National Education Society (R.)

Jawaharlal Nehru New College of Engineering, Shivamogga

(Approved by AICTE, New Delhi, Certified by UGC 2f & 12B, Accredited by NAAC –'B', UG programs:CE,ME,EEE,ECE,CSE,ISE, ETE PG Programs: MBA, acredited by NBA:1.7.2022 to 30.6.2025, Recognized by Govt. of Karnataka and Affiliated to VTU, Belagavi)

INTERNAL QUALITY ASSURANCE CELL (IQAC)

2018 Scheme

Sl. No	Branch	Sem	Subject	CO,S
1	MECH	3	Transform Calculus, Fourier Series and Numerical Techniques Mathematics (18MAT31)	1. To remember the definition of Laplace transform, Fourier series, Fourier transform, Z-transform, formulae of numerical methods and calculus of variation. 2. To understand the concept of periodic function, Unit step function, Convolution theorem in Laplace transform, Fourier series of period 2 pi, arbitrary period 2l, half range series, Fourier transform and Z- transform, numerical methods and calculus of variations 3. To apply the concept of Laplace transform in 2nd and higher order linear differential equations. Harmonic analysis in Fourier series, Z-transform in difference equations, numerical solution of ODE's by various numerical methods and Euler's equation, Geodesics in Calculus of variation.
2		3	Mechanics of Materials (18ME32)	1. Understand the fundamental concepts and principles of stresses, strains, elastic constants, volumetric strain and thermal stresses. 2. Analyze stresses on inclined plane and principal stresses under plane stress condition, strain energy in bars, beams and stresses in thick and thin cylinders.

				3. Draw shear force and bending moment diagram for beams under different loads and analyze beams with symmetrical and unsymmetrical sections for stresses.
				4. Design, shafts under pure torsion and understand the principle of theories of failure.
				5. Design columns under buckling with different support conditions and determine strain energy under different loading conditions.
3		3	Basic Thermodynamics (18ME33)	1. Explain fundamentals of thermodynamics and evaluate energy interactions across the boundary of thermodynamic systems. understand the concept of temperature, Scales
				2. Study the basic laws of thermodynamics including conservation of mass, conservation of energy or first law, Understand various forms of energy including heat transfer, work and Evaluate the feasibility of cyclic and non-cyclic processes using 2nd law of thermodynamics.
				3. Apply the knowledge of entropy, reversibility and irreversibility to solve numerical problems and apply 1st law of thermodynamics to closed and open systems and determine quantity of energy transfers and change in properties.
				4. Interpret the behavior of pure substances and its application in practical problems
				5. Recognize differences between ideal and real gases and evaluate thermodynamic properties of ideal and real gas mixtures using various relations.
4		3	Material Science (18ME34)	1. Understand types of structures, imperfections in metals, diffusion mechanism, mechanical behavior, fracture, fatigue and creep phenomenon.

				2. Understand and interpret phase transformation during solidification, phase diagrams, iron carbon equilibrium diagrams.
				3. Understand concepts of heat treatment process and their influence on material properties.
				4. Understand the structure, properties and applications of ceramics, plastics, composites and other advanced materials with emphasis to ethical and sustainability aspects of materials.
5		3	Constitution of India, Professional Ethics and Cyber Law (18CPC39)	1. to have constitutional knowledge and legal literacy
				2. to understand Engineering and Professional ethics and responsibilities of Engineers
				3. to understand the cybercrimes and cyber laws for cyber safety measures
6		3	Metal cutting and forming (18ME35A)	1. Able to Explain the construction & specification of various machine tools
				2. Able to Discuss different cutting tool materials, tool nomenclature & surface finish
				3. Apply mechanics of machining process to evaluate machining time
				4. Analyze tool wear mechanisms and equations to enhance tool life and minimize machining cost.
				5. Understand the concepts of different metal forming processes
				6. Apply the concepts of design of sheet metal dies to design different dies for simple sheet metal components
7		3	Metal Casting and Welding (18ME35B)	1. Describe the casting process and prepare different types of cast products. Acquire knowledge on Pattern, Core, Gating, Riser system and to use Jolt, Squeeze, Sand Slinger moulding machines
				2. Compare the Gas fired pit, Resistance, Coreless, Electrical and Cupola Metal

				Furnaces. Compare the Gravity, Pressure die, Centrifugal, Squeeze, slush and Continuous Metal mold castings
				3. Understand the Solidification process and Casting of Non-Ferrous Metals.
				4. Describe the Metal Arc, TIG, MIG, Submerged and Atomic Hydrogen Welding processes etc. used in manufacturing.
				5. Describe methods for the quality assurance of components made of casting and joining process
8		3	Computer Aided Machine Drawing (18ME36A)	1. Sketch the machine components in orthographic and pictorial views.
				2. Apply Limits, Tolerances to choose the appropriate Fits in machine component assembly.
				3. Communicate the complete technical details of the machine components.
9		3	Mechanical Measurements and Metrology (18ME36B)	1. Understand the metrology, its advancements and measuring instruments. Students acquire the knowledge of standards such as line, end and wavelength standards.
				2. Understand and acquire the knowledge of calibration, precision, accuracy etc., measurement of angles, screw threads and gear.
				3. Understand and acquire the knowledge of generalized description of measurement system.
				4. Understand the primary and secondary transducers. Students analyze the terminating devices such as Cathode-Ray-Oscilograph (CRO), X-Y Recorder etc.,
				5. Understand the measurement of Force, Torque, Pressure, Temperature and strain
10		3	Material Testing lab (18MEL37A)	1. Demonstrate good understanding of concepts and their applications in the lab.
				2. Use testing machines to determine mechanical properties of engineering materials and analyze

				the failure of the specimen under various loading condition.
				3. Work in teams to perform experimental tasks.
				4. Understand ethical issues associated with engineering experiments and professional practice.
				5. Write formal technical report & convey engineering message efficiently.
11		3	Mechanical Measurements and Metrology lab (18MEL37B)	1. Develop necessary skills to use different measuring instruments used in mechanical measurements and calibrate them.
				2. Analyse and interpret the measurement results to draw valid conclusions.
				3. Clarify the theoretical concepts with experimental outcomes.
				4. Report the experimental details and observations systematically.
12		3	Workshop and Machine Shop Practice (Consists of Fitting, and Machining) (18MEL38A)	1. Necessary calculations require for various operations in workshop and machine shop.
				2. Carryout the various operations using lathe, shaper and milling machines.
				3. To produce machine components required for various applications with accuracy.
13		3	Foundry, Forging and Welding lab (18MEL38B)	1. Demonstrate the various skills of sand preparation and sand testing
				2. Demonstrate the various skills of mould preparation using different types of patterns
				3. Demonstrate the welding skills and make different welded joints
				4. Demonstrate the various skills of handling of Forging equipment's and volume calculations for preparing the forging models
14		4	Additional Mathematics - 2 (18MATDIP41)	1. Solve rank of matrix by elementary row operations - Echelon form. Consistency of system of linear equations - Gauss elimination method

				2. Demonstrate various physical models through 2 nd and higher order linear differential equation and solve such equations.
				3. Construct a variety of Partial differential equation and solution by direct integration, method of separation of variables.
				4. Apply the knowledge of numerical methods, infinite series and series solution of ordinary differential equation to explain various physical and engineering problems.
15		4	Applied Thermodynamics (18ME42)	1. Apply the thermodynamic knowledge to analyze the performance of gas power cycles.
				2. Understand the concept of different types of fuels and combustion in IC engine and apply that knowledge in analyzing the performance of IC engines.
				3. Apply the thermodynamic concept to analyze vapour power cycle to improve their performance.
				4. Understand the concepts and applications of Refrigeration and Air conditioning and to apply that knowledge in analyzing the performance of Refrigerators and Air conditioning systems.
				5. Understand the concepts and applications of steam nozzle and air compressors and to apply that knowledge in analyzing the performance of steam nozzle and air compressors.
16		4	Fluid Mechanics (18ME43)	1. Identify and calculate the key fluid properties used in the analysis of fluid behavior
				2. Apply the knowledge of fluid statics, kinematics while addressing problems of Mechanical Engineering
				3. Explain the guiding Principles of Fluid Dynamics and its application to measure flow discharge, Energy losses in a fluid flow.

				4. Explain the concept of boundary layer, Laminar & turbulent flows in fluid flow and techniques of dimensional analysis to form dimensionless numbers in terms of input output variables.
				5. Illustrate and explain the basic concept of compressible flow and CFD
17		4	Kinematics of Machines (18ME44)	1. Identify mechanisms in real life applications and describe the working principle of various mechanisms.
				2. Analyze velocity and acceleration of mechanisms by graphical and analytical methods.
				3. Analyze the working of Spur Gears and determine the velocity ratio of different gear trains.
				4. Draw the profile of disc cams for different types of followers for specified type of motion.
18		4	Metal cutting and forming (18ME45A)	1. Understand the Construction and specification of various machine tools, different cutting tool materials, tool nomenclature and surface machines
				2. Apply mechanics of machining process to evaluate machining time
				3. Analyze tool wear mechanisms and equations to enhance tool life and minimize machining cost
				4. Understand the concepts of different metal forming processes.
				5. Apply the concepts of design of sheet metal dies to design different dies for simple sheet metal components
19		4	Metal Casting and Welding (18ME45B)	1. Understand the casting processes, preparation of Green, Core, dry sand molds and Sweep, Shell, Investment and plaster molds. Explain the Pattern, Core, Gating, Riser system and Jolt, Squeeze, Sand Slinger Molding Machines.

					Compare the Gas fired pit, Resistance, Coreless, Electrical and Cupola Metal Furnaces
					2. Understand and Compare the Gravity, Pressure die, Centrifugal, Squeeze, slush and Continuous Metal mold castings.
					3. Understand the Solidification process and Casting of Non-Ferrous Metals
					4. Understand the Metal Arc, TIG, MIG, Submerged and Atomic Hydrogen Welding processes used in manufacturing. Understand the Resistance spot, Seam, Butt , Projection, Friction, Explosive, Thermit, Laser and Electron Beam Special type of welding process used in manufacturing.
					5. Understand the Metallurgical aspects in Welding and inspection methods for the quality assurance of components made of casting and joining process.
20		4		Computer Aided Machine Drawing (18ME46A)	1. Understand the use and applications of CAD software (Solid Edge) in Machine drawing, modeling and assembling.
					2. Apply the knowledge of orthographic projections in the reading Machine drawings.
					3. Execute the steps involved in orthographic projections to draw 2D views of machine components with suitable scale.
					4. Create the 3D models of machine drawings using CAD software.
					5. Report systematically the 2D views and 3D models of machine drawings.
21		4		Mechanical Measurements and Metrology (18ME46B)	1. C206.1 Understand the objectives of metrology and learn about methods of measurement, measuring instruments, standards of measurement, linear and angular measurements, errors in measurement and calibration.

				2. C206.2 Understand the concept of limits, fits and tolerances and apply it to design of gauges.
				3. C206.3 Understand the generalized measurement system and able to recognize sensor, transducer, modifying and terminating devices and their functions in an instrument.
				4. C206.4 Understand the different approaches to measure screw thread, gear, force, torque, pressure, strain and temperature.
				5. C206.5 Understand the advancements in metrology and measurements.
22		4	Material Testing lab (18MEL47A)	1. Demonstrate good understanding of concepts and their applications in the lab.
				2. Use testing machines to determine mechanical properties of engineering materials and analyze the failure of the specimen under various loading condition.
				3. Work in teams to perform experimental tasks.
				4. Understand ethical issues associated with engineering experiments and professional practice.
				5. Write formal technical report & convey engineering message efficiently.
23		4	Mechanical Measurements and Metrology lab (18MEL47B)	1. Determine the calibration of pressure gauge, thermo couple, LVDT, load cell, and finding out the modulous of elasticity of a mild steel specimen using strain gauges.
				2. Determine the measurement using Optical projector/Tool maker microscope, sine bar/ sine centre/ bevel protractor, alignment using Auto colimeter / roller set, measurement of cutting tool forcesusing a) Lathe too Dynamometer b)Drill tool Dynamometer. Screw thread parameter, Surface roughness, gear tooth profile, Optical flatsand also to calibrate micrometer.

					3. Students can be able to answer the viva questions based on both theory and practical work
24		4		Workshop and Machine Shop Practice (Consists of Fitting, and Machining) (18MEL48A)	1. Perform turning, facing, knurling, thread cutting, tapering, eccentric turning and allied operations.
					2. Perform key ways/slots, grooves etc., and using shaper.
					3. Perform gear teeth cutting using milling machine. Cut and file various shapes on M S flat using filling operations.
25		4		Foundry, Forging and Welding lab (18MEL48B)	1. Demonstrate the various skills of sand preparation and sand testing
					2. Demonstrate the various skills of mould preparation using different types of patterns
					3. Demonstrate the welding skills and make different welded joints
					4. Demonstrate the various skills of handling of Forging equipment and volume calculations for preparing the forging models
26		5		Management and Economics (18ME51)	1. Understand the fundamentals of modern management and engineering economics and to take decisions to solve industrial problems.
					2. Employ the functions of management in align with the objectives of the organization and demonstrate leadership qualities, social responsibilities and interpret ethical characteristics in an industrial environment.
					3. Formulate and solve cash flow models to take economic decisions.
					4. Interpret the components of cost and taxation concepts in order to control the cost and compute depreciation in order to accumulate funds for replacement of assets.
27		5		Design of Machine Elements I (18ME52)	1. Understand the basic design procedure, design requirements, design considerations, Material

				properties, standard organizations for system designations and concept of stress concentration.
				2. Design the machine components for static, impact and fatigue loads
				3. Design the shafts, keys, couplings and joints based on strength & rigidity criteria
				4. Investigate the strength and efficiency of riveted & welded joints
				5. Design the threaded fasteners and power screws based on efficiency under static & eccentric loads
28		5	Dynamics of Machines (18ME53)	1. Apply the knowledge of engineering mechanics to analyze the static and dynamic forces acting on four-bar, slider-crank and shaper mechanisms.
				2. Evaluate the balancing forces for the static and dynamic equilibrium of rotating and reciprocating masses.
				3. Analyze the influence of governors and gyroscopes on the stability of vehicles.
				4. Determine the natural frequencies of simple mechanical systems under undamped and damped free vibration.
				5. Examine the vibration characteristics of mechanical system under forced vibration and transverse vibration of shaft subjected to different loads.
29		5	Turbo Machines (18ME54)	1. Categorize turbo machines & implement them based upon the functional requirement of an objective.
				2. Define the fundamental knowledge of turbo machines and implement it in solving problems related to turbo machines.
				3. Identify and analyze the problems related to Steam Turbines and suggest suitable solutions.

					4. Demonstrate the ability to determine parameters of hydraulic turbine and conduct its performance analysis.
					5. Analyze the performance of centrifugal pumps and axial flow air compressor
30			5	Fluid Power Engineering (18ME55)	1. Demonstrate the working Principle of a Hydraulic system and its components.
					2. Select and analyse Hydraulic pumps, actuators, its accessories to meet functional requirement of a hydraulic system.
					3. Design and analyse Hydraulic Circuits,
					4. Apply the knowledge in design, development and maintenance of Pneumatic systems
					5. Implement modern technique like electro pneumatics control systems to enhance the performance of Pneumatic systems.
31			5	Operations Management (18ME56)	1. Understand the operations management and its allied functional areas
					2. Apply forecasting, planning, and scheduling techniques to improve organizational efficiency and effectiveness
					3. Analyze location and capacity decisions to achieve profitability and meet future demands for products and services
					4. Determine the materials requirement and smooth flow of goods and services
32			5	Fluid Mechanics/Machines lab (18MEL57)	1. Perform experiments to determine the coefficient of discharge of flow measuring devices, Minor and Major losses in flow through pipe
					2. Conduct experiments on hydraulic turbines and pumps to draw its Main and Operating characteristics.

				3. Determine the performance of a Reciprocating Air Compressor & Centrifugal Air blower by conducting a performance test
				4. Exhibit his competency in designing experimental setup and methodology to conduct and analyse performance of fluid machines, flow measuring devices, head losses & impact analysis on vanes
33		5	Energy Conversion Lab (18MEL58)	1. Conduct experiments to determine the properties of fuels and oils.
				2. Conduct experiments on engines and draw characteristics.
				3. Conduct basic performance parameters of IC engine.
				4. Assess exhaust emission, factors affecting them and report the remedies.
34		6	Finite Element Methods (18ME61)	1. Apply the knowledge of mathematics and engineering mechanics to formulate and solve the structural, heat transfer and fluid flow problems.
				2. Analyze bars and trusses using finite element approach.
				3. Examine beams and shafts using finite element approach.
				4. Execute heat transfer and fluid flow problems using finite element approach.
				5. Evaluate axi-symmetric and structural engineering problems under dynamic conditions using finite element approach.
35		6	Design of Machine Elements II (18ME62)	1. Describe the design the mechanical systems involving flat & v-belt drives, chain & rope drives, helical & leaf springs
				2. Analyze the properties from the design of different types of gears such as spur, helical.
				3. Analyze the properties from the design of bevel and worm gears for power transmission.

					4. Evaluate the Normal and tangential forces, effort, maximum torque, heat generation in different types of brakes and axial force and torque transmitted in different types of clutches
					5. Design the hydrodynamic bearings and select anti friction bearings from manufacturers catalogue for various applications
36		6	Heat Transfer (18ME63)		1. Explain the basic modes of heat transfer and solve steady and unsteady state heat conduction problems
					2. Analyze the performance of extended surfaces subjected to free and forced convection heat transfer
					3. Analyze heat transfer rate in forced and free convection
					4. Solve the simple heat transfer problems pertaining to radiation
					5. Design and analyze the heat exchangers and explain the concept of boiling and condensation
37		6	Non-Traditional Machining (18ME641)		1. : Understand the compare traditional and non-traditional machining process and recognize the need for Non- traditional machining process
					2. Understand the constructional features, performance parameters, process characteristics, applications, advantages and limitations of USM, AJM and WJM
					3. Identify the need of Chemical and electro-chemical machining process along with the constructional features, process parameters, process characteristics, applications, advantages and limitations.
					4. Understand the constructional feature of the equipment, process parameters, process characteristics, applications, advantages and limitations EDM & PAM

				5. Understand the LBM equipment, LBM parameters, and characteristics. EBM equipment and mechanism of metal removal, applications, advantages and limitations LBM & EBM
38		6	Composite Materials Technology (18ME645)	1. Apply the knowledge of materials and its compatibility in the development of composite materials.
				2. Study the potential characteristics of polymeric matrix and metal matrix composites.
				3. Examine the viability of using ceramic matrix and carbon matrix composites in relevant applications.
				4. Determine the characteristics of composites materials under different loading conditions.
				5. Develop the composite materials as per micro-mechanics and macro-mechanics approaches.
39		6	Entrepreneurship Development (18ME646)	1. Understand the concept of entrepreneur and entrepreneurship and relevant roles
				2. Learn creativity and entrepreneurial plan including project feasibility and project appraisal
				3. Understand corporate entrepreneurship and issues related to corporate entrepreneurship
				4. Understand family and non-family entrepreneur and women entrepreneurs in India
				5. Understand international entrepreneurship opportunities and case studies on Indian start-ups
40		6	Non Conventional Energy Sources (18ME651)	1. Understand the various renewable energy sources and their environmental aspects in comparison with non-renewable energy sources.
				2. Understand the concept of solar energy, solar radiation and its measurement and the different applications of solar energy.
				3. Apply the knowledge of solar thermal conversion to analyze liquid flat plate collectors to enhance their performance.

			6		4. Understand the concept of wind energy and apply that knowledge to analyze the performance parameters of wind mills.
					5. Understand the concepts of tidal power, Ocean thermal energy conversion, and Geothermal energy, Biomass and hydrogen energy and their conversion to other useful forms of energy.
41			6	Supply Chain Management (18ME653)	1. Understand the frame work of Supply Chain Management
					2. Understand a competitive supply chain using strategies, models, techniques and information technology
					3. Understand the concepts of Inventory, supply, stock, surplus management
					4. Understand the concept of supply chain networking including location of ware-houses
					5. Understand the concepts of current trends future of IT infrastructure and E-commerce in Supply Chain Management
42			6	Computer Aided Modelling and Analysis Lab (18MEL66)	1. Understand the use and applications of FEA software (Ansys) in modelling and analyzing engineering problems.
					2. Apply the knowledge of FEA in the selection of suitable elements for modelling and analysing the engineering problems.
					3. Execute the steps involved in FEA using Ansys software to solve structural and thermal engineering problems under various boundary conditions.
					4. Validate the FEA results by correlating with theoretical solutions.
					5. Report systematically the observations made during FEA.
43			6	Heat Transfer Lab (18MEL67)	1. Understand the basic modes of heat transfer, conduction with and without internal heat

				generation, critical thickness of insulation and extended surfaces with the practical utilities.
				2. Understand concept and mechanism of natural and forced convection and also the various empirical correlations used in different fluid flow situations.
				3. Understand the design and performance analysis of heat exchangers and their practical applications, VCR, Air Conditioners, mass transfer theories, Condensation, Boiling phenomena and mechanism of radiation.
44		7	Control Engineering (18ME71)	1. Understand the control systems, its types, control actions and formulate the system governing equations for Mechanical, Electrical and Electronic models.
				2. Identify the order of the system based on response of the system.
				3. Calculate the gain of the system using block diagram and signal flow graphs
				4. Determine the stability of transfer functions using Hurwitz criterion, Routh's criterion and root Locus technique in complex domain.
				5. Analyse the stability of linear feedback control systems in frequency domain using polar plots, Nyquist and Bode plots.
45		7	Computer Aided Design and Manufacturing (18ME72)	1. Able to define Automation, CIM, CAD, CAM and explain the differences between these concepts
				2. Explain the basics of automated manufacturing industries through mathematical models and analyze different types of automated flow lines
				3. Analyze the automated flow lines to reduce down time and enhance productivity
				4. Explain the use of different computer applications in manufacturing, and able to prepare

				part programs for simple jobs on CNC machine tools and robot programming
				5. Visualize and appreciate the modern trends in Manufacturing like additive manufacturing, Industry 4.0 and applications of Internet of Things leading to Smart Manufacturing
46		7	Design for Manufacture (18ME731)	1. Select proper materials and manufacturing processes for designing products/components by applying the relevant principles for ease and economic production.
				2. Identify faulty design factors leading to increased costs in producing mechanical components.
				3. Apply appropriate design tolerances – dimensional, geometric and true position tolerances for the production processes of mechanical components.
				4. Apply the concepts related to reducing machined areas, simplification by amalgamation and separation, clampability, accessibility, etc., in the design of mechanical components.
				5. Analyze the design of castings, weldments, forgings, powder metallurgy components and suggest design modifications to reduce the cost.
47		7	Automation and Robotics (18ME732)	1. To identify potential areas for automation and justify need for automation
				2. To select suitable major control components required to automate the process or an activity
				3. To study the various parts of robots and fields of applications of robotics
				4. To perform the spatial transformations, Analyze forward and inverse kinematics
				5. To write the robot programming codes and control of robots for various applications

48		7	Operations Research (18ME735)	1. Understand the meaning, definitions, scope, need, phases and techniques of operations research. Formulate as L.P.P and derive optimal solutions to linear programming problems by graphical method,
				2. Simplex method, Big-M method and Dual Simplex method.
				3. Formulate as Transportation and Assignment problems and derive optimum solutions for transportation, Assignment and travelling salesman problems.
				4. Solve waiting line problems for M/M/1 and M/M/K queuing models. Construct network diagrams and determine critical path, floats f or deterministic and PERT networks including crashing of Networks.
				5. Solve problems on game theory for pure and mixed strategy under competitive environment. Determine minimum processing times for sequencing of n jobs-2 machines, n jobs-3 machines jobs-m machines and 2 jobs-n machines using Johnson's algorithm.
49		7	Additive Manufacturing (18ME741)	1. Demonstrate the knowledge of the broad range of AM processes, devices, capabilities, and materials that are available.
				2. Apply the concepts of the various additive manufacturing processes to design and create components that satisfy product development/prototyping requirements.
				3. Apply the concepts of additive manufacturing to design and create components that satisfy product development/prototyping requirements, using advanced/additive manufacturing devices and processes.

				4. Understand the various software tools, processes, and techniques that enable advanced/additive manufacturing.
				5. Understand the latest trends and business opportunities in additive manufacturing.
50		7	Mechatronics (18ME744)	1. Illustrate various components of mechatronics system.
				2. Access various control systems used in automation.
				3. Develop mechanical, hydraulic, pneumatic and electrical control system
51		7	Energy and Environment (18ME751)	1. Understand the different forms and sources of energy and their applications and analyze the energy scenario of India and World.
				2. Understand the principles of energy management, storage and estimate the energy demand and compute energy pricing.
				3. Understand the purpose and methodology of energy audit.
				4. Understand the structure, function and energy flow in various ecosystems and analyze the need of public awareness regarding environment.
				5. Understand the concept of environmental pollution along with social issues and acts.
52		7	Automotive Engineering (18ME752)	1. Identify different parts of an automobile and its working.
				2. Understand the working Transmission and Braking system.
				3. Understand the working of Steering and Suspension Systems.
				4. Understand the working of Fuel supply systems and Turbo Chargers.
				5. Understand the Government Stipulations on Automobile Emissions and its control.

53		7	Computer Integrated Manufacturing Lab (18MEL76)	1. Understand CNC lathe part programming techniques for turning, facing, chamfering, grooving, step turning, taper turning, circular interpolation, etc.
				2. Generate CNC Mill part programming for PTP motions, line motions, contour motions, pocket milling, etc.
				3. Apply canned cycles for drilling, boring, tapping, facing operations, etc.
				4. Apply simulation techniques for tool path generation for different machining operations of small components using CNC lathe and milling machines.
				5. Understand and write programs for Robot control, understand the operating principles of hydraulics and pneumatic systems.
54		7	Design Lab (18MEL77)	1. Develop the skills to measure various machine parameters to prevent the machinery failure.
				2. Record the data, analyze and interpret the experimental results.
				3. Correlate theoretical concepts with experimental outcomes.
				4. Report systematically the observations made.
55		7	Project Work Phase - 1 (18MEP78)	1. Identify the real time engineering problem and formulate solution with the application of modern tool usage to cater industrial and societal needs.
				2. Perform effectively as a member of group and demonstrate highest level of professionalism.
				3. Carryout analysis of the developed solution from the prospective of technical and economic feasibility and sustainability
				4. Communicate effectively to the stake holders about the project outcomes

				5. Inculcate the ability to think innovatively and engage in lifelong learning in technological advancements
56		8	Energy Engineering (18ME81)	1. Explain the fundamental construction, operating features of all the elements of a Coal based thermal power plant
				2. Demonstrate the constructional & operating principles of Solar & Biomass systems
				3. Illustrate constructional & working procedures of systems using renewable energy sources like wind, geothermal, tidal & ocean thermal.
				4. Execute the operations related to the estimation, installation and operations of a Hydel & a Nuclear Power plant
57		8	CNC Machine Tools (18ME821)	1. Understand evolution, classification and principles of CNC machine tools.
				2. Learn constructional details of CNC machine tools, selection of standard components used for CNC machine tools for accuracy and productivity enhancement.
				3. Select drives and positional transducers for CNC machine tools.
				4. Apply CNC programing concepts of for two axis turning centers and three axis vertical milling centers to generate programs different components.
				5. Analize and select tooling and work holding devices for different components to be machined on CNC machine tools
58		8	Automobile Engineering (18ME824)	1. To identify the different parts of an automobile and it's working and understand the working of Cooling and lubrication systems
				2. To understand the working of transmission and braking system

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				3. To comprehend the working of steering and Ignition system
				4. To learn various types of fuels and fuel injection systems
				5. To know the cause of automobile emissions, its effect on environment and methods to reduce the emission
59		8	Technical Seminar (18MES84)	1. Function effectively as an individual to apply the knowledge of engineering skills and make effective presentation on engineering technology.
				2. Review, prepare and present the technological developments in the field of mechanical engineering
				3. Design the documentation and write effective technical reports on seminar to describe, interpret and analyse technical issues and to improve the presentation and communication skills.
60		8	Internship (18MEI85)	1.Acquire fundamental knowledge about a technical domain
				2.Design the model /Test process related to the work undertaken
				3.Analyze the results of the work carried out
				4.Demonstrate the professional skill sets

2021 Scheme

Sl.No	Branch	Sem	Subject	CO,S
1	MECH	3	Transform Calculus, Fourier Series and Numerical Techniques (21MAT31)	1. To solve ordinary differential equations using Laplace transform
				2. Demonstrate the Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory

				3. To use Fourier transforms to analyze problems involving continuous-time signals and to Apply Z-Transform techniques to solve difference equations	
				4. To solve mathematical models represented by initial or boundary value problems involving partial differential equations	
				5. Determine the extremals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.	
2		3	Metal Casting, Forming & Joining Processes (21ME32)	1. To provide detailed information about the Molding process	
				2. To provide Knowledge of various casting process in Manufacturing	
				3. To provide in depth knowledge on metallurgical aspects during solidification of metal and alloys and to acquaint fundamentals of various metal forming process along with Quality aspects	
				4. To impart Fundamental knowledge of Welding process	
				5. To impart the knowledge of various Joining process used in Manufacturing	
3		3	Material Science & Engineering (21ME33)	1. Understand the atomic arrangement in crystalline materials, describe the periodic arrangement of atoms in terms of unit cell parameters and various kinds of defects	
				2. Understand the importance of phase diagrams and the phase transformations	
				3. Know various heat treatment methods for controlling the microstructure	
				4. Understand surface coating technologies and powder metallurgy	

					5. Apply the method of materials selection, material data and knowledge sources for computer aided selection of materials
4		3	Thermodynamics (21ME34)		1. Understand the fundamentals of thermodynamics and evaluate energy interactions across the boundary of thermodynamic systems and the concept of temperature, Zeroth law of thermodynamics and temperature Scales.
					2. Understand the concepts of work and heat and apply the knowledge to interpret work and heat interactions in various cyclic and non-cyclic processes.
					3. State the 1st and 2nd laws of thermodynamics and Apply the knowledge of 1st and 2nd laws of thermodynamics to evaluate open and closed systems. Understand the concept of entropy, reversibility and irreversibility to solve numerical problems.
					4. Interpret the behavior of pure substances and its application in practical problems and understand the concept of available and unavailable energy.
					5. Recognize differences between ideal and real gases and evaluate thermodynamic properties of ideal and real gas mixtures using various relations and apply the knowledge to understand the process of combustion, analyze the performance of gas power cycles and extend the study to gas turbines.
5		3	Constitution of India and Professional Ethics (21CIP37)		1. Students will be able to understand the basic structure of constitution and strategies beyond which it cannot be amended.
					2. Students can understand the Execution of fundamental rights and hence the progress of

				nation by formation of government and governmental policies through amendment procedure.
				3. Students can understand the importance of ethical values and responsibility of an engineer.
6		3	Machine Drawing and GD&T (21MEL35)	1. Understand the use and applications of CAD software (Solid Edge) in Machine drawing, modeling and assembling.
				2. Apply the knowledge of orthographic projections in the reading Machine drawings.
				3. Execute the steps involved in orthographic projections to draw different views of machine components with suitable scale.
				4. Create the models of machine drawings using CAD software.
				5. Report systematically the different views and models of machine drawings.
7		3	Social Connect and Responsibility (21SCR36)	1. Understand social responsibility
				2. Practice sustainability and creativity
				3. Showcase planning and organizational skills
8		4	Maths for Communication Engineers (21MAT41)	1. Use the concept of Analytic function and complex potential to solve the problems in electromagnetic theory and complex integration in airfoil and image processing.
				2. Obtain series solution ODEs
				3. Fit an appropriate mathematical model for the statistical data by using correlation and regression analysis.
				4. Apply discrete and continuous probability distribution in engg. field
				5. Construct joint probability distribution and testing the hypothesis

9		4	Machining Science and Jigs & Fixtures (21ME42)	1. Students are understand the machining operations using Lathe, Milling, Shaper, Drilling and Grinding Machines. Understand the concepts of CNC.	
				2. Students under the forces in metal cutting.	
				3. Students understand the Machinability, Tool Wear and Tool Life Concepts	
				4. Students understand the various Non-conventional machining and hybrid machining processes.	
				5. Students understand the design of Jigs and Fixtures for various machining operations	
10		4	Fluid Mechanics (21ME43)	1. Define & determine the properties of fluid and the Static & Kinematic properties of the fluid.	
				2. Explain the guiding Principles & laws of Fluid Dynamics and its application to measure flow discharge.	
				3. Distinguish between types of flow based upon its viscosity and apply relevant principles in problem solving	
				4. Explain the concept of boundary layer, Laminar & turbulent flows in fluid flow and techniques of dimensional analysis to form dimensionless numbers in terms of input output variables.	
				5. Demonstrate the ability to determine properties of compressible fluid & solve fluid flow problems in a compressible medium.	
11		4	Mechanics of Materials (21ME44)	1. Understand the fundamental concepts of mechanics of materials and principle stress, strains, elastic constants, volumetric strains and thermal stress.	
				2.Analyse stress on inclined plane under uniaxial, bi axial loading condition	

				3. Evaluate the formula for measuring the deflexion of beams	
				4. Draw the shear force and bending moment diagrams for beams under different loading conditions. And to evaluate the behaviour of shafts under pure torsion.	
				5. Design columns under buklling with different boundary conditions.	
12		4	Mechanical Measurements & Metrology Lab (21MEL46)	1. Develop necessary skills to use different measuring instruments used in mechanical measurements and calibrate them.	
				2. Analyse and interpret the measurement results to draw valid conclusions.	
				3. Clarify the theoretical concepts with experimental outcomes.	
				4. Report the experimental details and observations systematically.	
13		4	Spread Sheets for Engineers (21ME481)	1. To do regression analysis by using functions and charts.	
				2. To do iterative solutions to find roots, optimization and regression.	
				3.Can perform matrix operation	
				4. Understand and create subroutines and macros using VBA and UDF.	
				5. abled to do numerical integrations and solve equations.	
			4	Complex Analysis, Probability & Linear Programming (21MATME41)	1. Use the concepts of analytic function and complex potentials to solve the problems arising in fluid flow.
					2. Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.
					3. Apply discrete and continuous probability distributions in analyzing the probability

				models arising in engineering field.
				4.Analyze and slove linear programming modles of real-life situation and slove LPP by the simplex method
				5. Learn technique to slove transportation and assignment problems.
		4	Additional Mathematics I (21MATDIP41)	1. Solve rank of matrix by elementary row operations - Echelon form. Consistency of system of linear equations - Gauss elimination method
				2. Demonstrate various physical models through 2nd and higher order linear differential equation and solve such equations.
				3. Construct a variety of Partial differential equation and solution by direct integration, method of separation of variables.
				4. Apply the knowledge of numerical methods ,infinite series and series solution of ordinary differential equation to explain various physical and engineering problems
		4	Universal Human Values (21UH49)	1. Holistic vision of life and Socially responsible behaviour
				2. Environmentally responsible work and Ethical human conduct
				3. Having Competence and Capabilities for Maintaining Health and Hygiene
				4. Appreciation and aspiration for excellence (merit) and gratitude for all