanics
			3	Competence for application of principles of soil mechanics in Foundation Engineering to be learned in the next semester
56	PC606CE	Transportation Engineering - II	1	Describe the requirements of alignment and its surveys and explain the permanent way components with its functions
			2	Design the elements of railway track
			3	Present the techniques for construction and maintenance of railway track
			4	Elucidate the requirements of airport layout and explain aircraft characteristics
			5	Draw wind rose diagrams and determine the corrected runway length
PE - II				
57	PE601CE	Earthquake Resistant Design of Buildings	1	Apply the concepts of structural dynamics of MDOF systems for analysis of structures.
			2	Model and analyse the structures to resist earthquake forces by different methods
			3	Design the various structural elements resisting earthquake forces as per IS Codes.
			4	Practice ductile detailing of reinforced concrete and masonry buildings as per codal provisions
58	PE602CE	Wastewater Treatment	1	Planning for wastewater treatment facilities and conservation of ecological systems
			2	Selection of appropriate technologies for natural and mechanical systems of sewage disposal
59	PE603CE	Ground Improvement Techniques	1	Ability to understand the necessity of ground improvement and potential of a ground for improvement
			2	To gain comprehensive understanding about the improvement of insitu cohesive soils as well as Cohesion less soils
			3	Competence to analyze an in-situ ground, identification of ground improvement techniques feasible, selection of the ideal method, its planning , design, implementation and evaluation of improvement level
60	PE604CE	Watershed Management	1	Application of Watershed Management practices in conservation vital natural resources like land and Water
			2	Awareness on proper use of all available resources of a watershed for optimum production with minimum hazards
OE- I				
61	OE602ME	Material Handling	1	Able to understand various conveying systems that available in industry
			2	Able to understand various bulk solids handling systems and their design features
			3	Able to understand and various modern material handling systems and their integration
			4	Able to calculate number of MH systems required , storage space , cost and maintenance
			5	
PRACTICALS				
62	PC651CE	Soil Mechanics Laboratory	1	Determine the physical, index properties of soil for classification and identification purpose.
			2	Determine permeability, compaction & shear properties of soil to improve the Engineering properties of soils.
			3	Competence in performing the laboratory experiments on soil specimen, analyse the results, interpret and validate the same

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			4	Greater insight in to the soil behavior and hence enhanced understanding of soil mechanics
			5	Ability to model a field application in the laboratory to take up research
63	PC652CE	Concrete Laboratory	1	Exposure to a variety of established material testing techniques.
			2	Design and prepare concrete mix using Indian Standard method
			3	Knowledge in Non-destructive tests on concrete
64	PW661CE	Survey Camp	1	Apply the principles and operate various advanced surveying instruments.
			2	Compute the differences in elevation drawn and utilize contour plots, and volumes for earthwork.
			3	Interpret the need for accurate and thorough note taking in field work to serve as a legal record.
			4	Practice working as a team member and lead a team
			5	Demonstrate professional behavior in conducting the experiments and presenting the results effectively
SEMESTER VII				
65	PC701CE	Structural Engineering Design and Detailing -II (Steel)	1	Apply the principles, procedures and current code requirements to analyse and design plate girders
			2	Design of gantry girders using current code of practice
			3	Apply the related design procedure in design of bearings
			4	Identify types of bridges, related code of practices principles and procedures in the design of plate girder and truss girder bridges.
66	PC702CE	Estimation Costing and Specifications	1	Estimate the quantities of materials required for the construction of buildings, roads, culverts, septic tank and earthwork of irrigation canals .
			2	Estimate the steel quantities of materials required for the construction of slab, beams and column, footings, staircase, overhead rectangular water tank.
			3	Prepare the rate analysis for major items of works for building and roads.
			4	Knowledge of specification of works as per APDSS.
			5	Ability to prepare tender, contract Documents and identify the project delivery method.
67	PC703CE	Finite Element Techniques	1	Derive basic equations of theory of elasticity in 1-D, 2-D, 3-D and Axixsymmetric problems
			2	Apply Rayleigh-Ritz method and Galerkin method to formulate FEM equations and solve basic solid mechanics problems.
			3	Develop stiffness matrices and load vectors for bar, truss and beam elements and apply them to solve practical problems.
			4	Develop shape functions and obtain stiffness matrices and load vectors for 2-D elements like three noded triangular element, four noded rectangular element, four noded and eight noded quadrilateral elements and solve simple practical problems
			5	Apply the concept of prestressing and determine the losses of prestress
68	PC704CE	Prestressed Concrete	1	Analyse the prestressed concrete beam and suggest the cable profile for beam
			2	Design the prestressed concrete beam for flexure and shear
			3	Analyse the prestressed continuous beam and determine the concordant cable profile
			4	Estimate the deflection of a prestressed concrete beam and design the end block .
			1	Understand the stress distribution in soils

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69	PC705CE	Foundation Engineering	2	Calculate bearing capacity of shallow foundation.
			3	Design pile foundation and machine foundation
			4	To learn various aspects of foundation.
OE- II & III				
70	OE774EE (OE - II)	Entrepreneurship	1	Understand Indian Industrial Environment, Entrepreneurship and Economic growth, Small and Large Scale Industries, Types and forms of enterprises.
			2	Identify the characteristics of entrepreneurs, Emergence of first generation entrepreneurs, Conception and evaluation of ideas and their sources
			3	Practice the principles of project formulation, Analysis of market demand, Financial and profitability analysis and Technical analysis.
			4	Apply the concepts of Project Management during construction phase, project organization, project planning and control using CPM, PERT techniques
			5	Understand the Behavioural aspects of entrepreneurs, Time Management, Various approaches of time management, their strengths and weakness. The urgency addiction and time management matrix.
71	OE782IT (OE - III)	Software Engineering	1	Acquire knowledge about different software development processes and their usability in different problem domains
			2	Understand the process of requirements collection, analysing, and modelling requirements for effective understanding and communication with stakeholders
			3	Design and develop the architecture of real world problems towards developing a blueprint for implementation
			4	Use the UML language to design various models during software development life cycle
			5	Understand the concepts of software quality, testing and maintenance
PRACTICALS				
72	PC751CE	Computer Applications Laboratory	1	Apply algorithm design concepts to develop flowcharts for computer based solutions of civil engineering problems
			2	Demonstrate knowledge of Microsoft Excel by employing in-built and user-defined functions, debugging and executing different civil engineering problems
			3	Demonstration, documentation and presentation of the algorithms, flowcharts, programs and output in a record form
			4	Validate the program using known input and output parameters
			5	Employ analytical and logical skills to solve real world problems and demonstrate oral communication skills
73	PW761CE	Project Seminar	1	Apply algorithm design concepts to develop flowcharts for computer based solutions of civil engineering problems
			2	Demonstrate knowledge of Microsoft Excel by employing in-built and user-defined functions, debugging and executing different civil engineering problems
			3	Demonstration, documentation and presentation of the algorithms, flowcharts, programs and output in a record form
			4	Validate the program using known input and output parameters
			5	Employ analytical and logical skills to solve real world problems and demonstrate oral communication skills
			1	Analyze a technical problem along with specifications.

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74	SI762CE	Summer Internship	2	Execute the project work.
			3	Prepare technical presentation that are required in the project.
			4	Learn implementation of civil engineering software.
SEMESTER VIII				
75	PC801CE	Construction Management and Technology	1	Ability to express Construction labour Laws & categorize projects based on delivery methods
			2	Identify the Roles and Responsibilities of individuals in an Organization.
			3	Prepare & analyze Bar-chart & network diagram and conduct time-cost analysis.
			4	Solve Linear Programming Problems using Graphical & Simplex method and apply it to scheduling networks
			5	Ability to prepare tender and contract Documents and state construction safety principles
PE - III				
76	PE821CE	Retrofitting and Rehabilitation of Structures	1	Distinguish between various definitions related to building repair and maintenance
			2	Differentiate the types of defects, damage and explain the various deterioration mechanisms in structures
			3	Classify and explain the various non-destructive tests and condition assessment procedures.
			4	Describe various repair materials and techniques
			5	Explain the various retrofitting and rehabilitation procedures
PE - IV				
77	PE833CE	Groundwater Management	1	Describe the socio-economic aspects of groundwater hydrology
			2	Perform geophysical methods for groundwater exploration
			3	Compute flow from a groundwater aquifer
			4	Identify groundwater contamination sources
			5	Analyse various models in ground water
78	PE834CE	Intelligent Transport Systems	1	Able to plan and specification requirements using ITS
			2	Able to plan and management aspects for ITS
			3	Able to prepare architecture and application for ITS
PE-V				
79	PE842CE	Principles of Green Building Practices	1	Define sustainability and a green building, along with its features and benefits
			2	Describe the criteria used for site selection and water efficiency methods
			3	Explain the energy efficiency terms and methods used in green building practices
			4	. Select materials for sustainable built environment & adopt waste management methods
			5	Describe the methods used to maintain indoor environmental quality
80	PE843CE	Advanced Reinforced Concrete Design	1	Design the Beams Curved in Plan.
			2	Design the Deep beams.
			3	Design the Building frame
			4	Design the Flat Slabs.
			5	Design the PileFoundations
			6	Design the Raft Foundations.
PRACTICALS				

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81	PW961CE	Project Work - II	1	Demonstrate the ability to synthesize and apply the knowledge and skills acquired in the academic program to the real-world problems
			2	Evaluate different solutions based on economic and technical feasibility
			3	Effectively plan a project and confidently perform all aspects of project management
			4	Demonstrate effective written and oral communication skills
82	MP951SP	Yoga Practice	1	Students will become more focused towards becoming excellent citizens with more and more discipline in their day-to-day life
			2	An all-round development-physical, mental and spiritual health-takes place
			3	Self-discipline and discipline with respect society enormously increases
			4	University environment becomes more peaceful and harmonious
83	MC952SP	National Service Scheme (NSS)	1	Students will become more focused towards becoming excellent citizens with more and more discipline in their day-to-day life
			2	An all-round development-physical, mental and spiritual health-takes place
			3	Self-discipline and discipline with respect society enormously increases
			4	University environment becomes more peaceful and harmonious
84	MC952SP	Sports	1	Develop one's character and personal qualities, promote the fair game principles, and form an active life position
			2	Develop and share among members and others education, information, and leadership skills
			3	Encourage members to promote the active participation by all youth in fun and healthy physical activities according to their interests and abilities

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List of Course Outcomes for all the Courses of CSE 2020-2021				
Sl.No.	Course Code	Subject	CO code	CO
I SEM				
1	MC112CE	Environmental Science	1	To create awareness and impart basic knowledge about the environment and its allied problems.
			2	To know the functions of ecosystems.
			3	To understand the importance of biological diversity.
			4	To study different pollutions and their impact on the environment.
			5	To know social and environment-related issues and their preventive measures.
2	MC113PY	Essence of Indian Traditional Knowledge	1	Understand the philosophy of Indian culture and its foundation, acquire knowledge about the Indian cultural facts in different eras
			2	Distinguishing the Indian languages, appreciate the strength of language and literature in showcasing the traditional background of India
			3	Analyze the different religious philosophies in different eras in India and to be aware of the different religious reforms in modern India.
			4	Construct the knowledge about the different Indian art forms such as fine arts and performance arts, understand the engineering of Indian architecture, science and technology.
			5	Understand the holistic approach of Indian education system, explore the value-based education, develop the importance of Gurukula system of education
3	BS102MT	Mathematics-I	1	Find the Nature of sequences and Seies
			2	Apply Mean Value Theorems.
			3	Find the maximum and minimum values of given function of two variables
			4	Evaluate Multiple integrals.
			5	Know the Green's, Gauss, Stokes theorems and its applications.
4	BS105CH	Engineering Chemistry	1	Apply concept of electrode potential in identifying feasibility of electrochemical reaction; illustrate electro analytical techniques and working of batteries
			2	Identify the mechanism of corrosion of materials on the basis of electrochemical approach and devise corrosion control methods
			3	Estimate the physical and chemical parameters of quality of water and explain the process of water treatment
			4	Explain the influence of Chemical structure on properties of materials and their choice in engineering applications
			5	Classify chemical fuels and grade them through qualitative analysis.
			6	Relate the concept of green chemistry to modify engineering processes and materials.
5	ES107CS	Programming for Problem solving	1	Identify the basic components of computer and outline the domain of problem solving
			2	Demonstrate the applications of structured data using control structures
			3	Understand the basic algorithms and Incorporate the concepts of modular programming for problem solving
			4	Solve problems using recursion and organize data using structured data types
			5	Explicitly access data and store it permanently
PRACTICALS				
		Engineering	1	Apply the principles of Colorimetry and Electrochemistry in quantitative estimations.

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6	BS153CH	Chemistry Lab	2	Estimate the rate constants of reactions from concentration of Reactants / products as a function of time
			3	Synthesize small drug molecules.
7	ES155CS	Programming for Problem solving lab	1	Apply and practice logical ability to solve the problems.
			2	Explain C programming environment, compiling, debugging, linking and executing a program.
			3	Analyzing the complexity of problems, modularize the programs into small modules and customized functions for solving the problems.
8	ES157ME	Workshop/ Manufacturing process	1	Model the Components as per the drawing using appropiate tools and materials in the trades of carpentry, Fitting and Sheet Metal.
			2	Apply basic electrical engineering knowledge for house wiring circuits.
			3	Perform welding,Plumbing operations to make various joints using different materials.
			4	Know the importance of different machining processes such as injection moulding,rapid prototyping and glass cutting.
			5	Identify the computer parts and perform dis-assembling of the computer.
II SEM				
9	MC111PO	Indian Constitution	1	Know the background of the present constitution of India.
			2	Understand the working of the union, state and local level governments.
			3	Gain consciousness on the fundamental rights and duties.
			4	Be able to understand the functioning and distribution of financial resources between the centre and the states.
			5	Be exposed to the reality of hierarchical Indian social structure and the ways the grievances of the deprived sections can be addressed to raise human dignity in a democratic way.
10	HS101EG	English	1	comprehend a variety of written texts literally as well as understand their underlying meanings.
			2	demostrate a rich vocabulary and attain grammatical accuracy
			3	draft a variety of letters for professional requirements
			4	compose effective reports for various purposes
			5	write impressive SOPs in the pursuit of higher education
11	BS103MT	Mathematics-II	1	solve system of linear equations and eigenvalue problems
			2	solve certain
			3	solve basic problems of Beta Gamma and Legender's functions
			4	Apply laplace transform,solve ordinary differential equations by using it
12	BS104PH	Engineering Physics	1	Distinguish materials based on band theory of solids
			2	Classify semiconductors on the basis doping and to estimate conductivity and learn transport phenomenon in semiconductors
			3	Appreciate use of optical absorption by semiconductors.
13	ES106EE	Basic Electrical Engineering	1	To analyse Electrical circuits to compute and measure the parameters of Electrical Energy.
			2	To comprehend the working principles of Electrical DC Machines.
			3	To Identify and test various Electrical switchgear, single phase transformers and assess the ratings needed in given application.
			4	To comprehend the working principles of electrical AC machines.
PRACTICALS				

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14	HS151EG	English Lab	1	Comprehend audio or audio-visual contents aptly and thus improve their listening competence.
			2	demonstrate better pronunciation and enhance speaking skills through interactive activities .
			3	use apt non-verbal cues in various speaking activities.
			4	demostrate writing skills.
15	BS152PH	Engineering Physics Lab	1	Conduct experiments, take measurements independently.
			2	Write appropriate laboratory reports
			3	Compute and compare the experimental results and draw relevant conclusions.
			4	Use the graphical representation of data and estimate results from graphs
16	BS154EE	Basic Electrical Engineering Lab	1	Get an exposure to common electrical components and their ratings
			2	Analyse the performance of DC and AC Machines
			3	Comprehend the usage of common electrical measuring instruments
			4	Test the basic characteristics of transformers and electrical machines
17	ES156CE	Engineering Graphics & Design	1	Understand and write the theory and procedure for engineering drawings
			2	Draw the free hand sketches for the engineering drawings.
			3	Use the CAD software to draw the engineering drawings.
			4	Demonstrate and use the software for sheet layout, annotations and dimensioning
			5	Print the engineering drawings using the CAD software
				III SEM
18	MC112CE	Environmental Science	1	Adopt environmental ethics to attain sustainable development.
			2	Develop an attitude of concern for the environment.
			3	Conservation of natural resources and biological diversity.
			4	Creating awareness of Green technologies for nation's security.
			5	Imparts awareness for environmental laws and regulations
19	MC113PY	Essence of Indian Traditional Knowledge	1	Understand philosophy of Indian culture.
			2	Distinguish the Indian languages and literature among difference traditions.
			3	Learn the philosophy of ancient, medieval and modern India.
			4	Acquire the information about the fine arts in India.
			5	Know the contribution of scientists of different eras.
			6	The essence of Yogic Science for Inclusiveness of society.
20	HS204ME	Operations Research	1	Prepare the students to have the knowledge of Linear Programming Problem in Operations
			2	Research at the end students would be able to understand the concept and develop the models for different applications.
			3	Make students understand the concept Replacement models at the end students would able to explain various features and applications of replacement models in real time scenario.
			4	Prepare the students to understand theory of Game in operations research at the end students would able to explain application of Game theory in decision making for a conflict
			5	Prepare the students to have the knowledge of Sequencing model at the end student would able to develop optimum model for job scheduling.

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			6	Prepare students to understand Queuing theory concepts and various optimization techniques at the end students would able to develop models for waiting line cases.
21	BS206BZ	Biology for Engineers	1	Apply biological engineering principles, procedures needed to solve real-world problems.
			2	Understand the fundamentals of living things, their classification, cell structure and biochemical constituents.
			3	Apply the concept of plant, animal and microbial systems and growth in real life situations.
			4	Comprehend genetics and the immune system.
			5	Know the cause, symptoms, diagnosis and treatment of common diseases.
			6	Apply basic knowledge of the applications of biological systems in relevant industries.
22	ES214EC	Basic Electronics	1	Study and analyse the rectifiers and regulator circuits.
			2	Study and analyse the performance of BJTs, FETs on the basis of their operation and working.
			3	Ability to analyse & design oscillator circuits.
			4	Ability to analyse different logic gates & multi-vibrator circuits.
			5	Ability to analyse different data acquisition systems
23	ES216EC	Digital Electronics	1	Understand the deign process of digital hardware, use Boolean algebra to minimize the logical
			2	expressions and optimize the implementation of logical functions.
			3	Understand the number representation and design combinational circuits like adders, MUX etc.
			4	Design Combinational circuits using PLDS and write VHDL code for basic gates and combinational circuits.
			5	Analyse sequential circuits using flip-flops and design registers, counters.
			6	Represent a sequential circuit using Finite State machine and apply state minimization techniques to design a FSM
24	PC221CS	Data Structures and Algorithm	1	Understand the importance of abstract data type and implementing the concepts of data structure using abstract data type.
			2	Evaluate an algorithm by using algorithmic performance and measures.
			3	Distinguish between linear and non-linear data structures and their representations in the memory using array and linked list.
			4	Develop applications using Linear and Non-linear data structures.
			5	Apply the suitable data structure for a real world problem and think critically for improvement in solutions.
			6	Determine the suitability of the standard algorithms: Searching, Sorting and Traversals.
25	PC222CS	Discrete Mathematics	1	Apply Propositional and Predicate logic for a variety of problems in various domains.
			2	Understand Set Theory, Venn Diagrams, relations, functions and apply them to Real-world scenarios.
			3	Model and solve the real world problems using Generating Functions and Recurrence Relations.
			4	To identify the basic properties of graphs and trees and use these concepts to model simple applications.
			5	Understand General properties of Algebraic systems and study lattices as partially ordered sets and their applications.
			6	Apply the knowledge and skills obtained to investigate and solve a variety of discrete mathematics problems.
26	PC223CS	Programming Languages	1	Ability to express syntax and semantics in formal notation.
			2	Ability to apply suitable programming paradigm for the application.
			3	Gain Knowledge and comparison of the features programming languages
			4	Program in different language paradigms and evaluate their relative benefits.
			5	Identify and describe semantic issues associated with variable binding, scoping rules, parameter passing, and exception handling.

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			6	Understand the design issues of object-oriented and functional languages.
PRACTICALS				
27	ES251EC	Basic Electronics Lab	1	Ability to design diode circuits & understand the application of Zener diode.
			2	Ability to analyse characteristics of BJTs & FETs.
			3	Ability to understand the different oscillator circuits.
			4	Ability to understand operation of HWR & FWR circuits with & without filters.
			5	Ability tom design Analog-to-Digital converters & Digital-to-Analog converters.
28	ES251EC	Data Structures and Algorithm Lab	1	Implement the abstract data type and reusability of a particular data structure.
			2	Implement linear data structures such as stacks, queues using array and linked list.
			3	Understand and implements non-linear data structures such as trees, graphs.
			4	Implement various kinds of searching, sorting and traversal techniques and know when to choose which technique.
			5	Understanding and implementing hashing techniques.
			6	Decide a suitable data structure and algorithm to solve a real world problem.
29	PC253CS	Advanced Computer Skills Lab	1	Implement basic syntax in python.
			2	Analyse and implement different kinds of OOP concept in real world problems.
			3	Implement MATLAB operations and graphic functions.
IV SEM				
30	MC111PO	Indian Constitution	1	1. Know the background of the present constitution of India.
			2	2. Understand the working of the union, state and local levels.
			3	3. Gain consciousness on the fundamental rights and duties.
			4	4. Be able to understand the functioning and distribution of financial resources between the centre and states.
			5	5. Be exposed to the reality of hierarchical Indian social structure and the ways the grievances of the deprived sections can be addressed to raise human dignity in a democratic way
31	HS201EG	Effective Technical Communication in English	1	1. Handle technical communication effectively
			2	2. Use different types of professional correspondence
			3	3. Use various techniques of report writing
			4	4. Acquire adequate skills of manual writing
			5	5. Enhance their skills of information transfer and presentations
32	HS202CM	Finance and Accounting (HS202CM)	1	1. Evaluate the financial performance of the business unit.
			2	2. Take decisions on selection of projects.
			3	3. Take decisions on procurement of finances.
			4	4. Analyse the liquidity, solvency and profitability of the business unit.
			5	5. Evaluate the overall financial functioning of an enterprise.
33	BS207MT	Mathematics – III (Probability	1	1. Solve field problems in engineering involving PDEs.
			2	2. They can also formulate and solve problems involving random variables and apply statistical
			3	methods for analysing experimental data.
		Signals and	1	1. Define and differentiate types of signals and systems in continuous and discrete time
			2	2. Apply the properties of Fourier transform for continuous time signals

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34	ES215EC	Signals and Systems (ES215EC)	3	3. Relate Laplace transforms to solve differential equations and to determine the response of the Continuous Time Linear Time Invariant Systems to known inputs
			4	4. Apply Z-transforms for discrete time signals to solve Difference equations
			5	5. Obtain Linear Convolution and Correlation of discrete time signals with graphical representation
35	PC231CS	OOP using JAVA(PC231CS)	1	1. Identify classes, objects, members of a class and the relationships needed to solve a problem.
			2	2. Use interfaces and creating user-defined packages.
			3	3. Utilize exception handling and Multithreading concepts to develop Java programs.
			4	4. Compose programs using the Java Collection API.
			5	5. Design a GUI using GUI components with the integration of event handling.
			6	6. Create files and read from computer files.
36	PC232CS	Computer Organization (PC232CS)	1	1. After this course students understand in a better way the I/O and memory organization in depth.
			2	2. Ability to understand the merits and pitfalls in computer performance measurements.
			3	3. Identify the basic elements and functions of 8086 microprocessors.
			4	4. Understand the instruction set of 8086 and use them to write assembly language programs.
			5	5. Demonstrate fundamental understanding on the operation between the microprocessor and its interfacing devices.
37	PC233CS	Database Management Systems(PC233CS)	1	1. Understand the mathematical foundations on which RDBMS are built
			2	2. Model a set of requirements using the Extended Entity Relationship Model (EER), transform an EER model into a relational model and refine the relational model using theory of normalization
			3	3. Develop Database application using SQL and Embedded SQL
			4	4. Use the knowledge of file organization and indexing to improve database application performance
			5	5. Understand the working of concurrency control and recovery mechanisms in RDBMS
PRACTICALS				
38	PC261CS	Computer Organization Lab (PC261CS)	1	1. Interpret the principles of Assembly Language Programming, instruction set in developing microprocessor based applications.
			2	2. Develop Applications such as: 8-bit Addition, Multiplication, Division, array operations, swapping, negative and positive numbers.
			3	3. Analyse the interfaces like serial ports, digital-to-analog Converters and analog-to-digital converters etc.
			4	4. Build interfaces of Input-output and other units like stepper motor with 8086.
			5	5. Analyse the function of traffic light controller.
39	PC262CS	OOP using JAVA Lab(PC262CS)	1	1. Design interfaces and packages.
			2	2. Compose program for implementation of multithreading concepts.
			3	3. Develop program using Collection Framework.
			4	4. Develop small GUIs using GUI components with the integration of event handling.
			5	5. Handle I/O Streams from various sources.
			6	6. Write programs using the Java Concepts.
40	PC263CS	Database Managemen	1	Design and implement a database schema for a given problem
			2	Populate and query a database using SQL and PL/SQL

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		g	3	Develop web content publishing application that accesses back-end data base and publishes data in XML format
4	PC604CS	Computer Networks & Programming	1	Explain the function of each layer of OSI and trace the flow of information from one node to another node in the network
			2	Understand the principles of IP addressing and internet routing
			3	Describe the working of various networked applications such as DNS, mail, file transfer and www
			4	Implement client-server socket-based networked applications.
5	(PE-II) PE 601 CS	Graph Theory & its Applications	1	To Understand The Basic Foundations Of Graphs and Trees.
			2	To Validate the Logic Of Tracing a Path and Justifying the same using Algorithm.
			3	Apply The Concept Of Perfect Matching and Covering Using Greedy Approaches.
			4	To Apply the Logic for Coloring Graphs and its Validation using Algorithms.
			5	To Develop Algorithms based on Diverse Application of Graph in Different Domains.
5	(PE-II) PE 602 CS	Advanced DataBases	1	Describe the features added to object-relational systems to distinguish them from standard relational systems.
			2	Model a relational / semi-structured database using XML Schema
			3	Understand different algorithms used in the implementation of query evaluation engine
			4	Understand the different concurrency control and commit protocols in distributed databases
			5	Demonstrate and understanding of the role and concepts involved in databases such as Temporal, Spatial, Mobile and other similar database types
6	OE	Disater Management	1	The students will be able to understand impact on Natural and manmade disasters.
			2	Able to classify disasters and destructions due to cyclones
			3	Able to understand disaster management applied in India
7	PC651CS	Software Engineering Lab	1	Use open source case tools to develop software
			2	Analyze and design software requirements in efficient manner.
			3	Implement the design , debug and test the code
8	PC652CS	Web Programming Lab	1	Design a Web site using HTML/DHTML and style sheets
			2	Create dynamic web pages using server side scripting
			3	Develop a web application with backend database connectivity
9	PC653CS	Computer Networks & Programming Lab	1	Write concurrent programs using message queues and semaphores
			2	Use connection-oriented , connectionless and Asynchronous sockets
			3	Implement networked applications in TCP/IP protocol Suite
10	MC 953 SP	Mandatory Course	1	Students' sports activities are an essential aspect of university education, one of the most efficient means to develop one's character and personal qualities, promote the fair game principles, and form an active life position.
			2	Over the past year, sports have become much more popular among our students. Let us remember the most memorable events related to sports and physical training.
			3	Special attention was paid to team sports. Our male and female games and sports have achieved remarkable progress at a number of competitions.
			4	Our teams in the main sports took part in regional and national competitions. Special thanks to our team in track and field athletics, which has been revitalized this year at ICT and which has won Javelin competition.

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			5	Staff of our faculties and students of Sports, Physical Development, & Healthy Lifestyle of Faculty congratulates everyone on the upcoming New Year and wishes you robust health and new victories in whatever you conceive.
11	SI671CS	Summer Internship	1	Able to design/develop a small and simple product in hardware or software.
			2	Able to complete the task or realize a prespecified target, with limited scope, rather than taking up a complex task and leave it.
			3	Able to learn to find alternate viable solutions for a given problem and evaluate these alternatives with reference to prespecified criteria.
			4	Able to implement the selected solution and document the same.
B.E VII- Semester				
1	PC701CS	Compiler Constructio n	1	Create lexical rules and grammars for a given language
			2	Generate scanners and parsers from declarative specifications.
			3	Describe an abstract syntax tree for a small language.
			4	Use program analysis techniques for code optimization
			5	Develop the compiler for a subset of a given language
2	PC702CS	Distributed Systems	1	Describe the problems and challenges associated with distributed systems.
			2	Implement small scale distributed systems.
			3	Understand design trade-off sinlarge-scale distributed systems
3	PC703CS	Information Security	1	Describe the steps in Security Systems development lifecycle(SeeSDLC)
			2	Understand the common threats and attack to information systems
			3	Understand the legal and ethical issues of information technology
			4	Identify security needs using risk management and choose the appropriate risk control strategy basedonbusinessneeds
			5	Use the basic knowledge of security frame works in preparing security blueprint for the organization
			6	Usage of reactive solutions, network perimeter solution tools such as firewalls, host solutions such as antivirus software and Intrusion Detection techniques and knowledge of ethical hackingtools
			7	Useethicalhackingtoolstostudyattackpatternsandcryptographyandsecurecommunicationprotocols
			8	Understand the technical and non-technical aspects ofsecurity project implementation and accreditation
4	PC704CS	Data Mining		
			1	Organize and Prepare the data needed fordatamining using prepreprocessing techniques
			2	Implement the appropriate data mining methods like classification, clustering or FrequentPatternmining on agivendataset
			3	Define and apply metrics to measure the performanceof various data mining algorithms
			4	
5.1	OE 771 CE	(OE-II) Green Building Technologie	1	Define a green building, along with its features, benefits and rating systems.
			2	Describe the criteria used for site selection and water efficiency methods.
			3	Explain the energy efficiency terms and methods used in green building practices.
			4	Select materials for sustainable built environment & adopt waste management methods
			5	Describe the methods used to maintain indoor environmental quality.
		(OE-II)	1	Understand Indian Industrial Environment, Entrepreneurship and Economic growth, Small and Large Scale Industries, Types and forms of enterprises.
			2	Identify the characteristics of entrepreneurs, Emergence of first generation entrepreneurs, Conception and evaluation of ideas and their sources.

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5.2	OE 775 ME	(OE-II) Entrepreneurship	3	Practice the principles of project formulation, Analysis of market demand, Financial and profitability analysis and Technical analysis.
			4	Apply the concepts of Project Management during construction phase, project organization, project planning and control using CPM, PERT techniques
			5	Understand the Behavioural aspects of entrepreneurs, Time Management, Various approaches of time management, their strengths and weakness. The urgency addiction and time management matrix.
6.1	OE 781 CE	(OE-III) Road Safety Engineering	1	Prepare accident investigation reports and database
			2	Apply design principles for roadway geometrics improvement with various types of traffic safety appurtenances/tools
			3	Manage traffic including incident management
7	PC751CS	Compiler Constructio	1	To Generate scanner and parser from formal specification
			2	To design a compilerforasubset of any High level language
8	PC752CS	Distributed Systems Lab	1	Write programs that communicate data between twohosts
			2	ConfigureNFS
			3	Use distributed data processing frameworks and mobile applicationtoolkits
9	PC753CS	Data Mining Lab	1	Organize and Prepare the data needed for datamining usingprepreprocessingtechniques
			2	Implement the appropriate data mining methods like classification, clustering or Frequent Patternminingonagiven dataset
			3	Defineandapplymetricstomensuretheperformanceofvariousdatamininingalgorithms
10	PW761CS	Project Work-I	1	Demonstrate the ability to synthesize and apply the knowledge and skills acquired in the academicprogramto thereal-worldproblems.
			2	Evaluatedifferentsolutionsbasedoneconomicandtechnicalfeasibility
			3	Effectivelyplanaprojectandconfidentlyperformallaspectsofprojectmanagement
			4	Demonstrateeffectivewrittenandoralcommunicationskills
11	SI762CS	Summer Internship	1	Get Practical experience of software design and development and coding practices within Industrial/R&D Environments.
			2	Gain working practices with in Industrial/R&D Environments.
			3	Prepare reports and other relevant documentation
B.E VIII- Semester				
1	PE-III PE823CS	Software Quality andTesting	1	Describe the role of quality assurance activities in the software process
			2	Compare several process improvement models such as CMM,CMMI,PCMM, and ISO9000
			3	Describe several process metrics for assessing and controlling a project
			4	Describe how available static and dynamic test tools can be integrated into the software development environment
2	PE-IV PE832CS	Information RetrievalSystems	1	Understand the algorithms and techniques for information retrieval (documentindexingandretrieval,query processing)
			2	Quantitatively evaluate information retrieval systems
			3	Classify and cluster documents
			4	Understand the practical aspects of information retrieval such as those in web search engines
3	PE-IV PE833CS	MachineLearning	1	Explain thes trengths and weaknesses of many popula rmachine learning approaches
			2	Recognize and implement various ways of selecting suitable model parameters for different machine learning techniques
			3	Design and implement various machine learning algorithms in a range of real-world applications
4	PE-V PE842CS	CloudComputing	1	Understand the architecture and concept of different cloud models:IaaS,PaaS,SaaS
			2	Create virtual machine images and deploy them on cloud

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	PE842CS	uting	3	Identify security and compliance issues in clouds
3	PE-V PE843CS	Human Computer Interaction	1	Describe different types of interactive environments and interactionstyles
			2	Understand the user interface design process and the need for user-centred design
			3	Describe techniques for developing prototypes of user interfaces and evaluation of user interfaces
			4	Create an appropriate usability test plan
			5	Understand the human and technical issues involved in the usage of text,icons and colours in userinterfaces
4	PW961CS	Project Work-II	1	Demonstrate the ability to synthesize and apply the knowledge and skills acquired in the academieprogramto thereal-worldproblems.
			2	Evaluate differen tsolutions based on economic and technical feasibility
			3	Effectively plan a project and confidently perform all aspects of project management
			4	Demonstrate effective written and oral communication skills

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List of Course Outcomes for all the Courses of ECE 2020-2021

S. No	Course Code	Subject	CO code	CO
SEMESTER I				
1	MC111PO	Indian Constitution	1	Know the background of the present constitution of India.
			2	Understand the working of the union, state and local levels.
			3	Gain consciousness on the fundamental rights and duties.
			4	Be able to understand the functioning and distribution of financial resources between the centre and states.
			5	Be exposed to the reality of hierarchical Indian social structure and the ways the grievances of the deprived sections can be addressed to raise human dignity in a democratic way.
2	BS102MT	Mathematics - I	1	Find the nature of sequences and series
			2	Evaluate multiple integrals
			3	Apply this knowledge to solve the curriculum problems
3	BS104PH	Physics	1	Distinguish materials based on band theory of solids
			2	Classify semiconductors on the basis doping and to estimate conductivity and learn transport phenomenon in semiconductors
			3	Appreciate use of optical absorption by semiconductors.
4	ES106EE	Basic Electrical Engineering	1	To analyze Electrical circuits to compute and measure the parameters of Electrical Energy.
			2	To comprehend the working principles of Electrical DC Machines.
			3	To Identify and test various Electrical switchgear, single phase transformers and assess the ratings needed in given application.
			4	To comprehend the working principles of electrical AC machines.
PRACTICALS				
5	BS152PH	Physics Lab	1	Conduct experiments, take measurements independently.
			2	Write appropriate laboratory reports.
			3	Compute and compare the experimental results and draw relevant conclusions.
			4	Use the graphical representation of data and estimate results from graphs
6	ES154EE	Basic Electrical Engineering Lab	1	Get an exposure to common electrical components and their ratings.
			2	Analyze the performance of DC and AC Machines.
			3	Comprehend the usage of common electrical measuring instruments.
			4	Test the basic characteristics of transformers and electrical machines.
7	ES156CE	Engineering Graphics & Design	1	Introduction to engineering design and its place in society
			2	Exposure to the visual aspects of engineering design
			3	Exposure to engineering graphics standards
			4	Exposure to solid modeling
			5	Exposure to computer-aided geometric design
			6	Exposure to creating working drawings

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			7	Exposure to engineering communication
SEMESTER II				
8	MC112CE	Environmental Science	1	Adopt environmental ethics to attain sustainable development.
			2	Develop an attitude of concern for the environment.
			3	Conservation of natural resources and biological diversity.
			4	Creating awareness of Green technologies for nation's security.
			5	Imparts awareness for environmental laws and regulations.
9	MC113PY	Essence of Indian Traditional Knowledge	1	Understand philosophy of Indian culture.
			2	Distinguish the Indian languages and literature.
			3	Learn the philosophy of ancient, medieval and modern India.
			4	Acquire the information about the fine arts in India.
			5	Know the contribution of scientists of different eras.
10	HS101EG	English	1	Read, understand, and interpret a variety of written texts
			2	Use appropriate vocabulary and correct grammar
			3	Undertake guided and extended writing with confidence.
11	BS103MT	Mathematics – II	1	Solve system of linear equations and eigen value problems
			2	Solve certain first order and higher order differential equations
			3	Solve basic problems of Beta Gamma and Legender's Function.
			4	Apply Laplace Transforms; solve ordinary Differential Equations by using it.
12	BS105CH	Chemistry	1	Apply concept of electrode potential in identifying feasibility of electrochemical reaction; illustrate electro analytical techniques and working of batteries.
			2	Identify the mechanism of corrosion of materials on basis of electrochemical approach and devise corrosion control methods.
			3	Estimate the physical & chemical parameters of quality of water and explain the process of water treatment.
			4	Explain the influence of chemical structure on properties of materials and their choice in engineering applications.
			5	Classify chemical fuels and grade them through qualitative analysis.
			6	Relate the concept of green chemistry to modify engineering processes and materials.
13	ES107CS	Programming for Problem Solving	1	Formulate simple algorithms for arithmetic and logical problems.
			2	Translate the algorithms to programs (in c language).
			3	Test and execute the programs and correct syntax and logical errors.
			4	Implement conditional branching, iteration and recursion.
			5	Decompose a problem into functions and synthesize a complete program using divide and conquer approach.
			6	Use arrays, pointers and structures to formulate algorithms and programs.

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			7	Apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
			8	Apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.
				PRACTICALS
14	HS151EG	English Lab	1	Listen, understand, and interpret formal and informal spoken language
			2	Speak English with acceptable pronunciation, stress, and intonation
			3	Present themselves with confidence in formal situations
			4	Participate in individual and group activities with relative ease
15	BS 153 CH	Chemistry Lab	1	Apply the principles of Colourimetry and Electrochemistry in quantitative estimations.
			2	Estimate the rate constants of reactions from concentration of reactants/ products as a function of time.
			3	Synthesize small drug molecules.
16	ES 155 CS	Programming for Problem Solving Lab	1	Choose appropriate data type for implementing programs in C language.
			2	Design and implement modular programs involving input output operations, decision making and looping constructs.
			3	Implement search and sort operations on arrays.
			4	Apply the concept of pointers for implementing programs on dynamic memory management and string handling.
			5	Design and implement programs to store data in structures and files.
17	ES 157 ME	Workshop/ Manufacturing Process	1	Demonstrate an understanding of and comply with workshop safety regulations.
			2	Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
			3	Study and practice on machine tools and their operations
			4	Undertake jobs connected with Engineering Workshop trades including fitting, carpentry, sheet metal, house wiring, welding, smithy and foundry.
			5	Apply basic electrical engineering knowledge for house wiring practice
				SEMESTER III
18	MC111PO	Indian Constitution	1	Know the background of the present constitution of India
			2	Understand the working of the union, state and local levels.
			3	Gain consciousness on the fundamental rights and duties.
			4	Be able to understand the functioning and distribution of financial resources between the centre and states.
				Be exposed to the reality of hierarchical Indian social structure and the ways the grievances of the deprived sections can be addressed to raise human dignity in a democratic way.
19	HS201EG	Effective Technical Communication In English	1	Handle technical communication effectively
			2	Use different types of professional correspondence
			3	Use various techniques of report writing
			4	Acquire adequate skills of manual writing

		on in English	5	Enhance their skills of information transfer and presentations
20	HS202CM	Finance And Accounting	1	Evaluate the financial performance of the business unit.
			2	Take decisions on selection of projects.
			3	Take decisions on procurement of finances.
			4	Analyse the liquidity, solvency and profitability of the business unit.
			5	Evaluate the overall financial functioning of an enterprise.
21	BS205MT	Mathematics - III (PDE,Probabi	1	Solve field problems in engineering involving PDEs.
			2	They can also formulate and solve problems involving random variables and apply statistical methods for analysing experimental data.
22	ES212ME	Elements of Mechanical Engineering	1	State and differentiate various classifications of IC engines and reciprocating air compressors with specific focus on similarities and differences between (i) 2 stroke and 4 stroke engines and (ii) CI and SI engines. Subsequently, the student would be able to compute the performance parameters of the engines and gas turbines
			2	Compare various types of heat transfer, analyse the governing equations, understand the applications of heat exchangers and solve related problems
			3	Demonstrate the working principles of hydraulic turbines and pumps
			4	Classify different types of power transmission systems like gears, gear trains, belts, ropes etc. with emphasis on their kinematic mechanisms and solve related problems
			5	Understand various manufacturing processes like, welding, , machining, etc. and recognize their suitability for manufacturing of different industrial products
23	ES216EC	Digital Electronics	1	Understand the deign process of digital hardware, use Boolean algebra to minimize the logical expressions and optimize the implementation of logical functions
			2	Understand the number representation and design combinational circuits like adders, MUX etc
			3	Design Combinational circuits using PLDS and write VHDL code for basic gates and combinational circuits
			4	Analyse sequential circuits using flip-flops and design registers, counters.
			5	Represent a sequential circuit using Finite State machine and apply state minimization techniques to design a FSM
24	PC221EC	Electronics Devices	1	Interpret the characteristics and apply diode models to analyse various applications of diodes.
			2	Identify the merits and demerits of various filters, formulate and design rectifier circuits with filters Calculate ripple factor, efficiency and % regulation of rectifier circuits.
			3	Discriminate the BJT configurations to recognize appropriate transistor configuration for any given application and design the biasing circuits with good stability.
			4	Analyse, Compare and design of BJT amplifiers with various biasing circuits.
			5	Distinguish the working principles of BJT and FET also between FET & MOSFET
			1	Able to Express given Electrical Circuit in terms of A,B,C,D and Z,Y Parameter Model and Solve the circuits and how they are used in real time applications.

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25	PC222EC	Network Theory	2	Able to learn how to calculate properties of networks and design of attenuators.
			3	Able to design of equalizers.
			4	Able to design different types of filters using passive elements.
			5	Able to synthesize the RL & RC networks in Foster and Cauer Forms.
PRACTICALS				
28	PC251EC	Electronic Devices Lab	1	Understand characteristics of Diodes
			2	Plot the characteristics of BJT in different configurations.
			3	Record the parameters of BJT and FET amplifiers.
			4	Understand biasing techniques of BJT.
			5	Use the SPICE software for simulating electronic circuits.
29	PC252EC	Electronic Workshop	1	Use the basic electronic components and design circuits.
			2	Verify various parameters of the circuits by applying theorems.
			3	Understand the pin configuration of ICs and verify the operation of basic gates
			4	Design and verify the combinational and logic circuits.
SEMESTER IV				
30	MC112CE	Environmental Science	1	Adopt environmental ethics to attain sustainable development.
			2	Develop an attitude of concern for the environment.
			3	Conservation of natural resources and biological diversity.
			4	Creating awareness of Green technologies for nation's security.
			5	Imparts awareness for environmental laws and regulations.
31	MC113PY	Essence of Indian Traditional Knowledge	1	Understand philosophy of Indian culture.
			2	Distinguish the Indian languages and literature among difference traditions.
			3	Learn the philosophy of ancient, medieval and modern India.
			4	Acquire the information about the fine arts in India.
			5	Know the contribution of scientists of different eras.
			6	The essence of Yogic Science for Inclusiveness of society.
32	HS213MP	Industrial Psychology	1	Understanding of key concepts, theoretical perspectives, and trends in industrial psychology.
			2	Evaluate the problems thorough and systematic competency model.
			3	Analyse the problems present in environment and design a job analysis method.
			4	Create a better work environment for better performance.
			5	Design a performance appraisal process and form for the human behaviour.
33	BS206BZ	Biology For Engineers	1	Apply biological engineering principles, procedures needed to solve real-world problems.
			2	Understand the fundamentals of living things, their classification, cell structure and biochemical constituents.
			3	Apply the concept of plant, animal and microbial systems and growth in real life situations.
			4	Comprehend genetics and the immune system.
			5	Know the cause, symptoms, diagnosis and treatment of common diseases.
			6	Apply basic knowledge of the applications of biological systems in relevant industries.

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34	ES215EC	Signals and Systems	1	Define and differentiate types of signals and systems in continuous and discrete time
			2	Apply the properties of Fourier transform for continuous time signals
			3	Relate Laplace transforms to solve differential equations and to determine the response of the Continuous Time Linear Time Invariant Systems to known inputs
			4	Apply Z-transforms for discrete time signals to solve Difference equations
			5	Obtain Linear Convolution and Correlation of discrete time signals with graphical representation
35	PC231EC	Analog Electronic Circuits	1	Design and Analyse low frequency, mid frequency and high frequency response of small signal single stage and Multistage RC coupled and Transformer Amplifiers using BJT and FET.
			2	Identify the type of negative feedback, Analyse and design of negative feedback amplifiers.
			3	Design Audio Frequency and Radio Frequency oscillators
			4	Distinguish between the classes of Power Amplifiers and their design considerations
			5	Compare the performance of single and double tuned amplifiers
35	PC232EC	Electromagnetic Theory and Transmission lines	1	Understand the different coordinate systems, vector calculus, coulombs law and gauss law for finding electric fields due to different charges and to formulate the capacitance for different capacitors.
			2	Learn basic magneto-statics concepts and laws such as Biot-Savarts law and Amperes law, their application in finding magnetic field intensity, inductance and magnetic boundary conditions.
			3	Distinguish between the static and time-varying fields, establish the corresponding sets of Maxwell's Equations and Boundary Conditions, and use them for solving engineering problems.
			4	Determine the Transmission Line parameters to characterize the distortions and estimate the characteristics for different lines.
			5	Study the Smith Chart profile and stub matching features, and gain ability to practically use the same for solving practical problems
36	PC233EC	Pulse and Linear Integrated Circuits	1	Construct different linear networks and analyse their response to different input signals
			2	Understand, Analyse and design multi vibrators and sweep circuits using transistors.
			3	Distinguish different types of rectifying circuits and amplifier circuits and their performance parameters.
			4	Analyse DC and AC characteristics for Single/Dual input Balanced/Unbalanced output configurations using BJTs.
			5	Distinguish various linear and non-linear applications of Op-Amp. Analyse the operation of the most commonly used D/A and A/D converter types.
37	PC234EC	Computer Organisation and Architecture	1	Perform mathematical operations on fixed and floating point digital data.
			2	Illustrate the operation of a digital computer.
			3	Understand I/O interfacing of a computer.
			4	Interface microprocessor with memory devices.
			5	Understand latest trends in microprocessors.
PRACTICALS				
		Analog	1	Calculate gain and bandwidth of BJT, FET.
			2	Study multivibrator circuits.

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38	PC261EC	Electronic Circuits Lab	3	Study oscillator circuits.
			4	Demonstrate filter circuits.
			5	Demonstrate power amplifier and Op-Amp. Circuits
39	PC262EC	Pulse and Linear Integrated Circuits Lab	1	Design and analyse linear and non-linear wave shaping circuits.
			2	Design and analyse clipping and clamping circuits.
			3	Design and analyse multivibrator circuits.
			4	Design and analyse multivibrator circuits.
			5	Design and analyse Schmitt trigger circuit
SEMESTER V				
40	PC501EC	Linear ICs and Application	1	Illustrate various configurations of Op-amp.
			2	Illustrate the basic principles and practical limitations of Op-amp.
			3	Design Linear and Non-linear circuits using Op-amp
			4	Analyze Frequency generators active filters and voltage regulators.
			5	Design and analyze ADC & DAC converters.
41	PC502EC	Analog Communication	1	Understand analog communication system
			2	Compare and analyze analog modulation techniques
			3	Calculate noise performance of analog modulation techniques
			4	Design AM and FM receivers
			5	Differentiate between pulse modulation techniques & continuous modulation techniques.
42	PC503EC	Digital Signal Processing	1	Necessity and use of digital signal processing and its application.
			2	Analyze FIR and IIR digital filters.
			3	Applications of Multirate digital signal processing.
			4	Acquaintance of DSP processor and its architecture.
43	PC504EC	Automatic Control Systems	1	Convert a given control system into equivalent block diagram and transfer function
			2	Analyze system stability using time domain techniques
			3	Analyze system stability using frequency domain techniques
			4	Design a digital control system in the discrete time domain
			5	Analyze a control system in the state space representation.
44	PC505EC	Computer Organization & Architecture	1	Perform mathematical operations on fixed and floating point digital data
			2	Illustrate the operation of a digital computer
			3	Understand I/O interfacing of a computer
			4	Interface microprocessor with memory devices
			5	Understand latest trends in microprocessors
45	PC506EC	Digital System Design with Verilog HDL	1	Appreciate the constructs and conventions of the verilog HDL programming in gate,level and data flow modeling.
			2	· Generalize combinational circuits in behavioral modeling and concepts of switch level modeling
			3	Design and analyze digital systems and finite state machines.

		Verilog HDL	4	Comprehend advanced features of verilog HDL and apply them to design complex real time digital system using ASMs
			5	· Design various circuits for memory devices and annotate the ASIC/FPGA design flow
46	MC901EG	Gender Sensitization	1	Students will have developed a better understanding of important issues related to gender in contemporary India.
			2	Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film
			3	Students will attain a finer grasp of how gender discrimination works in our society and How to counter it.
			4	Students and professionals will be better equipped to work and live together as equals.
			5	Students will develop a sense of appreciation of women in all walks of life.
PRACTICALS				
47	PC551EC	IC Applications lab	1	Implement operational amplifiers Linear & Non-linear circuits.
			2	Implement Active filters using Op-amps.
			3	Implement oscillators, Multivibrators,etc., using Op-amps.
			4	Use PSPICE software for circuit design using Op-amp.
			5	Illustrate Op-amp for advanced application such as ADC, DAC, etc.
48	PC552EC	Systems and Signal Processing Lab	1	. Illustrate various signal processing algorithms.
			2	Analyze FIR Filter with specific magnitude and phase requirements.
			3	Analyze IIR Filter with specific magnitude and phase requirements.
			4	Illustrate the basics of Multirate signal processing.
			5	Analyze digital filters on DSP processors.
49	PC553EC	Industrial Visit		
SEMESTER VI				
50	PC601EC	Digital Communication	1	Classify the different types of digital modulation techniques PCM, DPCM, DM and ADM and compare their performance by SNR.
			2	Illustrate the classification of channels and Source coding methods.
			3	Distinguish different types of Error control codes along with their encoding/decoding algorithms.
			4	Examine the Performance of different Digital Carrier Modulation schemes of Coherent and Non-coherent type based on Probability of error.
			5	Generation of PN sequence using Spread Spectrum and characterize the Acquisition Schemes for Receivers to track the signals.
		Antennas and	1	. To Illustrate the basic principles of antennas and learn the antenna terminology.
			2	To design different types of wire antennas and make proficient in analytical skills for understanding practical antennas.

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51	PC602EC	Antennas and wave propagation	3	To design different types of antennas for various frequency ranges and get updated With latest developments in the practical antennas.
			4	To Apply the principles of antennas, to design antenna arrays and measure various parameters of antennas.
			5	To Identify and understand the suitable modes of Radio Wave propagation used in current practice
52	PC603EC	Microprocessor and Microcontroller	1	Explain the architecture of 8086 microprocessor and recognize different types of addressing modes.
			2	Write assembly language programming using 8086 microprocessor instruction set.
			3	Interface different peripherals to 8086 microprocessor.
			4	Explain the architecture of 8051 architecture and write Assembly/C language programming using 8051 microcontroller.
			5	Interface different peripherals to 8051 microcontroller.
53	HS604EC	Managerial Economics & Accountancy	1	Apply the fundamental concepts of managerial economics to evaluate business decisions.
			2	Understand types of Demand and factors related to it.
			3	Identify different types of markets and determine price –output under perfect competition.
			4	Determine working capital requirement and payback period.
			5	Analyze and interpret financial statements through ratios.
PE - I				
54	PE 671 EC	Digital Image Processing	1	processing area.
			2	edges and lines.
			3	Radar and Medical images.
			4	concept of image compression.
55	PC 672 EC	Data communication and computer networking	1	Understand the working of various network topologies and circuit and packet switching
			2	Comprehend the role of data link layers and significance of MAC protocols
			3	Understand the networking protocols and Internet protocols
			4	Understand the transport layer working with TCP, UDP and ATM protocols
			5	Comprehend the functionality of application layer and importance of network security.
OE- I				
56	OE 601CE	Disaster Management	1	Able to understand impact on Natural and manmade disasters.
			2	Able to classify disasters and destructions due to cyclones.
			3	Able to understand disaster management applied in India.
57	OE 602 CS	OOP using Java	1	Able to develop java applications using OO concepts and packages.
			2	Able to write multi threaded programs with synchronization.
			3	Able to implement real world applications using java collection frame work and I/O classes.
			4	Able to write Event driven GUI programs using AWT/Swing
PRACTICALS				
		Communicati	1	Understand and simulate modulation and demodulation of AM and FM.
			2	Construct pre-emphasis and de-emphasis at the transmitter and receiver respectively

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58	PC651EC	Communication Lab	3	Understand and simulate the PAM,PWM&PPM circuits
			4	Understand baseband transmission (i.e., PCM, DPCM, DM, ADM) generation and detection.
			5	Understand error detection and correction. Obtain modem characteristics.
59	PC652EC	Microprocessor and Microcontroller Lab	1	Apply different addressing modes & Model programs using 8086 Instruction set
			2	Exaine the usage of string instructions of 8086 for string manipulation, Comparison
			3	Develop interfacing applications using 8086 processor
			4	Design different programs using C cross compilers for 8051 controller
			5	Develop interfacing applications using 8051 controller
SEMESTER VII				
60	PC701EC	Embedded System	1	Understand the fundamentals of the embedded system design
			2	Enumerate the instruction set of ARM Processor by studying the architecture of ARM core
			3	Acquire knowledge on the serial, parallel and network communication protocols.
			4	Learn the embedded system design life cycle and co-design issues
61	PC 702 EC	VLSI Design	1	Analyse modes of operation of MOS transistor and its basic electrical properties
			2	Draw stick diagrams and layouts for any MOS transistors and calculate the parasitic R&C
			3	Analyse the operation of various arithmetic circuits.
			4	Design sequential logic circuits using CMOS transistors
			5	Understand the small signal model and characteristics of CMOS amplifiers
62	PC 703 EC	Microwave Techniques	1	Analyse the propagation of Guided waves in different modes between parallel planes
			2	Evaluate different parameters (Like impedance, attenuation and quality factor.) for Rectangular & Circular Waveguides &Cavity Resonators
			3	Determine Scattering parameters of different microwave components and analyse their properties
			4	Integrate the concept of bunching and velocity modulation to summarize the operation of microwave tubes and the high frequency limitations of conventional tubes
			5	Analyse the principle, operation and characteristics of different microwave solid state devices
63	MC 771 EG	Human Values and Professional Ethics	1	It ensures students sustained happiness through identifying the essentials of human values and skills
			2	It facilitates a correct understanding between profession and happiness
			3	It helps students understand practically the importance of trust, mutually satisfying human behavior and enriching interaction with nature.
			4	Ability to develop appropriate technologies and management patterns to create harmony in professional and personal life.
64	HS 707 ME	Industrial Administration and	1	1. Understand the different phases of product life cycle, types of manufacturing systems, plant layout optimization problems and role of scheduling function in better utilization of resources
			2	2. Understand the Fundamental concepts of quality control, process control, material control and appreciate the importance of MRP-I and MRP –II.

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		Financial Management	3	3. Know the different terminology used in financial management and understand the different techniques of capital budgeting and various types of costs involved in running an industrial organization.
				Professional Elective-II
65	PE723EC	Electronic Measurements and Instrumentati	1	Describe characteristic of an instrument and state different Standards of measurements
			2	Identify and explain different types of Transducers.
			3	Draw and Interpret types of transducers.
			4	Design and analyse the digital voltmeters and Prioritize the instruments.
66	PE721EC	Mobile and Cellular Communications	1	Understand the method of selection and reuse of a set of frequency channels, Base station requirement, signals required for communication and hand over between Base stations
			2	Appreciate and understand the methods of electromagnetic wave propagation in cellular communication. The evaluation of the electromagnetic energy reaching the mobile unit.
			3	Identify different a methods of mobile access technologies and which of them suitable for mobile cellular solutions. Understand process used for Bluetooth, ZigBee like low power devices
			4	Explain features, authentication, operational details of GSM and CDMA mobile cellular systems along with data frame structure details
			5	The development and limitation of the preliminary and advanced generation of mobile systems. Present trends in Cellular communications and the future communication requirements
				Open Elective-II
67	OE 772 CS	Data Science Using R Programming	1	Use various data structures and packages in R for data visualization and summarization
			2	Use linear, non-linear regression models, and classification techniques for data analysis
			3	Use clustering methods including K-means and CURE algorithm
68	OE 775 ME	Entrepreneurship	1	Understand Indian Industrial Environment, Entrepreneurship and Economic growth, Small and Large Scale Industries, Types and forms of enterprises.
			2	their sources
			3	analysis.
			4	CPM, PERT techniques
			5	and weakness. The urgency addiction and time management matrix.
				Open Elective-III
69	OE 781 CE	Road Safety Engineering	1	Prepare accident investigation reports and database
			2	Apply design principles for roadway geometrics improvement with various types of traffic safety appurtenances/tools
			3	Manage traffic including incident management
70	OE 782 CS	Software Engineering	1	Acquire knowledge about different software development processes and their usability in different problem domains.
			2	Understand the process of requirements collection, analysing, and modelling requirements for effective understanding and communication with stakeholders.
			3	Design and develop the architecture of real world problems towards developing a blueprint for implementation.
			4	Use the UML language to design various models during software development life cycle
			5	Understand the concepts of software quality, testing and maintenance
				PRACTICALS

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71	PC751EC	Microwave Lab	1	Analyse frequency, Wave length, SWR and Impedance for Reflex Klystron Oscillator by using its equation
			2	Evaluate of mode characteristics of Reflex klystron and V-I Characteristics of Gunn diode.
			3	Analyse of the characteristics of Circulator, Isolator, Directional Coupler, Tees like (Magic tee, E & H plane tees) using the Scattering parameters.
			4	Generate the Radiation pattern of different antennas like Yagi-Uda and Horn Antenna and measure the gain of the antennas.
			5	Familiarize with the EM simulation software
72	PC752EC	Electronic Design & Automation Lab	1	Familiarize with the usage of IDE tools and program using various on chip like LCD, Temperature sensor, Buzzer, Stepper Motor by interfacing them to ARM Processor
			2	Design the digital logic circuits in various modelling styles using Verilog HDL
			3	Familiarize with VLSI CAD tools like Mentor Graphics / Cadence
			4	Implement basic gates at transistor level
			5	Implement the digital circuits at transistor level.
73	PW 761 EC	Project Work - I	1	Demonstrate the ability to synthesize and apply the knowledge and skills acquired in the academic program to the real-world problems.
			2	Evaluate different solutions based on economic and technical feasibility
			3	Effectively plan a project and confidently perform all aspects of project management
			4	Demonstrate effective written and oral communication skills
74	SI 762 EC	Summer Internship	1	Get Practical experience of software design and development, and coding practices within Industrial/R&D Environments..
			2	Gain working practices within Industrial/R&D Environments
			3	Prepare reports and other relevant documentation.
SEMESTER VIII				
PE - III				
75	PE 833 EC	Neural Networks	1	To differentiate between Biological Neuron & Artificial Neuron and different Neuron Models
			2	To analyse activation & synaptic dynamics of Neural Networks
			3	To summarize the Pattern Recognition Tasks & different Neural Network memories
			4	To solve Perceptron XoR problem & write different training algorithms for Feed Forward Neural Networks
			5	To understand & train different Feedback Neural Networks and their applications
PE - IV				
76	PE 842 EC	Global Navigational Satellite Systems	1	Familiarize with the GNSS fundamentals and GPS architecture.
			2	Describe the different types of GNSS Signals and GNSS Datum.
			3	Analyse the GPS errors and their modelling techniques.
			4	Understanding various GPS data processing and GPS integration techniques
			5	Conceptualize the augmentation systems and regional navigation satellite systems
PE-V				
			1	To distinguish crisp sets & Fuzzy sets and perform operations on Fuzzy sets

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77	PE 854 EC	Fuzzy Logic and Applications	2	Define Fuzzy relations & apply operations on different Fuzzy relations
			3	To convert crisp sets to Fuzzy sets using different Fuzzification methods
			4	To convert Fuzzy sets to Crisp sets using different Defuzzification methods
			5	To understand Fuzzy Associative Memories & FAM system Architecture
PRACTICALS				
78	PW 961 EC	Project Work - II	1	Demonstrate the ability to synthesize and apply the knowledge and skills acquired in the academic program to the real-world problems.
			2	Evaluate different solutions based on economic and technical feasibility
			3	Effectively plan a project and confidently perform all aspects of project management
			4	Demonstrate effective written and oral communication skills

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List of Course Outcomes for all the Courses of EEE 2020-2021				
S.No	Course Code	Subject	CO code	CO
SEMESTER I				
1	MC112CE	Environmental Sciences	1	State the efficient use of natural resources.
			2	Knowledge on the role of ecology as the basis of environmental science
			3	State the importance of bio-diversity & means to conserve it.
			4	Assess the environmental risks associated to various pollutions and understand the environmental laws & policies.
			5	Discuss the current environmental issues & relate the disasters & its management techniques.
2	MC113PY	Essence of Indian Traditional Knowledge	1	Understand philosophy of Indian culture.
			2	Distinguish the Indian languages and literature.
			3	Learn the philosophy of ancient, medieval and modern India.
			4	Acquire the information about the fine arts in India.
			5	Know the contribution of scientists of different eras
3	BS102MT	Mathematics -I	1	Find the nature of sequences and series
			2	Evaluate multiple integrals
			3	Apply this knowledge to solve the curriculum problems
4	BS105CH	Chemistry	1	Apply concept of electrode potential in identifying feasibility of electrochemical reaction; illustrate electro analytical techniques and working of batteries
			2	Identify the mechanism of corrosion of materials on basis of electrochemical approach and devise corrosion control methods.
			3	Estimate the physical & chemical parameters of quality of water and explain the process of water treatment
			4	Explain the influence of chemical structure on properties of materials and their choice in engineering applications.
			5	Classify chemical fuels and grade them through qualitative analysis
			6	Relate the concept of green chemistry to modify engineering processes and materials
5	ES107CS	Programming for Problem Solving	1	Formulate simple algorithms for arithmetic and logical problems.
			2	Translate the algorithms to programs (in c language).
			3	Test and execute the programs and correct syntax and logical errors
			4	Implement conditional branching, iteration and recursion
			5	Decompose a problem into functions and synthesize a complete program using divide and conquer approach
			6	Use arrays, pointers and structures to formulate algorithms and programs
			7	Apply programming to solve matrix addition and multiplication problems and searching and sorting problems
			8	Apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.
PRACTICALS				

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6	BS153CH	Chemistry Lab	1	Apply the principles of Colourimetry and Electrochemistry in quantitative estimations.
			2	Estimate the rate constants of reactions from concentration of reactants/ products as a function of time.
			3	Synthesize small drug molecules.
7	ES115CS	Programming for Problem Solving Lab	1	Choose appropriate data type for implementing programs in C language
			2	Design and implement modular programs involving input output operations, decision making and looping constructs.
			3	Implement search and sort operations on arrays
			4	Apply the concept of pointers for implementing programs on dynamic memory management and string handling.
			5	Design and implement programs to store data in structures and files.
8	ES157ME	Workshop	1	Demonstrate an understanding of and comply with workshop safety regulations.
			2	Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiselling.
			3	Study and practice on machine tools and their operations
			4	Undertake jobs connected with Engineering Workshop trades including fitting, carpentry, sheet metal, house wiring, welding, smithy and foundry
			5	Apply basic electrical engineering knowledge for house wiring practice
SEMESTER II				
9	MC111PO	Indian Constitution	1	Know the background of the present constitution of India.
			2	Understand the working of the union, state and local levels.
			3	Gain consciousness on the fundamental rights and duties.
			4	Be able to understand the functioning and distribution of financial resources between the centre and states.
			5	Be exposed to the reality of hierarchical Indian social structure and the ways the grievances of the deprived sections can be addressed to raise human dignity in a democratic way
10	HS101EG	English	1	Read, understand, and interpret a variety of written texts
			2	Use appropriate vocabulary and correct grammar
			3	Undertake guided and extended writing with confidence.
11	BS103MT	Mathematics II	1	Solve system of linear equations and eigen value problems
			2	Solve certain first order and higher order differential equations
			3	Solve basic problems of Beta Gamma and Legender's Function
			4	Apply Laplace Transforms; solve ordinary Differential Equations by using it.
12	BS104PH	Physics	1	Distinguish materials based on band theory of solids
			2	Classify semiconductors on the basis doping and to estimate conductivity and learn transport phenomenon in semiconductors
			3	Appreciate use of optical absorption by semiconductors.
13	ES106EE	Basic Electrical Engineering	1	To analyse Electrical circuits to compute and measure the parameters of Electrical Energy
			2	To comprehend the working principles of Electrical DC Machines.
			3	To Identify and test various Electrical switchgear, single phase transformers and assess the ratings needed in given application

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			4	To comprehend the working principles of electrical AC machines
PRACTICALS				
14	HS151EG	English Lab	1	Listen, understand, and interpret formal and informal spoken language
			2	Speak English with acceptable pronunciation, stress, and intonation
			3	Present themselves with confidence in formal situations
			4	Participate in individual and group activities with relative ease
15	BS152PH	Physics Lab	1	Conduct experiments, take measurements independently.
			2	Write appropriate laboratory reports
			3	Compute and compare the experimental results and draw relevant conclusions.
			4	Use the graphical representation of data and estimate results from graphs
16	ES154EE	Basic Electrical Engineering Lab	1	Get an exposure to common electrical components and their ratings
			2	Analyse the performance of DC and AC Machines
			3	Comprehend the usage of common electrical measuring instruments
			4	Test the basic characteristics of transformers and electrical machines
17	ES156CE	Engineering Graphics and Design Lab	1	Draw various geometric shapes and scales using AutoCAD
			2	Draw the projections of points, lines, planes and solids using AutoCAD
			3	Draw the sections of solids using AutoCAD
			4	Draw the development of surfaces using AutoCAD
			5	Draw the isometric projections of the solid using AutoCAD
			6	Draw the orthographic projections of the three dimensional (3-D) objects using AutoCAD
SEMESTER III				
18	MC112CE	Environmental Sciences	1	Knowledge on the role of ecology as the basis of environmental science
			2	State the importance of bio-diversity & means to conserve it.
			3	Assess the environmental risks associated to various pollutions and understand the environmental laws & policies.
			4	Discuss the current environmental issues & relate the disasters & its management techniques.
			5	Understand philosophy of Indian culture.
19	MC113PY	Essence of Indian Traditional Knowledge	1	Distinguish the Indian languages and literature.
			2	Learn the philosophy of ancient, medieval and modern India.
			3	Acquire the information about the fine arts in India.
			4	Know the contribution of scientists of different eras
			5	Understand the relevance of civil engineering in the society & describe the uses of various construction materials
20	MC204CE	Overview of Civil Engineering	1	Explain the new technology/concepts of architecture in planning
			2	Remember the basics of surveying, transportation and geotechnical systems
			3	Remember the basics of environmental, water resources and structural engineering systems
			4	Remember the various software used in the field of civil engineering
			5	Understanding of key concepts, theoretical perspectives, and trends in industrial psychology.
			1	Evaluate the problems thorough and systematic competency model.

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21	HS203MP	Industrial Psychology	2	Analyse the problems present in environment and design a job analysis method.
			3	Create a better work environment for better performance.
			4	Design a performance appraisal process and form for the human behavior.
			5	Apply biological engineering principles, procedures needed to solve real-world problems
22	BS206BZ	Biology for Engineers	1	Understand the fundamentals of living things, their classification, cell structure and biochemical constituents
			2	Apply the concept of plant, animal and microbial systems and growth in real life situations
			3	Comprehend genetics and the immune system.
			4	Know the cause, symptoms, diagnosis and treatment of common diseases
			5	Apply basic knowledge of the applications of biological systems in relevant industries
			6	Analyze the effect of a system of forces on a body.
23	ES211CE	Engineering Mechanics	1	Analyze the static equilibrium of bodies in 2D and 3D and the effect of friction and its governing laws on bodies in equilibrium.
			2	Determine the Centroid, Center of gravity, Moment of Inertia and Mass moment of inertia of different plane and solid bodies.
			3	Apply the laws of motion to study the kinematic parameters of a moving rigid body.
			4	Solve the problems involving translation and rotation of rigid bodies by applying principles of kinetics, work-energy and impulse momentum.
			5	Analyze and solve impact problems using principles of impulse momentum.
			6	Understand the basics of various sources of energy
24	ES213ME	Energy Science and Engineering	1	Analyse the present status of conventional energy sources.
			2	Understand the working principles of Renewable Energy systems
			3	Design and develop waste heat recovery systems
			4	Relate energy economics, standards and future challenges
			5	
25	PC221EE	Electrical Circuit Analysis	1	Obtain steady-state response of electrical circuits.
			2	Apply network theorems for the analysis of electrical circuits.
			3	Analyse solution of first and second order RL, RC and RLC networks.
			4	Apply Laplace transforms for electrical circuits
			5	Analyse the behavior of two port networks
26	PC222EE	Electromagnetic Fields	1	To understand the basic laws of electromagnetism.
			2	To obtain the electric and magnetic fields for simple configurations under static conditions.
			3	To analyse time varying electric and magnetic fields.
			4	To understand Maxwell's equation in different forms and different media.
			5	To understand the propagation of EM waves
27	PC223EC	Analog	1	Interpret the characteristics and apply diode models to analyse various applications of diodes
			2	Discriminate the BJT configurations to recognize appropriate transistor configuration for any given application and design the biasing circuits with good stability

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		Electronics	3	Analyse and compare feedback amplifiers
			4	Distinguish various classes of Power Amplifiers.
			5	Analyse the operation of OPAMP and its applications
PRACTICALS				
28	PC252EE	Computer Aided Electrical Drawing Lab	1	Identify and draw different components of electrical systems
			2	Draw different control and wiring diagrams
			3	Draw winding diagrams of electrical machines
			4	Draw different starter diagrams of A.C and D.C machine
			5	Acquire knowledge on various Electrical Engineering Softwares
29	PC253EC	Analog Electronics Lab	1	Interpret the characteristics and apply diode models to analyse various applications of diodes
			2	Discriminate the BJT configurations to recognize appropriate transistor configuration for any given application and design the biasing circuits with good stability
			3	Analyse and compare feedback amplifiers
			4	Distinguish various classes of Power Amplifiers.
			5	Analyse the operation of OPAMP and its applications
SEMESTER IV				
30	MC111PO	Indian Constitution	1	Know the background of the present constitution of India.
			2	Understand the working of the union, state and local levels.
			3	Gain consciousness on the fundamental rights and duties.
			4	Be able to understand the functioning and distribution of financial resources between the centre and states.
			5	Be exposed to the reality of hierarchical Indian social structure and the ways the grievances of the deprived sections can be addressed to raise human dignity in a democratic way
31	HS201EG	Effective Technical Communication in English	1	Handle technical communication effectively
			2	Use different types of professional correspondence
			3	Use various techniques of report writing
			4	Acquire adequate skills of manual writing
			5	Enhance their skills of information transfer and presentations
32	HS202CM	Finance and Accounting	1	Evaluate the financial performance of the business unit
			2	Take decisions on selection of projects
			3	Take decisions on procurement of finances
			4	. Analyse the liquidity, solvency and profitability of the business unit
			5	Evaluate the overall financial functioning of an enterprise
33	BS205MT	Mathematics - III (PDE, Probability	1	Solve field problems in engineering involving PDEs.
			2	Formulate and solve problems involving random variables and apply statistical methods for analysing experimental data.

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38	PC262EE	Electronics and Logic Design Lab	3	3. Understand the process of Analog to Digital conversion and Digital to Analog conversion.
			4	4. Use PLCs to implement the given logical problem.
			5	5. Analysis of synchronous and asynchronous counters
				SEMESTER V
39	EE301	Power Systems -II	1	Assess the modeling & performance of transmission line, power flow problems & its solution in transmission line using circle diagram, the effect of CORONA on Transmission Line
			2	Analyze the need of voltage control, and its control from load end with and without FACTS Devices
			3	Calculate the Short circuit MVA & Short circuit current using PU Quantities
			4	Identify the different types of faults and their calculation using & Symmetrical component theory
			5	Define the concept of Reflection & Refraction of travelling wave in transmission line and the effect of variation of load on voltage and current wave
40	EE302	Electrical Machinery - II	1	Perform various tests & carry out maintenance on 1Φ transformers & illustrate the phenomena of load sharing
			2	Connect the different configuration of 3 Φ transformers using single phase transformers & analyze the operation of auto transformer in different modes.
			3	Analyze the steady state performance of 3 Φ Induction motor using equivalent circuit & determine the various performance indices & characteristics
			4	Demonstrate the knowledge of Induction motor starters , speed control methods & its operation on generating mode
			5	Outline the effects of unbalanced voltage on the operation of 3 Φ transformers & Induction motors
41	PC503EE	Electrical Measurements and Instrumentation	1	Explain the basic principles of measurement and various instruments for measurement, calculation of voltage, current and power.
			2	Discuss about magnetic measurements to find flux, B-H curve and Iron losses
			3	Explain the instrument ,for measurement and calculation of energy, frequency and power
			4	**Explain the bridges for measurement and calculation of passive elements and Frequency**
			5	Discuss Potentiometers ,Instrument Transformers and calculate their parameters
42	EE306	Linear Control Systems	1	Demonstrate an understanding of fundamentals of (feed back) control systems & obtain mathematical model of linear time invariant (LTI) system
			2	Analyze time domain response of first order & second order system & use root locus technique to analyze the stability of control system.
			3	Analyze the stability of linear time invariant (LTI) system using frequency domain approach.
			4	Represent & analyze a linear time invariant (LTI) system using state space technique
			5	Describe a discrete control system & analyze the stability of digital control system
43	PC505EE	Digital Signal Processing and	1	**Classify and analyze discrete signals and systems and review of Z transform**
			2	**Analyze different frequency response analysis methods for discrete time systems**
			3	**Design IIR filters and discuss realization of filters.**
			4	**Design FIR filters**
			5	**Describe and apply architectures of Digital signal processors**

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44	MC901EG	Gender Sensitization	1	Students will have developed a better understanding of important issues related to gender in contemporary India.
			2	Ø Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
			3	Ø Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
			4	Ø Students and professionals will be better equipped to work and live together as equals. Students will develop a sense of appreciation of women in all walks of life
PE -I				
45	PE501EE	Programmable Logic controllers	1	Ø Develop PLC programs for industrial applications
			2	Ø Acquire the knowledge of PLC counter functions and PLC Arithmetic functions and data handling functions.
46	PE502EE	Electronic Instrumenta	1	Understand various electrical transducers and instrumentation
			2	Ø Understand in detail about digital instruments and recorders
47	PE503EE	FACTS Devices	1	Apply impedance, phase angle and voltage control for real and reactive power flow in ac transmission systems
			2	Ø Analyze and select a suitable FACTS controller for a given power flow condition
PRACTICALS				
48	PC551EE	Electrical Machines Lab-1	1	Estimate the efficiency and voltage regulation of D.C. generator and transformers under various loading conditions.
			2	Ø Acquire the knowledge of efficiency and speed regulation D.C. Motors under various loading conditions
49	EE 382	Power Electronics Lab	1	Analyze the control methods to obtain the controlled DC & AC output using power electronic devices
			2	Demonstrate writing skills through clear laboratory reports
			3	Employ graphics packages for drawing of graphs for statistical analysis of data
			4	Employ graphics packages for drawing of graphs for statistical analysis of data
			5	Transfer group experience to individual performance of experiments and demonstrate effective oral communication skills
50	PC555EE	Circuits and Measurement Lab	1	Analyze the laws and principles of electrical circuits & design a real world electrical circuit using basic components to measure the required quantity
			2	Demonstrate writing skills through clear laboratory reports
			3	Demonstrate writing skills through clear laboratory reports
			4	Compare the experimental results with those introduced in lecture, draw relevant conclusions and substantiate them satisfactorily

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			5	Transfer group experience to individual performance of experiments and demonstrate effective oral communication skills.
SEMESTER VI				
51	PC601EE	Electrical Machines-III	1	Demonstrate the knowledge of construction , Principle of operation & application of synchronous machines both as motor & generator
			2	Describe & compare the various type of A.C windings
			3	Formulate , analyse & find a solution for any problem on synchronous machine both as motor & generator
			4	Understand the difference between three phase & single phase motors
			5	Explain the construction & working principle of single phase motors & demonstrate the starting & running characteristics of them
52	PC602EE	Microproces sors and Microcontro llers	1	Describe the Architecture, Instruction Set & Hardware of 8086 Microprocessor
			2	Recognize the Architecture, Instruction Set & Hardware of 8051 Microcontroller
			3	Identify Assembly language program of 8086 & 8051 for simple applications
			4	WriteAssembly language program for a 8086 Microprocessor & 8051 Microcontroller
			5	Analyze programs for Interfacing Microprocessor 8086 and Microcontroller 8051
53	PC603EE	Switchgear and Protection	1	Understanding of basic principles of protection relays & various types of relays with conventional electromagnetic, solid state & micro processor technologies.
			2	Design of protection scheme for transmission lines
			3	Design of Protection scheme for electrical rotating machines and transformers
			4	.Understanding phenomena of switching theory & operating principle of circuit breakers used in high voltage transmission lines.
			5	.Lightning phenomena & causes of high voltage surges produced in transmission lines.
54	PC604EE	Renewable Energy Technologie	1	Explain the advantages, disadvantages and applications of different conventional and non conventional sources.
			2	Ø Acquire the knowledge of various components, principle of operation and present scenario of different conventional and non conventional sources.
55	MC952SP	National Service Scheme	1	Students will become more focused towards becoming excellent citizens with more and more discipline in their day-to-day life.
			2	Ø An all-round development-physical, mental and spiritual health-takes place.
			3	Ø Self-discipline and discipline with respect society enormously increases.
			4	Ø University environment becomes more peaceful and harmonious.
56	SI 671 EE	SUMMER INTERNSHIP	1	Able to design/develop a small and simple product in hardware or software.
			2	Ø Able to complete the task or realize a prespecified target, with limited scope, rather than taking up a complex task and leave it.
			3	Ø Able to learn to find alternate viable solutions for a given problem and evaluate these alternatives with reference to prespecified criteria.
			4	Ø Able to implement the selected solution and document the same
PE - II				

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57	PE601EE	AI Techniques	1	Understand how the soft computing techniques can be used for solving the problems of Electrical Engineering..
			2	Ø Design of ANN based systems for function approximation used in load forecasting.
			3	Ø Design of Fuzzy based systems for load frequency control in power systems
			4	Ø Solve problem of Optimization in power systems.
58	PE602EE	ELECTRICAL DISTRIBUTION SYSTEM	1	Understand the concept of different factors used in design of distribution system components..
			2	Ø Explain the different types of secondary distribution systems and their performances.
			3	Ø Acquire the knowledge of various components, functions and applications of distribution automation and SCADA.
			4	Ø Able to design the optimal locations and ratings of shunt capacitors used in radial feeder for different loading conditions.
59	PE603EE	DIGITAL CONTROL SYSTEMS	1	Develop PLC programs for industrial applications.
			2	Ø Acquire the knowledge of PLC counter functions and PLC Arithmetic functions and data handling functions
OE- I				
61	OE601CE	Disaster Management	1	The students will be able to understand impact on Natural and manmade disasters.
			2	Ø Able to classify disasters and destructions due to cyclones
			3	Ø Able to understand disaster management applied in India
PRACTICALS				
62	PC651EE	Electrical Machines lab-II	1	Conduct experiments, take measurements and analyze the data through hands-on experience in order to demonstrate understanding of the theoretical concepts of induction machines & synchronous machines , while working in small groups.
			2	Demonstrate writing skills through clear laboratory reports
			3	Employ graphics packages for drawing of graphs for statistical analysis of data
			4	Compare the experimental results with those introduced in lecture, draw relevant conclusions and substantiate them satisfactorily
			5	Transfer group experience to individual performance of experiments and demonstrate effective oral communication skills
63	PC652EE	Digital signal Processing Lab	1	Simulate the concepts of digital signal processing and interpret data
			2	Demonstrate the knowledge of programming environment, compiling, debugging, linking and executing variety of programs in MATLAB
			3	Demonstrate documentation and presentation of the algorithms / programs in a record form.
			4	Validate simulated results from programs with theoretical calculations
			5	Employ analytical and logical skills to solve real world problem and demonstrate oral communication skills
64	PC653EE	Control	1	Conduct experiment,take measurements and analyse the data through hands on experience in order to demonstrate understanding of the theortical concepts of AC and DC servomotor,while working in small group
			2	Demonstrate writing skill through clear laboratory reports for the experiments conducted in the lab
			3	Employ graphics packages for drawing of graphs for statistical analysis of data

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64	PC655EE	systems lab	4	Compare experiments results those introduce in lecture draw relevant conclusions and substantiate them satisfactorily for compensating networks
			5	Transfer group experience to individual performance of experiments overall and demonstrate effective overall communication skills
				SEMESTER VII
65	PC 701 EE	Power System Operation and Control	1	Solve load flow by appropriate modeling of the given power system and formulation of Ybus.
			2	Evaluate generation mix for economic operation with and without transmission losses
			3	Explain load frequency control and estimate the frequency deviation through modeling
			4	Analyze and describe different types of power system stability and establish SSSL
			5	Identify various methods of voltage control and study the reactive power compensation
66	PC 702	EE Electric Drives and Static Control	1	Describe the structure and operation of Electric Drive and relate to study its stability (steady state and transient). Use the characteristics of load and motor -load combination to select through appropriate drive
			2	Analyze characteristics and the energy loss during starting and braking of DC (shunt & series motor) & AC (induction motor) 1drives
			3	.Use the single phase rectifier, chopper and dual converter circuits to understand the closed loop control of drives.
			4	Describe the speed control methods for 3 Phase Induction Motors from stator (with AC voltage regulators VSI and Cyclo-converters), rotor side (resistance control) and the slip recovery schemes
			5	Explain the control of synchronous motor (self & separately controlled), brushless DC motor, Switched reluctance motors.
67	PC 703 EE	Electrical Machine Design	1	Make a choice of material to evolve a particular design problem at hand and make reference to the standards used by the industry.
			2	Understand the behaviour of magnetic materials, thermal performance and rating of machines
			3	Design DC machine along with the materials, ventilation and cooling aspect used in it
			4	Design AC machine along with the materials, ventilation and cooling aspect used in it.
			5	To make the trials using a computer program and hundreds of design are worked in repetitive manner to evolve a cost optimized design by using computer aided design.
OE- II & III				
70	OE774EE (OE - II)	Entrepreneurship	1	Understand Indian Industrial Environment, Entrepreneurship and Economic growth, Small and Large Scale Industries, Types and forms of enterprises.
			2	Identify the characteristics of entrepreneurs, Emergence of first generation entrepreneurs, Conception and evaluation of ideas and their sources
			3	Practice the principles of project formulation, Analysis of market demand, Financial and profitability analysis and Technical analysis.
			4	Apply the concepts of Project Management during construction phase, project organization, project planning and control using CPM, PERT techniques
			5	Understand the Behavioural aspects of entrepreneurs, Time Management, Various approaches of time management, their strengths and weakness. The urgency addiction and time management matrix.

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71	OE782IT (OE - III)	Software Engineering	1	Acquire knowledge about different software development processes and their usability in different problem domains
			2	Understand the process of requirements collection, analysing, and modelling requirements for effective understanding and communication with stakeholders
			3	Design and develop the architecture of real world problems towards developing a blueprint for implementation
			4	Use the UML language to design various models during software development life cycle
			5	Understand the concepts of software quality, testing and maintenance
PRACTICALS				
72	PC 751 EE	Electrical Simulation Lab	1	Simulate the concepts of Electrical Circuits, Control Systems and Power Systems and interpret data.
			2	Demonstrate the knowledge of programming environment, compiling, debugging, linking and executing variety of programs in MATLAB
			3	Demonstrate ability to develop simulink models for various electrical systems
			4	Validate simulated results from programs/simulink models with theoretical calculations
			5	Employ analytical and logical skills to solve real world problem and demonstrate writing skills through clear laboratory reports
	PC 752 EE	Microprocessor and Microcontrollers Lab	1	Apply the design concepts for development of a process and interpret data.
			2	Demonstrate knowledge of programming environment, compiling, debugging, linking and executing variety of programs.
			3	Demonstrate documentation and presentation of the algorithms / flowcharts / programs in a record form.
			4	Validate the process using known input-output parameters.
			5	Employ analytical and logical skills to solve real world problem and demonstrate oral communication skills
73	PW 761 EE	Project Seminar	1	Apply algorithm design concepts to develop flowcharts for computer based solutions of civil engineering problems
			2	Demonstrate knowledge of Microsoft Excel by employing in-built and user-defined functions, debugging and executing different civil engineering problems
			3	Demonstration, documentation and presentation of the algorithms, flowcharts, programs and output in a record form
			4	Validate the program using known input and output parameters
			5	Employ analytical and logical skills to solve real world problems and demonstrate oral communication skills
74	PW 762EE	Summer Internship	1	Analyze a technical problem along with specifications.
			2	Execute the project work.
			3	Prepare technical presentation that are required in the project.
			4	Learn implementation of civil engineering software.
SEMESTER VIII				
75	PC 801 EE	Utilization of Electrical Energy	1	Design the resistive and inductive heating and calculate the requirements of heating power for an industrial need
			2	explain different types of Welding suitable for industrial need
			3	Analyze the type of motor control required and select the type and rating of motor.
			4	Design illumination for different application
			5	Analyze the traction mechanics to arrive at a rating of drive
PE - III				

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76	PE 824 EE	High Voltage DC Transmission	1	Understand the concept of HVDC along with applications, different kinds, planning and modern trends. Comparison with HVAC including corona losses.
			2	2. Understand properties of converter circuits and analyse Bridge Converter circuits with and without overlap for HVDC application including inverter operation.
			3	3. Demonstrate knowledge in the control aspects of HVDC systems
			4	4. Understand different types of faults and protection aspects of HVDC Systems
			5	5. Acquire Conceptual knowledge in applications of MTDC systems and their control
PE - IV				
77	PE 832 EE	Electrical Estimation Costing & Safety	1	. Acquire the knowledge of different types of wires and wiring systems, I.E. rules and Electric supply act.
			2	2. Explain the importance of earthling, rating of wires & cables, procedures for residential, commercial electrification.
			3	3. Able to estimate the length of wire, cable, conduit, earth wire, and earthing and also cost of residential, commercial electrification.
			4	4. Estimate electrification system for factory unit installation.
			5	5. Understand and apply various safety and prevention measures against electric shocks and accidents
78	PE 834 EE	Power Quality	1	Describe the different PQ disturbances and state remedies to improve PQ.
			2	.Determine voltage sag for different network configurations.
			3	Demonstrate the effect of ASD systems on power quality and the effect of voltage sags on operation of various electrical machines.
			4	Evaluate harmonic levels for distribution systems
			5	Describe power quality monitoring and measuring techniques
PE-V				
79	PE 843 EE	Special Electrical Machines	1	Explain theory of operation and control of switched reluctance motor.
			2	2. Explain the performance and control of stepper motors, and their applications.
			3	3. Describe the operation and characteristics of permanent magnet dc motor.
			4	4. Distinguish between brush dc motor and brush less dc motor.
			5	5. Explain the theory of travelling magnetic field and applications of linear motors
80	PE 844 EE	Power Electronics Applications to	1	To acquire knowledge on Non-Conventional energy sources
			2	2. To analyze various technologies and for renewable energy systems
			3	3. To develop standalone DG sets and micro grid systems from renewable energy sources
PRACTICALS				
81	PW961CE	Project Work - II	1	Demonstrate the ability to synthesize and apply the knowledge and skills acquired in the academic program to the real-world problems
			2	Evaluate different solutions based on economic and technical feasibility
			3	Effectively plan a project and confidently perform all aspects of project management
			4	Demonstrate effective written and oral communication skills

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S.No	Course	Subject	CO code	CO
SEMESTER I				
1	MC112CE	Environmental Sciences	1	State the efficient use of natural resources.
			2	Knowledge on the role of ecology as the basis of environmental science
			3	State the importance of bio-diversity & means to conserve it.
			4	Assess the environmental risks associated to various pollutions and understand the environmental laws & policies.
			5	Discuss the current environmental issues & relate the disasters & its management techniques.
2	MC113PY	Essence of Indian Traditional Knowledge	1	Understand philosophy of Indian culture.
			2	Distinguish the Indian languages and literature.
			3	Learn the philosophy of ancient, medieval and modern India.
			4	Acquire the information about the fine arts in India.
			5	Know the contribution of scientists of different eras
3	BS102MT	Mathematics -I	1	Find the nature of sequences and series
			2	Evaluate multiple integrals
			3	Apply this knowledge to solve the curriculum problems
4	BS105CH	Chemistry	1	Apply concept of electrode potential in identifying feasibility of electrochemical reaction, illustrate electro analytical
			2	Identify the mechanism of corrosion of materials on basis of electrochemical approach and devise corrosion control
			3	Estimate the physical & chemical parameters of quality of water and explain the process of water treatment
			4	Explain the influence of chemical structure on properties of materials and their choice in engineering applications.
			5	Classify chemical fuels and grade them through qualitative analysis
			6	Relate the concept of green chemistry to modify engineering processes and materials
5	ES107CS	Programming for Problem Solving	1	Formulate simple algorithms for arithmetic and logical problems.
			2	Translate the algorithms to programs (in c language).
			3	Test and execute the programs and correct syntax and logical errors
			4	Implement conditional branching, iteration and recursion
			5	Decompose a problem into functions and synthesize a complete program using divide and conquer approach
			6	Use arrays, pointers and structures to formulate algorithms and programs
			7	Apply programming to solve matrix addition and multiplication problems and searching and sorting problems
			8	Apply programming to solve simple numerical method problems, namely root finding of function, differentiation of
PRACTICALS				
6	BS153CH	Chemistry Lab	1	Apply the principles of Colourimetry and Electrochemistry in quantitative estimations.
			2	Estimate the rate constants of reactions from concentration of reactants/ products as a function of time.
			3	Synthesize small drug molecules.
7	ES115CS	Programming for Problem Solving Lab	1	Choose appropriate data type for implementing programs in C language
			2	Design and implement modular programs involving input output operations, decision making and looping constructs.
			3	Implement search and sort operations on arrays
			4	Apply the concept of pointers for implementing programs on dynamic memory management and string handling.
			5	Design and implement programs to store data in structures and files.

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8	ES157ME	Workshop	1	Demonstrate an understanding of and comply with workshop safety regulations.
			2	Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing,
			3	Study and practice on machine tools and their operations
			4	Undertake jobs connected with Engineering Workshop trades including fitting, carpentry, sheet metal, house wiring,
			5	Apply basic electrical engineering knowledge for house wiring practice
SEMESTER II				
9	MC111PO	Indian Constitution	1	Know the background of the present constitution of India.
			2	Understand the working of the union, state and local levels.
			3	Gain consciousness on the fundamental rights and duties.
			4	Be able to understand the functioning and distribution of financial resources between the centre and states.
			5	Be exposed to the reality of hierarchical Indian social structure and the ways the grievances of the deprived sections can
10	HS101EG	English	1	Read, understand, and interpret a variety of written texts
			2	Use appropriate vocabulary and correct grammar
			3	Undertake guided and extended writing with confidence.
11	BS103MT	Mathematics II	1	Solve system of linear equations and eigen value problems
			2	Solve certain first order and higher order differential equations
			3	Solve basic problems of Beta Gamma and Legender's Function
			4	Apply Laplace Transforms; solve ordinary Differential Equations by using it.
12	BS104PH	Physics	1	Distinguish materials based on band theory of solids
			2	Classify semiconductors on the basis doping and to estimate conductivity and learn transport phenomenon in
			3	Appreciate use of optical absorption by semiconductors.
13	ES106EE	Basic Electrical Engineering	1	To analyse Electrical circuits to compute and measure the parameters of Electrical Energy
			2	To comprehend the working principles of Electrical DC Machines.
			3	To identify and test various Electrical switchgear, single phase transformers and assess the ratings needed in given
			4	To comprehend the working principles of electrical AC machines
PRACTICALS				
14	HS151EG	English Lab	1	Listen, understand, and interpret formal and informal spoken language
			2	Speak English with acceptable pronunciation, stress, and intonation
			3	Present themselves with confidence in formal situations
			4	Participate in individual and group activities with relative ease
15	BS152PH	Physics Lab	1	Conduct experiments, take measurements independently.
			2	Write appropriate laboratory reports
			3	Compute and compare the experimental results and draw relevant conclusions.
			4	Use the graphical representation of data and estimate results from graphs
16	ES154EE	Basic Electrical Engineering Lab	1	Get an exposure to common electrical components and their ratings
			2	Analyse the performance of DC and AC Machines
			3	Comprehend the usage of common electrical measuring instruments
			4	Test the basic characteristics of transformers and electrical machines

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17	ES156CE	Engineering Graphics and Design Lab	1	Draw various geometric shapes and scales using AutoCAD
			2	Draw the projections of points, lines, planes and solids using AutoCAD
			3	Draw the sections of solids using AutoCAD
			4	Draw the development of surfaces using AutoCAD
			5	Draw the isometric projections of the solid using AutoCAD
			6	Draw the orthographic projections of the three dimensional (3-D) objects using AutoCAD
SEMESTER III				
18	MC112CE	Environmental Sciences	1	Knowledge on the role of ecology as the basis of environmental science
			2	State the importance of bio-diversity & means to conserve it.
			3	Assess the environmental risks associated to various pollutions and understand the environmental laws & policies.
			4	Discuss the current environmental issues & relate the disasters & its management techniques.
			5	Understand philosophy of Indian culture.
19	MC113PY	Essence of Indian Traditional Knowledge	1	Distinguish the Indian languages and literature.
			2	Learn the philosophy of ancient, medieval and modern India.
			3	Acquire the information about the fine arts in India.
			4	Know the contribution of scientists of different eras
			5	Understand the relevance of civil engineering in the society & describe the uses of various construction materials
20	MC204CE	Overview of Civil Engineering	1	Explain the new technology/concepts of architecture in planning
			2	Remember the basics of surveying, transportation and geotechnical systems
			3	Remember the basics of environmental, water resources and structural engineering systems
			4	Remember the various software used in the field of civil engineering
			5	Understanding of key concepts, theoretical perspectives, and trends in industrial psychology.
21	HS203MP	Industrial Psychology	1	Evaluate the problems thorough and systematic competency model.
			2	Analyse the problems present in environment and design a job analysis method.
			3	Create a better work environment for better performance.
			4	Design a performance appraisal process and form for the human behavior.
			5	Apply biological engineering principles, procedures needed to solve real-world problems
22	BS206BZ	Biology for Engineers	1	Understand the fundamentals of living things, their classification, cell structure and biochemical constituents
			2	Apply the concept of plant, animal and microbial systems and growth in real life situations
			3	Comprehend genetics and the immune system.
			4	Know the cause, symptoms, diagnosis and treatment of common diseases
			5	Apply basic knowledge of the applications of biological systems in relevant industries
			6	Analyze the effect of a system of forces on a body.
23	ES211CE	Engineering Mechanics	1	Analyze the static equilibrium of bodies in 2D and 3D and the effect of friction and its governing laws on bodies in
			2	Determine the Centroid, Center of gravity, Moment of Inertia and Mass moment of inertia of different plane and solid
			3	Apply the laws of motion to study the kinematic parameters of a moving rigid body.
			4	Solve the problems involving translation and rotation of rigid bodies by applying principles of Kinetics, work-energy
			5	Analyze and solve impact problems using principles of impulse momentum.
			6	Understand the basics of various sources of energy

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24	ES213ME	Energy Science and Engineering	1	Analyse the present status of conventional energy sources.
			2	Understand the working principles of Renewable Energy systems
			3	Design and develop waste heat recovery systems
			4	Relate energy economics, standards and future challenges
25	PC222EE	Electromagnetic Fields	1	To understand the basic laws of electromagnetism.
			2	To obtain the electric and magnetic fields for simple configurations under static conditions.
			3	To analyse time varying electric and magnetic fields.
			4	To understand Maxwell's equation in different forms and different media.
			5	To understand the propagation of EM waves
26	PC223EE	Network Theory	1	Classify the circuit elements and also evaluate the current, voltage in DC network with & without
			2	Analyse the DC steady state & transient responses of R, L, C circuits
			3	Evaluate the AC steady state response of R, L, C networks and explain the different configuration of AC circuits
			4	Explain the Resonance in the circuits, coupled circuits and different 3-phase system, also measure the power in 3-phase
			5	Analyse the Two port networks.
27	PC223EC	Analog Electronics	1	Interpret the characteristics and apply diode models to analyse various applications of diodes
			2	Discriminate the BJT configurations to recognize appropriate transistor configuration for any
			3	Analyse and compare feedback amplifiers
			4	Distinguish various classes of Power Amplifiers.
			5	Analyse the operation of OPAMP and its applications
PRACTICALS				
28	PC252EE	Computer Aided Electrical Drawing Lab	1	Identify and draw different components of electrical systems
			2	Draw different control and wiring diagrams
			3	Draw winding diagrams of electrical machines
			4	Draw different starter diagrams of A.C and D.C machine
			5	Acquire knowledge on various Electrical Engineering Softwares
29	PC253EC	Analog Electronics Lab	1	Interpret the characteristics and apply diode models to analyse various applications of diodes
			2	Discriminate the BJT configurations to recognize appropriate transistor configuration for any
			3	Analyse and compare feedback amplifiers
			4	Distinguish various classes of Power Amplifiers.
			5	Analyse the operation of OPAMP and its applications
SEMESTER IV				
30	MC111PO	Indian Constitution	1	Know the background of the present constitution of India.
			2	Understand the working of the union, state and local levels.
			3	Gain consciousness on the fundamental rights and duties.
			4	Be able to understand the functioning and distribution of financial resources between the centre and states.
			5	Be exposed to the reality of hierarchical Indian social structure and the ways the grievances of the deprived sections can

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31	HS201EG	Effective Technical Communication in English	1	Handle technical communication effectively
			2	Use different types of professional correspondence
			3	Use various techniques of report writing
			4	Acquire adequate skills of manual writing
			5	Enhance their skills of information transfer and presentations
32	HS202CM	Finance and Accounting	1	Evaluate the financial performance of the business unit
			2	Take decisions on selection of projects
			3	Take decisions on procurement of finances
			4	. Analyse the liquidity, solvency and profitability of the business unit
			5	Evaluate the overall financial functioning of an enterprise
33	BS205MT	Mathematics - III (	1	Solve field problems in engineering involving PDEs.
			2	Formulate and solve problems involving random variables and apply statistical methods for analysing experimental
34	ES212ME	Elements of Mechanical Engineering	1	State and differentiate various classifications of IC engines and reciprocating air compressors with specific focus on
			2	Compare various types of heat transfer, analyse the governing equations, understand the applications of heat exchangers
			3	Demonstrate the working principles of hydraulic turbines and pumps
			4	Classify different types of power transmission systems like gears, gear trains, belts, ropes etc. with emphasis on their
			5	Understand various manufacturing processes like, welding, , machining, etc. and recognize their suitability for
	PC234EE	Transducers Engineering	1	Describe various static and dynamic characteristics of measuring system
			2	Classify transducers.
			3	Use inductive and capacitive transducer for various sensing applications
			4	Discuss temperature and pressure standards for calibrations
			5	Use temperature and pressure transducer for various sensing applications
35	PC232EE	Digital Electronics and Logic Design	1	Understand working of logic families and logic gates.
			2	Design and implement Combinational and Sequential logic circuits.
			3	Understand the process of Analog to Digital conversion and Digital to Analog conversion.
			4	Use PLCs to implement the given logical problem.
			5	Analysis of synchronous and asynchronous counters
36	PC233EE	Power Electronics	1	Understand the characteristics and performance of various power electronic devices.
			2	2. Analyse single and three phase controlled rectifier circuits.
			3	3. Understand choppers circuits and AC voltage controllers
			4	4. Understand the performance of single phase inverter circuits.
			5	5. Analyse the operation of three phase voltage source inverters.
PRACTICALS				
37	PC263EE	Transducers Engineering Lab	1	Measure temperature by RTD, thermistor and Thermocouple.
			2	2. Measure linear and angular displacement using LVDT, capacitive and inductive transducers.
			3	3. Measure speed and toque by using suitable transducers
			4	4. Demonstrate the performance characteristics of various transducers.

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38	PC262EE	Digital Electronics and Logic Design Lab	1	Understand working of logic families and logic gates.
			2	2. Design and implement Combinational and Sequential logic circuits.
			3	3. Understand the process of Analog to Digital conversion and Digital to Analog conversion.
			4	4. Use PLCs to implement the given logical problem.
			5	5. Analysis of synchronous and asynchronous counters
SEMESTER V				
39	PC505EE	Digital Signal Processing and	1	**Classify and analyze discrete signals and systems and review of Z transform**
			2	**Analyze different frequency response analysis methods for discrete time systems**
			3	**Design IIR filters and discuss realization of filters.**
			4	**Design FIR filters**
			5	**Describe and apply architectures of Digital signal processors**
40	PC503EE	Electrical Measurements and Instrumenta	1	Explain the basic principles of measurement and various instruments for measurement, calculation of voltage, current
			2	Discuss about magnetic measurements to find flux, B-H curve and Iron losses
			3	Explain the instrument ,for measurement and calculation of energy, frequency and power
			4	**Explain the bridges for measurement and calculation of passive elements and Frequency**
			5	Discuss Potentiometers ,Instrument Transformers and calculate their parameters
41	EE306	Linear Control Systems	1	Demonstrate an understanding of fundamentals of (feed back) control systems & obtain mathematical model of linear
			2	Analyze time domain response of first order & second order system & use root locus technique to analyze the stability
			3	Analyze the stability of linear time invariant (LTI) system using frequency domain approach.
			4	Represent & analyze a linear time invariant (LTI) system using state space technique
			5	Describe a discrete control system & analyze the stability of digital control system
42	PC506EE	Power Plant Instrumentation	1	Devise and develop control loops for thermal power generating systems.
			2	Decode P & I diagrams for process control systems.
			3	Apply the knowledge gained for identification and reduction of redundancy in power station automation
			4	Evaluate and identify areas for prime mover supervision and instrumentation
			5	Apply techniques for measurement and control of four basic parameters like level, temperature, pressure and flow for
43	PC507EE	Instrumentation Systems	1	State the principles of measurement of various physical parameters.
			2	Classify the different methods used for measurement of few industrial parameters, based on their measurement criteria.
			3	Discuss the static and dynamic characteristics of vibration sensing instruments and flow sensors.
			4	Describe the construction and working of the methods used for the measurement of the physical parameters.
			5	Compare the various methods used for measurement of a physical quantity to identify the proper instrument.
44	MC901EG	Gender Sensitization	1	Students will have developed a better understanding of important issues related to gender in
			2	Students will be sensitized to basic dimensions of the biological, sociological, psychological and
			3	Students will attain a finer grasp of how gender discrimination works in our society and how to
			4	Students and professionals will be better equipped to work and live together as equals.

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PE -I				
45	PE504EE	Building Automation	1	Understand basic blocks and systems for building automation
			2	Ø Design different systems for building automation and integrate those systems
46	PE505EE	Principle of Communication Engineering	1	Develop an understanding of need for modulation and generation & detection of Analog
			2	Ø Explore AM and FM Super heterodyne receiver working principle
			3	Ø Discuss the techniques for generation and detection of pulse Analog modulation techniques
			4	Ø To understand the basic operation involved in PCM like sampling, quantization & encoding
			5	Ø To compare different communication system with various modulation techniques in the
47	PE506EE	Advanced Sensors	1	Develop an understanding of need multi sensor and recent trends in technology
			2	Ø Explore Smart sensors working principle
			3	Ø Discuss the techniques for MEMS, NANO and Chemical sensors techniques
			4	Ø To understand the basic operation involved in Robotics, fiber optics and Boi sensors
PRACTICALS				
48	PC554EE	Transducer Lab	1	Conduct experiments, take measurements through hands-on experience in order to demonstrate understanding of the
			2	Demonstrate writing skills through clear laboratory reports
			3	Employ graphics packages for drawing of graphs
			4	Compare the experimental results with those introduced in lecture, draw relevant conclusions and substantiate them
			5	Transfer group experience to individual performance of experiments and demonstrate effective oral communication
49	EE 382	Power Electronics Lab	1	Analyze the control methods to obtain the controlled DC & AC output using power electronic devices
			2	Demonstrate writing skills through clear laboratory reports
			3	Employ graphics packages for drawing of graphs for statistical analysis of data
			4	Employ graphics packages for drawing of graphs for statistical analysis of data
			5	Transfer group experience to individual performance of experiments and demonstrate effective oral communication
50	PC555EE	Circuits and Measurement Lab	1	Analyze the laws and principles of electrical circuits & design a real world electrical circuit using basic components to
			2	Demonstrate writing skills through clear laboratory reports
			3	Demonstrate writing skills through clear laboratory reports
			4	Transfer group experience to individual performance of experiments and demonstrate effective oral communication
			5	Compare the experimental results with those introduced in lecture, draw relevant conclusions and substantiate them
SEMESTER VI				
51	PC602EE	Microprocessors and Microcontrollers	1	Describe the Architecture, Instruction Set & Hardware of 8086 Microprocessor
			2	Recognize the Architecture, Instruction Set & Hardware of 8051 Microcontroller
			3	Identify Assembly language program of 8086 & 8051 for simple applications
			4	WriteAssembly language program for a 8086 Microprocessor & 8051 Microcontroller
			5	Analyze programs for Interfacing Microprocessor 8086 and Microcontroller 8051
52	PC605EE	Biomedical Instrumentation	1	Describe different general devices used in biomedical applications
			2	Explain instruments for recording of Bio- potentials
			3	Explain different techniques and related instruments for measuring blood pressure, blood flow and heart sounds
			4	Describe radiography and clinical laboratory instruments
			5	Describe electrical hazards, safety in hospital design and explain recent biomedical instruments

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53	PC606EE I	Process Control	1	Model conceptual and methodological framework for describing a process and its control system
			2	Explain to various controller, design different controllers electronically
			3	Explain Effects of closing of loop with different controller and analyze static error and velocity error
			4	Explain Controller tuning Methods and different control valves and actuators
			5	Implement ladder diagram logic for different process applications
54	MC952SP	National Service Scheme	1	Students will become more focused towards becoming excellent citizens with more and more
			2	Ø An all-round development-physical, mental and spiritual health-takes place.
			3	Ø Self-discipline and discipline with respect society enormously increases.
			4	Ø University environment becomes more peaceful and harmonious.
55	SI 671 EE	SUMMER INTERNSHIP	1	Able to design/develop a small and simple product in hardware or software.
			2	Ø Able to complete the task of realize a prespecified target, with limited scope, rather than taking
			3	Ø Able to learn to find alternate viable solutions for a given problem and evaluate these
			4	Ø Able to implement the selected solution and document the same
56	PC607EE	Electronics Instrumentation Systems	1	Display the ability to calibrate electronic instruments
			2	Demonstrate proficiency with computer and calculator applications involved in basic electronic circuit analysis
			3	**:Explain and perform basic operation of electronic process equipment**
			4	dentify, compare and contrast various electronic calibration devices
			5	Display the ability to calibrate electronic instruments
PE - II				
57	PE604EE and Navigation	Instrumentation in Aerospace	1	To understand the basics of aerospace and navigation
			2	Ø To know the technical aspects of this subject
			3	Ø To know about various troubles in aircrafts
58	PE605EE	Piping and Instrumentation	1	Understanding of P&I Diagrams, standards involved and its preparation.
			2	Ø Awareness on the different fittings used for instruments installation and various softwares
			3	Ø Understanding of Process safety, Safety Management Systems and instrumentation system
59	PE606EE	Instrumentation and Control in Petrochemical	1	An understanding on various petrochemical process, important parameter to be monitored
			2	Ø Various instruments involved in and its controlling process.
			3	Ø An ability to design and conduct experiments, as well as to analyze and interpret data
OE- I				
60	OE601CE	Disaster Management	1	The students will be able to understand impact on Natural and manmade disasters.
			2	Able to classify disasters and destructions due to cyclones
			3	Able to understand disaster management applied in India
PRACTICALS				
61	PC651EE	Electrical Machines lab-II	1	Conduct experiments, take measurements and analyze the data through hands-on experience in order to demonstrate
			2	Demonstrate writing skills through clear laboratory reports
			3	Employ graphics packages for drawing of graphs for statistical analysis of data
			4	Compare the experimental results with those introduced in lecture, draw relevant conclusions and substantiate them
			5	Transfer group experience to individual performance of experiments and demonstrate effective oral communication

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62	PC652EE	Digital signal Processing Lab	1	Simulate the concepts of digital signal processing and interpret data
			2	Demonstrate the knowledge of programming environment, compiling, debugging, linking and executing variety of
			3	Demonstrate documentation and presentation of the algorithms / programs in a record form.
			4	Validate simulated results from programs with theoretical calculations
			5	Employ analytical and logical skills to solve real world problem and demonstrate oral communication skills
63	PC653EE	Control systems lab	1	Conduct experiment,take measurements and analyse the data through hands on experience in order to demonstrate
			2	Demonstrate writing skill through clear laboratory reports for the experiments conducted in the lab
			3	Employ graphics packages for drawing of graphs for statistical analysis of data
			4	Compare experiments results those introduce in lecture draw relevant conclusions and substantiate them satisfactorily
			5	Transfer group experience to individual performance of experiments overall and demonstrate effective overall
SEMESTER VII				
64	PC 711 EE	Opto-Electronic Instrumentation	1	Describe the properties, construction & classification of Lasers
			2	Explain operation & applications of Laser instruments with their safety measures
			3	Analyze operation & transmission in Optical fiber with their modulation techniques.
				Express a fiber optic instrument to measure Electrical & Non Electrical parameters
			4	Analyze various optoelectronic sensors and display devices.
65	PC 712 EE	Virtual Instrumentation	1	Describe the architecture of Virtual Instrumentation (Lab VIEW) and differentiate between Lab VIEW and
			2	Create and program virtual instruments using programming tools.
			3	Explain different data acquisition components (ADC, DAC, DIO, Timers & Counters, Interrupts and DMA) required
			4	Discuss the common instrument interfaces (Current loop, RS232/RS485, GPIB, USB, PCMCIA, VXI, SCXI/PXI,
			5	Apply the VI programming techniques to industrial problems.
67	PC 713 EE	Analytical Instrumentation	1	State the principles of analytical instruments based on electro - magnetic radiation, m/e ratio, nuclear magnetic
			2	Describe the Instruments in detail and discuss the function of each component
			3	Apply the principles of electrochemistry for the quantitative and qualitative analysis of a sample.
			4	Select the instrument for a particular problem based on its merits, demerits and limitations
			5	Discuss the application of analytical instruments to Industrial gases and environmental pollution.
OE- II & III				
70	OE774EE (OE - II)	Entrepreneurship	1	Understand Indian Industrial Environment, Entrepreneurship and Economic growth, Small and Large Scale Industries,
			2	Identify the characteristics of entrepreneurs, Emergence of first generation entrepreneurs, Conception and evaluation of
			3	Practice the principles of project formulation, Analysis of market demand, Financial and profitability analysis and
			4	Apply the concepts of Project Management during construction phase, project organization, project planning and
			5	Understand the Behavioural aspects of entrepreneurs, Time Management, Various approaches of time management,
71	OE782IT (OE - III)	Software Engineering	1	Acquire knowledge about different software development processes and their usability in different problem domains
			2	Understand the process of requirements collection, analysing, and modeling requirements for effective understanding
			3	Design and develop the architecture of real world problems towards developing a blueprint for implementation
			4	Use the UML language to design various models during software development life cycle
			5	Understand the concepts of software quality, testing and maintenance

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PRACTICALS				
72	PC 751 EE	Instrumentation Simulation Lab	1	Simulate Electrical systems using software tools.
			2	2. Design and simulate compensators.
			3	3. Simulate the control system for temperature, level and pressure measurement systems.
			4	4. Analyse ECG waveform with VI
			5	5. Simulate digital communication system with VI
	PC 752 EE	Microprocessor and Microcontrollers Lab	1	Apply the design concepts for development of a process and interpret data.
			2	Demonstrate knowledge of programming environment, compiling, debugging, linking and executing variety of
			3	Demonstrate documentation and presentation of the algorithms / flowcharts / programs in a record form.
			4	Validate the process using known input-output parameters.
			5	Employ analytical and logical skills to solve real world problem and demonstrate oral communication skills
73	PW761CE	Project Seminar	1	Apply algorithm design concepts to develop flowcharts for computer based solutions of civil engineering problems
			2	Demonstrate knowledge of Microsoft Excel by employing in-built and user-defined functions, debugging and executing
			3	Demonstration, documentation and presentation of the algorithms, flowcharts, programs and output in a record form
			4	Validate the program using known input and output parameters
			5	Employ analytical and logical skills to solve real world problems and demonstrate oral communication skills
74	SI762CE	Summer Internship	1	Analyze a technical problem along with specifications.
			2	Execute the project work.
			3	Prepare technical presentation that are required in the project.
			4	Learn implementation of civil engineering software.
SEMESTER VIII				
75	PC 802 EE	Advance Programmable Logic Controller	1	Describe the architecture of PLC and differentiate between legal & illegal PLC ladder programming layouts
			2	Create Ladder diagram from a sequence of operational steps using Timers and counters with the '9' planning steps
			3	List and define the six basic intermediate functions.
			4	Describe and apply the PLC MOVE/JUMP function to industrial problems in combination with other PLCs Data
			5	Covert input signal to a form usable by input modules and output module to a form usable for output devices
PE - III				
76	PE 826 EE	Automation in Process Control	1	Explain DAS and digital signal conditioning elements used in real time applications
			2	Describe SCADA and DDC systems used in real time industrial control 2
			3	Describe DCS systems and their relevance in Industrial control Applications
			4	Discuss control loops formulation for level control systems, Distillation columns, heat exchangers etc.
			5	Explain Working of smart sensors, smart pettioners and their importance, the Field bus systems and various
PE - IV				
77	PE 837 EE	Power plant design and safety management	1	Model conceptual and methodological framework for describing a process and its management strategies
			2	Learn effective documentation and auditing techniques for I & C plants
			3	Learn the art of selecting safe zones for setting up of process control plants
			4	Apply the process safety management tools and techniques in real time projects and plants.
			5	Emphasis on security aspects like network security control centre and work station design and its related security

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78	PE 836 EE	Biomedical Signal Processing	1	Describe biomedical signal origin & dynamics.
			2	2. Identify artifact in biomedical signal.
			3	3. Design various time domain filtering for the removal of artifact from biomedical signal.
			4	4. Design frequency domain filtering for the removal of artifact from biomedical signal.
			5	5. Explain design methods for event detection.
PE-V				
79	PE 842 EE	Energy Management Systems	1	1. Understand energy management centers.
			2	2. Know the principles of power generation scheduling.
			3	3. Be acquainted with the configurations of SCADA
			4	4. Have a knowledge of SCADA communication
80	PE 847 EE	Instrumentation for Agricultural and Food	1	1. able to understand the necessity of instrumentation in agriculture and food processing.
			2	2. familiarized with instrumentation requirement in agriculture and food processing.
			3	3. able to analyse and design systems/instruments for agriculture and food processing
			4	4. able to understand problems in agriculture and food processing and provide technological solution to the same
PRACTICALS				
81	PW961CE	Project Work - II	1	Demonstrate the ability to synthesize and apply the knowledge and skills acquired in the academic program to the real-world problems
			2	Evaluate different solutions based on economic and technical feasibility
			3	Effectively plan a project and confidently perform all aspects of project management
			4	Demonstrate effective written and oral communication skills
82	PC 852 EE	Process Instrumentation Lab	1	Conduct experiments, take measurements and analyze the data through hands-on experience in order to demonstrate understanding of the theoretical concepts of Process instrumentation lab while working in small groups
			2	Demonstrate writing skills through clear laboratory reports
			3	Employ graphics packages for drawing of Graphs
			4	Compare the experimental results with those mentioned in literature, draw relevant conclusions and substantiate them with sound logic
			5	Transfer group experience to individual performance of experiments & demonstrate effective oral communication skills

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List of Course Outcomes for all the Courses of IT 2020-2021

S.No	Course Code	Subject	CO code	CO
			SEMESTER I	
1	MC111PO	Indian Constitution	1	Know the background of the present constitution of India.
			2	Understand the working of the union, state and local levels.
			3	Gain consciousness on the fundamental rights and duties.
			4	Be able to understand the functioning and distribution of financial resources between the centre and states.
			5	Be exposed to the reality of hierarchical Indian social structure and the ways the grievances of the deprived sections can be addressed to raise human dignity in a democratic way
2	BS102MT	Mathematics -I	1	Find the nature of sequences and series
			2	Evaluate multiple integrals
			3	Apply this knowledge to solve the curriculum problems
3	BS104PH	Physics	1	Distinguish materials based on band theory of solids
			2	Classify semiconductors on the basis doping and to estimate conductivity and learn transport phenomenon in semiconductors
			3	Appreciate use of optical absorption by semiconductors.
4	ES106EE	Basic Electrical Engineering	1	To analyse Electrical circuits to compute and measure the parameters of Electrical Energy
			2	To comprehend the working principles of Electrical DC Machines.
			3	To Identify and test various Electrical switchgear, single phase transformers and assess the ratings needed in given application
			4	To comprehend the working principles of electrical AC machines
		PRACTICALS		
5	BS152PH	Physics Lab	1	Conduct experiments, take measurements independently.
			2	Write appropriate laboratory reports
			3	Compute and compare the experimental results and draw relevant conclusions.
			4	Use the graphical representation of data and estimate results from graphs
6	ES154EE	Basic Electrical Engineering Lab	1	Get an exposure to common electrical components and their ratings
			2	Analyse the performance of DC and AC Machines
			3	Comprehend the usage of common electrical measuring instruments
			4	Test the basic characteristics of transformers and electrical machines
7	ES156CE	Engineering Graphics and Design Lab	1	Draw various geometric shapes and scales using AutoCAD
			2	Draw the projections of points, lines, planes and solids using AutoCAD
			3	Draw the sections of solids using AutoCAD
			4	Draw the development of surfaces using AutoCAD
			5	Draw the isometric projections of the solid using AutoCAD
			6	Draw the orthographic projections of the three dimensional (3-D) objects using AutoCAD
			SEMESTER II	
8	MC112CE	Environmental Sciences	1	State the efficient use of natural resources.
			2	Knowledge on the role of ecology as the basis of environmental science
			3	State the importance of bio-diversity & means to conserve it.
			4	Assess the environmental risks associated to various pollutions and understand the environmental laws & policies.

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			5	Discuss the current environmental issues & relate the disasters & its management techniques.
9	MC113PY	Essence of Indian Traditional Knowledge	1	Understand philosophy of Indian culture.
			2	Distinguish the Indian languages and literature.
			3	Learn the philosophy of ancient, medieval and modern India.
			4	Acquire the information about the fine arts in India.
			5	Know the contribution of scientists of different eras
10	HS101EG	English	1	Read, understand, and interpret a variety of written texts
			2	Use appropriate vocabulary and correct grammar
			3	Undertake guided and extended writing with confidence.
11	BS103MT	Mathematics II	1	Solve system of linear equations and eigen value problems
			2	Solve certain first order and higher order differential equations
			3	Solve basic problems of Beta Gamma and Legender's Function
			4	Apply Laplace Transforms; solve ordinary Differential Equations by using it.
12	BS105CH	Chemistry	1	Apply concept of electrode potential in identifying feasibility of electrochemical reaction; illustrate electro analytical techniques and working of batteries
			2	Identify the mechanism of corrosion of materials on basis of electrochemical approach and devise corrosion control methods.
			3	Estimate the physical & chemical parameters of quality of water and explain the process of water treatment
			4	Explain the influence of chemical structure on properties of materials and their choice in engineering applications.
			5	Classify chemical fuels and grade them through qualitative analysis
			6	Relate the concept of green chemistry to modify engineering processes and materials
13	ES107CS	Programming for Problem Solving	1	Formulate simple algorithms for arithmetic and logical problems.
			2	Translate the algorithms to programs (in c language).
			3	Test and execute the programs and correct syntax and logical errors
			4	Implement conditional branching, iteration and recursion
			5	Decompose a problem into functions and synthesize a complete program using divide and conquer approach
			6	Use arrays, pointers and structures to formulate algorithms and programs
			7	Apply programming to solve matrix addition and multiplication problems and searching and sorting problems
			8	Apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.
PRACTICALS				
14	HS151EG	English Lab	1	Listen, understand, and interpret formal and informal spoken language
			2	Speak English with acceptable pronunciation, stress, and intonation
			3	Present themselves with confidence in formal situations
			4	Participate in individual and group activities with relative ease
15	BS153CH	Chemistry Lab	1	Apply the principles of Colourimetry and Electrochemistry in quantitative estimations.
			2	Estimate the rate constants of reactions from concentration of reactants/ products as a function of time.
			3	Synthesize small drug molecules.
16	ES155CS	Programming for Problem Solving Lab	1	Choose appropriate data type for implementing programs in C language
			2	Design and implement modular programs involving input output operations, decision making and looping constructs.
			3	Implement search and sort operations on arrays
			4	Apply the concept of pointers for implementing programs on dynamic memory management and string handling.

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			5	Design and implement programs to store data in structures and files.
17	ES157ME	Workshop	1	Demonstrate an understanding of and comply with workshop safety regulations.
			2	Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiselling.
			3	Study and practice on machine tools and their operations
			4	Undertake jobs connected with Engineering Workshop trades including fitting, carpentry, sheet metal, house wiring, welding, smithy and foundry
			5	Apply basic electrical engineering knowledge for house wiring practice
				SEMESTER III
18	MC111PO	Indian Constitution	1	Know the background of the present constitution of India.
			2	Understand the working of the union, state and local levels.
			3	Gain consciousness on the fundamental rights and duties.
			4	Be able to understand the functioning and distribution of financial resources between the centre and states.
			5	Be exposed to the reality of hierarchical Indian social structure and the ways the grievances of the deprived sections can be addressed to raise human dignity in a democratic way
19	HS201EG	Effective Technical Communication in English	1	Handle technical communication effectively
			2	Use different types of professional correspondence
			3	Use various techniques of report writing
			4	Acquire adequate skills of manual writing
			5	Enhance their skills of information transfer and presentations
20	HS202CM	Finance and Accounting	1	To understand the basics of Financial accounting and evaluate the financial performance of business.
			2	To understand the accounting aspects and take decision on selection of projects.
			3	Decisions relating to procurement of finance and understand the Financial system.
			4	To analyze the liquidity, solvency and profitability and evaluate the viability of projects.
			5	Evaluate Financial functioning of a business using ratios.
21	BS207MT	Mathematics – III (Probability & Statistics)	1	Solve field problems in engineering involving PDEs.
			2	They can also formulate and solve problems involving random variables and apply statistical methods for analysing experimental data.
22	ES214EC	Basic Electronics	1	Study and analyse the rectifiers and regulator circuits.
			2	Study and analyse the performance of BJTs, FETs on the basis of their operation and working.
			3	Ability to analyse & design oscillator circuits.
			4	Ability to analyse different logic gates & multi-vibrator circuits.
			5	Ability to analyse different data acquisition systems
23	ES216EC	Digital Electronics	1	Understand the deign process of digital hardware, use Boolean algebra to minimize the logical expressions and optimize the implementation of logical functions.
			2	Understand the number representation and design combinational circuits like adders, MUX etc.
			3	Design Combinational circuits using PLDS and write VHDL code for basic gates and combinational circuits.
			4	Analyse sequential circuits using flip-flops and design registers, counters.
			5	Represent a sequential circuit using Finite State machine and apply state minimization techniques to design a FSM
			1	Implement linear, non-linear data structures and balanced binary trees
			2	Understand the basic data structures arrays and linked lists.
			3	Analyse time complexity of both iterative and recursive functions.

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24	PC221IT	Data Structures	4	Define ADT necessary for solving problems based on Stacks and Queues.
			5	Develop solutions using binary trees, advanced search trees, tries and graphs.
			6	Use hash functions and handle collisions.
			7	Understand various kinds of sorting techniques and apply appropriate techniques for solving a given problem.
25	PC222IT	Mathematical Foundations of Information Technology	1	Illustrate by examples the basic terminology of functions, relations, and sets and demonstrate knowledge of their associated operations.
			2	Understand basics of counting, apply permutations and combinations to handle different types of objects.
			3	Describe and use recursively-defined relationships to solve problems using generating functions.
			4	Analyse semi group, monoid group and abelian group with suitable examples and appreciate group theory applications in computer arithmetic.
			5	Demonstrate in practical applications the use of basic counting principles of permutations, combinations, inclusion/exclusion principle and the pigeonhole methodology.
			6	Represent and Apply Graph theory in solving computer science problems
PRACTICALS				
26	ES251EC	Basic Electronics Lab	1	Ability to design diode circuits & understand the application of Zener diode.
			2	Ability to analyse characteristics of BJTs & FETs.
			3	Ability to understand the different oscillator circuits.
			4	Ability to understand operation of HWR & FWR circuits with & without filters.
			5	Ability tom design Analog-to-Digital converters & Digital-to-Analog converters.
27	PC252IT	Data Structures Lab	1	Implement various data structures using arrays, linked lists.
			2	Develop ADT necessary for solving problems based on Stacks and Queues.
			3	Implement binary trees, general tree structures, advanced search trees, heaps, graphs.
			4	Implement hash functions and handle collisions.
			5	Implement various kinds of sorting techniques and apply appropriate techniques for solving a given problem.
28	PC253IT	IT Workshop Lab	1	Implement basic syntax in python.
			2	Analyse and implement different kinds of OOP concept in real world problems.
			3	Implement MATLAB operations and graphic functions.
SEMESTER IV				
29	MC112CE	Environmental Sciences	1	State the efficient use of natural resources.
			2	Knowledge on the role of ecology as the basis of environmental science
			3	State the importance of bio-diversity & means to conserve it.
			4	Assess the environmental risks associated to various pollutions and understand the environmental laws & policies.
			5	Discuss the current environmental issues & relate the disasters & its management techniques.
30	MC113PY	Essence of Indian Traditional Knowledge	1	Understand philosophy of Indian culture.
			2	Distinguish the Indian languages and literature.
			3	Learn the philosophy of ancient, medieval and modern India.
			4	Acquire the information about the fine arts in India.
			5	Know the contribution of scientists of different eras
			1	Prepare the students to have the knowledge of Linear Programming Problem in Operations
			2	Research at the end students would be able to understand the concept and develop the models for different applications.

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31	HS204ME	Operations Research	3	Make students understand the concept Replacement models at the end students would able to explain various features and applications of replacement models in real time scenario.
			4	Prepare the students to understand theory of Game in operations research at the end students would able to explain application of Game theory in decision making for a conflict
			5	Prepare the students to have the knowledge of Sequencing model at the end student would able to develop optimum model for job scheduling.
			6	Prepare students to understand Queuing theory concepts and various optimization techniques at the end students would able to develop models for waiting line cases.
32	BS206BZ	Biology for Engineers	1	Apply biological engineering principles, procedures needed to solve real-world problems.
			2	Understand the fundamentals of living things, their classification, cell structure and biochemical constituents.
			3	Apply the concept of plant, animal and microbial systems and growth in real life situations.
			4	Comprehend genetics and the immune system.
			5	Know the cause, symptoms, diagnosis and treatment of common diseases.
			6	Apply basic knowledge of the applications of biological systems in relevant industries.
33	ES215EC	Signals and Systems	1	Define and differentiate types of signals and systems in continuous and discrete time
			2	Apply the properties of Fourier transform for continuous time signals
			3	Relate Laplace transforms to solve differential equations and to determine the response of the Continuous Time Linear Time Invariant Systems to known inputs
			4	Apply Z-transforms for discrete time signals to solve Difference equations
			5	Obtain Linear Convolution and Correlation of discrete time signals with graphical representation
34	PC231IT	JAVA Programming	1	Achieve proficiency in object-oriented concepts and also learns to incorporate the same into the Java programming language.
			2	Create Java application programs using sound OOP practices e.g.Inheritance, interfaces and proper program structuring by using packages, access control specifiers.
			3	Understand and Implement the concepts of Exception Handling injava.
			4	Develop the ability to solve real-world problems through software development in high-level programming language using Large APIs of Java as well as the Java standard class library.
			5	Understand File, Streams, Input and Output Handling in java.
			6	Create graphical user interface and Applets in java as well as apply the knowledge of Event Handling.
35	PC232IT	Database Systems	1	Develop the knowledge of fundamental concepts of database management and Designing a database using ER modelling approach.
			2	Implement storage of data, indexing, and hashing.
			3	Apply the knowledge about transaction management, concurrency control and recovery of database systems.
			4	Ability to design entity relationship model and convert entity relationship diagrams into RDBMS and formulate SQL queries on the data.
			5	Apply normalization for the development of application software.
36	PC233IT	Computer Organization and Microprocessor	1	To understand the architecture of modern computer, Bus structures.
			2	Analyse the Different memories and evaluate the mapping techniques.
			3	Discuss the architecture, the instruction set and addressing modes of 8085 processor
			4	Analyse Stacks, Subroutine, Interrupts of 8085, different PPI techniques, the uses of interfaces 8259, RS 232C, USART (8251), and DMA controller

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			5	Design the applications of interfacing circuits 8254/8253timer, A/D and D/A converter, Keyboard/Display controller.
37	PC234IT	Data Communications	1	Demonstrate systematic understanding of Data Communication Techniques.
			2	Apply various encoding schemes.
			3	Understand multiplexing techniques.
			4	Get acquainted with the concepts of virtual circuit networks.
			5	Understand various types of switching techniques.
			6	Understand concepts of wireless LANs.
PRACTICALS				
38	PC261IT	Microprocessor Lab	1	Interpret the principles of Assembly Language Programming, instruction set in developing microprocessor based applications.
			2	Develop Applications such as: 8-bit Addition, Multiplication, Division, array operations, swapping, negative and positive numbers.
			3	Analyse the interfaces like serial ports, digital-to-analog Converters and analog-to-digital converters etc.
			4	Build interfaces of Input-output and other units like stepper motor with 8085.
			5	Analyse the function of traffic light controller.
39	PC262IT	JAVA Programming Lab	1	Develop Java applications using the concepts of Inheritance, interfaces, packages, access control specifiers.
			2	Implement the concepts of Exception Handling in java Applications.
			3	Read and write data using different Java I/O streams.
			4	Create graphical user interfaces and Applets by applying the knowledge of Event Handling.
			5	Create robust applications using Java standard class libraries and retrieve data from a database with JDBC.
			6	Ability to solve real-world problems by designing user friendly GUI with befitting backend through the APIs of Java.
40	PC263IT	Database Systems Lab	1	Design and implement a database schema for a given problem
			2	Develop the query statements with the help of structured query language.
			3	Populate and query a database using SQL and PL/SQL
			4	Develop multi-user database application
			5	Design GUI using forms and implement database connectivity.
SEMESTER V				
41	PC 501IT	SOFTWARE ENGINEERING	1	Acquire knowledge about different software development processes and their usability in different problem domains.
			2	Understand the process of requirements collection, analysing, and modelling requirements for effective understanding and communication with stakeholders.
			3	Design and develop the architecture of real world problems towards developing a blueprint for implementation.
			4	Use the UML language to design various models during software development life cycle.
			5	Understand the concepts of software quality, testing and maintenance.
42	PC 502IT	DATABASE SYSTEMS	1	Understand the mathematical foundations on which RDBMS are built
			2	Model a set of requirements using the Extended Entity Relationship Model (EER), transform an EER model into a relational model.
			3	Understand fundamental and advanced elements of relational model, relational algebra and SQL: construct queries using SQL
			4	Use the knowledge of file organization and indexing to improve database application performance

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			5	Understand the working of concurrency control and recovery mechanisms in RDBMS
43	PC 503IT	OPERATING SYSTEMS	1	To understand the working of computer system and the basic concepts of operating system and the services provided by it.
			2	To understand the functions and management of different resources of the operating system (Processor, I/O, and Memory etc)
			3	To understand process management concepts including scheduling, synchronization, deadlocks
			4	To learn the mechanisms involved in memory management and I/O subsystems of an operating system.
			5	To understand issues of protection and security
44	PC 504IT	AUTOMATA THEORY	1	Design and use deterministic, nondeterministic, and epsilon transition finite state automata and illustrate state transition on symbols of input words and establish the corresponding language of automata.
			2	Analyze Regular Expressions and use Laws and establish the corresponding Regular Language. Prove a given language is regular or otherwise. Use Closure and Decision Properties of Regular Language.
			3	Analyze ambiguity. Develop Context Free Grammars, Parse Tees and establish Context Free Language. Use Closure and Decision Properties of Regular Language.
			4	Design Pushdown Automata and illustrate the working. Develop deterministic Pushdown Automata and establish equivalence of language of PDA and CFG.
			5	Design Turing Machine and illustrate its working, implement programming techniques for Turing Machines, analyze extended and restricted Turing Machines for computational abilities, and establish the Recursively Enumerable language of Turing Machine and analyze the Undecidable problems.
45	PC 505IT	COMPUTER NETWORKS	1	Explain the function of each layer of OSI and trace the flow of information from one
			2	node to another node in the network
			3	Understand the principles of IP addressing and internet routing
			4	Describe the working of various networked applications such as DNS, mail, file transfer and www
			5	Implement client-server socket-based networked applications
PE -I				
46	PE 511 IT	ARTIFICIAL INTELLIGENCE	1	Identify problems that are amenable to solution by AI method.
			2	Understand and analyze working of an AI technique
			3	Formalize a given problem in the language/framework of different AI methods
			4	Understand and design the working of ANN.
47	MC901EG	Gender Sensitization	1	Students will have developed a better understanding of important issues related to gender in contemporary India.
			2	Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film
			3	Students will attain a finer grasp of how gender discrimination works in our society and How to counter it.
			4	Students and professionals will be better equipped to work and live together as equals.
			5	Students will develop a sense of appreciation of women in all walks of life.
PRACTICALS				
48	PC531IT	COMPUTER NETWORKS AND OPERATING	1	Write concurrent programs using message queues and semaphores
			2	Use connection-oriented, connectionless and Asynchronous sockets
			3	Implement networked applications in TCP/IP protocol Suite
			4	Implement client-server socket-based networked applications
			1	Design and implement a database schema for a given problem

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49	PC532IT	DATABASE LAB	2	Populate and query a database using SQL and PL/SQL
			3	Develop multi-user database application
50	PW533IT	MINI PROJECT - III	1	Implement the system using SQL, data structures, C/C++, JAVA, Python and different software engineering models
SEMESTER VI				
51	PC 601 IT	WEB APPLICATION DEVELOPMENT	1	Design and develop dynamic web sites using Html 5.0, CSS, Query.
			2	Develop web content publishing applications that accesses data in XML or JSON format
			3	Develop single page web applications using Angular JS
			4	Design and develop big data applications using Mean stack and SMACK stack Frameworks.
52	PC 602IT	COMPILER CONSTRUCTION	1	Identify and describe the various concepts underlying the components of a compiler and the translation process.
			2	Explain various techniques to Scan and Parse the source code.
			3	Analyze attribute grammars and evaluations for SDT's and use the terminology for generating intermediate code representations.
			4	Analyze fundamentals of storage allocation strategies towards run-time management of data.
			5	Explain basic code generation, code optimization techniques.
53	PC 603IT	EMBEDDED SYSTEMS	1	Study and analysis of embedded systems.
			2	Design and develop embedded systems (hardware, software and firmware)
			3	Analyze, real time systems using RTOS and develop applications.
			4	Apply knowledge to interface various sensors and its applications in embedded systems.
			5	Understand principles of SOC design.
54	PC 604IT	DESIGN AND ANALYSIS OF ALGORITHMS	1	Compute and analyse complexity of algorithms using asymptotic notations.
			2	Write algorithms to solve various computing problems and analyse their time and space complexity.
			3	Understand and apply different algorithm design techniques to solve real world problems and analyse their complexities.
			4	To describe algorithmic complexities of various well known computing problems.
PE -II				
55	PE 611 IT	DATA MINING	1	Classify types of data, perform preprocessing of data and appreciate applications of data mining.
			2	Analyze data for mining frequent patterns, Associations and Correlations.
			3	Perform the classification by using decision tree induction, Bayes classification methods etc. and evaluate the classifier.
			4	Select and perform clustering, outlier analysis detection methods.
			5	Perform Text mining, Spatial Mining, Web mining and Multimedia mining.
56	PE 612 IT	SOFTWARE QUALITY & TESTING (SQT)	1	How to write a useful test plan
			2	How to construct test cases
			3	How to evaluate completeness of testing
			4	Importance of software quality in software development phases
			5	Importance of different standards and metrics for quality assurance.
OE- I				
57	OE 601CE	Disaster Management	1	Able to understand impact on Natural and manmade disasters.
			2	Able to classify disasters and destructions due to cyclones.
			3	Able to understand disaster management applied in India.
			1	To acquire an overview of what an embedded system implies

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58	OE 601 EC	PRINCIPLES OF EMBEDDED SYSTEMS	2	To understand the architecture of a microprocessor and microcontroller to enable to design embedded applications using them.
			3	To apply theoretical learning to practical real time problems for automation.
			4	To understand how to build and debug an embedded system application.
			5	To analyze and design real world applications and interface peripheral devices to the microprocessor.
PRACTICALS				
59	PC631IT	EMBEDDED SYSTEMS LAB	1	Apply the basic concepts to develop an Interface for 8051 and ARM processors.
			2	Demonstrate the RTOS Concepts by designing real time applications.
60	PC632IT	WEB APPLICATION DEVELOPMENT LAB	1	Design Web pages and perform form validation using HTML 5.0 inbuilt functions.
			2	Apply Styles to the web content using CSS.
			3	Create and process web publishing content using XML and JSON.
			4	Use JQuery to perform client side Dynamics.
			5	Create single page applications (Front End) using Angular JS.
			6	Design Big data applications using Mean stack or SMACK stack Frameworks.
61	PW633IT	MINI PROJECT - IV	1	Implement the system using SQL, data structures, C/C++, JAVA, Python and different software engineering models
62	MC 953 SP	Sports	1	Develop one's character and personal qualities, promote the fair game principles, and form an active life position
			2	Develop and share among members and others education, information, and leadership skills
			3	Encourage members to promote the active participation by all youth in fun and healthy physical activities according to their interests and abilities
SEMESTER VII				
63	PC 701 IT	VLSI Design	1	Explain VLSI Design hierarchy and analyse logic gates using CMOS & transmission gate structures.
			2	Identify the layers in the physical structure of ICs and draw the layouts of CMOS logic gates
			3	Summarize the fabrication process of CMOS ICs and analyse the DC, switching characteristics of CMOS inverter.
			4	Analyse dynamic CMOS & pseudo nMOS structures of logic gates, SRAM & DRAM cells
			5	Develop Verilog code for logic gates, examine the effects of interconnect elements in logic cascades and Explain the floor-planning , routing techniques of VLSI circuits
64	PC 702 IT	Big Data Analytics	1	Demonstrate big data and use cases from selected business domains.
			2	Apply the knowledge of NoSQL big data management and experiment with Install, configure, and run Hadoop and HDFS.
			3	Analyse map-reduce analytics using Hadoop.
			4	Adapt Hadoop related tools such as HBase, Cassandra, Pig, and Hive for big data Analytics.
65	PC 703 IT	Wireless Mobile Communication	1	Understand the fundamental concepts of wireless and cellular Networks.
			2	Understand Spread spectrum modulation techniques and compare various Medium Access Control mechanisms
			3	Describe WLAN and GSM
			4	Analyse different variations of TCP for mobile communication systems.
			5	Discuss protocols for MANETs and WAP
66	PC 704 IT	Network Security and Cryptography	1	Understand the most common type of information and network threat sources.
			2	Be able to determine appropriate mechanisms for protecting the network.
			3	Design a security solution for a given application system with respect to security of the system.
			4	Understand the information and network security issues and apply the related concepts for protection and communication privacy.

			5	Comprehend various network security threats and cryptographic algorithms.
OE- II				
67	OE 771 CE	Green Building Technologies	1	Define a green building, along with its features, benefits and rating systems.
			2	Describe the criteria used for site selection and water efficiency methods.
			3	Explain the energy efficiency terms and methods used in green building practices.
			4	Select materials for sustainable built environment & adopt waste management methods.
			5	Describe the methods used to maintain indoor environmental quality.
68	OE 773 EC	Fundamentals of IoT	1	Understand the various applications of IoT and other enabling technologies.
			2	Comprehend various protocols and communication technologies used in IoT
			3	Design simple IoT systems with requisite hardware and C programming software
			4	Understand the relevance of cloud computing and data analytics to IoT
			5	Comprehend the business model of IoT from developing a prototype to launching a product.
69	OE 775 ME	Entrepreneurship	1	Understand Indian Industrial Environment, Entrepreneurship and Economic growth, Small and Large Scale Industries, Types and forms of enterprises.
			2	Identify the characteristics of entrepreneurs, Emergence of first generation entrepreneurs, Conception and evaluation of ideas and their sources.
			3	Practice the principles of project formulation, Analysis of market demand, Financial and profitability analysis and Technical analysis.
			4	Apply the concepts of Project Management during construction phase, project organization, project planning and control using CPM, PERT techniques
			5	Understand the Behavioural aspects of entrepreneurs, Time Management, Various approaches of time management, their strengths and weakness. The urgency addiction and time management matrix.
OE- III				
70	OE 781 CE	Road Safety Engineering	1	Prepare accident investigation reports and database
			2	Apply design principles for roadway geometrics improvement with various types of traffic safety appurtenances/tools
			3	3. Manage traffic including incident management
71	OE 785 ME	Mechatronics	1	Model and analyse electrical and mechanical systems and their interconnection
			2	Integrate mechanical, electronics, control and computer engineering in the design of Mechatronics systems
			3	Do the complete design, building, interfacing and actuation of a Mechatronics system for a set of specifications
			4	Be proficient in the use of fluid power systems in various Mechatronics applications
			5	Demonstrate the use of industrial electronic devices
			6	Demonstrate the design of modern CNC machines, and Mechatronics elements
PRACTICALS				
72	PC 751 IT	VLSI Design Lab	1	Demonstrate Xilinx ISE suite to write Verilog code for logic gates, combinational circuits and sequential circuits.
			2	Write Verilog code for basic logic gates, complex logic gates, combinational circuits, and sequential circuits using switch level, gate level, data flow and behavioural modelling.
			3	Develop test bench code using Verilog and verify the simulation results.
			4	Demonstrate the FPGA implementation of digital circuits and generate the synthesis report.
			5	Draw the layouts of basic logic gates using Microwind
			1	Understand Hadoop working environment
			2	Work with big data applications in multi node clusters

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73	PC 752 IT	Big Data Analytics Lab	3	Write scripts using Pig to solve real world problems
			4	Write queries using Hive to analyse the datasets
			5	Model and build a recommendation system using Mahout Hadoop
			6	Apply big data and echo system techniques for real world
74	PW 761 IT	Project Work - I	1	Demonstrate the ability to synthesize and apply the knowledge and skills acquired in the academic program to the real-world problems.
			2	Evaluate different solutions based on economic and technical feasibility
			3	Effectively plan a project and confidently perform all aspects of project management
			4	Demonstrate effective written and oral communication skills
75	SI 762 IT	Summer Internship	1	Get Practical experience of software design and development, and coding practices within Industrial/R&D Environments.
			2	Gain working practices within Industrial/R&D Environments.
			3	Prepare reports and other relevant documentation.
SEMESTER VIII				
PE -III				
76	PE 821 IT	Distributed Systems	1	Describe the problems and challenges associated with distributed systems.
			2	Implement small scale distributed systems.
			3	Understand design trade-offs in large-scale distributed systems
77	PE 824 CS	Web Services and Architecture	1	Understand web service framework with respect to SOA
			2	Develop SOA compliant web services using open standards and various technologies
			3	Model and implement businesses processes using service oriented approach
PE -IV				
78	PE 832 IT	Adhoc and Sensor Networks	1	Understand the needs of Wireless Adhoc and Sensor Network in current scenario of technology.
			2	Describe current technology trends for the implementation and deployment of wireless adhoc/sensor networks.
			3	Discuss the challenges in designing MAC, routing and transport protocols for wireless ad-hoc/sensor networks.
			4	Explain the principles and characteristics of wireless sensor networks.
PE -V				
79	PE 842 IT	Cloud Computing	1	Understand the architecture and concept of different cloud models: IaaS, PaaS, SaaS
			2	Create virtual machine images and deploy them on cloud
			3	dentify security and compliance issues in clouds.
PRACTICALS				
80	PW 961 IT	Project Work – II	1	Demonstrate the ability to synthesize and apply the knowledge and skills acquired in the academic program to the real-world problems.
			2	Evaluate different solutions based on economic and technical feasibility
			3	Effectively plan a project and confidently perform all aspects of project management
			4	Demonstrate effective written and oral communication skills

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List of Course Outcomes for all the Courses of MECHANICAL 2020-2021

S.No	Course Code	Subject	CO code	CO
				SEMESTER I
1	MC111PO	Indian Constitution	1	Know the background of the present constitution of India.
			2	Understand the working of the union, state and local levels.
			3	Gain consciousness on the fundamental rights and duties.
			4	Be able to understand the functioning and distribution of financial resources between the centre and states.
			5	Be exposed to the reality of hierarchical Indian social structure and the ways the grievances of the deprived sections can be addressed to raise human dignity in a democratic way.
2	BS102MT	Mathematics - I	1	Find the nature of sequences and series
			2	Evaluate multiple integrals
			3	Apply this knowledge to solve the curriculum problems
3	BS104PH	Physics	1	Distinguish materials based on band theory of solids
			2	Classify semiconductors on the basis doping and to estimate conductivity and learn transport phenomenon in semiconductors
			3	Appreciate use of optical absorption by semiconductors.
4	ES106EE	Basic Electrical Engineering	1	To analyze Electrical circuits to compute and measure the parameters of Electrical Energy.
			2	To comprehend the working principles of Electrical DC Machines.
			3	To Identify and test various Electrical switchgear, single phase transformers and assess the ratings needed in given application.
			4	To comprehend the working principles of electrical AC machines.
				PRACTICALS
5	BS152PH	Physics Lab	1	Conduct experiments, take measurements independently.
			2	Write appropriate laboratory reports.
			3	Compute and compare the experimental results and draw relevant conclusions.
			4	Use the graphical representation of data and estimate results from graphs
6	ES154EE	Basic Electrical Engineering Lab	1	Get an exposure to common electrical components and their ratings.
			2	Analyze the performance of DC and AC Machines.
			3	Comprehend the usage of common electrical measuring instruments.
			4	Test the basic characteristics of transformers and electrical machines.
7	ES156CE	Engineering Graphics & Design	1	Introduction to engineering design and its place in society
			2	Exposure to the visual aspects of engineering design
			3	Exposure to engineering graphics standards
			4	Exposure to solid modeling
			5	Exposure to computer-aided geometric design
			6	Exposure to creating working drawings

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			7	Exposure to engineering communication
SEMESTER II				
8	MC112CE	Environmental Science	1	Adopt environmental ethics to attain sustainable development.
			2	Develop an attitude of concern for the environment.
			3	Conservation of natural resources and biological diversity.
			4	Creating awareness of Green technologies for nation's security.
			5	Imparts awareness for environmental laws and regulations.
9	MC113PY	Essence of Indian Traditional Knowledge	1	Understand philosophy of Indian culture.
			2	Distinguish the Indian languages and literature.
			3	Learn the philosophy of ancient, medieval and modern India.
			4	Acquire the information about the fine arts in India.
			5	Know the contribution of scientists of different eras.
10	HS101EG	English	1	Read, understand, and interpret a variety of written texts
			2	Use appropriate vocabulary and correct grammar
			3	Undertake guided and extended writing with confidence.
11	BS103MT	Mathematics – II	1	Solve system of linear equations and eigen value problems
			2	Solve certain first order and higher order differential equations
			3	Solve basic problems of Beta Gamma and Legender's Function.
			4	Apply Laplace Transforms; solve ordinary Differential Equations by using it.
12	BS105CH	Chemistry	1	Apply concept of electrode potential in identifying feasibility of electrochemical reaction; illustrate electro analytical techniques and working of batteries.
			2	Identify the mechanism of corrosion of materials on basis of electrochemical approach and devise corrosion control methods.
			3	Estimate the physical & chemical parameters of quality of water and explain the process of water treatment.
			4	Explain the influence of chemical structure on properties of materials and their choice in engineering applications.
			5	Classify chemical fuels and grade them through qualitative analysis.
			6	Relate the concept of green chemistry to modify engineering processes and materials.
13	ES107CS	Programming for Problem Solving	1	Formulate simple algorithms for arithmetic and logical problems.
			2	Translate the algorithms to programs (in c language).
			3	Test and execute the programs and correct syntax and logical errors.
			4	Implement conditional branching, iteration and recursion.
			5	Decompose a problem into functions and synthesize a complete program using divide and conquer approach.
			6	Use arrays, pointers and structures to formulate algorithms and programs.
			7	Apply programming to solve matrix addition and multiplication problems and searching and sorting problems.

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			8	Apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.
				PRACTICALS
14	HS151EG	English Lab	1	Listen, understand, and interpret formal and informal spoken language
			2	Speak English with acceptable pronunciation, stress, and intonation
			3	Present themselves with confidence in formal situations
			4	Participate in individual and group activities with relative ease
15	BS 153 CH	Chemistry Lab	1	Apply the principles of Colourimetry and Electrochemistry in quantitative estimations.
			2	Estimate the rate constants of reactions from concentration of reactants/ products as a function of time.
			3	Synthesize small drug molecules.
16	ES 155 CS	Programming for Problem Solving Lab	1	Choose appropriate data type for implementing programs in C language.
			2	Design and implement modular programs involving input output operations, decision making and looping constructs.
			3	Implement search and sort operations on arrays.
			4	Apply the concept of pointers for implementing programs on dynamic memory management and string handling.
			5	Design and implement programs to store data in structures and files.
17	ES 157 ME	Workshop/ Manufacturing Process	1	Demonstrate an understanding of and comply with workshop safety regulations.
			2	Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
			3	Study and practice on machine tools and their operations
			4	Undertake jobs connected with Engineering Workshop trades including fitting, carpentry, sheet metal, house wiring, welding, smithy and foundry.
			5	Apply basic electrical engineering knowledge for house wiring practice
				SEMESTER III
18	MC111PO	Indian Constitution	1	Know the background of the present constitution of India.
			2	Understand the working of the union, state and local levels.
			3	Gain consciousness on the fundamental rights and duties.
			4	Be able to understand the functioning and distribution of financial resources between the centre and states.
			5	Be exposed to the reality of hierarchical Indian social structure and the ways the grievances of the deprived sections can be addressed to raise human dignity in a democratic way
19	HS201EG	Effective Technical Communication in English	1	Handle technical communication effectively
			2	Use different types of professional correspondence
			3	Use various techniques of report writing
			4	Acquire adequate skills of manual writing
			5	Enhance their skills of information transfer and presentations
20	HS202CM	Finance and Accounting	1	Evaluate the financial performance of the business unit
			2	Take decisions on selection of projects
			3	Take decisions on procurement of finances

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		Accounting	4	Analyse the liquidity, solvency and profitability of the business unit
			5	Evaluate the overall financial functioning of an enterprise
21	BS205MT	Mathematics - III (PDE, Probability	1	Solve field problems in engineering involving PDEs.
			2	Formulate and solve problems involving random variables and apply statistical methods for analysing experimental data.

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22	ES211CE	Engineering Mechanics	1	Analyze the effect of a system of forces on a body.
			2	Analyze the static equilibrium of bodies in 2D and 3D and the effect of friction and its governing laws on bodies in equilibrium.
			3	Determine the Centroid, Center of gravity, Moment of Inertia and Mass moment of inertia of different plane and solid bodies.
			4	Apply the laws of motion to study the kinematic parameters of a moving rigid body.
			5	Solve the problems involving translation and rotation of rigid bodies by applying principles of kinetics, work-energy and impulse momentum.
			6	Analyze and solve impact problems using principles of impulse momentum.
23	ES214EC	BASIC ELECTRONICS	1	Study and analyse the rectifiers and regulator circuits.
			2	Study and analyse the performance of BJTs, FETs on the basis of their operation and working.
			3	Ability to analyse & design oscillator circuits.
			4	Ability to analyse different logic gates & multi-vibrator circuits.
			5	Ability to analyse different data acquisition systems
24	PC221ME	METALLURGY & MATERIAL SCEINCE	1	Know the fundamental science and engineering principles relevant to material.
			2	Suggest appropriate physical metallurgical methods (phase diagrams).
			3	The type of heat treatment operation to be given to any metal in order to improve desired Mechanical properties.
			4	Basic ability to plan an extraction process for given ore.
			5	Suggest the appropriate methods for prevention of failures.
			6	Analyse the applications of conventional metals and alloys.
25	PC222ME	Thermodynamics	1	Correlate the study of thermodynamics with the fundamental conceptual terminologies and Distinguish the different forms of energy
			2	Analyse the Laws of Thermodynamics and correlate them for real life problem solving.
			3	Read data from the chart of Mollier diagram and its applications.
			4	Assess the importance of entropy and recognize the various curves of phase transformation
			5	Identify the various air standard cycles, gas cycles and gas laws toward solving practical applications.
PRACTICALS				
26	PC251ME	Metallurgy and Material Testing Lab	1	Prepare specimen for metallographic observation
			2	Analyse and identify low, medium and high carbon steels, different types of cast irons, non-ferrous alloys, from the study of their microstructure
			3	Underlines the importance of grain size in evaluating the desired mechanical properties.
			4	Correlate the heat treatment methods and the mechanical properties obtained.
			5	Analyse and identify microstructures after annealing, normalizing, hardening and tempering Relate the properties of the materials using image analyser

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27	PC252ME	Machine Drawing and Modelling Lab	1	Will be able to draw isometric and orthogonal projections and sectional views of various mechanical components.
			2	Will be able to draw free hand sketches of various mechanical components
			3	Will be able to understand the shape and structure of different types of joints, screws, keys and Couplings
			4	Will be sufficiently knowledgeable to use both the software and drafter to produce assembly views of various mechanical components from part drawings.
SEMESTER IV				
28	MC112CE	Environmental Sciences	1	State the efficient use of natural resources.
			2	Knowledge on the role of ecology as the basis of environmental science
			3	State the importance of bio-diversity & means to conserve it.
			4	Assess the environmental risks associated to various pollutions and understand the environmental laws & policies.
			5	Discuss the current environmental issues & relate the disasters & its management techniques.
29	MC113PY	Essence of Indian Traditional Knowledge	1	Understand philosophy of Indian culture.
			2	Distinguish the Indian languages and literature.
			3	Learn the philosophy of ancient, medieval and modern India.
			4	Acquire the information about the fine arts in India.
			5	Know the contribution of scientists of different eras
30	HS203MP	Industrial Psychology	1	Understanding of key concepts, theoretical perspectives, and trends in industrial psychology.
			2	Evaluate the problems thorough and systematic competency model.
			3	Analyse the problems present in environment and design a job analysis method.
			4	Create a better work environment for better performance.
			5	Design a performance appraisal process and form for the human behavior.
31	BS206BZ	Biology for Engineers	1	Apply biological engineering principles, procedures needed to solve real-world problems.
			2	Understand the fundamentals of living things, their classification, cell structure and biochemical constituents.
			3	Apply the concept of plant, animal and microbial systems and growth in real life situations.
			4	Comprehend genetics and the immune system.
			5	Know the cause, symptoms, diagnosis and treatment of common diseases.
			6	Apply basic knowledge of the applications of biological systems in relevant industries.
32	ES213ME	Energy Sciences and Engineering	1	Understand the basics of various sources of energy
			2	Analyse the present status of conventional energy sources.
			3	Understand the working principles of Renewable Energy systems
			4	Design and develop waste heat recovery systems.
			5	Relate energy economics, standards and future challenges.
33	PC231ME	Mechanics of Materials	1	Understand the theory of elasticity and Hooke's law
			2	Analyse beams to determine shear force and bending moments
			3	Analyse shear stress distribution in different sections of beams.
			4	Analyse and design structural members subjected to combined stresses
			5	Solve problems on bars and to determine deflections at any point of the beams

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34	PC232ME	Applied Thermodynamics	1	Expected to be able to quantify the behaviour of reciprocating compressors.
			2	Expected to be able to explain thermal design and working principles of IC Engines, their supporting systems and Combustion chambers.
			3	Expected to be able to quantify the behaviour of power plants based on the Rankine cycle, including the effect of enhancements such as superheat, reheat and regeneration.
			4	Expected to be able to explain the thermal design and working principles of Power plant devices.
			5	Expected to be able to explain working principles of Boilers, Condensers, Pumps &Nozzles.
35	PC233ME	Kinematics of Machinery	1	Understand the principles of kinematic pairs, chains and their classification, DOF, inversions, equivalent chains and planar mechanisms.
			2	Analyse the planar mechanisms for position, velocity and acceleration.
			3	Design frictional systems like belt drives, rope drives, clutches, bearings and screw threads
			4	Design cams and followers for specified motion profiles.
			5	Evaluate gear tooth geometry and select appropriate gears for the required applications
36	PC234ME	Manufacturing Process	1	Describe the concepts of Foundry Technologies consisting of pattern making, mould making, gating design and solidification.
			2	Discuss the importance of special casting processes, categorize various casting defects and describe the processing of plastics.
			3	Classify and differentiate various Arc welding, Gas welding and Advanced welding processes, discuss their advantages, applications and limitations.
			4	Differentiate various Solid State welding and Resistance welding processes, discuss their applications, and identify various welding defects.
			5	Describe various forming processes, sheet metal operations and discuss the importance of unconventional forming processes.
PRACTICALS				
37	PC261ME	Thermal Engineering Lab - I	1	Perform experiments to find the efficiency of Petrol and Diesel engines.
			2	Find the properties of unknown fuels/lubricants.
			3	Perform experiments on CI and SI engines.
			4	Perform experiments on Reciprocating Air Compressor.
38	PC262ME	Manufacturing Processes Lab	1	Conduct experiments and put hands-on experience on various processes in foundry, welding, forging, forming and plastic manufacturing technologies.
			2	Demonstrate the understanding of the theoretical concepts of above technologies while working in small groups.
			3	Demonstrate writing skills through clear laboratory reports
			4	Identity the defects / imperfections and discuss their causes and suggest remedies to eliminate them.
			5	Transfer group experience to individual performance of exercises and demonstrate effective oral communication skills.

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B.E 3/4				
39	PC501ME	Fluid Mechanics and Hydraulic Machinery		Distinguish the properties of the fluids and different types of pressure and measure them.
				Explain different types of flows and analyze them.
				Analyze the flow between parallel plates and in pipes and also calculate drag and lift coefficients.
				Demonstrate the working principles of various hydraulic turbines and estimate their performance.
				Demonstrate the working principles of various hydraulic pumps and estimate their performance.
40	PC502ME	Design of Machine Elements		Identify & Use codes and standards, selection proper material & perform static design.
				Analyze cyclic loading conditions and provide fatigue design of components
				Analyze machine elements like keys, shafts and couplings,
				Evaluate various joining techniques like welding, riveting and cotter joints.
				Synthesize an d design screw threads for fasteners and power screw applications
41	PC503ME	Dynamics of Machines		Analyse static and dynamic forces in slider crank and other mechanisms; determine the magnitude of gyroscopic couple and its effect on vehicles in motion.
				Evaluate the performance of various types of governors and design flywheels considering speed and energy fluctuation
				Analyse problems of balancing in rotating and reciprocating machinery.
				Evaluate the natural frequencies of single and two degree of freedom systems in free and forced vibration mode, also considering the effect of damping.
				Determine the natural frequencies and mode shapes of multi degree of freedom systems, including by Dunkerley, Raleigh and Holzer methods.
42	PC504ME	Metal Cutting and Machine Tools		Understand the cutting tool geometry, mechanism of chip formation and mechanics of orthogonal cutting.
				Understand the thermal aspects of metal cutting, influence of tool wear on tool life and machinability.
				Identify basic parts and operations of machine tools including lathe, shaper, planer, milling, drilling, and boring machines.
				Design locating and clamping devices to produce a component.
				Understand the principles of various finishing processes and gear manufacturing processes
				Understand the principle and working of various unconventional machining processes.
43	PC505ME	Heat Transfer		To understand the basic concepts of heat transfer.
				To understand the concepts of heat transfer through extended surfaces.
				To Familiarize with time dependent heat transfer and compute convective heat transfer coefficients in forced, natural convection.
				To understand radiation heat transfer
				To understand , heat exchangers and mechanism involved in boiling and condensation.

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44	PC591ME	Thermal Engineering Lab-2		Interpret the link between refrigeration effects, work done and COP of the system, describe different methods adopted to evaluate COP, list the different psychrometric processes and describe how those processes can be maintained
				Calculate the overall efficiency of centrifugal blower and axial flow fan at different volume flow rates, show the variation of overall efficiency with load and speed graphically To understand radiation heat transfer, heat exchangers and mechanism involved in boiling and condensation.
				Identify the various components of low speed wind tunnel, plot a graph showing variation of pressure over the entire length of aerofoil blade and also evaluate the lift and drag coefficient values for a given aerofoil blade at different angle of assign
				Describe the modes of heat transfer, calculate thermal conductivity, heat transfer coefficient subjected to natural and forced convection environment and Stefan Boltzmann constant value of thermal radiation.
				Express the working principle of heat exchangers and its application in real life, calculate the LMTD and effectiveness of a given heat exchanger for both parallel and counter flows.
46	PC592ME	Dynamics of Machines Lab		To experimentally quantify the effect of inertia forces in systems like flywheel, gyroscope and governors.
				To evaluate vibrational characteristics of various systems experimentally.
				To Synthesize balancing method of multi plane rotating masses.
47	PC593ME	Fluid Mechanics and Hydraulic		Practice and experiment on different types of turbines and analyse their performance at rated and off design conditions.
				Investigate through experimentation different types of pump models and estimate their performance.
				Apply the priniciple of different flow measuring instruments and their adoptability to the industry.
				Develop the hydraulic circuits to cater the needs of the industry.
48	PC601ME	Machine Design		Analyze helical coil springs and leaf springs for mechanical systems
				Evaluate kinematic transmission systems using gears
				Select bearing system for specific applications
				Design various IC engine components
				Determine load carrying capacity of curved beams
49	PC602ME	Metrology and Instrumentation		To understand limits, fits and tolerances and their applications. Linear and angular measurements and measuring instruments.
				To understand the design of limit gauges, evaluate roughness and its measurement.
				To understand basic measuring system, static and dynamic characteristics of instruments
				To understand various principles to measure pressure, temperature, displacement, force, torque and vibrations.

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50	PC603ME	Finite Element Analysis		Summarize basic equations of elasticity and formulate finite element modeling of one dimensional element using Potential energy approach.
				Formulate finite element modeling of truss and frame elements along with the concepts of transformation from local to global matrices.
				Interpolate Hermitian shape function of beam element in natural coordinate system.
				Develop stiffness matrix for a plane stress & plane strain conditions on a CST, Axisymmetric elements by interpolating shape functions in natural coordinate system.
				Formulate finite element model to steady state heat transfer analysis using one & two dimensional elements.
				Formulate mass and stiffness matrices of 1D & beam elements to establish Eigen values &Eigen vectors using Lagarangian and Hamilton principles.
51	PE611ME	CAD/CAM		Understand the fundamental applications of computer in design, manufacturing and geometric transformation techniques in CAD
				Develop mathematical Model for curves, surfaces, solid models and understand the fundamental concepts of Finite Element Analysis
				Write CNC Part program for manufacturing components
				Understand the concepts of Machining Centres, adaptive control and as well as fundamentals knowledge of robotics
				Understand the working of various components of an modern manufacturing systems
52	PE612ME	AUTOMOBILE ENGINEERING		Generalize the different types of automobiles, list the engine components, describe the functioning of IC engines and classify the fuel supply system for S.I and C.I engines
				Differentiate the types of lubrication system; identify different lubrication and cooling systems used in vehicles. Classify ignition system and describe the functioning of battery and automobile air conditioning system.
				List the salient features of different steering mechanisms, describe the importance of wheel alignment and wheel balancing, describe the importance of different suspension systems and shock absorbers used in an automobile
				Identify different components in power transmission system design a system, components, or process to meet desired needs with in realistic constrains such as economic, environmental, health and safety, describe about braking system
				Adapt techniques, skills and modern engineering tools necessary to control the pollution, record the automobile parts maintenance, design and build components and system to reduce pollution of automobile vehicles
53	PE613ME	MODERN MACHINING AND FORMING METHODS		Understand the evolution, classification and need of nontraditional machining technology in modern manufacturing
				Understand the principle, description, the parametric effect on process performance and material removal mechanics of USM, AJM, WJM and AWJM processes.
				Understand the principle, description, the parametric effect on process performance and material removal mechanics of EDM, EDG, ECM and CHM processes.
				Understand the principle, description, the parametric effect on process performance and material removal mechanics of LBM, EBM, PAM and Ion machining processes.
				Compare conventional & high energy rate forming methods
				Understand the principle, working and applications of various types of high energy rate forming methods.

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54	OE601ME	Entrepreneurship		Understand Indian Industrial Environment, Entrepreneurship and Economic growth, Small and Large Scale Industries, Types and forms of enterprises.
				Identify the characteristics of entrepreneurs, Emergence of first generation entrepreneurs, Conception and evaluation of ideas and their sources.
				Practice the principles of project formulation, Analysis of market demand, Financial and profitability analysis and Technical analysis.
				Apply the concepts of Project Management during construction phase, project organization, project planning and control using CPM, PERT techniques
				Understand the Behavioural aspects of entrepreneurs, Time Management, Various approaches of time management, their strengths and weakness. The urgency addiction and time management matrix.
55	OE602ME	INDUSTRIAL ROBOTICS		Able to demonstrate knowledge of the relationship between mechanical structures of industrial robots and their operational workspace characteristics and have an understanding of the functionality and limitations of robot actuators and sensors.
				Able to demonstrate an ability to apply spatial transformation to obtain forward/Inverse kinematics equation of robot manipulators using analytical/numerical/simulation tools.
				Able to apply knowledge and choose the best & economically suitable sensors/end effectors required for specific applications.
				Able to understand the importance of robot vision and apply the learnt techniques to get the required information from input images.
				Able to design and develop a industrial robot for a given purpose economically.
				Appreciate the current state and potential for robotics in new application areas.
56	PC691ME	METROLOGY & MACHINE TOOLS LAB		Select and apply the knowledge of measuring tools for external, internal and angular measurements for promoting the qualitative production management.
				Adapt the principles of optical measurements in measurement of screw and gear profiles.
				Choose and practice the appropriate methods of force measuring devices principles for required situation.
				Demonstrate the need of machine alignment test for qualitative production.
				Practice calibration principles for maintaining the required precision of instruments / tools.
				Select and practice the methods of temperature measurement.
				Select cutting tool materials and tool geometries along with appropriate cutting conditions for different work materials and grind the cutting tools to the required geometry.
				Recognize and summarize the features and applications of various machine tools like Lathe, Milling, Drilling, Grinding, Shaping, Slotting etc.

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57	PC692ME	Computer Aided Engineering LAB		Classify the types of Trusses (Plane Truss & Spatial Truss) and Beams (2D & 3D) with various cross sections to determine Stress, Strains and deflections under static, thermal and combined loading
				Generalized Plane stress, plane strain conditions & axi-symmetric loading on inplane members to predicting the failure behavior and finding the SCF
				Analyse connecting rod with tetrahedron and brick elements, performing static analysis on flat & curved shells to determine stresses, strains with different boundary conditions.
				Predict the natural frequencies and modes shapes using Modal, Harmonic analysis. Also finding the critical load using Buckling analysis
				Simulate steady state heat transfer analysis of chimney, Transient heat transfer of castings, Non linear, Buckling analysis of shells CFD analysis
				Evaluate the stiffness matrix, B matrix and loading matrices of beam in plane/solid elements using MATLAB / Python software
SEMESTER VII				
58	PC 701 ME	Thermal Turbo Machines	1	Formulate the problems related to fluid flow
			2	Explain the working principle of mechanical devices handling compressible fluids
			3	Analyse the turbomachines for its performance parameters
			4	Understand formulation of governing equations for compressible fluid flow
			5	Design concepts of mechanical devices handling compressible fluids
59	PC 702 ME	Finite Element Analysis	1	Summarize basic equations of elasticity and formulate finite element modelling of one dimensional element using Potential energy approach.
			2	Formulate finite element modelling of truss and frame elements along with the concepts of transformation from local to global matrices.
			3	Interpolate Hermitian shape function of beam element in natural coordinate system.
			4	Develop stiffness matrix for a plane stress & plane strain conditions on a CST, Axisymmetric elements by interpolating shape functions in natural coordinate system.
			5	Interpolate the shape functions of Isoparametric elements and to present the use of numerical integration to evaluate the element matrices in typical 2D problems. Formulate finite element model to steady state heat transfer analysis using one & two dimensional elements
60	PC 703 ME	Industrial Engineering	1	Explain various approaches for industrial management. Able to infer concept of management in human resource domain
			2	Apply Philosophy of Production Planning and Control in Industry and control the activities in delivering the products in time
			3	Determine the optimum requirement of inventory by developing the various quantitative models.
			4	Develop various models or methods for ensuring the required quality of the products or processes.
			5	Elaborate the role of Decision theory and apply various approaches under Uncertainty and Risk conditions

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61	PC 704 ME	Production And Operations Management	1	Explain various types of Production Systems, develop suitable layout for a given plant
			2	Develop various methods for work study and apply suitable Recording techniques. Develop standard procedures and time for the operations.
			3	Explain necessity of Forecasting and various methods of it. Develop suitable quantitative forecasting technique for the given past data. Compare accuracy of models in connection with forecast errors.
			4	Explain Aggregate planning & Mater scheduling, Materials Requirement Planning Processes, Develop quantitative models for Material requirement and resources based on time span.
			5	Elaborate the usages of PERT/CPM techniques for a give project and develop suitable quantitative model for the project in successful competition by identifying the time constraints for start and end of process activities.
62	HS 901 MB	Managerial Economics and Accountancy	1	Determine the responsibilities of a manager of a business undertaking.
			2	Assess various factors influencing demand elasticity
			3	Able to Forecast & compute the future sales level.
			4	Determine Break Even Point (BEP) of an enterprise Outline the features, steps, merits, uses & limitations of Pay Back, ARR, NPV, PI & IRR methods of Capital Budgeting
			5	Understands the principles of accounting and prepare Journal, Ledger, Trial Balance, Manufacturing A/c, Trading A/c., Profit & Loss A/c. and Balance Sheet of an enterprise.
OE- II & III				
63	OE 774 EE	Non-Conventional Energy Sources	1	Understand the different nonconventional sources and the power generation techniques to generate electrical power.
			2	Understand the Solar energy power development and different applications.
			3	Understand different wind energy power generation techniques and applications.
			4	Design a prescribed engineering sub-system
			5	Recognize the need and ability to engage in lifelong learning for further developments in this field.
64	OE 775 ME**	Entrepreneurship	1	Understand Indian Industrial Environment, Entrepreneurship and Economic growth, Small and Large Scale Industries, Types and forms of enterprises.
			2	Identify the characteristics of entrepreneurs, Emergence of first generation entrepreneurs, Conception and evaluation of ideas and their sources.
			3	Practice the principles of project formulation, Analysis of market demand, Financial and profitability analysis and Technical analysis.
			4	Apply the concepts of Project Management during construction phase, project organization, project planning and control using CPM, PERT techniques
			5	Understand the Behavioural aspects of entrepreneurs, Time Management, Various approaches of time management, their strengths and weakness. The urgency addiction and time management matrix.
65	OE 785 ME**	Mechatronics	1	Model and analyse electrical and mechanical systems and their interconnection
			2	Integrate mechanical, electronics, control and computer engineering in the design of Mechatronics systems
			3	Be proficient in the use of fluid power systems in various Mechatronics applications
			4	Demonstrate the use of industrial electronic devices
			5	Demonstrate the design of modern CNC machines, and Mechatronics elements

PRACTICALS				
66	PC 751 ME	Thermal Engineering Lab	1	Interpret the link between refrigeration effects, work done and COP of the system, describe different methods adopted to evaluate COP, list the different psychrometric processes and describe how those processes can be maintained
			2	Calculate the overall efficiency of centrifugal blower and axial flow fan at different volume flow rates, show the variation of overall efficiency with load and speed graphically
			3	Identify the various components of low speed wind tunnel, plot a graph showing variation of pressure over the entire length of aerofoil blade and also evaluate the lift and drag coefficient values for a given aerofoil blade at different angle of assign
			4	Describe the modes of heat transfer, calculate thermal conductivity, heat transfer coefficient subjected to natural and forced convection environment and Stefan Boltzmann constant value of thermal radiation
			5	Express the working principle of heat exchangers and its application in real life, calculate the LMTD and effectiveness of a given heat exchanger for both parallel and counter flows
67	PC 752 ME	CAE Lab	1	Classify the types of Trusses (Plane Truss & Spatial Truss) and Beams (2D & 3D) with various cross sections to determine Stress, Strains and deflections under static, thermal and combined loading
			2	Generalize Plane stress, plane strain conditions & axisymmetric loading on inplane members to predicting the failure behavior and finding the SCF
			3	Analyse connecting rod with tetrahedron and brick elements, performing static analysis on flat & curved shells to determine stresses, strains with different boundary conditions.
			4	Predict the natural frequencies and modes shapes using Modal, Harmonic analysis. Also finding the critical load using Buckling analysis
			5	Simulate steady state heat transfer analysis of chimney, Transient heat transfer of castings, Nonlinear, Buckling analysis of shells &CFD analysis
68	PW 761 ME	Project Work – I	1	Demonstrate the ability to synthesize and apply the knowledge and skills acquired in the academic program to the real-world problems.
			2	Evaluate different solutions based on economic and technical feasibility
			3	Effectively plan a project and confidently perform all aspects of project management
			4	Demonstrate effective written and oral communication skills
69	SI 762 ME	Summer Internship	1	Able to design/develop a small and simple product in hardware or software.
			2	Able to complete the task or realize a prespecified target, with limited scope, rather than taking up a complex task and leave it.
			3	Able to learn to find alternate viable solutions for a given problem and evaluate these alternatives with reference to prespecified criteria.
			4	Able to implement the selected solution and document the same.

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SEMESTER VIII				
70	PE 823 ME	Composite Materials	1	Demonstrate knowledge of composites and their structure
			2	Predict the Elastic constants and Hygrothermal stresses
			3	Analyse the stress - strain relationship in composites
			4	Summarise and apply the Design procedure and the failure criteria.
			5	Formulate Plate bending equations for various Boundary conditions of composite plates.
71	PE 824 ME	Non-Destructive Testing	1	Knows the different NDT techniques
			2	Clear understanding of liquid penetrant inspection and magnetic particle inspection.
			3	View and interpret radiographs, utilize the various principles of radiography for different components of different shapes
			4	State the knowledge of acoustic emission for NDT and the instrumentation used for NDT.
			5	Discuss knowledge of latest research, developments and trends in NDT.
PE - III				
72	PE 826 ME	Power Plant Engineering	1	Select coal and ash handling methods for a coal fired power plant.
			2	Comprehend basic working principle of steam and gas turbine power plant, Classify Dams and Spillways.
			3	Demonstrate the basic principles of thermal-fission and fast-breeder nuclear power plants, such as pressurized- water, boiling-water, and heavy-water reactors.
			4	Analyse load factor, capacity factor, average load and peak load on a power plant.
			5	Illustrate the control methods of major pollutants emitted from fossil-fuel power plants.
73	PE 829 ME	Product Design And Process Planning	1	Identify the functions of design of a product in a system in a given situation and select a suitable product; identify the procedure for technological innovation of a product; explain the importance of brainstorming and Delphi techniques in innovation
			2	Explain the importance of design, human machine interaction in project selection and evaluation methods including ergonomic considerations
			3	Explain the importance of research in new product development; describe the process of patenting including search of patents, patent laws and international code and discriminate the scope of IPR for a product patent.
			4	Discuss the features of design of a new product with respect to manufacture, quality testing and marketing; and steps to evaluate a new product for introduction
			5	Develop process planning including creating process sheets; explain value engineering, group technology and concurrent engineering in the selection of manufacturing process.

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PE - IV				
74	PE 833 ME	Machine Tool Engineering and Design	1	Understand basic motions involved in a machine tool.
			2	Design machine tool structures
			3	Design and analyse systems for specified speeds and feeds
			4	Understand control strategies for machine tool operations
			5	Apply appropriate quality tests for quality assurance
75	PE 834 ME	Entrepreneurship Development	1	Understand Indian Industrial Environment, Entrepreneurship and Economic growth, Small and Large Scale Industries, Types and forms of enterprises.
			2	Identify the characteristics of entrepreneurs, Emergence of first generation entrepreneurs, Conception and evaluation of ideas and their sources.
			3	Practice the principles of project formulation, Analysis of market demand, Financial and profitability analysis and Technical analysis.
			4	Apply the concepts of Project Management during construction phase, project organization, project planning and control using CPM, PERT techniques
			5	Understand the Behavioural aspects of entrepreneurs, Time Management, Various approaches of time management, their strengths and weakness. The urgency addiction and time management matrix.
PE-V				
76	PE 841 ME	Energy Conservation and Management	1	Understand different forms of energy
			2	Calculate the amount of heat energy available
			3	Understand the industry energy conservation modelling
			4	Understand methodology for forecasting industrial energy supply and demand.
77	PE 843 ME	Waste Heat Recovery and	1	Understand the concept of waste heat recovery
			2	Distinguish heat exchangers and recuperators
			3	Acquire knowledge about various cogeneration methods
PRACTICALS				
78	PW 961 ME	Project Work - II	1	Demonstrate the ability to synthesize and apply the knowledge and skills acquired in the academic program to the real-world problems.
			2	Evaluate different solutions based on economic and technical feasibility
			3	Effectively plan a project and confidently perform all aspects of project management
			4	Demonstrate effective written and oral communication skills

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List of Course Outcomes for all the Courses of Production 2020-2021

S.No	Course Code	Subject	CO code	CO
			SEMESTER I	
1	MC111PO	Indian Constitution	1	Know the background of the present constitution of India.
			2	Understand the working of the union, state and local levels.
			3	Gain consciousness on the fundamental rights and duties.
			4	Be able to understand the functioning and distribution of financial resources between the centre and states.
			5	Be exposed to the reality of hierarchical Indian social structure and the ways the grievances of the deprived sections can be addressed to raise human dignity in a democratic way.
2	BS102MT	Mathematics - I	1	Find the nature of sequences and series
			2	Evaluate multiple integrals
			3	Apply this knowledge to solve the curriculum problems
3	BS104PH	Physics	1	Distinguish materials based on band theory of solids
			2	Classify semiconductors on the basis doping and to estimate conductivity and learn transport phenomenon in semiconductors
			3	Appreciate use of optical absorption by semiconductors.
4	ES106EE	Basic Electrical Engineering	1	To analyze Electrical circuits to compute and measure the parameters of Electrical Energy.
			2	To comprehend the working principles of Electrical DC Machines.
			3	To Identify and test various Electrical switchgear, single phase transformers and assess the ratings needed in given application.
			4	To comprehend the working principles of electrical AC machines.
			PRACTICALS	
5	BS152PH	Physics Lab	1	Conduct experiments, take measurements independently.
			2	Write appropriate laboratory reports.
			3	Compute and compare the experimental results and draw relevant conclusions.
			4	Use the graphical representation of data and estimate results from graphs
6	ES154EE	Basic Electrical Engineering Lab	1	Get an exposure to common electrical components and their ratings.
			2	Analyze the performance of DC and AC Machines.
			3	Comprehend the usage of common electrical measuring instruments.
			4	Test the basic characteristics of transformers and electrical machines.
7	ES156CE	Engineering Graphics & Design	1	Introduction to engineering design and its place in society
			2	Exposure to the visual aspects of engineering design
			3	Exposure to engineering graphics standards
			4	Exposure to solid modeling
			5	Exposure to computer-aided geometric design
			6	Exposure to creating working drawings
			7	Exposure to engineering communication
			SEMESTER II	

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8	MC112CE	Environmental Science	1	Adopt environmental ethics to attain sustainable development.
			2	Develop an attitude of concern for the environment.
			3	Conservation of natural resources and biological diversity.
			4	Creating awareness of Green technologies for nation's security.
			5	Imparts awareness for environmental laws and regulations.
9	MC113PY	Essence of Indian Traditional Knowledge	1	Understand philosophy of Indian culture.
			2	Distinguish the Indian languages and literature.
			3	Learn the philosophy of ancient, medieval and modern India.
			4	Acquire the information about the fine arts in India.
			5	Know the contribution of scientists of different eras.
10	HS101EG	English	1	Read, understand, and interpret a variety of written texts
			2	Use appropriate vocabulary and correct grammar
			3	Undertake guided and extended writing with confidence.
11	BS103MT	Mathematics – II	1	Solve system of linear equations and eigen value problems
			2	Solve certain first order and higher order differential equations
			3	Solve basic problems of Beta Gamma and Legender's Function.
			4	Apply Laplace Transforms; solve ordinary Differential Equations by using it.
12	BS105CH	Chemistry	1	Apply concept of electrode potential in identifying feasibility of electrochemical reaction; illustrate electro analytical techniques and working of batteries.
			2	Identify the mechanism of corrosion of materials on basis of electrochemical approach and devise corrosion control methods.
			3	Estimate the physical & chemical parameters of quality of water and explain the process of water treatment.
			4	Explain the influence of chemical structure on properties of materials and their choice in engineering applications.
			5	Classify chemical fuels and grade them through qualitative analysis.
			6	Relate the concept of green chemistry to modify engineering processes and materials.
13	ES107CS	Programming for Problem Solving	1	Formulate simple algorithms for arithmetic and logical problems.
			2	Translate the algorithms to programs (in c language).
			3	Test and execute the programs and correct syntax and logical errors.
			4	Implement conditional branching, iteration and recursion.
			5	Decompose a problem into functions and synthesize a complete program using divide and conquer approach.
			6	Use arrays, pointers and structures to formulate algorithms and programs.
			7	Apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
			8	Apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.
PRACTICALS				

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14	HS151EG	English Lab	1	Listen, understand, and interpret formal and informal spoken language
			2	Speak English with acceptable pronunciation, stress, and intonation
			3	Present themselves with confidence in formal situations
			4	Participate in individual and group activities with relative ease
15	BS 153 CH	Chemistry Lab	1	Apply the principles of Colourimetry and Electrochemistry in quantitative estimations.
			2	Estimate the rate constants of reactions from concentration of reactants/ products as a function of time.
			3	Synthesize small drug molecules.
16	ES 155 CS	Programming for Problem Solving Lab	1	Choose appropriate data type for implementing programs in C language.
			2	Design and implement modular programs involving input output operations, decision making and looping constructs.
			3	Implement search and sort operations on arrays.
			4	Apply the concept of pointers for implementing programs on dynamic memory management and string handling.
			5	Design and implement programs to store data in structures and files.
17	ES 157 ME	Workshop/ Manufacturing Process	1	Demonstrate an understanding of and comply with workshop safety regulations.
			2	Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
			3	Study and practice on machine tools and their operations
			4	Undertake jobs connected with Engineering Workshop trades including fitting, carpentry, sheet metal, house wiring, welding, smithy and foundry.
			5	Apply basic electrical engineering knowledge for house wiring practice
SEMESTER III				
18	MC111PO	Indian Constitution	1	Know the background of the present constitution of India.
			2	Understand the working of the union, state and local levels.
			3	Gain consciousness on the fundamental rights and duties.
			4	Be able to understand the functioning and distribution of financial resources between the centre and states.
			5	Be exposed to the reality of hierarchical Indian social structure and the ways the grievances of the deprived sections can be addressed to raise human dignity in a democratic way
19	HS201EG	Effective Technical Communication in English	1	Handle technical communication effectively
			2	Use different types of professional correspondence
			3	Use various techniques of report writing
			4	Acquire adequate skills of manual writing
			5	Enhance their skills of information transfer and presentations
20	HS202CM	Finance and Accounting	1	Evaluate the financial performance of the business unit
			2	Take decisions on selection of projects
			3	Take decisions on procurement of finances
			4	Analyse the liquidity, solvency and profitability of the business unit
			5	Evaluate the overall financial functioning of an enterprise
		Mathematic	1	Solve field problems in engineering involving PDEs.

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21	BS205MT	s - III (PDE, Probability	2	Formulate and solve problems involving random variables and apply statistical methods for analysing experimental data.
22	ES211CE	Engineering Mechanics	1	Analyze the effect of a system of forces on a body.
			2	Analyze the static equilibrium of bodies in 2D and 3D and the effect of friction and its governing laws on bodies in equilibrium.
			3	Determine the Centroid, Center of gravity, Moment of Inertia and Mass moment of inertia of different plane and solid bodies.
			4	Apply the laws of motion to study the kinematic parameters of a moving rigid body.
			5	Solve the problems involving translation and rotation of rigid bodies by applying principles of kinetics, work-energy and impulse momentum.
			6	Analyze and solve impact problems using principles of impulse momentum.
23	ES214EC	BASIC ELECTRONICS	1	Study and analyse the rectifiers and regulator circuits.
			2	Study and analyse the performance of BJTs, FETs on the basis of their operation and working.
			3	Ability to analyse & design oscillator circuits.
			4	Ability to analyse different logic gates & multi-vibrator circuits.
			5	Ability to analyse different data acquisition systems
24	PC221ME	METALLURGY & MATERIAL SCEINCE	1	Know the fundamental science and engineering principles relevant to material.
			2	Suggest appropriate physical metallurgical methods (phase diagrams).
			3	The type of heat treatment operation to be given to any metal in order to improve desired Mechanical properties.
			4	Basic ability to plan an extraction process for given ore.
			5	Suggest the appropriate methods for prevention of failures.
			6	Analyse the applications of conventional metals and alloys.
25	PC222ME	Thermodynamics	1	Correlate the study of thermodynamics with the fundamental conceptual terminologies and Distinguish the different forms of energy
			2	Analyse the Laws of Thermodynamics and correlate them for real life problem solving.
			3	Read data from the chart of Mollier diagram and its applications.
			4	Assess the importance of entropy and recognize the various curves of phase transformation
			5	Identify the various air standard cycles, gas cycles and gas laws toward solving practical applications.
PRACTICALS				
26	PC251ME	Metallurgy and Material Testing Lab	1	Prepare specimen for metallographic observation
			2	Analyse and identify low, medium and high carbon steels, different types of cast irons, non-ferrous alloys, from the study of their microstructure
			3	Underlines the importance of grain size in evaluating the desired mechanical properties.
			4	Correlate the heat treatment methods and the mechanical properties obtained.
			5	Analyse and identify microstructures after annealing, normalizing, hardening and tempering Relate the properties of the materials using image analyser
		Machine	1	Will be able to draw isometric and orthogonal projections and sectional views of various mechanical components.

27	PC252ME	Drawing and Modelling Lab	2	Will be able to draw free hand sketches of various mechanical components
			3	Will be able to understand the shape and structure of different types of joints, screws, keys and Couplings
			4	Will be sufficiently knowledgeable to use both the software and drafter to produce assembly views of various mechanical components from part drawings.
SEMESTER IV				
28	MC112CE	Environmental Sciences	1	State the efficient use of natural resources.
			2	Knowledge on the role of ecology as the basis of environmental science
			3	State the importance of bio-diversity & means to conserve it.
			4	Assess the environmental risks associated to various pollutions and understand the environmental laws & policies.
			5	Discuss the current environmental issues & relate the disasters & its management techniques.
29	MC113PY	Essence of Indian Traditional Knowledge	1	Understand philosophy of Indian culture.
			2	Distinguish the Indian languages and literature.
			3	Learn the philosophy of ancient, medieval and modern India.
			4	Acquire the information about the fine arts in India.
			5	Know the contribution of scientists of different eras
30	HS203MP	Industrial Psychology	1	Understanding of key concepts, theoretical perspectives, and trends in industrial psychology.
			2	Evaluate the problems thorough and systematic competency model.
			3	Analyse the problems present in environment and design a job analysis method.
			4	Create a better work environment for better performance.
			5	Design a performance appraisal process and form for the human behavior.
31	BS206BZ	Biology for Engineers	1	Apply biological engineering principles, procedures needed to solve real-world problems.
			2	Understand the fundamentals of living things, their classification, cell structure and biochemical constituents.
			3	Apply the concept of plant, animal and microbial systems and growth in real life situations.
			4	Comprehend genetics and the immune system.
			5	Know the cause, symptoms, diagnosis and treatment of common diseases.
			6	Apply basic knowledge of the applications of biological systems in relevant industries.
32	ES213ME	Energy Sciences and Engineering	1	Understand the basics of various sources of energy
			2	Analyse the present status of conventional energy sources.
			3	Understand the working principles of Renewable Energy systems
			4	Design and develop waste heat recovery systems.
			5	Relate energy economics, standards and future challenges.
33	PC231ME	Mechanics of Materials	1	Understand the theory of elasticity and Hooke's law
			2	Analyse beams to determine shear force and bending moments
			3	Analyse shear stress distribution in different sections of beams.
			4	Analyse and design structural members subjected to combined stresses
			5	Solve problems on bars and to determine deflections at any point of the beams

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34	PC233ME	Kinematics of Machinery	1	Understand the principles of kinematic pairs, chains and their classification, DOF, inversions, equivalent chains and planar mechanisms.
			2	Analyse the planar mechanisms for position, velocity and acceleration.
			3	Design frictional systems like belt drives, rope drives, clutches, bearings and screw threads
			4	Design cams and followers for specified motion profiles.
			5	Evaluate gear tooth geometry and select appropriate gears for the required applications
35	PC234ME	Manufacturing Process	1	Describe the concepts of Foundry Technologies consisting of pattern making, mould making, gating design and solidification.
			2	Discuss the importance of special casting processes, categorize various casting defects and describe the processing of plastics.
			3	Classify and differentiate various Arc welding, Gas welding and Advanced welding processes, discuss their advantages, applications and limitations.
			4	Differentiate various Solid State welding and Resistance welding processes, discuss their applications, and identify various welding defects.
			5	Describe various forming processes, sheet metal operations and discuss the importance of unconventional forming processes.
36	PC235ME	Applied Thermodynamics and Heat Transfer	1	Estimate power required for reciprocating air compressor, used for many engineering applications.
			2	Evaluate the performance of diesel and petrol engines and various heat losses from engines.
			3	Understand the importance of combustion phenomenon and various functional systems of IC engines.
			4	Apply appropriate equations depending on mode of heat transfer.
			5	Distinguish the various modes of heat transfer.
			6	Design heat exchangers with the basic knowledge acquired in heat exchangers.
PRACTICALS				
37	PC262ME	Manufacturing Processes Lab	1	Conduct experiments and put hands-on experience on various processes in foundry, welding, forging, forming and plastic manufacturing technologies.
			2	Demonstrate the understanding of the theoretical concepts of above technologies while working in small groups.
			3	Demonstrate writing skills through clear laboratory reports
			4	Identity the defects / imperfections and discuss their causes and suggest remedies to eliminate them.
			5	Transfer group experience to individual performance of exercises and demonstrate effective oral communication skills.
38	PC263ME	Applied Thermodynamics and Heat Transfer	1	Perform experiments to find the efficiency of Petrol and Diesel engines.
			2	Perform experiments on CI and SI engines.
			3	Perform experiments of reciprocating air compressor.
			4	Perform Experiments on heat exchangers and design suitable exchangers for a given application.
			5	Perform exhaust gas analysis on Petrol and Diesel engines.
B.E 3/4				
				To differentiate between various machines tools & their specifications, recognize the kinematics and its mechanism of the machines.

39	PC501PE	Machine Tool Design		To recognize the drives of the machine tools at varies speeds.
				To understand the drives and analysis of the machine tool componants.
				To recognize the varies spindle speeds of machine tool elements.
				To understand the varies hydraulic controls of machine tools.
40	PC502ME	Design of Machine Elements		Identify & Use codes and standards, selection proper material & perform static design.
				Analyze cyclic loading conditions and provide fatigue design of components
				Analyze machine elements like keys, shafts and couplings,
				Evaluate various joining techniques like welding, riveting and cotter joints.
				Synthesize an d design screw threads for fasteners and power screw applications
41	PC503ME	Dynamics of Machines		Analyse static and dynamic forces in slider crank and other mechanisms; determine the magnitude of gyroscopic couple and its effect on vehicles in motion.
				Evaluate the performance of various types of governors and design flywheels considering speed and energy fluctuation
				Analyse problems of balancing in rotating and reciprocating machinery.
				Evaluate the natural frequencies of single and two degree of freedom systems in free and forced vibration mode, also considering the effect of damping.
				Determine the natural frequencies and mode shapes of multi degree of freedom systems, including by Dunkerley, Raleigh and Holzer methods.
42	PC504ME	Metal Cutting and Machine Tools		Understand the cutting tool geometry, mechanism of chip formation and mechanics of orthogonal cutting.
				Understand the thermal aspects of metal cutting, influence of tool wear on tool life and machinability.
				Identify basic parts and operations of machine tools including lathe, shaper, planer, milling, drilling, and boring machines.
				Design locating and clamping devices to produce a component.
				Understand the principles of various finishing processes and gear manufacturing processes
				Understand the principle and working of various unconventional machining processes.
43	PC502PE	Computer Aided Design and Manufacturing		Appraise about the product life cycle and CAD standards. Analyse the geometric transformations.
				Differentiate the types of geometric modelling and apprehend the application of geometric modelling w.r.t real time applications.
				Execute the part programming for machining.
				Identify the working of CNC, DNC, Robots and analyse the applications of GT.
				Differentiate the various CAPP, CAQC techniques and understand the advancement in CAM technologies i.e. reverse engineering and rapid prototyping.
		Computer		Interpret the link between refrigeration effects, work done and COP of the system, describe different methods adopted to evaluate COP, list the different psychrometric processes and describe how those processes can be maintained
				Calculate the overall efficiency of centrifugal blower and axial flow fan at different volume flow rates, show the variation of overall efficiency with load and speed graphically To understand radiation heat transfer, heat exchangers and mechanism involved in boiling and condensation.

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44	PC591PE	Aided Production Drawing		Identify the various components of low speed wind tunnel, plot a graph showing variation of pressure over the entire length of aerofoil blade and also evaluate the lift and drag coefficient values for a given aerofoil blade at different angle of assign
				Describe the modes of heat transfer, calculate thermal conductivity, heat transfer coefficient subjected to natural and forced convection environment and Stefan Boltzmann constant value of thermal radiation.
				Express the working principle of heat exchangers and its application in real life, calculate the LMTD and effectiveness of a given heat exchanger for both parallel and counter flows.
45	PC592PE	Modern Manufacturing and Testing Lab		Decide on the process parameters to be adopted and applicability of various materials that are suitable for mechanical energy based machining processes
				Decide on the process parameters to be adopted and applicability of various materials that are suitable for electrical and thermal based machining processes
				Will be able to understand the CNC control in modern manufacturing system.
				Will be able to distinguish between various manufacturing processes.
				Will be able to select appropriate manufacturing process to manufacture any component.
46	PC593ME	Fluid Mechanics and Hydraulic		Practice and experiment on different types of turbines and analyse their performance at rated and off design conditions.
				Investigate through experimentation different types of pump models and estimate their performance.
				Apply the priniciple of different flow measuring instruments and their adoptability to the industry.
				Develop the hydraulic circuits to cater the needs of the industry.
47	PC601ME	Machine Design		Analyze helical coil springs and leaf springs for mechanical systems
				Evaluate kinematic transmission systems using gears
				Select bearing system for specific applications
				Design various IC engine components
				Determine load carrying capacity of curved beams
48	PC602ME	Metrology and Instrumentation		To understand limits, fits and tolerances and their applications. Linear and angular measurements and measuring instruments.
				To understand the design of limit gauges, evaluate roughness and its measurement.
				To understand basic measuring system, static and dynamic characteristics of instruments
				To understand various principles to measure pressure, temperature, displacement, force, torque and vibrations.
49	PC603ME	Finite Element Analysis		Summarize basic equations of elasticity and formulate finite element modeling of one dimensional element using Potential energy approach.
				Formulate finite element modeling of truss and frame elements along with the concepts of transformation from local to global matrices.
				Interpolate Hermitian shape function of beam element in natural coordinate system.
				Develop stiffness matrix for a plane stress & plane strain conditions on a CST, Axisymmetric elements by interpolating shape functions in natural coordinate system.
				Formulate finite element model to steady state heat transfer analysis using one & two dimensional elements.

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				Formulate mass and stiffness matrices of 1D & beam elements to establish Eigen values &Eigen vectors using Lagarangian and Hamilton principles.
50	PE611PE	Additive Manufacturing Technologies		Describe fundamentals of additive manufacturing, classify and explain advantages and disadvantages AM processes.
				Describe the operating principles, capabilities, and limitations of liquid and solid based additive manufacturing systems
				Explain the operating principles, capabilities and limitations of powder based additive manufacturing systems
				Classify rapid tooling techniques and select suitable tooling for a given application.
				Select and use right CAD data formats and AM software in additive manufacturing of a part
				Explore the potential applications of additive manufacturing in different industrial sectors
51	PE612ME	AUTOMOBILE ENGINEERING		Generalize the different types of automobiles, list the engine components, describe the functioning of IC engines and classify the fuel supply system for S.I and C.I engines
				Differentiate the types of lubrication system; identify different lubrication and cooling systems used in vehicles.
				Classify ignition system and describe the functioning of battery and automobile air conditioning system.
				List the salient features of different steering mechanisms, describe the importance of wheel alignment and wheel balancing, describe the importance of different suspension systems and shock absorbers used in an automobile
				Identify different components in power transmission system design a system, components, or process to meet desired needs with in realistic constrains such as economic, environmental, health and safety, describe about braking system
				Adapt techniques, skills and modern engineering tools necessary to control the pollution, record the automobile parts maintenance, design and build components and system to reduce pollution of automobile vehicles
52	PE613ME	MODERN MACHINING AND FORMING METHODS		Understand the evolution, classification and need of nontraditional machining technology in modern manufacturing
				Understand the principle, description, the parametric effect on process performance and material removal mechanics of USM, AJM, WJM and AWJM processes.
				Understand the principle, description, the parametric effect on process performance and material removal mechanics of EDM, EDG, ECM and CHM processes.
				Understand the principle, description, the parametric effect on process performance and material removal mechanics of LBM, EBM, PAM and Ion machining processes.
				Compare conventional & high energy rate forming methods
				Understand the principle, working and applications of various types of high energy rate forming methods.
53	OE601ME	Entrepreneurship		Understand Indian Industrial Environment, Entrepreneurship and Economic growth, Small and Large Scale Industries, Types and forms of enterprises.
				Identify the characteristics of entrepreneurs, Emergence of first generation entrepreneurs, Conception and evaluation of ideas and their sources.
				Practice the principles of project formulation, Analysis of market demand, Financial and profitability analysis and Technical analysis.
				Apply the concepts of Project Management during construction phase, project organization, project planning and control using CPM, PERT techniques
				Understand the Behavioural aspects of entrepreneurs, Time Management, Various approaches of time management, their strengths and weakness. The urgency addiction and time management matrix.

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54	OE602ME	INDUSTRIAL ROBOTICS		Able to demonstrate knowledge of the relationship between mechanical structures of industrial robots and their operational workspace characteristics and have an understanding of the functionality and limitations of robot actuators and sensors.
				Able to demonstrate an ability to apply spatial transformation to obtain forward/Inverse kinematics equation of robot manipulators using analytical/numerical/simulation tools.
				Able to apply knowledge and choose the best & economically suitable sensors/end effectors required for specific applications.
				Able to understand the importance of robot vision and apply the learnt techniques to get the required information from input images.
				Able to design and develop a industrial robot for a given purpose economically.
				Appreciate the current state and potential for robotics in new application areas.
55	PC691ME	METROLOGY & MACHINE TOOLS LAB		Select and apply the knowledge of measuring tools for external, internal and angular measurements for promoting the qualitative production management.
				Adapt the principles of optical measurements in measurement of screw and gear profiles.
				Choose and practice the appropriate methods of force measuring devices principles for required situation.
				Demonstrate the need of machine alignment test for qualitative production.
				Practice calibration principles for maintaining the required precision of instruments / tools.
				Select and practice the methods of temperature measurement.
				Select cutting tool materials and tool geometries along with appropriate cutting conditions for different work materials and grind the cutting tools to the required geometry.
				Recognize and summarize the features and applications of various machine tools like Lathe, Milling, Drilling, Grinding, Shaping, Slotting etc.
56	PC692ME	Computer Aided Engineering LAB		Classify the types of Trusses (Plane Truss & Spatial Truss) and Beams (2D & 3D) with various cross sections to determine Stress, Strains and deflections under static, thermal and combined loading
				Generalized Plane stress, plane strain conditions & axi-symmetric loading on inplane members to predicting the failure behavior and finding the SCF
				Analyse connecting rod with tetrahedron and brick elements, performing static analysis on flat & curved shells to determine stresses, strains with different boundary conditions.
				Predict the natural frequencies and modes shapes using Modal, Harmonic analysis. Also finding the critical load using Buckling analysis
				Simulate steady state heat transfer analysis of chimney, Transient heat transfer of castings, Non linear, Buckling analysis of shells CFD analysis
				Evaluate the stiffness matrix, B matrix and loading matrices of beam in plane/solid elements using MATLAB / Python software
SEMESTER VII				
			1	Design various single and multipoint cutting tools
			2	Analyse heat generation in machining & coolant operation

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57	PC 701 MP	Tool Design	3	Illustrate the properties of various cutting tool materials and hence select an appropriate tool material for particular machining application
			4	Identify appropriate combination of tools, jigs and fixture, suitable for a particular machining operation
			5	Design assembly of jigs and fixtures on simple work-piece
58	PC 702 ME	Finite Element Analysis	1	Summarize basic equations of elasticity and formulate finite element modelling of one dimensional element using Potential energy approach.
			2	Formulate finite element modelling of truss and frame elements along with the concepts of transformation from local to global matrices.
			3	Interpolate Hermitian shape function of beam element in natural coordinate system.
			4	Develop stiffness matrix for a plane stress & plane strain conditions on a CST, Axisymmetric elements by interpolating shape functions in natural coordinate system.
			5	Interpolate the shape functions of Isoparametric elements and to present the use of numerical integration to evaluate the element matrices in typical 2D problems. Formulate finite element model to steady state heat transfer analysis using one & two dimensional elements
59	PC 703 ME	Industrial Engineering	1	Explain various approaches for industrial management. Able to infer concept of management in human resource domain
			2	Apply Philosophy of Production Planning and Control in Industry and control the activities in delivering the products in time
			3	Determine the optimum requirement of inventory by developing the various quantitative models.
			4	Develop various models or methods for ensuring the required quality of the products or processes.
			5	Elaborate the role of Decision theory and apply various approaches under Uncertainty and Risk conditions
60	PC 704 ME	Production And Operations Management	1	Explain various types of Production Systems, develop suitable layout for a given plant
			2	Develop various methods for work study and apply suitable Recording techniques. Develop standard procedures and time for the operations.
			3	Explain necessity of Forecasting and various methods of it. Develop suitable quantitative forecasting technique for the given past data. Compare accuracy of models in connection with forecast errors.
			4	Explain Aggregate planning & Mater scheduling, Materials Requirement Planning Processes, Develop quantitative models for Material requirement and resources based on time span.
			5	Elaborate the usages of PERT/CPM techniques for a give project and develop suitable quantitative model for the project in successful competition by identifying the time constraints for start and end of process activities.
61	HS 901 MB	Managerial Economics and Accountancy	1	Determine the responsibilities of a manager of a business undertaking.
			2	Assess various factors influencing demand elasticity
			3	Able to Forecast & compute the future sales level.
			4	Determine Break Even Point (BEP) of an enterprise Outline the features, steps, merits, uses & limitations of Pay Back, ARR, NPV, PI & IRR methods of Capital Budgeting
			5	Understands the principles of accounting and prepare Journal, Ledger, Trial Balance, Manufacturing A/c, Trading A/c, Profit & Loss A/c. and Balance Sheet of an enterprise.
OE- II & III				

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62	OE 774 EE	Non-Conventional Energy Sources	1	Understand the different nonconventional sources and the power generation techniques to generate electrical power.
			2	Understand the Solar energy power development and different applications.
			3	Understand different wind energy power generation techniques and applications.
			4	Design a prescribed engineering sub-system
			5	Recognize the need and ability to engage in lifelong learning for further developments in this field.
63	OE 775 ME**	Entrepreneurship	1	Understand Indian Industrial Environment, Entrepreneurship and Economic growth, Small and Large Scale Industries, Types and forms of enterprises.
			2	Identify the characteristics of entrepreneurs, Emergence of first generation entrepreneurs, Conception and evaluation of ideas and their sources.
			3	Practice the principles of project formulation, Analysis of market demand, Financial and profitability analysis and Technical analysis.
			4	Apply the concepts of Project Management during construction phase, project organization, project planning and control using CPM, PERT techniques
			5	Understand the Behavioural aspects of entrepreneurs, Time Management, Various approaches of time management, their strengths and weakness. The urgency addiction and time management matrix.
64	OE 785 ME**	Mechatronics	1	Model and analyse electrical and mechanical systems and their interconnection
			2	Integrate mechanical, electronics, control and computer engineering in the design of Mechatronics systems
			3	Be proficient in the use of fluid power systems in various Mechatronics applications
			4	Demonstrate the use of industrial electronic devices
			5	Demonstrate the design of modern CNC machines, and Mechatronics elements
PRACTICALS				
65	PC 751 MP	CAME Lab	1	Develop 3D models using modeling software.
			2	Understand the CNC control in modern manufacturing system.
			3	Distinguish between various manufacturing processes.
			4	Select appropriate manufacturing process to manufacture any component.
66	PC 752 ME	CAE Lab	1	Classify the types of Trusses (Plane Truss & Spatial Truss) and Beams (2D & 3D) with various cross sections to determine Stress, Strains and deflections under static, thermal and combined loading
			2	Generalize Plane stress, plane strain conditions & axisymmetric loading on inplane members to predicting the failure behavior and finding the SCF
			3	Analyse connecting rod with tetrahedron and brick elements, performing static analysis on flat & curved shells to determine stresses, strains with different boundary conditions.
			4	Predict the natural frequencies and modes shapes using Modal, Harmonic analysis. Also finding the critical load using Buckling analysis
			5	Simulate steady state heat transfer analysis of chimney, Transient heat transfer of castings, Nonlinear, Buckling analysis of shells &CFD analysis
		Project	1	Demonstrate the ability to synthesize and apply the knowledge and skills acquired in the academic program to the real-world problems.

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