INDIRA COLLEGE OF ENGINEERING AND MANAGEMENT

Approved By AICTE New Delhi, DTE (MS) and Affiliated to Pune University

ACADEMIC YEAR 2021-22

COURSE OUTCOMES

Course Pattern :

SE(MECHANICAL)(2019)				
YEAR	**COURSE CODE**	**COURSE NAME**	**COURSE OUTCOME NO.**	**COURSE OUTCOMES**
	202041	Solid Mechanics	202041.1	DEFINE various types of stresses and strain developed on determinate and indeterminate
			202041.2	DRAW Shear force and bending moment diagram for various types of transverse loading and
			202041.3	COMPUTE the slope & deflection, bending stresses and shear stresses on a beam
			202041.4	CALCULATE torsional shear stress in shaft and buckling on the column
			202041.5	APPLY the concept of principal stresses and theories of failure to determine stresses on a 2-D element.
			202041.6	UTILIZE the concepts of SFD & BMD, torsion and principal stresses to solve combined loading application based problems
	202042	Solid Modeling and Drafting	202042.1	UNDERSTAND basic concepts of CAD system, need and scope in Product Lifecycle Management
			202042.2	UTILIZE knowledge of curves and surfacing features and methods to create complex solid
			202042.3	CONSTRUCT solid models, assemblies using various modeling techniques & PERFORM mass property analysis, including creating and using a coordinate system
			202042.4	APPLY geometric transformations to simple 2D geometries
			202042.5	USE CAD model data for various CAD based engineering applications viz. production drawings, 3D printing, FEA, CFD, MBD, CAE, CAM, etc.
			202042.6	USE PMI & MBD approach for communication
			202043.1	DESCRIBE the basics of thermodynamics with heat and work interactions.

SE (SEM-III,TERM-I)	202043	Engineering Thermodynamics	202043.2	APPLY laws of thermodynamics to steady flow and non-flow processes.
			202043.3	APPLY entropy, available and non available energy for an Open and Closed System,
			202043.4	DETERMINE the properties of steam and their effect on performance of vapour
			202043.5	ANALYSE the fuel combustion process and products of combustion.
			202043.6	SELECT various instrumentations required for safe and efficient operation of
	202044	Engineering Materials and Metallurgy	202044.1	COMPARE crystal structures and ASSESS different lattice parameters.
			202044.2	CORRELATE crystal structures and imperfections in crystals with mechanical behaviour of materials.
			202044.3	DIFFERENTIATE and DETERMINE mechanical properties using destructive and non-destructive testing of materials
			202044.4	IDENTIFY & ESTIMATE different parameters of the system viz., phases, variables, component, grains, grain boundary, and degree of freedom. etc.
			202044.5	ANALYSE effect of alloying element & heat treatment on properties of ferrous & nonferrous alloy.
			202044.6	SELECT appropriate materials for various applications.
	203156	ectrical and Electronics Engineerin	203156.1	APPLY programming concepts to UNDERSTAND role of Microprocessor and Microcontroller in embedded systems
			203156.2	DEVELOP interfacing of different types of sensors and other hardware devices with Atmega328 based Arduino Board
			203156.3	UNDERSTAND the operation of DC motor, its speed control methods and braking
			203156.4	DISTINGUISH between types of three phase induction motor and its characteristic features
			203156.5	EXPLAIN about emerging technology of Electric Vehicle (EV) and its modular subsystems
			203156.6	CHOOSE energy storage devices and electrical drives for EVs
	202045	Geometric Dimensioning and Tolerancing Lab	202045.1	SELECT appropriate IS and ASME standards for drawing
			202045.2	READ & ANALYSE variety of industrial drawings
			202045.3	APPLY geometric and dimensional tolerance, surface finish symbols in drawing
			202045.4	EVALUATE dimensional tolerance based on type of fit, etc.
			202045.5	SELECT an appropriate manufacturing process using DFM, DFA, etc.
	202046	Audit Course - III Developing soft	202046.1	To know about various aspects of soft skills and learn ways to develop personality
			202046.2	Understand the importance and type of communication in personal and professional environment

202046	skills and personality	202046.3	To provide insight in to much needed technical and non-technical qualities in career planning.
		202046.4	Learn about Leadership, team building,decision makin gand stress management
207002	Engineering Mathematics - III	207002.1	SOLVE higher order linear differential equations and its applications to model and
		207002.2	APPLY Integral transform techniques such as Laplace transform and Fourier
		207002.3	APPLY Statistical methods like correlation, regression in analyzing and interpreting
		207002.4	PERFORM Vector differentiation & integration, analyze the vector fields and APPLY to fluid flow problems
		207002.5	SOLVE Partial differential equations such as wave equation, one and two
202047	Kinematics of Machinery	202047.1	APPLY kinematic analysis to simple mechanisms
		202047.2	ANALYZE velocity and acceleration in mechanisms by vector and graphical method
		202047.3	SYNTHESIZE a four bar mechanism with analytical and graphical methods
		202047.4	APPLY fundamentals of gear theory as a prerequisite for gear design
		202047.5	CONSTRUCT cam profile for given follower motion
202048	Applied Thermodynamics	202048.1	DETERMINE COP of refrigeration system and ANALYZE psychrometric processes.
		202048.2	DISCUSS basics of engine terminology,air standard, fuel air and actual cycles.
		202048.3	IDENTIFY factors affecting the combustion performance of SI and CI engines.
		202048.4	DETERMINE performance parameters of IC Engines and emission control.
		202048.5	EXPLAIN working of various IC Engine systems and use of alternative fuels
		202048.6	CALCULATE performance of single and multi stage reciprocating compressors and DISCUSS rotary positive displacement compressors
202049	Fluid Mechanics	202049.1	DETERMINE various properties of fluid
		202049.2	APPLY the laws of fluid statics and concepts of buoyancy
		202049.3	IDENTIFY types of fluid flow and terms associated in fluid kinematics
		202049.4	APPLY principles of fluid dynamics to laminar flow
		202049.5	ESTIMATE friction and minor losses in internal flows and DETERMINE boundary layer formation over an external surface
		202049.6	CONSTRUCT mathematical correlation considering dimensionless parameters, also ABLE to predict the performance of prototype using model laws

SE (SEM-IV,TERM-II)	202050	Manufacturing Processes	202050.1	SELECT appropriate moulding, core making and melting practice and estimate pouring time, solidification rate and DESIGN riser size and location for sand casting process
			202050.2	UNDERSTAND mechanism of metal forming techniques and CALCULATE load required for flat rolling
			202050.3	DEMONSTRATE press working operations and APPLY the basic principles to DESIGN dies and tools for forming and shearing operations
			202050.4	CLASSIFY and EXPLAIN different welding processes and EVALUATE welding characteristics
			202050.5	DIFFERENTIATE thermoplastics and thermosetting and EXPLAIN polymer processing techniques
			202050.6	UNDERSTAND the principle of manufacturing of fibre-reinforce composites and metal matrix composites
	202051	Machine Shop	202051.1	PERFORM welding using TIG/ MIG/ Resistance/Gas welding technique
			202051.2	MAKE Fibre-reinforced Composites by hand lay-up process or spray lay-up techniques
			202051.3	PERFORM cylindrical/surface grinding operation and CALCULATE its machining time
			202051.4	DETERMINE number of indexing movements required and acquire skills to PRODUCE a spur gear on a horizontal milling machine
			202051.5	PREPARE industry visit report
			202051.6	UNDERSTAND procedure of plastic processing
	202052	Project Based Learning - II	202052.1	IDENTIFY the real-world problem (possibly of interdisciplinary nature) through a rigorous literature survey and formulate / set relevant aims and objectives.
			202052.2	ANALYZE the results and arrive at valid conclusions
			202052.3	PROPOSE a suitable solution based on the fundamentals of mechanical engineering by possibly integration of previously acquired knowledge.
			202052.4	CONTRIBUTE to society through proposed solutions by strictly following professional ethics and safety measures.
			202052.5	USE of technology in proposed work and demonstrate learning in oral and written form.
			202052.6	DEVELOP ability to work as an individual and as a team member.
	202053	Audit Course - IV Human Behaviour	202053.1	Understand concept of human act and interact
			202053.2	Understand types of human beheviour

TE(MECHANICAL)(2019)				
YEAR	**COURSE CODE**	**COURSE NAME**		**COURSE OUTCOMES**
	302041	Numerical and Statistical Methods	302041.1	SOLVE system of equations using direct and iterative numerical methods
			302041.2	ESTIMATE solutions for differential equations using numerical techniques
			302041.3	DEVELOP solution for engineering applications with numerical integration.
			302041.4	DESIGN and CREATE a model using a curve fitting and regression analysis.
			302041.5	APPLY statistical Technique for quantitative data analysis
			302041.6	DEMONSTRATE the data, using the concepts of probability and linear algebra
	302042	Heat and Mass Transfer	302042.1	ANALYZE & APPLY the modes of heat transfer equations for one dimensional thermal system.
			302042.2	DESIGN a thermal system considering fins, thermal insulation and & Transient heat conduction.
			302042.3	EVALUATE the heat transfer rate in natural and forced convection & validate with experimentation results
			302042.4	INTERPRET heat transfer by radiation between objects with simple geometries, for black and grey surfaces.
			302042.5	ABILITY to analyze the rate of mass transfer using Fick's Law of Diffusion and understands mass diffusion in different coordinate systems.
			302042.6	DESIGN & ANALYSIS of heat transfer equipments and investigation of its performance
	302043	Design of Machine Elements	302043.1	DESIGN AND ANALYZE the cotter and knuckle Joints, levers and components subjected to eccentric loading
			302043.2	DESIGN shafts, keys and couplings under static loading conditions.
			302043.3	ANALYZE different stresses in power screws and APPLY those in the procedure to design screw jack.
			302043.4	EVALUATE dimensions of machine components under fluctuating loads.
			302043.5	EVALUATE & INTERPRET the stress developed on the different type of welded and threaded joints.
			302043.6	APPLY the design and development procedure for different types of springs.
	302044	Mechatronics	302044.1	DEFINE key elements of mechatronics, principle of sensor and its characteristics.
			302044.2	UTILIZE concept of signal processing and MAKE use of interfacing systems such as ADC, DAC, Digital I/O.
			302044.3	DETERMINE the transfer function by using block diagram reduction technique.

TE (SEM-V,TERM-I)			302044.4	EVALUATE Poles and Zero, frequency domain parameter for mathematical modeling for mechanical system
			302044.5	APPLY the concept of different controller modes to an industrial application.
			302044.6	DEVELOP the ladder programming for industrial application
	302045	Advanced Forming & Joining Processes	302045.1	ANALYSE the effect of friction in metal forming deep drawing and IDENTIFICATION of surface defects and their remedies in deep drawing operations
			302045.2	ASSESS the parameters for special forming operation and SELECT appropriate special forming operation for particular applications
			302045.3	ANALYSE the effect of HAZ on microstructure and mechanical properties of materials
			302045.4	CLASSIFY various solid state welding process and SELECT suitable welding processes for particular applications
			302045.5	CLASSIFY various advanced welding process and SELECT suitable welding processes for particular applications.
			302045.6	INTERPRET the principles of sustainable manufacturing and its role in manufacturing industry.
	302046	Digital Manufacturing Laboratory	302046.1	DEVELOP a component using conventional machines, CNC machines and Additive
			302046.2	ANALYZE cutting tool parameters for machining given job.
			302046.3	DEMONSTRATE simulation of manufacturing process using Digital Manufacturing Tools.
			302046.4	SELECT and DESIGN jigs and Fixtures for a given component.
			302046.5	DEMONESTRATE different parameters for CNC retrofitting and reconditioning.
	302047	Skill Development	302047.1	APPLY& DEMONSTRATE procedure of assembly & disassembly of various machines.
			302047.2	DESIGN & DEVELOP a working/model of machine parts or any new product.
			302047.3	EVALUATE fault with diagnosis on the machines, machine tools and home appliances.
			302047.4	IDENTIFY & DEMONSTRATE the various activities performed in an industry such as maintenance, design of components, material selection.
	302048	Audit Course V Entrepreneurship and IP strategy		

	302049	Artificial Intelligence & Machine Learning	302049.1	DEMONSTRATE fundamentals of artificial intelligence and machine learning
			302049.2	APPLY feature extraction and selection techniques
			302049.3	APPLY machine learning algorithms for classification and regression problems.
			302049.4	DEVISE AND DEVELOP a machine learning model using various steps.
			302049.5	EXPLAIN concepts of reinforced and deep learning.
			302049.6	SIMULATE machine learning model in mechanical engineering problems.
	302050	Computer Aided Engineering	302050.1	DEFINE the use of CAE tools and DESCRIBE the significance of shape functions in finite element formulations.
			302051.2	APPLY the various meshing techniques for better evaluation of approximate results.
			302052.3	APPLY material properties and boundary condition to SOLVE 1-D and 2-D element stiffness matrices to obtain nodal or elemental solution
			302053.4	ANALYZE and APPLY various numerical methods for different types of analysis.
			302054.5	EVALUATE and SOLVE non-linear and dynamic analysis problems by analyzing the results obtained from analytical and computational method.
			302055.6	GENERATE the results in the form of contour plot by the USE of CAE tools.
	302051	Design of Transmission Systems	302051.1	APPLY the principle of Spur & Helical gear design for industrial application and PREPARE a manufacturing drawing with the concepts of GD&T.
			302051.2	EXPLAIN and DESIGN Bevel & Worm gear considering design parameters as per design standards.
			302051.3	SELECT&DESIGN Rolling and Sliding Contact Bearings from manufacturer's catalogue for a typical application considering suitable design parameters.
			302051.4	DEFINE and DESIGN various types of Clutches, Brakes, used in automobile
			302051.5	APPLY various concept to DESIGN Machine Tool Gear box, for different applications
			302051.6	ELABORATE various modes of operation, degree of hybridization and allied terms associated with hybrid electric vehicles.
	302052	Composite Materials	302052.1	DEFINE & COMPARE composites with traditional materials
			302052.2	IDENTIFY & ESTIMATE different parameters of the Polymer Matrix Composite
			302052.3	CATEGORISE and APPLY Metal Matrix Process from possessions landscape.
			302052.4	DETERMINE volume/weight fraction and strength of Composites.

TE (SEM-VI,TERM-II)			302052.5	SELECT appropriate testing and inspection method for composite materials.
			302052.6	SELECT composites materials for various applications
	302053	Measurement Laboratory	302053.1	EVALUATE causes of errors in Vernier calipers, micrometers by performing experiments in standard metrological conditions, noting deviations at actual and by plotting cause and effect diagram, to reduce uncertainty in measurement.
			302053.2	ANALYZE strain measurement parameters by taking modulus of elasticity in consideration to acknowledge its usage in failure detection and force variations.
			302053.3	EXAMINE surface Textures, surface finish using equipment's like Talysurf and analyze surface finish requirements of metrological equipment's like gauges, jaws of vernier calipers, micrometers, magnifying glasses of height gauge and more, to optimize surface finish accuracy requirements and cost of measurement.
			302053.4	MEASURE the dimensional accuracy using Comparator and limit gauges and appraise their usage in actual measurement or comparison with standards set to reduce measurement lead time.
			302053.5	PERFORM Testing of Flow rate, speed and temperature measurements and their effect on performance in machines and mechanisms like hydraulic or pneumatic trainers, lathe machine etc. to increase repeatability and reproducibility.
			302053.6	COMPILE the information of opportunities of entrepreneurships/business in various sectors of metrology like calibrations, testing, coordinate and laser metrology etc in an industry visit report.
	302054	Fluid Power & Control Laboratory	302054.1	DEFINE working principle of components used in hydraulic and pneumatic systems
			302054.2	IDENTIFY & EXPLAIN various applications of hydraulic and pneumatic systems.
			302054.3	SELECT an appropriate component required for hydraulic and pneumatic systems using manufactures' catalogues.
			302054.4	SIMULATE & ANALYSE various hydraulic and pneumatic systems for industrial/mobile applications.
			302054.5	DESIGN a hydraulic and pneumatic system for the industrial applications
			302054.6	DESIGN & DEMONESTRATE various IoT, PLC based controlling system using hydraulics and pneumatics.
			302055.1	DEMONSTRATE professional competence through industry internship.

	302055	Internship/Mini project	302055.2	APPLY knowledge gained through internships to complete academic activities in a professional manner
			302055.3	CHOOSE appropriate technology and tools to solve given problem.
			302055.4	DEMONSTRATE abilities of a responsible professional and use ethical practices in day to day life.
			302055.5	DEVELOP network and social circle, and DEVELOPING relationships with industry people.
			302055.6	ANALYZE various career opportunities and DECIDE career goals.
	302056	Audit Course VI		
BE(MECHANICAL)(2015)				
YEAR	**COURSE CODE**	**COURSE NAME**		**COURSE OUTCOMES**
	402041	Hydraulics and Pneumatics	402041.1	Understand working principle of components used in hydraulic & pneumatic systems.
			402041.2	Identify various applications of hydraulic & pneumatic systems.
			402041.3	Selection of appropriate components required for hydraulic and pneumatic systems.
			402041.4	Analyse hydraulic and pneumatic systems for industrial/mobile applications.
			402041.5	Design a system according to the requirements.
			402041.6	Develop and apply knowledge to various applications.
	402042	CAD CAM Automation	402042.1	Apply homogeneous transformation matrix for geometrical transformations of 2D CAD entities for basic geometric transformations
			402042.2	Use analytical and synthetic curves and surfaces in part modeling
			402042.3	Do real times analysis of simple mechanical elements like beams, trusses, etc. and comment on safety of engineering components using analysis software.
			402042.4	Generate CNC program for Turning / Milling and generate tool path using CAM software
			402042.5	Demonstrate understanding of various rapid manufacturing techniques and develop competency in designing and developing products using rapid manufacturing technology.
			402042.6	Understand the robot systems and their applications in manufacturing industries.
			402043.1	Apply balancing technique for static and dynamic balancing of multi cylinder inline and radial engines.
			402043.2	Estimate natural frequency for single DOF undamped & damped free vibratory systems.

BE(SEM-VII,TERM-I)	402043	Dynamics of Machinery	402043.3	Determine response to forced vibrations due to harmonic excitation, base excitation and excitation due to unbalance forces.
			402043.4	Estimate natural frequencies, mode shapes for 2 DOF undamped free longitudinal and torsional vibratory systems.
			402043.5	Describe vibration measuring instruments for industrial / real life applications
			402043.6	Explain noise, its measurement & noise reduction techniques for industry and day today life problems.
	402044 A	Elective-I Finite Element Analysis	402044 A.1	Understand the different techniques used to solve mechanical engineering problems.
			402044 A.2	Derive and use 1-D and 2-D element stiffness matrices and load vectors from various methods to solve for displacements and stresses.
			402044 A.3	Apply mechanics of materials and machine design topics to provide preliminary results used for testing the reasonableness of finite element results.
			402044 A.4	Explain the inner workings of a finite element code for linear stress, displacement, temperature and modal analysis.
			402044 A.5	Use commercial finite element analysis software to solve complex problems in solid
			402044 A.6	Interpret the results of finite element analyses and make an assessment of the results in terms of modeling (physics assumptions) errors, discretization (mesh density and refinement toward convergence) errors, and numerical (round-off) errors.
	402044 B	Elective-I Computational Fluid Dynamics	402044B.1	Analyse and model fluid flow and heat transfer problems.
			402044B.2	Generate high quality grids and interpret the correctness of numerical results with physics.
			402044B.3	Conceptualize the programming skills.
			402044B.4	Use A CFD tool effictively for Practical problems and research.
			402044B.5	Interpretation of Software solution to physics involved in Fluid flow & Heat Transfer
			402044 C.1	Determine the performance parameters of trans-critical & ejector refrigeration systems
			402044 C.2	Estimate thermal performance of compressor, evaporator, condenser and cooling tower.

	402044 C	Elective-I Heating, Ventilation, Air Conditioning and Refrigeration Engineering	402044 C.3	Describe refrigerant piping design, capacity & safety controls and balancing of vapour compressor system.
			402044 C.4	Explain importance of indoor and outdoor design conditions, IAQ, ventilation and air distribution system.
			402044 C.5	ventilation and air distribution system. • Estimate heat transmission through building walls using CLTD and decrement factor &time lag methods with energy-efficient and cost-effective measures for building envelope.
			402044 C.6	Explain working of types of desiccant, evaporative, thermal storage, radiant cooling, clean room and heat pump air-conditioning systems.
	402045 A	Elective - II Automobile Engineering	402045 A.1	To compare and select the proper automotive system for the vehicle.
			402045 A.2	To analyse the performance of the vehicle.
			402045 A.3	To diagnose the faults of automobile vehicles.
			402045 A.4	To apply the knowledge of EVs, HEVs and solar vehicles
	402045 B	Elective - II Operation Research	402045 B.1	Apply LPP and Decision Theory to solve the problems
			402045 B.2	Apply the concept of transportation models to optimize available resources.
			402045 B.3	Decide optimal strategies in conflicting situations.Implement the project management techniques.
			402045 B.4	.Minimize the process time Optimize multi stage decision making problems
	402045 C	Elective - II Energy Audit and Management	402045 C.1	Compare energy scenario of India and World.
			402045 C.2	Carry out Energy Audit of the Residence / Institute/ Organization
			402045 C.3	Evaluate the project using financial techniques
			402045 C.4	Identify and evaluate energy conservation opportunities in Thermal Utilities.
			402045 C.5	Identify and evaluate energy conservation opportunities in Electrical Utilities.
			402045 C.6	Identify the feasibility of Cogeneration and WHRUse a CFD tool effectively for practical problems and research.
	402050	Project - I	402046.1	Find out the gap between existing mechanical systems and develop new creative new mechanical system.
			402046.2	Learn about the literature review
			402046.3	Get the experience to handle various tools, tackles and machines.
			402047.1	Describe the power generation scenario, the layout components of thermal power plant and analyze the improved Rankin cycle, Cogeneration cycle

BE (SEM-VIII,TERM-II)	402047	Energy Engineering	402047.2	Analyze the steam condensers, recognize the an environmental impacts of thermal power plant and method to control the same
			402047.3	Recognize the layout, component details of hydroelectric power plant and nuclear power plant
			402047.4	Realize the details of diesel power plant, gas power plant and analyze gas turbine power cycle
			402047.5	Emphasize the fundaments of non-conventional power plants
			402047.6	Describe the different power plant electrical instruments and basic principles of
	402048	Mechanical System Design	402048.1	Understand the difference between component level design and system level design
			402048.2	Design various mechanical systems like pressure vessels, machine tool gear boxes, material handling systems, etc. for the specifications stated/formulated
			402048.3	Learn optimum design principles and apply it to mechanical components
			402048.4	Handle system level projects from concept to product.
	402049 A	Elective-III Tribology	402049 A.1	The course will enable the students to know the importance of Tribology in Industry.
			402049 A.2	The course will enable the students to know the basic concepts of Friction, Wear, Lubrications and their measurements
			402049 A.3	This course will help students to know the performance of different types of bearings and analytical analysis thereof
			402049 A.4	This course will help students to apply the principles of surface engineering for different applications of tribology.
	402049 B	Elective-III Industrial Engineering	402049 B.1	Apply the Industrial Engineering concept
			402049 B.2	Understand, analyze and implement different concepts involved in method study.
			402049 B.3	Design and Develop different aspects of work system and facilities
			402049 B.4	Understand and Apply Industrial safety standards, financial management practices.
			402049 B.5	Undertake project work based on modeling & simulation area.
	402049 C	Elective-III Robotics	402049 C.1	Identify different type of robot configuration with relevant terminology.
			402049 C.2	Design robot with desired motion with suitable trajectory planning.
			402049 C.3	Select suitable sensors, actuators and drives for robotic systems.
			402049 C.4	Understand kinematics in robotic systems
			402049 C.5	Select appropriate robot programming for given application
			402049 C.6	Understand need of IoT, machine learning, simulation in robotics.
			402050A.1	Classify and analyze special forming processes
			402050A.2	Analyze and identify applicability of advanced joining processes

	402050 A	Elective-IV Advanced Manufacturing Processes	402050A.3	Understand and analyze the basic mechanisms of hybrid non-conventional machining techniques
			402050A.4	Select appropriate micro and nano fabrication techniques for engineering applications
			402050A.5	Understand and apply various additive manufacturing technology for product development
			402050A.6	Understand material characterization techniques to analyze effects of chemical composition, composition variation, crystal structure, etc.
	402050 B	Elective-IV Solar and Wind Energy	402050 B.1	Design of solar food drier for domestic purpose referring existing system
			402050 B.2	Design of parabolic dish solar cooker for domestic purpose referring existing system
			402050 B.3	Design of solar photovoltaic system for domestic purpose referring existing system
			402050 B.4	Design miniature wind mill for domestic purpose referring existing system
	402050 C	Elective-IV Product Design and Development	402050 C.1	Understand essential factors for product design
			402050 C.2	Design product as per customer needs and satisfaction
			402050 C.3	Understand Processes and concepts during product development
			402050 C.4	Understand methods and processes of Forward and Reverse engineering
			402050 C.5	Carry various design processes as DFA, DFMEA, design for safety
			402050 C.6	Understand the product life cycle and product data management
	402051	Project-II	402051.1	Find out the gap between existing mechanical systems and develop new creative new mechanical system.
			402051.2	Learn about the literature review
			402051.3	Get the experience to handle various tools, tackles and machines.
ME(MECHANICAL)				
YEAR	**COURSE CODE**	**COURSE NAME**		**COURSE OUTCOMES**
	507101	Advanced Mathematics and Numerical Methods	507101.1	apply and solve Linear Algebraic Equations
			507101.2	understand Linear Regression Analysis methods
			507101.3	Expalin methods of Differentiation & Integration
			507101.4	solve Eigen Values & Eigen Vectors of Matrices
			507101.5	solve Ordinary differential equations
			507101.6	apply and solve Ordinary differential equations
			502102.1	Explain the Equation of state and properties of pure substance
			502102.2	Apply the laws of thermodynamics to real life problems

FIRST YEAR (SEM-I,TERM-I)	502102	Advanced Thermodynamics and Combustion Technology	502102.3	Estimate Exergy Analysis of Thermal Systems
			502102.4	Derive and explain Thermodynamic Property Relations
			502102.5	Describe chemical reaction,phase and chemical equilibrium,gas mixtures concepts to analyse the combustion technology.
			502102.6	Explain Thermodynamics of Biological systems
	502103	Advanced Fluid Mechanics	502103.1	Describe the governing equations integral and differencial relations
			502103.2	explain Navier-Stokes Equations,exact solutions and Analysis of numerical schemes
			502103.3	Describe Elementary Plane-Flow Solutions,Role of viscosity in rotational and irrotational flows, Concept of lift and drag.
			502103.4	Explain Boundary layer equations,Effect of pressure gradient
			502103.5	Understand turbulent flow and explain Various Turbulent Models.
			502103.6	Expain one dimenssional compressible flow,normal shock relations and oblick
	502104	Research Methodology	502104.1	understand reserach meaning and types,methods and methodology.
			502104.2	farmulate Research Problem and understand the Concept & need of research design.
			502104.3	Apply Mathematical Modelling and prediction of performance
			502104.4	Explain basic instrumentation used in research.
			502104.5	understand and apply statitics in research.
			502104.6	write research report and publish research work.
	502105	Project Management	502105A.1	Explain project and understand planning,budgeting,implementing
			502105A.2	Describe Implementation and performance monitoring. Implementation plan for top management
			502105A.3	Explain Planning Budget, Procurement Procedures, Construction, Measurement & Verification.
		Operation Management	502105B.1	Explain Operating systems models, key decisions, Planning and controlling
			502105B.2	Describe Technology and knowledge management, Quality Management
			502105B.3	Understand Operations - Challenges, Opportunities, Excellence, risk management and sustainability through case studies
		Environmental and Pollution control	502105C.1	Identify Pollution and Environmental Ethics
			502105C.2	Understand Nuclear hazards Environmental impact and economic aspects
			502105C.3	Realize Emission standards and regulations for Automobiles.
			502107.1	Understand modes of heat transfer and laws of heat transfer and apply it to real system
			502107.2	solve the transient heat conduction problems
			502107.3	solve the problems related to External Forced Convection

	502106	Advanced Heat Transfer	502107.4	Apply the Principle of Fluid flow and Convective heat transfer
			502107.5	solve the problems related to natural convection
			502107.6	Apply the correlations of boiling and condensation to solve real life problems
			502107.7	Solve the problems of thermal radiation.
	502108	Air Conditioning Technology	502108.1	understand HVAC basics termonology
			502108.2	understand and apply Psychrometry
			502108.3	Realize and analysis importance of thermal comfort.
			502108.4	calculate heating and cooling load
			502108.5	design duct system
			502108.6	design air conditioning system
FIRST YEAR (SEM-II,TERM-II)	502109	Measurements and Controls	502109.1	explain Instrument types and performance characteristics
			502109.2	evaluate Measurement Uncertainty
			502109.3	Measure field quantities
			502109.4	measure derived quantities
			502109.5	understand basics of controller
	502110	Turbomachinery	502110A.1	Analyse the Axial flow Compressors, Centrifugal flow compressors
			502110A.2	analyse Axial flow Turbines and Radial flow Turbines
		Gas Turbine	502110B.1	Understand basics of Compressible flow
			502110B.2	analysis of ideal and real engine
		Selection of Fans, Pumps and blowers	502110C.1	analyse conservation opportunities
			502110C.2	evaluate performance
			502110C.3	Select fans, pumps and blowers
	502112	Seminar-1	502112.1	To use multiple thinking strategies to examine real-world issues and explore creative avenues of expression
			502112.2	To acquire, articulate, create and convey intended meaning using verbal and non-verbal method of communication
			502112.3	To learn and integrate, through independent learning in sciences and technologies, with disciplinary specialization and the ability to integrate information across
YEAR	**COURSE CODE**	**COURSE NAME**		**COURSE OUTCOMES**
	602113	Computational Fluid Dynamics	602113.1	understand application of CFD and Basics governing equation
			602113.2	understand Discretization and Essentials of Numerical Methods
			602113.3	use Curvilinear Coordinates and Numerical Grid Generation
			602113.4	Compute Heat-Transfer on a Cartesian-Geometry

			602113.5	Solve Eulers and Navier-Stokes Equations
			602113.6	explain Turbulence Modeling
SECOND YEAR (SEM-III,TERM-I)	602114	Design of Heat Transfer Equipments	602114.1	classify Heat Exchangers
			602114.2	Solve to Determine Exchanger Effectiveness
			602114.3	analyse Heat Exchanger Pressure Drop
			602114.4	understand Heat Transfer Characteristics
			602114.5	understand basics of cooling tower and furnaces
			602114.6	explain thermal devices
	602115	Solar Energy	602115A.1	understand solar cell
			602115A.2	understand environmental impact of photovoltaic
		Waste Heat Recovery and Cogeneration	602115B.1	Understand Waste Heat Recovery
			602115B.2	understand Cogeneration
		Biomass Technology	602115C.1	understand Biomass potential and Use
			602115C.2	understand Environmental impact of biomass
SECOND YEAR (SEM-IV,TERM-II)	602117	Project	602117.1	Find out the gap between existing mechanical systems and develop new creative new mechanical system.
			602117.2	Learn about the literature review
			602117.3	Get the experience to handle various tools, tackles and machines.
			602117.4	inculcate research culture