Vidyavardhini's college of Engineering & Technology Vasai (W)

Department of Mechanical Engineering

R-2012

Program Outcomes

PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	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.
PO7	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.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO12	Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes	
PSO1	Graduates will exhibit the ability to analyze and solve problems in Design, Thermal, Manufacturing and Renewable energy domains
PSO2	Graduates will incorporate technical and professional skills in their career

Course Outcomes (FE to BE)

	At the end of the semester student will able to
FEC101	**Applied Mathematics-I**
FEC101.1	Apply principals of basic operations of matrices , rank and echelon form of matrices to solve linear simultaneous equations.
FEC101.2	Solve and Analyze Partial Derivatives and apply it in related field of Engineering
FEC101.3	Apply the concepts of Complex Numbers,hyperbolic functions and logarithms to solve engineering problems.
FEC101.4	Apply Numerical Methods and Inculcate the habit of Mathematical thinking through Indeterminate forms and Taylor's Series Expansion.
FEC102	**Applied Physics-I**
FEC102.1	Draw miller indices using concept of crystallography and Identify crystal structure using X-ray diffraction techniques viz. Laue method, rotating crystal method & powder method.
FEC102.2	Determine the output of LED, photoconductor and photovoltaic cell applying concepts of semiconductor physics.
FEC102.3	Calculate parameters of superconductor viz. Critical temperature, critical magnetic field and differentiate application of superconductor based on Mesinner effect and Josephson effect
FEC102.4	Design acoustic of hall/auditorium using reasons for acoustic defects and Select method for production of ultrasonic waves.
FEC103	**Applied Chemistry -I**
FEC103.1	Analyze the quality of water and suggest methods of treatment.
FEC103.2	Illustrate the knowledge of polymers, fabrication methods, conducting polymers in industrial fields.
FEC103.3	Apply the knowledge of lubricants, their properties & mechanism to avoid frictional resistance and interpret phase transformations using thermodynamics
FEC103.4	Demonstrate knowledge of portland cement.
FEC104	**Engineering Mechanics**
FEC104.1	Illustrate the concept of force, moment and apply the same along with the concept of equilibrium in two and three dimensional systems with the help of FBD.
FEC104.2	Demonstrate the understanding of Centroid and its significance and locate the same

FEC104.3	Estimate required force to overcome friction and correlate real life application to specific type of friction.
FEC104.4	Establish relation between velocity and acceleration of a particle and analyse the motion by plotting the relation.
FEC104.5	Illustrate different types of motions and establish Kinematic relations for a rigid body.
FEC104.6	Analyse body in motion using force and acceleration, work-energy, impulse-momentum principles
FEC105	**Basic Electrical & Electronics Engineering**
FEC105.1	Understand fundamentals of DC circuits and apply knowledge for analyzing network theorems in DC circuits.
FEC105.2	Learn the fundamentals and analyze single phase AC circuits.
FEC105.3	Learn the basic operation and analyze the performance of single-phase transformer.
FEC105.4	Learn the fundamentals and analyze three phase AC circuits and understand the construction, basic operation of DC motors and generators.
FEC106	**Environmental studies**
FEC106.1	Classify essential resources and control measures for sustainable development.
FEC106.2	Illustrate sources and effects of environmental decay.
FEC106.3	Select renewable sources of energy and technology essential for sustainable development.
FEC106.4	Apply the regulations of Environmental Protection Act and other bodies for perpetuation of environment.
FEL101	**Basic Workshop Practice-I**
FEL101.1	Model different prototypes in the carpentry trade such as Cross cut lap joint, Tee lap joint, Dovetel lap joint.
FEL101.2	Model various basic prototypes in the trade of fitting such as Square, Hexagonal and V Male Female joint.
FEL101.3	Perform various basic House Wiring techniques while taking care of electrical safety.
FEL101.4	Dismantle and Assemble a Personal Computer, perform Basic troubleshooting and maintenance, identify network components and perform Basic networking and crimping.
FEC201	**Applied Mathematics-II**
FEC201.1	Apply Euler's , Runge -Kutta method to solve differential equations of second and fourth order and apply Trapezoidal, Simpson's 1/3rd , 3/8th rule to solve definite integrals

FEC201.2	Solve differential equations of First order, first degree and engineereing problems representable in the form of linear equations with constant coefficient, Cauchy's /Legendre's homogeneous equation
FEC201.3	Apply Beta, Gamma functions and D.U.I.S. to evaluate definite integrals
FEC201.4	Apply Double, Triple integration to find area, mass, volume and find length of curve using Rectification method
FEC202	**Applied Physics-II**
FEC202.1	Calculate thickness of thin wire or foil to wedge-shaped thin film, refractive index, wavelength of light /or radius of curvature to Newton's rings in interference application and calculate missing order, grating element wavelength of light using diffraction grating considering parameter viz resolving power of grating
FEC202.2	Compare characteristics of images received by photography and holography using concept of LASER
FEC202.3	Calculate critical angle, angle of acceptance, V number, number of modes of propagation, numerical aperture of step index fibre
FEC202.4	Apply concept of electromagnetism in focussing system and CRO
FEC203	**Applied Chemistry -II**
FEC203.1	Illustrate types of corrosion & suggest control measures in industries.
FEC203.2	Analyze the quality of fuel & calculate the oxygen required for combustion of fuel.
FEC203.3	Illustrate composition, properties of alloys & properties & application of composite material.
FEC203.4	Illustrate the principles of green chemistry
FEC204	**Engineering Drawing**
FEC204.1	Apply the basic principles of projections in Projection of Lines, Planes and Engineering Curves
FEC204.2	Apply the basic principles of projections in Projection of Solids & Section of solids
FEC204.3	Visualize the given 3D object and draw Orthographic projections
FEC204.4	Draw Isometric view from the given orthographic projections
FEC204.5	Draw Orthographic and Isometric Projection using AutoCAD
FEC205	**Structured Programming Approach**
FEC205.1	Identify the terminologies in operating system used for computer programming and Write an algorithm to support Structure Programming approach.
FEC205.2	Use variables, derived data types and control structures to write c program
FEC205.3	Use Strings and Functions to solve complex computational problem
FEC205.4	Use Pointers, Structure-Union and Files for solving complex computational problem

FEC206	**Communication Skills**
FEC206.1	Develop the ability to understand the importance of communication fundamentals
FEC206.2	Apply techniques to improve oral communication & develop their own speaking style
FEC206.3	Acquire the letter writing skills and produce the letters in any given situation
FEC206.4	Learn all the important aspects of reading including skimming, scanning , note making and understand discourse coherence.
FEL201	**Basic Workshop Practice-II**
FEL201.1	Model different prototypes in the carpentry trade such as Cross cut lap joint, Tee lap joint, Dovetel lap joint.
FEL201.2	Model various basic prototypes in the trade of fitting such as Square, Hexagonal and V Male Female joint.
FEL201.3	Read various basic Layout drawing; make positive and negative film, and perform PCB etching and drilling, Tinning and soldering operations.
FEL201.4	Perform various basic domestic plumbing operations such as pipe cutting, threading, fitting etc.
MEC301	**APPLIED MATHEMATICS-III**
MEC201.1	Apply the knowledge of Laplace transform and Inverse Laplace transform to solve ODE's
MEC201.2	Apply the concept of Fourier Series for the expansion of Periodic functions
MEC201.3	Understand Complex Variables and functions and perform mapping using different tecniques
MEC201.4	Solve Partial Differential Equations numerically and analytically and Correlation, Regression and Curve Fitting
MEC302	**Thermodynamics**
MEC302.1	Apply first law of thermodynamics for various flow and non-flow systems.
MEC302.2	Compute quantification and grade of energy using second law, entropy and availability.
MEC302.3	Use steam table and Mollier chart to compute properties of steam and Rankine cycle parameters.
MEC302.4	Analyse various heat engines cycles and compressors.
MEC303	**Strength of Materials**
MEC303.1	Demonstrate the concepts of direct stresses and strain in simple and compound bars.
MEC303.2	Analyse the principal planes and stresses induced in thin shell subjected to internal and external pressure
MEC303.3	Draw the SFD & BMD for the different types of loads and support conditions

MEC303.4	Analyse the stresses induced in basic mechanical components due to shearing force, bending moment, twisting moment
MEC303.5	Estimate the strain energy in Mechanical Elements subjected to different types of loading.
MEC303.6	Estimate buckling and deflection phenomenon in columns, struts and beams by using different methods
MEC304	**Production Process I**
MEC304.1	Demonstrate understanding of casting process.
MEC304.2	Demonstrate applications of various types of welding process and differentiate clip forming processes.
MEC304.3	Illustrate Principles of forming process.
MEC304.4	Illustrate the concept of producing polymer components and ceramic components and distinguish between conventional and modern machine tools.
MEC305	**Material Technology**
MEC305.1	Identify various defects and failure mechanisms
MEC305.2	Interpret Iron-Iron carbide phase diagram, TTT diagram and their significance
MEC305.3	Select appropriate heat treatment process for specific requirement
MEC305.4	Identify effect of alloying element on properties of steel and Illustrate basics of composites, Nano materials and polymers
MEL301	**Computer Aided M/c Drawing**
MEL301.1	Sketch various machine elements and conventional representation.
MEL301.2	Practice Geometric dimensioning and Tolerance.
MEL301.3	Prepare detail & assembly drawing of Bearings
MEL301.4	Prepare detail & assembly drawing of Pulleys & Pipe joints.
MEL301.5	Prepare detail & assembly drawing of Valves & I C Engine components.
MEL301.6	Prepare detailed drawing of any given physical object/machine element with actual measurements
MEL302	**Strength of Material**
MEL302.1	Analyse the stress strain behaviour of materials.
MEL302.2	Assess the modulus of rupture (bending strength) for the material and calculate the stresses in beams.
MEL302.3	Measure the hardness of materials
MEL302.4	Measure the impact strength (toughness) of materials.
MEL302.5	Measure the torsional strength of the matrials
MEL302.6	To conduct the deflection test and calculate SFD, BMD, slope and deflection for the beam under different loading.
MEL303	**Material Technology**

MEL303.1	Demonstrate the understanding of the procedure to prepare samples for studying microstructure using microscope (metallography)
MEL303.2	Interpret different phases present in different plain carbon steels and cast irons
MEL303.3	Perform different heat treatment processes for a steel and observe microstructures in these conditions
MEL303.4	Identify effects of Annealing, Normalizing and Hardening on microstructure of medium carbon steel
MEL303.5	Determine hardenability of steel using Jominy end Quench test
MEL303.6	Determine S-N curve by Fatigue Test.
MEL304	**Machine shop Practice-I**
MEL304.1	Perform plain turning, taper turning, screw cutting, drilling and boring operations on lathe machine
MEL304.2	Perform plane and inclined shaping on shaper machine
MEL304.3	Perform rough and smooth grinding on pedestal grinder and precision grinding on surface grinder
MEL304.4	Perform basic milling operations and gear cutting on universal milling machine
MEL304.5	Perform forging and heat treatment operations to prepare forging tool
MEL304.6	Prepare composite welded job using arc welding machine
MEC401	**Applied Mathematics IV**
MEC401.1	Apply matrix theory to solve the system of linear equations and eigen values and eigen vectors and their applications
MEC401.2	Apply principles of Vector Differentiation and Integration to engineering problems
MEC401.3	Optimise LPP using various optimisation techniques
MEC401.4	Apply the concepts of Probability Distribution and Sampling theory to engineering problems
MEC402	**Fluid Mechanics**
MEC402.1	Define properties of fluids and classification of flows
MEC402.2	Formulate and solve equations of the control volume for fluid flow systems
MEC402.3	Calculate resistance to flow of incompressible fluids through closed conduits and over surfaces surfaces
MEC402.4	Apply fundamentals of compressible fluid flows to relevant systems
MEC403	**Industrial Electronics**
MEC403.1	Examine the working of Combinational circuits and describe the operation of Sequential circuits.
MEC403.2	Distinguish between microprocessor and microcontroller and interpret working of MSP430 microcontroller for applications.

MEC403.3	Explain and illustrate operation of analog circuits (Op-AMP and IC555 timer).
MEC403.4	Compare performances of power semiconductor devices and explain speed torque characteristics of AC and DC motors.
MEC404	**Production Process II**
MEC404.1	Demonstrate understanding of casting process.
MEC404.2	Demonstrate applications of various types of welding process and differentiate clip forming processes.
MEC404.3	Illustrate Principles of forming process.
MEC404.4	Illustrate the concept of producing polymer components and ceramic components and distinguish between conventional and modern machine tools.
MEC405	**Kinematics of Machinery**
MEC405.1	Illustrate various components of mechanisms.
MEC405.2	Develop mechanisms to provide specific motion.
MEC405.3	Draw velocity and acceleration diagrams of various mechanisms using graphical methods.
MEC405.4	Plot s-t, v-t, a-t and j-t diagram for specific cam and follower motion.
MEC405.5	Analyze power transmission through spur gears.
MEC405.6	Select appropriate power transmission for specific applications from belt, rope and chain drive.
MEL401	**Data Base and Information Retrieval**
MEL401.1	Determine the data models and selection of data models
MEL401.2	Apply the features of database management systems and relational database
MEL401.3	Use SQL – the standard language for relational database
MEL401.4	Apply concept of functional dependencies and design of the database
MEL401.5	Design graphical user Interface for specific application
MEL401.6	Create visual software entities
MEL402	**Fluid Mechanics**
MEL402.1	Calculate the coefficient of discharge for Orifice meter and Venturimeter
MEL402.2	Determine Metacentric height of floating ship.
MEL402.3	Verify the Bernoulli's Principle.
MEL402.4	Determine Friction factor for a pipe & calculate energy loss due to pipe fittings.
MEL402.5	Verify Momentum principle using Impact of Jet on Vane.
MEL402.6	Determine pressure profile over an aerofoil.
MEL403	**Industrial Electronics**
MEL403.1	Design and develop combinational circuits. Develop MSP430 program for LED(blinking, rotating, running etc)
MEL403.2	Construct and analyze performance of integrated circuits (Opamp and 555 Timer).

MEL403.3	Examine the working of semi-conductor device based on the Turning ON methods, commutation methods and its characteristics.
MEL403.4	Compare performances of power semiconductor devices and explain speed torque characteristics of AC and DC motors.
MEL404	**Kinematics of Machinery**
MEL404.1	Draw velocity diagrams of 6 link mechanisms using instantaneous center methods.
MEL404.2	Draw velocity and acceleration diagrams of 6 link mechanisms using graphical method.
MEL404.3	Plot s-t, v-t, a-t and j-t diagram for specific cam and follower motion.
MEL404.4	Analyze power transmission through spur gears.
MEL404.5	Select appropriate power transmission for specific applications from belt, rope and chain drive.
MEL404.6	Develop and build mechanisms to provide specific motion
MEL405	**Machine shop Practice-II**
MEL405.1	Perform plain turning, taper turning, screw cutting, drilling and boring operations on lathe machine
MEL405.2	Perform plane and inclined shaping on shaper machine
MEL405.3	Perform rough and smooth grinding on pedestal grinder and precision grinding on surface grinder
MEL405.4	Perform basic milling operations and gear cutting on universal milling machine
MEL405.5	Perform forging and heat treatment operations to prepare forging tool
MEL405.6	Prepare composite welded job using arc welding machine
MEC501	**Internal Combustion Engines**
MEC501.1	Demonstrate the principle concepts pertaining to Internal combustion engines.
MEC501.2	Demonstrate and Examine working of spark ignition engine components and systems
MEC501.3	Compute and Examine working of compression ignition engine components and systems
MEC501.4	Illustrate the working of lubrication, cooling and analyze supercharging systems
MEC501.5	Plot and analyze engine performance characteristics also discuss emission norms and control.
MEC501.6	Comprehend the different technological advances in engines and alternate fuels.
MEC502	**Mechanical Measurements and Control**
MEC502.1	Illustrate various types of static characteristics and types of errors occurring in the system.
MEC502.2	Demonstrate the linear and angular displacement measuring instruments for industrial applications.

MEC502.3	Demonstrate the pressure and temperature measuring instruments for industrial applications.
MEC502.4	Design mathematical model of system/ process for standard input responses.
MEC502.5	Analyze error and differentiate various types of control systems and time domain specifications.
MEC502.6	Analyze the problems associated with stability.
MEC503	**Heat Transfer**
MEC503.1	Identify basic modes of heat transfer (Conduction, Convection and Radiation)
MEC503.2	Apply one dimensional steady state heat conduction through various systems
MEC503.3	Develop mathematical model of convection with the flow of fluids in different elements
MEC503.4	Develop mathematical model of radiation and application in heat transfer systems.
MEC503.5	Demonstrate and explain mechanism of boiling and condensation
MEC503.6	Design and analyses different heat exchangers
MEC504	**Dynamics of Machinery**
MEC504.1	Apply principles of different types of governors and Gyroscopic effects on the mechanical systems
MEC504.2	Illustrate basic of static and dynamic forces
MEC504.3	Determine natural frequency of element/system
MEC504.4	Determine vibration response of mechanical elements / systems
MEC504.5	Select vibration isolation system for a specific application
MEC504.6	Demonstrate basic concepts of balancing of forces and couples
MEDLO5011	**Department Level Optional Course I-Press Tool Design**
MEDLO5011.1	Demonstrate press working operation for mass production of sheet metal parts
MEDLO5011.2	Design and Select elements pertaining to requirements and materials of press tool
MEDLO5011.3	Illustrate development in bend and draw components
MEDLO5011.4	Illustrate automation and safety aspects in press working
MEL501	**Internal Combustion Engines**
MEL501.1	Dismantle engine assembly
MEL501.2	Overhaul and Assemble engine components
MEL501.3	Perform load test/speed test on engine setup
MEL501.4	Calculate performance of multi cylinder engine
MEL501.5	Analyse engine performance and draw heat balance sheet
MEL501.6	Perform exhaust gas analysis
MEL502	**Mechanical Measurements and Control**
MEL502.1	Calibrate displacement sensors.

MEL502.2	Calibrate pressure gauges.
MEL502.3	Measure torque using strain gauges.
MEL502.4	Identify system/process characterstics for standard input responses.
MEL502.5	Identify various types of control systems and time domain specifications.
MEL502.6	Analyse the problems associated with stability.
MEL503	**Heat Transfer**
MEL503.1	Estimate thermal conductivity of metals / non metals
MEL503.2	Compute heat transfer coefficient in natural and forced convection
MEL503.3	Measure emissivity of grey body
MEL503.4	Quantify fin effectiveness / efficiency
MEL503.5	Analyse heat exchanger performance
MEL503.6	Demonstrate Heat Pipe
MEL504	**Dynamics of Machinery**
MEL504.1	Plot and analyse governor characteristics
MEL504.2	Analyse gyroscopic effect on laboratory model
MEL504.3	Estimate natural frequency of mechanical system
MEL504.4	Analyse vibration response of mechanical systems
MEL504.5	Determine damping coefficient of a system
MEL504.6	Balance rotating mass
MEL505	**Manufacturing Sciences Lab**
MEL505.1	Design of Simple progressive die for sheet metal parts.
MEL505.2	Design a simple tool for production system.
MEL505.3	Calculate geometry of metal cutting tool.
MEL505.4	Demonstrate parameter for metal cutting
MEL506	**Business Communication and Ethics**
MEL506.1	Develop the interpersonal skills to progress professionally by building stronger relationships
MEL506.2	Design a technical document using precise language, suitable vocabulary and apt style
MEL506.3	Apply the techniques to participate in GD, Interviews and write Resume
MEL506.4	Display competence required for professional career growth
MEC601	**Metrology and Quality Engineering**
MEC601.1	Demonstrate inspection methods and different gauges.
MEC601.2	Illustrate working principle of measuring instruments and calibration methodology.
MEC601.3	Illustrate basic concepts of quality and statistical methods in quality control.

MEC601.4	Select the appropriate sampling technique and non-destructive techniques.
MEC602	**Machine Design I**
MEC602.1	Illustrate the basic principle and procedure of machine design and various parameters involved in machine design
MEC602.2	Design of joints against static load
MEC602.3	Design and analyse fasteners for given application
MEC602.4	Design machine elements against fluctuating load
MEC602.5	Design and analyse various forces acting on shaft and couplings
MEC602.6	Design springs for strength and stiffness for given application
MEC603	**Finite Element Analysis**
MEC603.1	Select appropriate element for given problem and solve differential equations using weighted residual methods
MEC603.2	Develop the finite element equations to model engineering problems governed by second order differential equations
MEC603.3	Apply the basic finite element formulation techniques to solve engineering problems by using one dimensional elements
MEC603.4	Apply the basic finite element formulation techniques to solve engineering problems by using two dimensional elements
MEC603.5	Apply the basic finite element formulation techniques to find natural frequency of single degree of vibration system
MEC604	**Refrigeration and Air Conditioning**
MEC604.1	Demonstrate fundamental principles of refrigeration & air conditioning, Vapour absorption, Non conventional systems and analyse air refrigeration systems.
MEC604.2	Explain components of the vapour compression refrigeration system (VCRS), refrigerants, cooling towers and analyse VCRS.
MEC604.3	Illustrate air conditioning processes using psychrometry and design air conditioning system using cooling load calculations.
MEC604.4	Explain controls & application of refrigeration & air conditioning and estimate duct parameters
MEDLO6021	**Department Level Optional Course II-Mechatronics**
MEDLO6021.1	Demonstrate mechatronics system and it's application
MEDLO6021.2	Identify appropriate sensor and actuator for mechatronics system
MEDLO6021.3	Analyze data acquisition, signal conditioning and it's interfacing with microcontrollers
MEDLO6021.4	Design pneumatic, electo-pneumatic, hydraulic circuit and it's application
MEDLO6021.5	Analyze continuous control logics for standard input condition
MEDLO6021.6	Develop ladder logic program in PLC for various example and demonstrate team work

MEDLO6023	**Department Level Optional Course II-Industrial Automation**
MEDLO6023.1	Demonstrate basics of industrial automation and discuss safety monitoring.
MEDLO6023.2	Compare mechanization and automation, and communicate importance of atomization to engineering community
MEDLO6023.3	Design electro-pneumatic, pneumatic and hydraulic circuits.
MEDLO6023.4	Choose sensors and mechano-electrical actuators
MEDLO6023.5	Write program in PLC for process industry
MEDLO6023.6	Demonstrate basic working of robots and apply knowledge in multidisciplinary environment.
MEL601	**Metrology and Quality Engineering**
MEL601.1	Measure linear and angular dimensions.
MEL601.2	Use Comparators for inspection and control charts.
MEL601.3	Measure roughness and flatness of surface.
MEL601.4	Measure various parameters of gear tooth profile and screw threads.
MEL602	**Machine Design I**
MEL602.1	Use design data book/standard codes to standardise the designed dimensions
MEL602.2	Design of components subjected to static loading such as knuckle joint or cotter joint
MEL602.3	Design and analyse power transmission devices such as screw jack or C - clamp
MEL602.4	Design machine elements against fluctuating loads for finite and infinite life
MEL602.5	Design of shaft and flexible flange couplings under various loading conditions
MEL602.6	Design springs for strength and stiffness in order to meet desired needs
MEL603	**Finite Element Analysis**
MEL603.1	Perform analysis of one dimensional Bar element
MEL603.2	Perform analysis of one dimensional Truss element
MEL603.3	Perform analysisof one dimensional Beam element
MEL603.4	Perform analysis of Beam element for Modal and Harmonic conditions
MEL603.5	Perform analysis of Two dimensional Plate element
MEL603.6	Perform analysis of Axisymmetric Element
MEL604	**Refrigeration and Air Conditioning**
MEL604.1	Identify parts, operate & compute COP of refrigeration & air conditioning system.
MEL604.2	Plot processes on psychrometric chart.
MEL604.3	Compute performance of cooling tower.
MEL604.4	Simulate vapour compression refrigeration system.
MEL604.5	Write technical report of industrial visit.

MEL605	**Mechatronics Lab**
MEL605.1	Demonstrate implementation of interfacing sensors and actuators.
MEL605.2	Demonstrating interfacing of appropriate sensors for different applications.
MEL605.3	Develop pneumatic circuits for a specific system
MEL605.4	Development and visualization of robotic arm
MEL605.5	Implement program to PLC system and demonstrate its application
MEL605.6	Design and development of Mechatronic system
MEC701	**Machine Design II**
MEC701.1	Select appropriate gears for power transmission on the basis of given load and speed application
MEC701.2	Analyse various forces acting on the gear and Design gears based on the given conditions in context of safety and environment
MEC701.3	Analyze the various forces acting on bearing and Choose appropriate bearings for a given applications from the manufacturers catalogue committing professional ethics
MEC701.4	Analyze the various forces acting on belts and design belts for given applications committing professional ethics
MEC701.5	Analyze the various forces acting on cam and follower and Design cam and follower mechanisms on the given conditions in context to engineer and society
MEC701.6	Analyze the various forces acting on clutches and brakes and Design clutches and brakes on the given conditions in context to engineer and society
MEC702	**CAD/CAM/CAE**
MEC702.1	Illustrate methods of geometric modelling using techniques of computer graphics.
MEC702.2	Illustrate the transformation, manipulation of objects for storing and managing data
MEC702.3	Create CAM Toolpath and NC - G code output for technologically driven practices
MEC702.4	Demonsrate rapid prototyping and tooling concepts in any real life applications.
MEC702.5	Identify the tools for Analysis of a complex engineering component.
MEC703	**Mechanical Utility Systems**
MEC703.1	Demonstrate operating principles of compressors and pumps
MEC703.2	Evaluate performance of reciprocating/rotary compressors
MEC703.3	Illustrate and analyze characteristic curves of pumps
MEC703.4	Interpret possibilities of energy conservation in pumping and compressed air systems
MEC704	**Production Planning and Control**
MEC704.1	Illustrate production planning functions and manage manufacturing functions in a better way.

MEC704.2	Develop competency in scheduling and sequencing in manufacturing operations and effect affordable manufacturing lead time.
MEC704.3	Analyse and control inventory with cost effectiveness.
MEC704.4	Evaluate various documents procedural aspects and preparation for orders for various manufacturing methods.
MEE7013	**Elective I-Energy Management**
MEE7013.1	Explain need for energy management, economics and auditing
MEE7013.2	Describe importance of and analyse efficiency in thermal utilities
MEE7013.3	Describe importance of and analyse efficiency in electrical utilities
MEE7013.4	Assess need of waste heat recoevery and cogeneration
MEE7019	**Elective I-Operations Research**
MEE7019.1	Formulate and solve engineering and managerial situations as LPP ,Transportation ,Assignment Problem and Sequencing problem
MEE7019.2	Formulate and solve replacement ,queuing and game theory numericals
MEE7019.3	Formulate and solve inventory models problems
MEE7019.4	Solve dynamic programming and simulation problems
MEP701	**Project I**
MEP701.1	Identify societal needs, industrial, research problems and investigate them through in-depth literature survey for defining the problem statement.
MEP701.2	implement the appropriate methodology with modern tools.
MEP701.3	Manufacture the product for experimentations and corelate with theoretical/computational results to draw the proper inferences.
MEP701.4	Work as an individual and contribute as a team member with effective management skills to achieve a common objective.
MEP701.5	Write and present their work effectively with ethical values.
MEP701.6	Engage themselves in their area of interest and explore engineering advancements to structure open problem competency.
MEC801	**Design of Mechanical Systems**
MEC801.1	Design material handling systems such as hoisting mechanism of EOT Crane, belt conveyor
MEC801.2	Design engine components such as cylinder, piston, connecting rod and crankshaft from system design point of view
MEC801.3	Design pumps for given application surfaces
MEC801.4	Prepare layout of machine tool gear box and select number of teeth on each gear.
MEC802	**Industrial Engineering and Management**

MEC802.1	Illustrate the concept of Industrial Engineering, Productivity and differentiate between value engineering and value analysis.
MEC802.2	Recognize methods of work study and differentiate aspects of work system design for manufacturing industries.
MEC802.3	Explain discrete features of facility design pertaining to manufacturing industries.
MEC802.4	Identify various cost accounting and financial management practices widely applied in industries.
MEC803	**Refrigeration and Air Conditioning**
MEC803.1	Demonstrate fundamental principles of refrigeration & air conditioning, Vapour absorption, Non conventional systems and analyse air refrigeration systems.
MEC803.2	Explain components of the vapour compression refrigeration system (VCRS), refrigerants, cooling towers and analyse VCRS.
MEC803.3	Illustrate air conditioning processes using psychrometry and design air conditioning system using cooling load calculations.
MEC803.4	Explain controls & application of refrigeration & air conditioning and estimate duct parameters
MEE8022	**Elective II- Renewable Energy Sources**
MEE8022.1	Demonstrate need of different renewable energy sources and their importance
MEE8022.2	Calculate and analyse utilization of solar and wind energy
MEE8022.3	Illustrate design of biogas plant
MEE8022.4	Estimate alternate energy sources India
MEE8023	**Elective II-Project Management**
MEE8023.1	Apply selection criteria and select an appropriate project from different options
MEE8023.2	Write work break down structure for a project and develop a schedule based on it
MEE8023.3	Identify opportunities and threats to the project and decide an approach to deal with them strategically
MEE8023.4	Use Earned value technique and determine & predict status of the project
MEE8023.5	Capture lessons learned during project phases and document them for future reference
MEE8026	**Elective II-Automobile Engineering**
MEE8026.1	Demonstrate various systems like Clutch, Transmission, Axle, Differential, Steering in an automobile.
MEE8026.2	Illustrate importance and features of different systems like Brakes, Suspension, Wheel and balancing in an automobile.
MEE8026.3	Illustrate Electrical system and Body engineering in an automobile.
MEE8026.4	Compare the different technological advances in automobile.
MEP802	**Project II**

MEP802.1	Identify societal needs, industrial, research problems and investigate them through in-depth literature survey for defining the problem statement.
MEP802.2	implement the appropriate methodology with modern tools.
MEP802.3	Manufacture the product for experimentations and corelate with theoretical/computational results to draw the proper inferences.
MEP802.4	Work as an individual and contribute as a team member with effective management skills to achieve a common objective.
MEP802.5	Write and present their work effectively with ethical values.
MEP802.6	Engage themselves in their area of interest and explore engineering advancements to structure open problem competency.