PKM Educational Trust ®

R. R. Institute of Technology

Affiliated to VTU Belgaum and Approved by AICTE, New Delhi, Recognized by Govt. of Karnataka,
Accredited by NAAC with 'B+'
Raja Reddy Layout, Chikkabanavara, Bengaluru – 560 090

Department of Mechanical Engineering

Batch: 2018-19   **Scheme: 2018**

CME101	Calculus and Linear Algebra (Subject Code: 18MAT11)
CME101.1	Apply the knowledge of calculus to solve ~~problems~~ related to polar curves and its applications in determining the bentness of a curve
CME101.2	Learn the notion of partial differential equation to calculate rates of change of multivarient functions and solve the problems related to composite functions and Jacobians
CME101.3	Applying the concept of change of order of integration and variables to evaluvate multiple integrals and their usage in computing the area and volumes.
CME101.4	Solve first order linear/ non-linear differential equation analytically using standard methods.
CME101.5	Make use of matrix theory for solving a system of linear equations and compute eigen values and eigen vectors required for matrix diagonalization process.
CME102	**ENGGINEERING PHYSICS (Subject Code: 18PHY12)**
CME102.1	Understand various types of oscillations and their implications, the role of Shock waves in various fields and recognize the elastic properties of materials for engineering applications.
CME102.2	Realize the interrelation between time varying electric and magnetic field, the transverse nature of the EM waves and their role in optical fiber communication.
CME102.3	Compute Eigen values, Eigen functions, momentum of atomic and subatomic particles using Time independent 1-D Schrodinger's wave equation.
CME102.4	Apprehend theoretical background of Laser, construction and working of different types of Lasers and its application in different fields.
CME102.5	Understand various electrical and thermal properties of materials like conductors, semiconductors and dielectrics using different theoretical models.
CME103	**Basic Electrical Engineering (Subject Code: 18ELE13)**
CME103.1	Analyse D.C and A.C circuits.
CME103.2	Explain the principle of operation and construction of single-phase transformers.
CME103.3	Explain the principle of operation and construction of DC machines and synchronous machines.
CME103.4	Explain the principle of operation and construction of three phase induction motors.
CME103.5	Discuss concepts of electrical wiring, circuit protecting devices and earthing.
CME104	**CIVIL ENGINEERING AND MECHANICS (Subject Code: 18CIV14)**
CME104.1	Mention the various field in Engineering
CME104.2	Compute the resultant of given force system subjected to various loads. Comprehend the action of Forces, Moments and other loads on systems of rigid bodies and compute the reactive forces that develop as a result of the external loads.
CME104.3	Comprehend the action of forces, Moments and their load of system on rigid body
CME104.4	Locate the Centroid and compute the Moment of Inertia of regular and built-up sections.

CME104.5	Express the relationship between the motion of bodies and analyze the bodies in motion.
CME105	**Engineering Graphics (Subject Code: 18EGDL15)**
CME105.1	Prepare engineering drawings as BIS conventions mentioned in the relevant codes and produce computer generated drawings using CAD Software
CME105.2	Use knowledge of orthographic projections to represent engineering and present the same in the form of drawings
CME105.3	Develop isometric drawings of simple objects reading the orthographic projections of those objects
CME106	**Engineering Physics Lab (Subject Code: 18PHYL16)**
CME106.1	Apprehend the concepts of interference of light, diffraction of light, Fermi energy and magnetic effect of current.
CME106.2	Understand the principles of operations of optical fibres and semiconductor devices such as photo diode and NPN transistor using simple circuits.
CME106.3	Determine elastic moduli and moment of inertia of given materials with the help of suggested procedures.
CME106.4	Recognize the resonance concept and its practical applications
CME106.5	Understand the importance of measurement procedure, honest recording and representing the data, reproduction of final results.
CME107	**Basic Electrical Lab (Subject Code: 18ELEL17)**
CME107.1	Identify the common electrical components and measuring instruments used for conducting experiments in the electrical laboratory
CME107.2	Compare power factor of lamps
CME107.3	Determine impedance of an electrical circuit and power consumed in a 3-phase load
CME107.4	Determine earth resistance and understand two way and three-way control of lamps
CME108	**Technical English-I (Subject Code: 18EGH18)**
CME108.1	Use grammatical English and essentials of language skills and identify the nuances of phonetics, intonation and flawless pronunciations
CME108.2	Implement English vocabulary at command and language proficiency
CME108.3	Identify common errors in spoken and written communication
CME108.4	Understand and improve the non-verbal communication and kinesics
CME108.5	Perform well in campus recruitment, engineering and all other general competitive examinations
CME111	**Advanced calculus & numerical methods (Subject Code: 18MAT21)**
CME111.1	Illustrate the applications of multivariate calculus to understand the solenoidal and irrotational vectors and also exhibit the inter dependence of line, surface and volume integrals.
CME111.2	Demonstrate various physical models through higher order differential equations and solve such linear ordinary differential equations.
CME111.3	Construct a variety of partial differential equations and solution by exact methods/method of separation of variables.
CME111.4	Explain the applications of infinite series and obtain series solution of ordinary differential equations.
CME111.5	Apply the knowledge of numerical methods in the modeling of various physical and engineering phenomena.
CME112	**Engineering chemistry (Subject Code: 18CHE22)**

CME112.1	use of free energy in equillibria rationalize bulk properties and process using thermodynamic consideration electrochemical energy system.
CME112.2	Causes and effects of corrosion of metal and control of corrosion. Modification of surface properties of metal to develop.
CME112.3	Production and consumption of energy or industrialization of country and living standards of people. Production and use for electrochemical cells, concentration cells fuel cells, classical batteries and modern batteries.
CME112.4	Understand various Environmental pollutants & waste management
CME112.5	Different techniques of instrumental analysis of materials and synthesis, properties and applications of nano materials.
CME113	**C programming for problem solving (Subject Code: 18CPS23)**
CME113.1	Illustrate simple algorithms from the different domains such as mathematics, physics, etc.
CME113.2	Construct a programming solution to the given problem using C
CME113.3	Identify and correct the syntax and logical errors in C programs
CME113.4	Modularize the given problem using functions and structures
CME114	**Basic Electronics (Subject Code: 18ELN24)**
CME114.1	Describe the operation of diodes, BJT, FET and Operational Amplifiers.
CME114.2	Design and explain the construction of rectifiers, regulators, amplifiers and oscillators.
CME114.3	Describe general operating principles of SCRS and its application.
CME114.4	Explain the working and design of Fixed voltage IC regulator using 7805 and a stable oscillator using Timer IC 555.
CME114.5	Explain the different number system and their conversions and construct simple combinational and sequential logic circuits using Flip-Flops.
CME114.6	Describe the basic principle of operation of communication system and mobile phones.
CME115	**Elements of mechanical engineering (Subject Code: 18ME25)**
CME115.1	Identify different sources of energy and their conversion process
CME115.2	Explain the working principle of hydraulic turbines, pumps, IC engines and refrigeration
CME115.3	Recognize various metal joining process and power transmission elements
CME115.4	Understand the properties of common engineering materials and their application in engineering industry
CME115.5	Discuss the working of conventional machine tools, machining processes, tools and accessories and advanced manufacturing systems.
CME116	**Engineering Chemistry Lab (Subject Code: 18CHEL26)**
CME116.1	Explain various methods of volumetric analysis i.e. Redox, Iodometric, complexometric, Neutralization etc. and use of conductivity meter for measurement of conductance of water sample.
CME116.2	Apply the use of internal and external indicators and their comparison for redox titrations and mechanisms of iodometric titrations and use of double indicator method in a single titration.
CME116.3	Estimate the amount of various components using instrumental method.
CME116.4	Explain qualitative chemical concepts and trends.
CME116.5	Perform laboratory experiments correctly using appropriate techniques and safety procedures.

CME117	**C Programming Laboratory (Subject Code: 18CPL27)**
CME117.1	Write algorithms, flowcharts and program for simple problems
CME117.2	Correct syntax and logical errors to execute a program
CME117.3	Write iterative and wherever possible recursive programs
CME117.4	Demonstrate use of functions, arrays, strings, structures and pointers in problem solving
CME118	**Technical English-II (Subject Code: 18EGH28)**
CME118.1	Use grammatical English and essentials of language skills and identify the nuances of phonetics, intonation and flawless pronunciations.
CME118.2	Implement English vocabulary at command and language proficiency
CME118.3	Identify common errors in spoken and written communication
CME118.4	Understand and improve the non-verbal communication and kinesics
CME118.5	Perform well in campus recruitment, engineering and all other general competitive examinations
CME201	**Transform calculus, Fourier series and numerical techniques (Subject Code: 18MAT31)**
CME201.1	Use Laplace transform and inverse Laplace transform in solving differential/integral equation arising in network analysis, control systems and other fields of engineering.
CME201.2	Demonstrate Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory.
CME201.3	Make use of Fourier transform and Z- transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems.
CME201.4	Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.
CME201.5	Determine the externals of functional using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.
CME202	**Mechanics of Materials (Subject Code: 18ME32)**
CME202.1	Understand simple, compound, thermal stresses and strains their relations and strain energy.
CME202.2	Analyse structural members for stresses, strains and deformations.
CME202.3	Analyse the structural members subjected to bending and shear loads
CME202.4	Analyse shafts subjected to twisting loads.
CME202.5	Analyse the short columns for stability.
CME203	**Basic Thermodynamics (Subject Code: 18ME33)**
CME203.1	Explain fundamentals of thermodynamics and evaluate energy interactions across the boundary of thermodynamic systems. Evaluate the feasibility of cyclic and non-cyclic processes using 2nd law of thermodynamics
CME203.2	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.
CME203.3	Interpret the behaviour of pure substances and its application in practical problems. Recognize differences between ideal and real gases and evaluate thermodynamic properties of ideal and real gas mixtures using various relations
CME204	**Material Science (Subject Code: 18ME34)**
CME204.1	Understand the mechanical properties of metals and their alloys

CME204.2	Analyze the various modes of failure and understand the microstructures of ferrous and non-ferrous materials
CME204.3	Describe the processes of heat treatment of various alloys
CME204.4	Acquire the Knowledge of composite materials and their production process as well as applications
CME204.5	Understand the properties and potentialities of various materials available and material selection procedures
CME205	**Metal Casting & Welding (Subject Code: 18ME35B)**
CME205.1	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
CME205.2	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
CME205.3	Understand the Solidification process and Casting of Non-Ferrous Metals.
CME205.4	Describe the Metal Arc, TIG, MIG, Submerged and Atomic Hydrogen Welding processes etc. used in manufacturing.
CME205.5	Describe methods for the quality assurance of components made of casting and joining process
CME206	**Mechanical Measurements & Metrology (Subject Code: 18ME36B)**
CME206.1	Understand the objectives of metrology, methods of measurement, standards of measurement & various measurement parameters
CME206.2	Explain tolerance, limits of size, fits, geometric and position tolerances, gauges and their design
CME206.3	Understand the working principle of different types of comparators. Describe measurement of major & minor diameter, pitch, angle and effective diameter of screw threads
CME206.4	Explain measurement systems, transducers, intermediate modifying devices and terminating devices
CME206.5	Describe functioning of force, torque, pressure, strain and temperature measuring devices
CME207	**Mechanical Measurements & Metrology LAB (Subject Code: 18MEL37B)**
CME207.1	Understand Calibration of pressure gauge, thermocouple, LVDT, load cell, micrometre.
CME207.2	Apply concepts of Measurement of angle using Sine Centre/ Sine Bar/ Bevel Protractor, alignment using Autocollimator/ Roller set
CME207.3	Demonstrate measurements using Optical Projector/Tool maker microscope, Optical flats. Analyse tool forces using Lathe/Drill tool dynamometer
CME207.4	Analyse Screw thread parameters using 2-Wire or 3-Wire method, gear tooth profile using gear tooth Vernier/Gear tooth micrometre. Understand the concepts of measurement of surface roughness.
CME208	**Foundry, Forging & Welding Lab (Subject Code: 18MEL38B)**
CME208.1	Demonstrate various skills in preparation of molding sand for conducting tensile, shear and compression tests using Universal sand testing machine.
CME208.2	Demonstrate skills in determining permeability, clay content and Grain Fineness Number of base sands
CME208.3	Demonstrate skills in preparation of forging models involving upsetting, drawing and bending operations.
CME209	**Vyavaharika Kannada/ Aadalitha Kannada (Subject Code: 18KVK39/18KAK39)**
CME209.1	At the end of the course, the student will be able to understand Kannada and communicate in Kannada language

CME209.2	Kannada Alphabets and Pronunciation. Also know Kannada Vocabulary required for Communication
CME209.3	To be able use Kannada Grammar in Conversations and do activities in Kannada
CME211	**Mathematics (Subject Code: 18MAT41)**
CME211.1	Solve first and second order ordinary differential equation arising in flow problems using single step and multistep numerical methods.
CME211.2	Illustrate problems of potential theory, quantum mechanics and heat conduction by employing notations and properties of Bessel's functions and Legendre's polynomials.
CME211.3	Explain the concept of analytic functions, residues, poles of complex potentials and describe conformal and bilinear transformation arising in field theory and signal processing.
CME211.4	Develop probability distribution of discrete, continuous random variables and joint probability distribution occurring in digital signal processing, information theory and design engineering.
CME211.5	Demonstrate testing of hypothesis of sampling distributions and illustrate examples of Markov chains related to discrete parameter stochastic process.
CME212	**Applied Thermodynamics (Subject Code: 18ME42)**
CME212.1	Apply thermodynamic concepts to analyze the performance of gas power cycles. Apply thermodynamic concepts to analyze the performance of vapour power cycles. Understand combustion of fuels and performance of I C engines.
CME212.2	Understand the principles and applications of refrigeration systems. Apply Thermodynamic concepts to determine performance parameters of refrigeration and air conditioning systems
CME212.3	Understand the working principle of Air compressors and Steam nozzles, applications, relevance of air and identify methods for performance improvement
CME213	**Fluid Mechanics (Subject Code: 18ME43)**
CME213.1	Identify and calculate the key fluid properties used in the analysis of fluid behaviour
CME213.2	Explain the principles of pressure, buoyancy and floatation
CME213.3	Apply the knowledge of fluid statics, kinematics and dynamics while addressing problems of mechanical and chemical engineering
CME213.4	Explain the concept of boundary layer in fluid flow and apply dimensional analysis to form dimensionless numbers in terms of input output variables
CME213.5	Illustrate and explain the basic concept of compressible flow and CFD
CME214	**Kinematics of Machines (Subject Code: 18ME44)**
CME214.1	Knowledge of mechanisms and their motion. Understand the inversions of four bar mechanisms.
CME214.2	Analyse the velocity, acceleration of links and joints of mechanisms.
CME214.3	Analysis of cam follower motion for the motion specifications.
CME214.4	Understand the working of the spur gears.
CME214.5	Analyse the gear trains speed ratio and torque.
CME215	**Metal Cutting & Forming (Subject Code: 18ME45A)**
CME215.1	Explain the construction & specification of various machine tools. Discuss different cutting tool materials, tool nomenclature & surface finish
CME215.2	Apply mechanics of machining process to evaluate machining time
CME215.3	Analyze tool wear mechanisms and equations to enhance tool life and minimize machining cost
CME215.4	Understand the concepts of different metal forming processes

CME215.5	Apply the concepts of design of sheet metal dies to design different dies for simple sheet metal components
CME216	**Computer Aided Machine Drawing (Subject Code: 18ME46A)**
CME216.1	Identify the national and international standards pertaining to machine drawing.
CME216.2	Understand the importance of the linking functional and visualization aspects in the preparation of the part drawings
CME216.3	Interpret the Machining and surface finish symbols on the component drawings
CME216.4	Apply limits and tolerances to assemblies and choose appropriate fits for given assemblies. Preparation of the part or assembly drawings as per the conventions
CME217	**Material Testing LAB (Subject Code: 18MEL47A)**
CME217.1	Acquire experimentation skills in the field of material testing. Develop theoretical understanding of the mechanical properties of materials by performing experiments.
CME217.2	Apply the knowledge to analyse a material failure and determine the failure inducing agent/s.
CME217.3	Apply the knowledge of testing methods in related areas.
CME217.4	Understand how to improve structure/behaviour of materials for various industrial applications
CME218	**Workshop & Machine Shop Practice (Subject Code: 18MEL48A)**
CME218.1	To read working drawings, understand operational symbols and execute machining operations
CME218.2	Prepare fitting models according to drawings using hand tools- V-block, marking gauge, files, hack saw, drills etc.
CME218.3	Understand integral parts of lathe, shaping and milling machines and various accessories and attachments used. Select cutting parameters like cutting speed, feed, depth of cut, and tooling for various machining operations
CME218.4	Perform cylindrical turning operations such as plain turning, taper turning, step turning, thread Cutting, facing, knurling, internal thread cutting, eccentric turning and estimate cutting time. Perform machining operations such as plain shaping, inclined shaping, keyway cutting, Indexing and Gear cutting and estimate cutting time.
CME219	**Constitution of India, Professional Ethics and Cyber Law (Subject Code: 18CPC49)**
CME219.1	Have constitutional knowledge and legal literacy
CME219.2	Understand Engineering and Professional ethics and responsibilities of Engineers
CME219.3	Understand the cybercrimes and cyber laws for cyber safety measures
CME301	**Management & Economics (Subject Code: 18ME51)**
CME301.1	Understand needs, functions, roles, scope and evolution of Management
CME301.2	Understand importance, purpose of Planning and hierarchy of planning and also analyse its types.
CME301.3	Discuss Decision making, Organizing, Staffing, Directing and Controlling.
CME301.4	Select the best economic model from various available alternatives.
CME301.5	Understand various interest rate methods and implement the suitable one.
CME302	**Design of Machine Elements-I (Subject Code: 18ME52)**
CME302.1	Apply the concepts of selection of materials for given mechanical components.
CME302.2	List the functions and uses of machine elements used in mechanical systems

CME302.3	Apply codes and standards in the design of machine elements and select an element based on the manufacturer's catalogue.
CME302.4	Analyse the performance and failure modes of mechanical components subjected to combined loading and fatigue loading using the concepts of theories of failure.
CME302.5	Demonstrate the application of engineering design tools to the design of machine components like shafts, couplings, power screws, fasteners, welded and riveted joints.
CME303	**Dynamics of Machines (Subject Code: 18ME53)**
CME303.1	Analyse the mechanisms for static and dynamic equilibrium.
CME303.2	Carry out the balancing of rotating and reciprocating masses
CME303.3	Analyse different types of governors used in real life situation
CME303.4	Analyse the gyroscopic effects on disks, airplanes, stability of ships, two and four wheelers
CME303.5	Understand the free and forced vibration phenomenon. Determine the natural frequency, force and motion transmitted in vibrating systems.
CME304	**Turbo Machines (Subject Code: 18ME54)**
CME304.1	Model studies and thermodynamics analysis of turbomachines.
CME304.2	Analyse the energy transfer in Turbo machine with degree of reaction and utilisation factor.
CME304.3	Classify, analyse and understand various type of steam turbine.
CME304.4	Classify, analyse and understand various type of hydraulic turbine.
CME304.5	Understand the concept of radial power absorbing machine and the problems involved during its operation.
CME305	**Fluid Power Engineering (Subject Code: 18ME55)**
CME305.1	Identify and analyse the functional requirements of a fluid power transmission system for a given application.
CME305.2	Visualize how a hydraulic/pneumatic circuit will work to accomplish the function
CME305.3	Design an appropriate hydraulic or pneumatic circuit or combination circuit like electro-hydraulics, electro- pneumatics for a given application.
CME305.4	Select and size the different components of the circuit.
CME305.5	Develop a comprehensive circuit diagram by integrating the components selected for the given application.
CME306	**Operations Management (Subject Code: 18ME56)**
CME306.1	Explain the concept & Scope of operations management in a business context
CME306.2	Recognise the role of operations Management among various Business functions & its role in the organisation strategic planning & gaining competitive advantage
CME306.3	Analyse the appropriateness & applicability of a range of operations Management systems & models in Decision Making
CME306.4	Assess a range of strategies for improving the efficiency & effectiveness of organisational operations.
CME306.5	Evaluate a selection of frame work used in the design & delivery of operations
CME307	**Fluid Mechanics / Machines Lab (Subject Code: 18MEL57)**
CME307.1	Perform experiments to determine the coefficient of discharge of flow measuring devices.
CME307.2	Conduct experiments on hydraulic turbines and pumps to draw characteristics.

CME307.3	Test basic performance parameters of hydraulic turbines and pumps and execute the knowledge in real life situations.
CME307.4	Determine the energy flow pattern through the hydraulic turbines and pumps.
CME307.5	Exhibit his competency towards preventive maintenance of hydraulic machines.
CME308	**Energy Conversion Lab (Subject Code: 18MEL58)**
CME308.1	Perform experiments to determine the properties of fuels and oils.
CME308.2	Conduct experiments on engines and draw characteristics.
CME308.3	Test basic performance parameters of I.C. Engine and implement the knowledge in industry.
CME308.4	Identify exhaust emission, factors affecting them and exhibit his competency towards preventive maintenance of IC engines.
CME309	**Environmental Studies (Subject Code: 18CIV59)**
CME309.1	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale
CME309.2	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment
CME309.3	Demonstrate ecology knowledge of a complex relationship between biotic and abiotic components
CME309.4	Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues
CME311	**Finite Element Method (Subject Code: 18ME61)**
CME311.1	Identify the application and characteristics of FEA elements such as bars, beams, plane and iso-parametric elements
CME311.2	Develop element characteristic equation and generation of global equation
CME311.3	Formulate and solve Axi-symmetric and heat transfer problems
CME311.4	Apply suitable boundary conditions to a global equation for bars, trusses, beams, circular shafts, heat transfer, fluid flow, axi-symmetric and dynamic problems
CME312	**Design of Machine Element – II (Subject Code: 18ME62)**
CME312.1	Apply design principles for the design of mechanical systems involving springs, belts, pulleys, and wire ropes.
CME312.2	Design spur and helical gear
CME312.3	Design worm and bevel gear
CME312.4	Understand the design principles of brakes and clutches
CME312.5	Apply design concepts of hydrodynamic bearings for different applications and select Anti friction bearings for different applications using the manufacturers, catalogue
CME313	**Heat Transfer (Subject Code: 18ME63)**
CME313.1	Understand the modes of heat transfer and apply the basic laws to formulate engineering systems.
CME313.2	Understand and apply the basic laws of heat transfer to extended surface, composite material and unsteady state heat transfer problems.
CME313.3	Analyze heat conduction through numerical methods and apply the fundamental principle to solve radiation heat transfer problems.
CME313.4	Analyze heat transfer due to free and forced convective heat transfer.

CME313.5	Understand the design and performance analysis of heat exchangers and their practical applications, Condensation and Boiling phenomena.
CME314	**Non-Traditional Machining (Subject Code: 18ME641)**
CME314.1	Understand the compare traditional and non-traditional machining process and recognize the need for non-traditional machining process.
CME314.2	Understand the constructional features, performance parameters, process characteristics, applications, advantages and limitations of USM, AJM and WJM.
CME314.3	Identify the need of Chemical and electro-chemical machining process along with the constructional features, process parameters, process characteristics, applications, advantages and limitations.
CME314.4	Understand the constructional feature of the equipment, process parameters, process characteristics, applications, advantages and limitations EDM & PAM.
CME314.5	Understand the LBM equipment, LBM parameters, and characteristics. EBM equipment and mechanism of metal removal, applications, advantages and limitations LBM & EBM.
CME315	**OCCUPATIONAL HEALTH AND SAFETY (Subject Code: 18CV653)**
CME315.1	Identify hazards in the workplace that pose a danger or threat to their safety or health,or that of others
CME315.2	Control unsafe or unhealthy hazards and propose methods to eliminate the hazard
CME315.3	Present a coherent analysis of a potential safety or health hazard both verbally and in writing, citing the occupational Health and Safety Regulations as well as supported legislation
CME315.4	Discuss the role of health and safety in the workplace pertaining to the responsibilities of workers, managers, supervisors
CME315.5	Identify the decisions required to maintain protection of the environment, workplace as well as personal health and safety
CME316	**Computer Aided Modelling & Analysis LAB (Subject Code: 18MEL66)**
CME316.1	Use the modern tools to formulate the problem, create geometry, descritize, apply boundary conditions to solve problems of bars, truss, beams, and plate to find stresses with different-loading conditions.
CME316.2	Demonstrate the ability to obtain deflection of beams subjected to point, uniformly distributed and varying loads and use the available results to draw shear force and bending moment diagrams.
CME316.3	Analyze and solve 1D and 2D heat transfer conduction and convection problems with different boundary conditions.
CME316.4	Carry out dynamic analysis and finding natural frequencies of beams, plates, and bars for various boundary conditions and also carry out dynamic analysis with forcing functions.
CME317	**Heat Transfer Lab (Subject Code: 18MEL67)**
CME317.1	Determine the thermal conductivity of a metal rod and overall heat transfer coefficient of composite slabs.
CME317.2	Determine convective heat transfer coefficient for free and forced convection and correlate with theoretical values.
CME317.3	Evaluate temperature distribution characteristics of steady and transient heat conduction through solid cylinder experimentally.
CME317.4	Determine surface emissivity of a test plate and Stefan Boltzmann constant
CME317.5	Estimate performance of a refrigerator and effectiveness of a fin and Double pipe heat exchanger
CME318	**Mini-Project (Subject Code: 18MEL67)**

CME318.1	Apply Engineering Knowledge and prepare the project proposal relevant to subject of real-world problem
CME318.2	Design the system components and identify the tools to develop solution to the problems defined
CME318.3	Use the Engineering skills to develop solutions for contemporary problems using modern tools by working in team and present the work progress
CME318.4	Demonstrate the Project objective and outcomes to the community at the large in oral and written forms in effective manner
CME318.5	Prepare a Comprehensive report, use ethical practice to record the finding
CME401	**Control Engineering (Subject Code: 18ME71)**
CME401.1	Identify the type of control and control actions. Develop the mathematical model of the physical systems
CME401.2	Estimate the response and error in response of first and second order systems subjected standard input signals
CME401.3	Represent the complex physical system using block diagram and signal flow graph and obtain transfer function.
CME401.4	Analyse a linear feedback control system for stability using Hurwitz criterion, Routh's criterion and root Locus technique in complex domain
CME401.5	Analyse the stability of linear feedback control systems in frequency domain using polar plots, Nyquist and Bode plots.
CME402	**Computer Aided Design and Manufacturing (Subject Code: 18ME72)**
CME402.1	Define Automation, CIM, CAD, CAM and explain the differences between these concepts. Solve simple problems of transformations of entities on computer screen
CME402.2	Explain the basics of automated manufacturing industries through mathematical models and analyze different types of automated flow lines.
CME402.3	Analyse the automated flow lines to reduce time and enhance productivity.
CME402.4	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.
CME402.5	Visualize and appreciate the modern trends in Manufacturing like additive manufacturing, Industry 4.0 and applications of Internet of Things leading to Smart Manufacturing.
CME403	**Design for Manufacturing (Subject Code: 18ME731)**
CME403.1	Select proper materials and manufacturing processes for designing products/components by applying the relevant principles for ease and economic production.
CME403.2	Identify faulty design factors leading to increased costs in producing mechanical components.
CME403.3	Apply appropriate design tolerances – dimensional, geometric and true position tolerances for the production processes of mechanical components.
CME403.4	Apply the concepts related to reducing machined areas, simplification by amalgamation and separation, clampability, accessibility etc., in the design of mechanical components.
CME403.5	Analyse the design of castings, weldments, forgings, powder metallurgy components and suggest design modifications to reduce the cost.
CME404	**Mechatronics (Subject Code: 18ME744)**
CME404.1	Illustrate various components of Mechatronics systems.
CME404.2	Assess various control systems used in automation by electro mechanical drives and communication methods through Data acquisition systems.

CME404.3	Design and conduct experiments to evaluate the performance of a mechatronics system or Component with respect to Microprocessors Microcontrollers
CME404.4	Apply the principles of Mechatronics design to product design.
CME404.5	Function effectively as members of multidisciplinary teams in Mechatronics Design process
CME405	**Electrical Energy Conservation and Auditing (Subject code: 18EE754)**
CME405.1	Analyze about energy scenario nationwide and worldwide, also outline Energy Conservation Act and its features
CME405.2	Discuss load management techniques and energy efficiency.
CME405.3	Understand the need of energy audit and energy audit methodology.
CME405.4	Understand various pillars of electricity market design. Conduct energy audit of electrical systems and buildings
CME405.5	Show an understanding of demand side management and energy conservation
CME406	**Computer Integrated Manufacturing Lab (Subject Code: 18MEL76)**
CME406.1	Generate CNC Lathe part program for Turning, Facing, Chamfering, Grooving, Step turning, Taper turning, Circular interpolation etc.
CME406.2	Generate CNC Mill Part programming for Point-to-point motions, Line motions, Circular interpolation, Contour motion, Pocket milling- circular, rectangular, Mirror commands etc.
CME406.3	Use Canned Cycles for Drilling, Peck drilling, Boring, Tapping, Turning, Facing, Taper turning thread cutting etc.
CME406.4	Simulate Tool Path for different Machining operations of small components using CNC Lathe & CNC Milling Machine.
CME407	**Design Lab (Subject Code: 18MEL77)**
CME407.1	Compute the natural frequency of the free vibration of single degree freedom systems
CME407.2	Compute the natural frequency of the damped single degree freedom systems
CME407.3	Compute the Critical speed of shafts
CME407.4	Analyse the governor characteristics.
CME407.5	Determination of Pressure distribution in Journal bearing
CME318	**Project work phase I (Subject Code: 18MEP78)**
CME408.1	Apply Engineering Knowledge and prepare the project proposal relevant to subject of real-world problem
CME408.2	Design the system components and identify the tools to develop solution to the problems defined
CME408.3	Use the Engineering skills to develop solutions for contemporary problems using modern tools by working in team and present the work progress
CME408.4	Demonstrate the Project objective and outcomes to the community at the large in oral and written forms in effective manner
CME408.5	Prepare a Comprehensive report, use ethical practice to record the finding
CME411	**Energy Engineering (Subject Code: 18ME81)**
CME411.1	Understand the construction and working of steam generators and their accessories.
CME411.2	Understand the basic concepts of solar radiation and analyze the working of solar PV and thermal systems. Identify methods of biomass energy storage for specific applications
CME411.3	Understand principles of energy conversion from alternate sources including wind, tidal energy and geothermal energy sources

CME411.4	Understand principles of Hydroelectric plants and Ocean thermal energy conversion, advantages & disadvantages of water power, Hydrographs etc.
CME411.5	Understand principles of energy conversion from nuclear energy source.
CME412	**Non- Destructive Testing and Evaluation (Subject Code: 18ME823)**
CME412.1	To understand various Non-Destructive Testing (NDT) methods and Various physical characteristics of materials and their applications in NDT
CME412.2	Understand the basic surface NDT methods such as Liquid penetrant test, Magnetic particle test – Principles.
CME412.3	Explain and perform Contact and non-contact inspection methods such as thermography and eddy current testing.
CME412.4	Understand Ultrasonic Testing-Principle and Acoustic Emission Principal instrumentation parameters and applications.
CME412.5	Understand principles of Radiography and different film and film less techniques.
CME413	**Project Work Phase-2 (Subject Code: 18MEP83)**
CME413.1	Apply Engineering Knowledge and prepare the project proposal relevant to subject of real-world problem
CME413.2	Design the system components and identify the tools to develop solution to the problems defined
CME413.3	Use the Engineering skills to develop solutions for contemporary problems using modern tools by working in team and present the work progress
CME413.4	Demonstrate the Project objective and outcomes to the community at the large in oral and written forms in effective manner
CME413.5	Prepare a Comprehensive report, use ethical practice to record the finding
CME414	**Technical Seminar (Subject Code: 18MES84)**
CME414.1	Acquire sound Knowledge and emphasize the information on chosen title
CME414.2	Use Engineering knowledge, carryout survey to compare and analyze solutions relevant to Societal needs
CME414.3	Gain Technical Skills to prepare report relevant to the scientific information gathered
CME414.4	Ability to work independently and demonstrate the knowledge, skills and attitudes of a professional engineer
CME415	**Internship (Subject Code: 18MEI85)**
CME415.1	Gain practical Knowledge of the Industry and professionals practice
CME415.2	Manifest to develop critical thinking, ethical values, teamwork, communication and multidisciplinary domain
CME415.3	Ability to adopt Industry practice and prepare detailed technical report
CME415.4	Communicate the technical learning to peer group and ability to learn technical content
CME415.5	Develop greater understanding about carrier option to achieve successful employability in the field of study