INDIRA COLLEGE OF ENGINEERING AND MANAGEMENT

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

ACADEMIC YEAR 2021-22

COURSE OUTCOMES

SE(MECHANICAL SANDWICH)(2019 pat)				
YEAR	**COURSE CODE**	**COURSE NAME**	**COURSE OUTCOME NO.**	**COURSE OUTCOMES**
SE (SEM-III,TERM-I)	207002	Engineering Mathematics - III	207002.1	Solve higher order linear differential equations and apply to Mechanical engineering problems such as mechanical vibrations and heat transfer.
			207002.2	Integral Transform techniques such as laplace transform,Fourier transform
			207002.3	Apply statistical methods like correlation, regression analysis in analyzing and interpreting experimental data and probability theory applied to construction management.
			207002.4	Perform vector differentiation and integration, analyze the vector fields and apply to fluid flow problems
			207002.5	Solve various partial differential equations such as wave equation, one and two dimensional heat flow equations.
	202043	Thermodynamics*	202043.1	Apply various laws of thermodynamics to various processes and real systems.
			202043.2	Apply the concept of Entropy, Calculate heat, work and other important thermodynamic properties for various ideal gas processes.
			202043.3	Estimate performance of various Thermodynamic gas power cycles and gas refrigeration cycle and availability in each case.
			202043.4	Estimate the condition of steam and performance of vapour power cycle and vapour compression cycle.
			202043.5	Estimate Stoichiometric air required for combustion, performance of steam generators and natural draught requirements in boiler plants.
			202043.6	Use Psychromertic charts and estimate various essential properties related to Psychrometry and processes
	202051	Strength of Materials*	202051.1	Apply Knowledge of Mathematics science for Engineering applications
			202051.2	Design and conduct experiments ,as well to analyse interpret data
			202051.3	Design a component to meet desired needs within realistic constraints of health and safety
			202051.4	Identify formulate and solve engineering problems
			202051.5	Practice professional and ethical responsibility
			202051.6	Use the techniques,skills,and modern engineering tools necessory for engineering practice
			202061.1	Understanding basic concepts and properties of Material Science
			202061.2	Understanding mechanical behavior of materials and their testing and estimate properties of materials

	202061	Material Science and Metallurgy	202061.3	knowledge in various classes of materials, their properties, compositions and applications
			202061.4	Understanding various heat treatments suitable for ferrous and non ferrous materials
			202061.5	Understanding various processes of Powder Metallurgy techniques its application and various non ferrous materials
			202061.6	understanding various polymers composites and ceramics, their properties,application and structure
	202062	Fluid Mechanics and Machinery	202062.1	Understand and apply various fluid properties and hydrostatic concept to various geometry
			202062.2	Apply Bernoulli's principle to various flow system and concept of Fluid kinematics to find velocities and acceleration at any point in a flow field.
			202062.3	Estimate the major and minor losses through pipe and Velocity ,shear stress distribution for laminar flow in a pipe
			202062.4	Apply thermodynamics and kinematics principles to turbo machines
			202062.5	Estimate and Analyze the performance of turbo machines
			202062.6	Identify the components of a centrifugal pump and determine the operating performance charecteristics of a centrifugal pump
	202055	Audit Course	202055.1	To create and sustain a community of learning in which students acquire knowledge in fire, safety and hazard management and learn to apply it professionally with due consideration for ethical, human life & property safety issues.
			202055.2	To pursue research and development in fire safety engineering, hazard management and disseminate its findings.
			202055.3	To meet the challenges of today and tomorrow in the most effective, efficient and contemporary educational manner.
			202055.4	To help in building national capabilities in fire safety engineering, disaster management, hazard management, industrial safety education through practical training to ensure a fire safe nation.
	202063	Thermal Engineering	202063.1	Understand the types of compressors, selection, work and related efficiencies
			202063.2	To know different refrigeration systems and COP
			202063.3	Conversant with gas turbines and Jet propulsion
			202063.4	Understand all the IC Engine systems, layouts and its importance
			202063.5	Able to understand methods to test the IC Engine
			202063.6	Understand the concept of normal and abnormal combustion in engine and emission
	202064	Metrology and Quality Control	202064.1	develop and evaluate measurement techniques
			202064.2	create awareness among the students regarding different gauges used in industries.
			202064.3	understand limits, fits and tolerances will aid them while assembling different parts to perform desired function developing interchangeability concept.
			202064.4	understand SQC tools will help the students in continual improvement process.

SE (SEM-IV,TERM-II)	202065	Manufacturing Engineering	202065.1	Understand various casting methods and suggest appropriate method pertaining to the application
			202065.2	Understand basics of metal forming processes, selection of equipments and tooling
			202065.3	Classify, describe and configure the principles of various welding techniques
			202065.4	Understanding mechanism of chip formation, differentiate between oblique and orthogonal cutting, estimate cutting forces in metal cutting
			202065.5	Demonstrate and configure the functions of milling, drilling and grinding machines and estimate machining time for various metal cutting operations
			202065.6	Identify characteristics of non-conventional machining processes, describe basic mechanisms and list-out applications
		Computer Aided Machine Drawing	202066.1	Understand the importance of CAD in the light of allied technologies such as CAM, CAE, FEA, CFD, PLM.
			202066.2	Understand the significance of parametric technology and its application in 2D sketching.
			202066.3	Understand the significance of parametric feature-based modeling and its application in 3D machine components modeling.
			202066.4	Ability to create 3D assemblies that represent static or dynamic Mechanical Systems.
			202066.5	Ability to ensure manufacturability and proper assembly of components and assemblies.
			202066.6	Ability to communicate between Design and Manufacturing using 2D drawings.
	202067	Soft Skills	202067.1	Improved communication, interaction and presentation of ideas.
			202067.2	Right attitudinal and behaviouralchange
			202067.3	Developed right-attitudinal and behavioral change
	202068	THEORY OF MACHINES	202068.1	Identify mechanisms in real life applications.
			202068.2	Perform kinematic analysis of simple mechanisms.
			202068.3	Perform static and dynamic force analysis of slider crank mechanism.
			202068.4	Determine moment of inertia of rigid bodies experimentally.
			202068.5	Analyze velocity and acceleration of mechanisms by vector and graphical methods.
	203152	Electrical and Electronics Engineering	203152.1	Develop the capability to identify and select suitable DC motor / induction motor / special
			203152.2	Program Arduino IDE using conditional statements
			203152.3	Interfacing sensors with Arduino IDE
TE(MECHANICAL SANDWICH)(2019 pat)				
	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
			302042.1	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.

TE (SEM-V,TERM-I)	**302042**	Heat and Mass Transfer	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.
			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
	302061	Fundamentals Computer Aided Engineering	302061.1	DEFINE the use of CAE tools and DESCRIBE the significance of shape functions in finite element formulations.
			302061.2	APPLY the various meshing techniques for better evaluation of approximate results.
			302061.3	APPLY material properties and boundary condition to SOLVE 1-D and 2-D element stiffness matrices to obtain nodal or elemental solution.
			302061.4	Develop code for a component for CNC machines
			302061.5	Describe various methods of Automation and Robot Architecture
			302061.6	GENERATE the results in the form of contour plot by the USE of CAE tools.
	302046	Digital Manufacturing Laboratory	302046.1	DEVELOP a component using conventional machines, CNC machines and Additive Manufacturing Techniques.
			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.
			302062.1	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
			302062.2	ANALYZE the calibration process of dial gauge by using dial calibration tester.

	302062	Mechanical Measurement Laboratory	302062.3	EXAMINE surface Textures, surface finish using equipment like Talysurf and analyze surface finish requirements of metrological equipments like gauges, jaws of vernier calipers, micrometers,magnifying glasses of height gauge and more, to optimize surface finish accuracy requirements and cost of measurement.
			302062.4	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
			302062.5	IDENTIFY surface patterns/ flatness of given specimens by using optical flat.
			302062.6	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.
	302048	Audit Course V Entrepreneurship and IP strategy		
TE (SEM-VI,TERM-II)	**302063**	Industrial In-plant Training-I	302063.1	To understand the industrial environment with better understanding of different industry attributes
			302063.2	To Understand industrial practices and technical details followed in industry.
			302063.3	To analyze and solve engineering problems by applying engineering knowledge with teamwork and multidisciplinary approach.
			302063.4	To work in professional organisations with all the professional ethics.
			302063.5	To handle the industrial assignments and projects with good confidence level and with better understanding of basic engineering concepts and principles.
			302063.6	Write and present technical reports / projects with effective presentation skills.
	302064	Industrial Mini-Project	302064.1	To identify specific areas for improvement in industry with better understanding.
			302064.2	To develop and implement systematic approach to solve specific industrial problem.
			302064.3	To develop methodology for providing solution to industrial problems with teamwork and multidisciplinary approach
			302064.4	To understand and implement basic principles of project management.
			302064.5	To solve and analyze industrial problems.
	302065	Seminar	302065.1	Read and understand recent trends and technologies in the area of mechanical engineering.
			302065.2	Recognize problems after doing research literature survey using various resources.
			302065.3	Prepare concise, comprehend and conclude selective topic in area of mechanical engineering
			302065.4	Effective presentation and discussion of research topics in a public forum
			302065.5	Make use of new and recent technology (e.g. Latex) for creating technical reports
	302067	Process Planning & Tool Selection	302067.1	Interpret and analyse Part print of an industrial component.
			302067.2	Illustrate the meaning of geometric dimensions and understand the tolerance chart.
			302067.3	Understand Principles of location and clamping and Establish suitable manufacture sequence.
			302067.4	Select appropriate equipment and tooling requirements.
			302067.5	Estimate the total unit time per piece for a component in mass production.

			302067.6	Design of Process picture sheet and operation route sheet on GPM for batch production or a special purpose machine for mass production.
	302068	Advanced Materials & Manufacturing (Self Study-II)	302068.1	DEFINE & COMPARE composites with traditional materials.
			302068.2	IDENTIFY & ESTIMATE different parameters of the Polymer Matrix Composite
			302068.3	CATEGORISE and APPLY Metal Matrix Process from possessions landscape.
			302068.4	ASSESS the parameters for special forming operation and SELECT appropriate special forming operation for particular applications.
			302068.5	CLASSIFY various advanced welding processes and SELECT suitable welding processes for particular applications.
			302068.6	COMPREHEND various non-conventional machining processes and SELECT suitable processes for particular applications.
	302056	Audit Course VI Business and Sustainable Development		

BE(MECHANICAL SANDWICH)(2015 pat)				
YEAR	**COURSE CODE**	**COURSE NAME**		**COURSE OUTCOMES**
BE(SEM-VII,TERM-I)	402061	Industrial In-plant Training-II	402061.1	Work in industrial environment with professional ethics.
			402061.2	Understand various industrial aspects.
			402061.3	Able to analyze and solve engineering problems.
	402062	Project	402062.1	Correlate and implement theory knowledge to solve specific industrial problems.
			402062.2	Develop systematic approach to solve specific industrial problem.
			402062.3	Competent to face industrial problems.
	402063	Technical Paper Presentation	402063.1	Understand advanced technology and research in engineering.
			402063.2	Communicate and present the work effectively
	402064	Automobile Engineering (Self-Study - III)	402064.1	Ability to understand the fundamentals of Automobile systems.
			402064.2	Ability to understand Automobile systems, its development and performance.
			402064.3	Ability to analyze automobile safety, automobile electronics and performance testing of automobiles.
			402064.4	Ability to understand construction and working of off road vehicles.
	402065	Plant Engineering and Maintenance (Self-Study - IV)	402065.1	Understand basic principles of plant engineering, classify maintenance work and able to perform manpower planning.
			402065.2	Identify basic plant facilities and selection of layout for product/process engineering.
			402065.3	Identify maintenance problems and calculate machine availability and system downtime.
			402065.4	To understand product life cycle cost estimation.
			402065.5	Learn steps to be followed for failure analysis and conservation of plant safety.
			402065.6	Understand advanced techniques in maintenance engineering.
			402047.1	Describe the power generation scenario, the layout components of thermal power plant and analyze the improved Rankin cycle, Cogeneration cycle
			402047.2	Analyze the steam condensers, recognize the an environmental impacts of thermal power plant and method to control the same

BE (SEM-VIII,TERM-II)	402047	Energy Engineering	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 economics of power generation.
	402048	Mechanical System Design	402048.1	Understand the difference between component level design and system level design.
			402048.2	Ability to design various mechanical systems like pressure vessels, machine tool gear boxes, material handling systems, etc. for the specifications stated/formulated.
			402048.3	Ability to learn optimum design principles and apply it to mechanical components.
			402048.4	Ability to handle system level projects from concept to product.
	402066	Mechanical Vibrations	402066.1	Apply balancing technique for static and dynamic balancing of multi cylinder inline & radial engines.
			402066.2	Estimate natural frequency for single DOF un-damped & damped free vibratory systems.
			402066.3	Determine response to forced vibrations due to harmonic excitation, base excitation & excitation due to unbalance forces.
			402066.4	Estimate natural frequencies, mode shapes for 2 DOF un-damped free longitudinal & torsional vibratory systems.
			402066.5	Describe vibration measuring instruments for industrial / real life applications along with suitable method for vibration control.
	402068 D	Elective -I - Hydraulics & Pneumatics	402068 D.1	Understand working principle of components used in hydraulic & pneumatic systems.
			402068 D.2	Identify various applications of hydraulic & pneumatic systems.
			402068 D.3	Selection of appropriate components required for hydraulic and pneumatic systems.
			402068 D.4	Analyse hydraulic and pneumatic systems for industrial/mobile applications.
			402068 D.5	Design a system according to the requirements.
			402068 D.6	Develop and apply knowledge to various applications.
	402069 A	Elective -II- Energy Audit and Management	402069 A.1	Compare energy scenario of India and World
			402069 A.2	Carry out Energy Audit of the Residence / Institute/ Organization.
			402069 A.3	Evaluate the project using financial techniques
			402069 A.4	Identify and evaluate energy conservation opportunities in Thermal Utilities
			402069 A.5	Identify and evaluate energy conservation opportunities in Electrical Utilities.
			402069 A.6	Identify the feasibility of Cogeneration and WHRUse a CFD tool effectively for practical problems and research.