Vision:

To impart quality education to the students in the areas ofMechanical Engineering and expose them to the world of work

Mission:

M1: To impart analytical skills through adequate exposure to theory
M2: To provide exposure to engineering practices
M3: To inculcate professional ethics and provide necessary inputs for the development of overall personality

ProgrammeEducationalObjectives(PEO's):

PEO1: To impart knowledge in the areas of Mechanical design, Thermal systems and Manufacturing processes

PEO2:To inculcate leadership qualities, soft skills and spirit of teamwork

PEO3:Capacity building of students for pursuing higher studies, entrepreneurship or successful careers in industry

ProgramOutcomes:

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 analyze 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 thepublic 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 modeling to complex engineering activities with an understanding of the limitations.
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal and cultural issues and the consequent responsibilities relevant to theprofessional 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 team work: 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.
PO11: Project management and finance: Demonstrate knowledge and understanding of theengineering and management principles and apply these to one's own work, as a member and leaderin a team, to manage projects and in multidisciplinary environments.
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: Analyse the real life problems in the field of Mechanical engineering including Design, Thermal and Manufacturing and develop appropriate solutions using modern tools

PSO2: Apply acquired professional skills, project management abilities and hands on experience in mechanical engineering and allied areas

CourseOutcomes:

SE– SemI

Subject1:Solid Mechanics(202041)

Attheend ofthis course,Students willbe ableto

CO202041.1.DEFINE various types of stresses and strain developed on determinate and indeterminate members.

CO202041.2.DRAW Shear force and bending moment diagram for various types of transverse loading and support.

CO202041.3. COMPUTE the slope & deflection, bending stresses and shear stresses on a beam.

CO202041.4. CALCULATE torsional shear stress in shaft and buckling on the column.

CO202041.5.APPLY the concept of principal stresses and theories of failure to determine stresses on a 2-D element.

CO202041.6.UTILIZE the concepts of SFD & BMD, torsion and principal stresses to solve combined loading application based problems.

Subject2:Solid Modeling and Drafting (202042)

Attheend ofthis course,Students willbe ableto

CO202042.1.UNDERSTAND basic concepts of CAD system, need and scope in Product Lifecycle Management

CO202042.2.UTILIZE knowledge of curves and surfacing features and methods to create complex solid geometry

CO202042.3. CONSTRUCT solid models, assemblies using various modeling techniques & PERFORM mass property analysis, including creating and using a coordinate system

CO202042.4. APPLY geometric transformations to simple 2D geometries

CO202042.5. USE CAD model data for various CAD based engineering applications viz. production drawings, 3D printing, FEA, CFD, MBD, CAE, CAM, etc.

CO202042.6. USE PMI & MBD approach for communication

Subject3:Engineering Thermodynamics (202043)

Attheend ofthis course,Students willbe ableto

CO202043.1.DESCRIBE the basics of thermodynamics with heat and work interactions.

CO 202043.2. APPLY laws of thermodynamics to steady flow and non-flow processes.

CO 202043.3.APPLY entropy, available and non available energy for an Open and Closed System,

CO 202043.4.DETERMINE the properties of steam and their effect on performance of vapour power cycle.

CO 202043.5.ANALYSE the fuel combustion process and products of combustion.

CO 202043.6.SELECT various instrumentations required for safe and efficient operation of steam generator.

Subject4:Engineering Materials and Metallurgy (202044)

Attheend ofthis course,Students willbe ableto
CO202044.1. DESCRIBE the basics of thermodynamics with heat and work interactions.
CO202044.2. APPLY laws of thermodynamics to steady flow and non-flow processes.
CO202044.3. APPLY entropy, available and non available energy for an Open and Closed System,
CO202044.4. DETERMINE the properties of steam and their effect on performance of vapour power cycle.
CO202044.5. ANALYSE the fuel combustion process and products of combustion.
CO202044.6. SELECT various instrumentations required for safe and efficient operation of steam generator.

Subject5: Electrical and Electronics Engineering (203156)

Attheend ofthis course,Students willbe ableto
CO203156.1. DESCRIBE the basics of thermodynamics with heat and work interactions.
CO203156.2. APPLY laws of thermodynamics to steady flow and non-flow processes.
CO203156.3. APPLY entropy, available and non available energy for an Open and Closed System,
CO203156.4. DETERMINE the properties of steam and their effect on performance of vapour power cycle.
CO203156.5. ANALYSE the fuel combustion process and products of combustion.
CO203156.6. SELECT various instrumentations required for safe and efficient operation of steam generator.

Subject6: Geometric Dimensioning and Tolerancing Lab (202045)

Attheend ofthis course,Students willbe ableto
CO202045.1. SELECT appropriate IS and ASME standards for drawing
CO202045.2. READ & ANALYSE variety of industrial drawings
CO202045.3. APPLY geometric and dimensional tolerance, surface finish symbols in drawing
CO202045.4. EVALUATE dimensional tolerance based on type of fit, etc.
CO202045.5. SELECT an appropriate manufacturing process using DFM, DFA, etc.

SE– SemII

Subject1: Engineering Mathematics - III (207002)

Attheend ofthis course,Students willbe ableto

CO207002.1. SOLVE higher order linear differential equations and its applications to model and analyze mass spring systems.

CO207002.2. APPLY Integral transform techniques such as Laplace transform and Fourier transform to solve differential equations involved in vibration theory, heat transfer and related mechanical engineering applications.

CO207002.3. APPLY Statistical methods like correlation, regression in analyzing and interpreting experimental data applicable to reliability engineering and probability theory in testing and quality control

CO207002.4. PERFORM Vector differentiation & integration, analyze the vector fields and APPLY to fluid flow problems

CO207002.5. SOLVE Partial differential equations such as wave equation, one and two dimensional heat flow equations.

Subject 2:Kinematics of Machinery (202047)

Attheend ofthis course,Students willbe ableto

CO202047.1. APPLY kinematic analysis to simple mechanisms

CO202047.2. ANALYZE velocity and acceleration in mechanisms by vector and graphical method

CO202047.3. SYNTHESIZE a four bar mechanism with analytical and graphical methods

CO202047.4. APPLY fundamentals of gear theory as a prerequisite for gear design

CO202047.5. CONSTRUCT cam profile for given follower motion

Subject 3:Applied Thermodynamics (202048)

Attheend ofthis course,Students willbe ableto

CO202048.1. DETERMINE COP of refrigeration system and ANALYZE psychrometric processes.

CO202048.2. DISCUSS basics of engine terminology,air standard, fuel air and actual cycles.

CO202048.3. IDENTIFY factors affecting the combustion performance of SI and CI engines.

CO202048.4. DETERMINE performance parameters of IC Engines and emission control.

CO202048.5. EXPLAIN working of various IC Engine systems and use of alternative fuels.

CO202048.6. CALCULATE performance of single and multi stage reciprocating compressors and DISCUSS rotary positive displacement compressors

Subject 4:Fluid Mechanics (202049)

Attheend ofthis course,Students willbe ableto

CO202049.1.DETERMINE various properties of fluid

CO202049.2.APPLY the laws of fluid statics and concepts of buoyancy

CO202049.3.IDENTIFY types of fluid flow and terms associated in fluid kinematics

CO202049.4.APPLY principles of fluid dynamics to laminar flow

CO202049.5.ESTIMATE friction and minor losses in internal flows and DETERMINE boundary layer formation over an external surface

CO202049.6.CONSTRUCT mathematical correlation considering dimensionless parameters, also ABLE to predict the performance of prototype using model laws

Subject 5: Manufacturing Processes (202050)

Attheend ofthis course,Students willbe ableto

CO202050.1. SELECT appropriate moulding, core making and melting practice and estimate pouring time, solidification rate and DESIGN riser size and location for sand casting process

CO202050.2. UNDERSTAND mechanism of metal forming techniques and CALCULATE load required for flat rolling

CO202050.3. DEMONSTRATE press working operations and APPLY the basic principles to DESIGN dies and tools for forming and shearing operations

CO202050.4. CLASSIFY and EXPLAIN different welding processes and EVALUATE welding characteristics

CO202050.5. DIFFERENTIATE thermoplastics and thermosetting and EXPLAIN polymer processing techniques

CO202050.6. UNDERSTAND the principle of manufacturing of fibre-reinforce composites and metal matrix composites

Subject 6: Machine Shop (202051)

Attheend ofthis course,Students willbe ableto

CO202051.1. PERFORM welding using TIG/ MIG/ Resistance/Gas welding technique

CO202051.2. MAKE Fibre-reinforced Composites by hand lay-up process or spray lay-up techniques

CO202051.3. PERFORM cylindrical/surface grinding operation and CALCULATE its machining time

CO202051.4. DETERMINE number of indexing movements required and acquire skills to PRODUCE a spur gear on a horizontal milling machine

CO202051.5. PREPARE industry visit report

CO202051.6. UNDERSTAND procedure of plastic processing

Subject 7: Project Based Learning – II (202052)

Attheend ofthis course,Students willbe ableto

CO202052.1. IDENTIFY the real-world problem (possibly of interdisciplinary nature) through a rigorous literature survey and formulate / set relevant aims and objectives.

CO202052.2. ANALYZE the results and arrive at valid conclusions.

CO202052.3. PROPOSE a suitable solution based on the fundamentals of mechanical engineering by possibly integration of previously acquired knowledge.

CO202052.4. CONTRIBUTE to society through proposed solutions by strictly following professional ethics and safety measures.

CO202052.5. USE of technology in proposed work and demonstrate learning in oral and written form.

CO202052.6. DEVELOP ability to work as an individual and as a team member.

TE–SemI

Subject 1:Numerical & Statistical Methods (302041)

Attheend ofthis course,Students willbe ableto
CO302041.1. SOLVE system of equations using direct and iterative numerical methods.
CO302041.2. ESTIMATE solutions for differential equations using numerical techniques.
CO302041.3. DEVELOP solution for engineering applications with numerical integration.
CO302041.4. DESIGN and CREATE a model using a curve fitting and regression analysis.
CO302041.5. APPLY statistical Technique for quantitative data analysis.
CO302041.6. DEMONSTRATE the data, using the concepts of probability and linear algebra.

Subject 2: Heat & Mass Transfer (302042)

Attheend ofthis course,Students willbe ableto
CO302042.1. ANALYZE & APPLY the modes of heat transfer equations for one dimensional thermal system.
CO302042.2. DESIGN a thermal system considering fins, thermal insulation and & Transient heat conduction.
CO302042.3. EVALUATE the heat transfer rate in natural and forced convection & validate with experimentation results.
CO302042.4. INTERPRET heat transfer by radiation between objects with simple geometries, for black and grey surfaces.
CO302042.5. ABILITY to analyze the rate of mass transfer using Fick's Law of Diffusion and understands mass diffusion in different coordinate systems.
CO302042.6. DESIGN & ANALYSIS of heat transfer equipments and investigation of its performance.

Subject 3: Design of Machine Elements (302043)

Attheend ofthis course,Students willbe ableto
CO3020243.1. DESIGN AND ANALYZE the cotter and knuckle Joints, levers and components subjected to eccentric loading.
CO302042.2. DESIGN shafts, keys and couplings under static loading conditions.
CO302042.3. ANALYZE different stresses in power screws and APPLY those in the procedure to design screw jack.
CO302042.4. EVALUATE dimensions of machine components under fluctuating loads.
CO302042.5. EVALUATE & INTERPRET the stress developed on the different type of welded and threaded joints.
CO302042.6. APPLY the design and development procedure for different types of springs

Subject 4: Mechatronics (302044)

Attheend ofthis course,Students willbe ableto

CO302044.1. DEFINE key elements of mechatronics, principle of sensor and its characteristics.
CO302044.2. UTILIZE concept of signal processing and MAKE use of interfacing systems such as ADC, DAC, Digital I/O.
CO302044.3. DETERMINE the transfer function by using block diagram reduction technique.
CO302044.4. EVALUATE Poles and Zero, frequency domain parameter for mathematical modeling for mechanical system.
CO302044.5. APPLY the concept of different controller modes to an industrial application.
CO302044.6. DEVELOP the ladder programming for industrial application

Subject 5: Advanced Forming & Joining Processes (302045-A)

Attheend ofthis course,Students willbe ableto

CO302045A.1. ANALYSE the effect of friction in metal forming deep drawing and IDENTIFICATION of surface defects and their remedies in deep drawing operations
CO302045A.2. ASSESS the parameters for special forming operation and SELECT appropriate special forming operation for particular applications
CO302045A.3. ANALYSE the effect of HAZ on microstructure and mechanical properties of materials
CO302045A.4. CLASSIFY various solid state welding process and SELECT suitable welding processes for particular applications
CO302045A.5. CLASSIFY various advanced welding process and SELECT suitable welding processes for particular applications.
CO302045A.6. INTERPRET the principles of sustainable manufacturing and its role in manufacturing industry.

Subject 6: Machining Science & Technology (302045-B)

Attheend ofthis course,Students willbe ableto

CO302045B.1. DEFINE metal cutting principles and mechanics of metal cutting and tool life.
CO302045B.2. DESCRIBE features of gear and thread manufacturing processes.
CO302045B.3. SELECT appropriate grinding wheel and demonstrate the various surface finishing processes.
CO302045B.4. SELECT appropriate jigs/fixtures and to draw the process plan for a given component.
CO302045B.5. SELECT & EVALUATE various parameters of process planning.
CO302045B.6. GENERATE CNC program for Turning / Milling processes and generate tool path using CAM software.

Subject 7: Digital Manufacturing Laboratory (302046)

Attheend of this course, Students will be able to

CO302046.1. DEVELOP a component using conventional machines, CNC machines and Additive Manufacturing Techniques.

CO302046.2. ANALYZE cutting tool parameters for machining given job.

CO302046.3. DEMONSTRATE simulation of manufacturing process using Digital Manufacturing Tools.

CO302046.4. SELECT and DESIGN jigs and Fixtures for a given component.

CO302046.5. DEMONESTRATE different parameters for CNC retrofitting and reconditioning

Subject 8: Skill Development (302047)

Attheend ofthis course,Students willbe ableto

CO302047.1. APPLY& DEMONSTRATE procedure of assembly & disassembly of various machines.

CO302047.2. DESIGN & DEVELOP a working/model of machine parts or any new product.

CO302047.3. EVALUATE fault with diagnosis on the machines, machine tools and home appliances.

CO302047.4. IDENTIFY & DEMONSTRATE the various activities performed in an industry such as maintenance, design of components, material selection.

TE–SemII

Subject 1: Artificial Intelligence &Machine Learning (302049)

Attheend ofthis course,Students willbe ableto

CO302049.1. DEMONSTRATE fundamentals of artificial intelligence and machine learning.

CO302049.2. APPLY feature extraction and selection techniques.

CO302049.3. APPLY machine learning algorithms for classification and regression problems.

CO302049.4. DEVISE AND DEVELOP a machine learning model using various steps.

CO302049.5. EXPLAIN concepts of reinforced and deep learning.

CO302049.6. SIMULATE machine learning model in mechanical engineering problems.

Subject 2: Computer Aided Engineering (302050)

Attheend ofthis course,Students willbe ableto

CO302050.1. DEFINE the use of CAE tools and DESCRIBE the significance of shape functions in finite element formulations.

CO302050.2. APPLY the various meshing techniques for better evaluation of approximate results.

CO302050.3. APPLY material properties and boundary condition to SOLVE 1-D and 2-D element stiffness matrices to obtain nodal or elemental solution.

CO302050.4. ANALYZE and APPLY various numerical methods for different types of analysis.

CO302050.5. EVALUATE and SOLVE non-linear and dynamic analysis problems by analyzing the results obtained from analytical and computational method.

CO302050.6. GENERATE the results in the form of contour plot by the USE of CAE tools.

Subject 3: Design of Transmission Systems (302051)

Attheend ofthis course,Students willbe ableto

CO302051.1. APPLY the principle of Spur & Helical gear design for industrial application and PREPARE a manufacturing drawing with the concepts of GD&T.

CO302051.2. EXPLAIN and DESIGN Bevel & Worm gear considering design parameters as per design standards.

CO302051.3. SELECT&DESIGN Rolling and Sliding Contact Bearings from manufacturer's catalogue for a typical application considering suitable design parameters.

CO302051.4. DEFINE and DESIGN various types of Clutches, Brakes, used in automobile.

CO302051.5. APPLY various concept to DESIGN Machine Tool Gear box, for different applications.

CO302051.6. ELABORATE various modes of operation, degree of hybridization and allied terms associated with hybrid electric vehicles.

Subject 4: Composite Materials (302052A)

Attheend ofthis course,Students willbe ableto

CO302052A.1. DEFINE & COMPARE composites with traditional materials.

CO302052A.2. IDENTIFY & ESTIMATE different parameters of the Polymer Matrix Composite.

CO302052A.3. CATEGORISE and APPLY Metal Matrix Process from possessions landscape.

CO302052A.4. DETERMINE volume/weight fraction and strength of Composites.

CO302052A.5. SELECT appropriate testing and inspection method for composite materials.

CO302052A.6. SELECT composites materials for various applications.

Subject 5: Surface Engineering (302052B)

Attheend ofthis course,Students willbe ableto

CO302052B.1. DEFINE the basic's principle & mechanism of surface degradation.

CO302052B.2. ANALYSE & SELECT correct corrosion prevention techniques for a different service condition.

CO302052B.3. DEMONSTRATE the role of surface engineering of materials to modify/improve the surface properties.

CO302052B.4. SELECT the suitable surface heat treatments to improve the surface properties.

CO302052B.5. APPLY the surface modification technique to modify surface properties.

CO302052B.6. ANALYSE & EVALUTE various surface coating defects using various testing/characterization method

Subject 6: Measurement Laboratory (302053)

Attheend ofthis course,Students willbe ableto

CO302053.1. 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.

CO302053.2. ANALYZE strain measurement parameters by taking modulus of elasticity in consideration to acknowledge its usage in failure detection and force variations.

CO302053.3. 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.

CO302053.4. 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.

CO302053.5. 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.

CO302053.6. 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.

Subject 7: Fluid Power &Control Laboratory (302054)

Attheend ofthis course,Students willbe ableto

CO302054.1. DEFINE working principle of components used in hydraulic and pneumatic systems.

CO302054.1. IDENTIFY & EXPLAIN various applications of hydraulic and pneumatic systems.

CO302054.1. SELECT an appropriate component required for hydraulic and pneumatic systems using manufactures' catalogues.

CO302054.1. SIMULATE & ANALYSE various hydraulic and pneumatic systems for industrial/mobile applications.

CO302054.1. DESIGN a hydraulic and pneumatic system for the industrial applications.

CO302054.1. DESIGN & DEMONESTRATE various IoT, PLC based controlling system using hydraulics and pneumatics.

Subject 8: Internship/Mini project (**302055**)

Attheend ofthis course,Students willbe ableto

CO302055.1. DEMONSTRATE professional competence through industry internship.

CO302055.2. APPLY knowledge gained through internships to complete academic activities in a professional manner.

CO302055.3. CHOOSE appropriate technology and tools to solve given problem.

CO302055.4. DEMONSTRATE abilities of a responsible professional and use ethical practices in day to day life.

CO302055.5. DEVELOP network and social circle, and DEVELOPING relationships with industry people.

CO302055.6. ANALYZE various career opportunities and DECIDE career goals

BE–SemI

Subject 1: Heating Ventilation Air-Conditioning and Refrigeration (402041)

Attheend ofthis course,Students willbe ableto

CO402041.1. ANALYSE different air-craft refrigeration systems and EXPLAIN the properties, applications and environmental issues of different refrigerants.
CO402041.2. ANALYSE multi pressure refrigeration system used for refrigeration applications.
CO402041.3. DISCUSS types of compressors, condensers, evaporators and expansion valves along with regulatory and safety controls and DESCRIBE Transcritical and ejector refrigeration systems.
CO402041.4. ESTIMATE cooling load for air conditioning systems used with concern of design conditions and indoor quality of air.
CO402041.5. DESIGN air distribution system along with consideration of ventilation and infiltration.
CO402041.6. EXPLAIN the working of types of desiccants, evaporative, thermal storage, radiant cooling, clean room and heat pump systems.

Subject 2: Dynamics of Machinery (402042)

Attheend ofthis course,Students willbe ableto

CO402042.1. APPLY balancing technique for static and dynamic balancing of multi cylinder inline and radial engines.
CO402042.2. ANALYZE the gyroscopic couple or effect for stabilization of Ship, Airplane and Four wheeler vehicles.
CO402042.3. ESTIMATE natural frequency for single DOF un-damped & damped free vibratory systems.
CO402042.4. DETERMINE response to forced vibrations due to harmonic excitation, base excitation and excitation due to unbalance forces.
CO402042.5. ESTIMATE natural frequencies, mode shapes for 2 DOF un-damped free longitudinal and torsional vibratory systems.
CO402042.6. DESCRIBE noise and vibration measuring instruments for industrial / real life applications along with suitable method for noise and vibration control.

Subject 3: Turbomachinery (402043)

Attheend ofthis course,Students willbe ableto

CO402043.1. VALIDATE impulse moment principle using flat, inclined and curved surfaces and INVESTIGATE performance characteristics of hydraulic turbines.
CO402043.2. DETERMINE performance parameters of impulse and reaction steam turbine along with discussion of nozzles, governing mechanism & losses.
CO402043.3. MEASURE performance parameters of single & multistage centrifugal pumps along with discussion of cavitation and selection.
CO402043.4. EXPLAIN performance parameters of centrifugal compressor along with discussion of theoretical aspects of axial compressor.

Subject 4: Automobile Design (402044A)

Attheend ofthis course,Students willbe ableto
CO4020414A.1. COMPREHEND the steps involved in the design process of Principal Engine Components.
CO4020414A.2. GAIN the knowledge and design of Engine Sub-Systems.
CO4020414A.3. COMPUTE the critical dimensions of chassis components involved in the Steering System and Differential and final drive of a vehicle.
CO4020414A.4. SELECT the tyres and wheels required for automobile vehicle and design the various types automotive brakes.
CO4020414A.5. UNDERSTAND the design concepts of Automotive Suspension system
CO4020414A.6. POSSES the knowledge of Vehicle Packaging and System Integration, NVH.

Subject 5: Design of Heat Transfer Equipments (402044B)

Attheend ofthis course,Students willbe ableto
CO402044B.1. EXPLAIN the design aspect of heat exchanger considering fouling factor for Heat Transfer Applications
CO402044B.2. SELECT and DESIGN the double tube heat exchangers for process industry
CO402044B.3. DESIGN the Shell & Tube Heat Exchangers for specified conditions
CO402044B.4. DESIGN the condensers and evaporators for refrigeration applications
CO402044B.5. DESIGN the compact heat exchangers
CO402044B.6. ANALYSE the performance of counter and cross flow cooling tower.

Subject 6: Modern Machining Processes (402044C)

Attheend ofthis course,Students willbe ableto
CO402044C.1. UNDERSTAND and ANALYZE the mechanism, process parameters of mechanical assisted modern machining processes.
CO402044C.2. UNDERSTAND the mechanism, construction and working of laser, plasma and electron beam assisted machining.
CO402044C.3. CLASSIFY and ANALYZE the mechanism, process parameters of the chemical and electrochemical machining.
CO402044C.4. RELATE and ANALYZE the mechanism and select process parameters Electrical Discharge Machining for an application.
CO402044C.5. ILLUSTRATE the application of micromachining processes.
CO402044C.6. SUGGEST appropriate nanomachining process for the specific application.

Subject 7: Industrial Engineering (402044D)

Attheend ofthis course,Students willbe ableto
CO402044D.1. EVALUATE the productivity and IMPLEMENT various productivity improvement techniques.
CO402044D.2. APPLY work study techniques and UNDERSTANDS its importance for better productivity.
CO402044D.3. DEMONSTRATE the ability to SELECT plant location, appropriate layout and material handling equipment.
CO402044D.4. USE of Production planning and control tools for effective planning, scheduling and managing the shop floor control.
CO402044D.5. PLAN inventory requirements and EXERCISE effective control on manufacturing requirements.
CO402044D.6. APPLY Ergonomics and legislations for human comfort at work place and UNDERSTANDS the role of value engineering in improving productivity.

Subject 8: Internet of Things (402044E)

Attheend ofthis course,Students willbe ableto
CO402044E.1. EXPLAIN the Applications/Devices, Protocols and Communication Models of IoT
CO402044E.2. DEMONSTARTE small Mechanical Engineering IoT oriented applications using Sensors, Actuators, Microcontrollers and Cloud
CO402044E.3. SELECT commonly used IoT Simulation Hardware platforms
CO402044E.4. APPLICATION of Interfacing and Communication Technologies for IoT
CO402044E.5. ILLUSTRATE IoT Application Development and Security of IoT Ecosystem
CO402044E.6. EVALUATE Present and Future Domain specific Applications of IoT Ecosystem

Subject 9: Computational Fluid Dynamics (402044F)

Attheend ofthis course,Students willbe ableto
CO402044F.1. DISTINGUISH and ANALYSE the governing equations of fluid mechanics and heat transfer in various formulations
CO402044F.2. ANALYZE and MODEL the conduction and advection problems
CO402044F.3. ANALYZE and MODEL the Convection-Diffusion problems
CO402044F.4. IDENTIFY and EVALUATE the External/Internal flow and its simulation
CO402044F.5. DISTINGUISH and COMPARE concepts of stability and turbulence.
CO402044F.6. USE and APPLY a CFD tool for effectively solving practical Fluid-Structure Interaction problems

Subject 10: Product Design and Development (402045A)

Attheend ofthis course,Students willbe ableto
CO402045A.1. UNDERSTAND Product design and Product development processes
CO402045A.2. UNDERSTAND Processes, tools and techniques for Market Survey & Product Specification Finalization
CO402045A.3. UNDERSTAND Processes, tools and techniques for Concept Inception, Verification and selection
CO402045A.4. UNDERSTAND Processes, tools and techniques for Concept Exploration & Development
CO402045A.5. UNDERSTAND Processes, tools and techniques for Design Verification and Validation
CO402045A.6. UNDERSTAND Processes, tools and techniques for Robust Design and Development

Subject 11: Experimental Methods in Thermal Engineering (402045B)

Attheend ofthis course,Students willbe ableto
CO402045B.1. IDENTIFY the suitable instrument for measuring parameters as per performance characteristics
CO402045B.2. ANALYZE experimental data by using different statistical techniques and estimate error
CO402045B.3. DISTINGUISH different methods of temperature measurements and thermal radiation
CO402045B.4. CLASSIFY various pressure measurement instruments and their comparison
CO402045B.5. EXPLAIN different flow measurement methods and flow visualization techniques
CO402045B.6. APPLY knowledge of modern engineering experimentation, including calibration, data acquisition, analysis and interpretation using different AI and ML techniques

Subject 12: Additive Manufacturing (402045C)

Attheend ofthis course,Students willbe ableto

CO402045C.1. USE and CLASSIFY the fundamentals of Additive Manufacturing Technologies for engineering applications.

CO402045C.2. IDENTIFY and CATEGORIZE the methodology to manufacture the products using light-based photo-curing, LASER based technologies and STUDY their applications, benefits.

CO402045C.3. IDENTIFY and CATEGORIZE the methodology to manufacture the products using extrusion-based deposition, inkjet-based technologies and STUDY their applications, benefits.

CO402045C.4. SYNTHESIZE, RECOMMEND and DESIGN the suitable material and process for fabrication and build behavior of verities of product.

CO402045C.5. DESIGN and CONSTRUCT the AM equipment's for appropriate applications and the input CAD model.

CO402045C.6. DEVELOP the knowledge of additive manufacturing for various real-life applications.

Subject 13: Operations Research (402045D)

Attheend ofthis course,Students willbe ableto

CO402045D.1. EVALUATE various situations of Games theory and Decision techniques and APPLY them to solve them in real life for decision making.

CO402045D.2. SELECT appropriate model for queuing situations and sequencing situations and FIND the optimal solutions using models for different situations.

CO402045D.3. FORMULATE various management problems and SOLVE them using Linear programming using graphical method and simplex method.

CO402045D.4. FORMULATE variety of problems such as transportation, assignment, travelling salesman and SOLVE these problems using linear programming approach.

CO402045D.5. PLAN optimum project schedule for network models arising from a wide range of applications and for replacement situations find the optimal solutions using appropriate models for the situation.

CO402045D.6. APPLY concepts of simulation and Dynamic programming

Subject 14: Augmented Reality and Virtual Reality (402045E)

Attheend ofthis course,Students willbe ableto

CO402045E.1. UNDERSTAND fundamental Computer Vision, Computer Graphics and HumanComputer Interaction Techniques related to VR/AR

CO402045E.2. UNDERSTAND Geometric Modeling Techniques

CO402045E.3. UNDERSTAND the Virtual Environment

CO402045E.4. ANALYZE and EVALUATE VR/AR Technologies

CO402045E.5. APPLY various types of Hardware and Software in Virtual Reality systems

CO402045E.6. DESIGN and FORMULATE Virtual/Augmented Reality Applications

Subject 15: Data Analytics (402046)

Attheend ofthis course,Students willbe ableto
CO402046.1. UNDERSTAND the basics of data analytics using concepts of statistics and probability.
CO402046.2. APPLY various inferential statistical analysis techniques to describe data sets and withdraw useful conclusions from acquired data set.
CO402046.3. EXPLORE the data analytics techniques using various tools
CO402046.4. APPLY data science concept and methods to solve problems in real world context
CO402046.5.SELECT advanced techniques to conduct thorough and insightful analysis and interpret the results

Subject 16: Project (Stage - I) (402047)

Attheend ofthis course,Students willbe ableto
CO402047.1. IMPLEMENT systems approach.
CO402047.2. CONCEPTUALIZE a novel idea / technique into a product.
CO402047.3. THINK in terms of a multi-disciplinary environment.
CO402047.4. TAKE ON the challenges of teamwork, and DOCUMENT all aspects of design work.
CO402047.5. UNDERSTAND the management techniques of implementing a project.
CO402047.6. DEMONSTRATE the final product for Functionality, Designability, and Manufacturability.

BE–SemII

Subject 1: Computer Integrated Manufacturing (402048)

Attheend ofthis course,Students willbe ableto
CO402048.1. EXPLAIN CIM and factory automation.
CO402048.2.UNDERSTAND the integration of hardware and software elements for CIM
CO402048.3. APPLY CNC program for appropriate manufacturing techniques.
CO402048.4. ANALYZE processes planning, quality and MRP integrated with computers.
CO402048.5. INTERPRET flexible, cellular manufacturing and group technology.
CO402048.6. ANALYZE the effect of IOT, Industry-4.0 and cloud base manufacturing.

Subject 2: Energy Engineering (402049)

Attheend ofthis course,Students willbe ableto
CO402049.1. EXPLAIN the power generation scenario, the layout components of thermal power plant and ANALYZE the improved Rankine cycle.
CO402049.2. CO2:ANALYZE the performance of steam condensers, cooling tower system; RECOGNIZE an environmental impact of energy systems and methods to control the same.
CO402049.3. EXPLAIN the layout, component details of diesel engine plant, hydel and nuclear energy systems.
CO402049.4. ANALYZE gas and improved power cycles.
CO402049.5. EXPLAIN the fundamentals of renewable energy systems.
CO402049.6. EXPLAIN basic principles of energy management, storage and economics of power generation.

Subject 3: Quality and Reliability Engineering (402050A)

Attheend ofthis course,Students willbe ableto
CO402050A.1. UNDERSTAND basic concepts of quality and RELATE various quality tools
CO402050A.2. DEVELOP analytical competencies to SOLVE problems on control charts and process capability.
CO402050A.3. UNDERSTAND fundamental concepts of reliability.
CO402050A.4. EVALUATE system reliability.
CO402050A.5. IDENTIFY various failure modes and CREATE fault tree diagram.
CO402050A.6. UNDERSTAND the concept of reliability centered maintenance and APPLY reliability tests methods.

Subject 4: Energy Audit and Management (402050B)

Attheend ofthis course,Students willbe ableto
CO402050B.1. EXPLAIN the energy need and role of energy management
CO402050B.2. CARRY OUT an energy audit of the Institute/Industry/Organization
CO402050B.3. ASSESS the ENCON opportunities using energy economics
CO402050B.4. ANALYSE the energy conservation performance of Thermal Utilities
CO402050B.5. ANALYSE the energy conservation performance of Electrical Utilities
CO402050B.6. EXPLAIN the energy performance improvement by Cogeneration and WHR method

Subject 5: Manufacturing Systems and Simulation (402050C)

Attheend ofthis course,Students willbe ableto
CO402050C.1. UNDERSTAND the concepts of manufacturing system, characteristics, type, etc.
CO402050C.2. UNDERSTAND the concepts of Facilities, manufacturing planning & control and Support System.
CO402050C.3. UNDERSTAND the concepts of manufacturing towards solving productivity related problems.
CO402050C.4. DEVELOP a virtual model to solve industrial engineering related issues such as capacity. utilization, line balancing.
CO402050C.5. BUILDING tools to view and control simulations and their results.
CO402050C.6. PLAN the data representation & Evaluate the results of the simulation

Subject 6: Engineering Economics and Financial Management (402050D)

Attheend ofthis course,Students willbe ableto
CO402050D.1. UNDERSTAND the business environment, concepts of economics and demand-supply scenario.
CO402050D.2. APPLY the concepts of costing and pricing to evaluate the pricing of mechanical components.
CO402050D.3. UNDERSTAND accounting systems and analyze financial statements using ratio analysis
CO402050D.4. SELECT and PREPARE the appropriate type of budget and understand the controlling aspects of budget.
CO402050D.5. UNDERSTAND the international business and trade system functioning
CO402050D.6. DEMONSTRATE understanding of financing decisions of new ventures and performanc

Subject 7: Organizational Informatics (402050E)

Attheend ofthis course,Students willbe ableto

CO402050E.1. Demonstrate an understanding of the scope, purpose and value of information systems in an organization.

CO402050E.2. Understand the constituents of the information system.

CO402050E.3. Demonstrate the Understanding of the management of product data and features of various PLM aspects.

CO402050E.4. Relate the basic concepts of manufacturing system and the ERP functionalities in context of information usage.

CO402050E.5. Understand the manufacturing execution system and it's applications in functional areas.

CO402050E.6. Outline the role of the information system in various types of business and allied emerging technologies.

Subject 8: Computational Multi Body Dynamics (402050F)

Attheend ofthis course,Students willbe ableto

CO402050F.1. APPLY the basic terminology and concepts used in Multibody Dynamics to solve varieties of motion related applications

CO402050F.2. IDENTIFY and EVALUATE the types of joints, its kinematics and relevant transformations

CO402050F.3. DISTINGUISH and COMPARE the formulation methods

CO402050F.4. DERIVE equations of motion and EVALUATE the kinematics and dynamics of rigid Planar inter-connected bodies

CO402050F.5. DERIVE equations of motion and EVALUATE the kinematics of rigid Spatial interconnected bodies

CO402050F.6. APPLY MBD tool effectively and SIMULATE it to solve and validate practical Multibody Dynamics problems and its solutions

Subject 9: Process Equipment Design (402051A)

Attheend ofthis course,Students willbe ableto

CO402051A.1. INTERPRET the different parameters involved in design of process Equipments.

CO402051A.2. ANALYZE thin and thick walled cylinder

CO402051A.3. DESIGN cylindrical vessel, spherical vessel, tall vessels and thick walled high pressure vessels

CO402051A.4. DESIGN different process Equipments and select pump, compressor etc. and auxiliary services

CO402051A.5. EVALUATE Process parameters and their correlation

CO402051A.6. APPLY the concepts of process equipment design for specific applications

Subject 10: Renewable Energy Technologies (402051B)

Attheend ofthis course,Students willbe ableto

CO402051B.1. DESCRIBE fundaments, needs and scopes of renewable energy systems.

CO402051B.2. EXPLAIN performance aspects of flat and concentric solar collectors along with applications.

CO402051B.3. DESIGN solar photovoltaic system for residential applications.

CO402051B.4. DESIGN AND ANALYSIS of wind energy conversion system.

CO402051B.5. APPLY Installation practices of Wind and Solar Photovoltaic Systems for grid connection.

CO402051B.6.DETERMINE performance parameters of bio-energy conversion systems.

Subject 11: Automation and Robotics (402051C)

Attheend ofthis course,Students willbe ableto
CO402051C.1. UNDERSTAND the basic concepts of Automation
CO402051C.1. UNDERSTAND the basic concepts of Robotics
CO402051C.1. IDENTIFY and EVALUATE appropriate Drive for Robotic Applications
CO402051C.1. COMPARE and SELECT End-effectors and Sensors as per Application
CO402051C.1. DEVELOPE the Mathematical Modeling Approaches of Robot
CO402051C.1. EVALUATE the fundamentals of robot programming and CLASSIFY the Applications

Subject 12: Industrial Psychology and Organizational Behavior (402051D)

Attheend ofthis course,Students willbe ableto
CO402051D.1. UNDERSTAND the basic concepts of Automation
CO402051D.1. UNDERSTAND the basic concepts of Robotics
CO402051D.1. IDENTIFY and EVALUATE appropriate Drive for Robotic Applications
CO402051D.1. COMPARE and SELECT End-effectors and Sensors as per Application
CO402051D.1. DEVELOPE the Mathematical Modeling Approaches of Robot
CO402051D.1. EVALUATE the fundamentals of robot programming and CLASSIFY the Applications

Subject 13: Electrical and Hybrid Vehicle (402051E)

Attheend ofthis course,Students willbe ableto
CO402051E.1. UNDERSTAND the basics related to e-vehicle
CO402051E.2. CLASSIFY the different hybrid vehicles
CO402051E.3. IDENTIFY and EVALUATE the Prime Movers, Energy Storage and Controllers
CO402051E.4. DISCOVER and CATAGORIZE the Electric Vehicle Configuration with respect to Propulsion, Power distribution and Drive-Train Topologies
CO402051E.5. DEVELOP body frame with appropriate suspension system and TESTING of for eVehicles
CO402051E.6. CLASSIFY and EVALUATE Battery Charging techniques and management

Subject 14: Mechanical Systems Analysis Laboratory (402052)

Attheend ofthis course,Students willbe ableto
CO402052.1. DEVELOP an understanding of the Systems Engineering Process and the range of factors that influence the product need, problem-specific information collection, Problem Definition, Task Specification, Solution Concept inception, Concept Development, System's Mathematical Modelling, Synthesis, Analysis, final solution Selection, Simulation, Detailed Design, Construction, Prototyping, Testing, fault-finding, Diagnosis, Performance Analysis, and Evaluation, Maintenance, Modification, Validation, Planning, Production, Evaluation and use of a system using manual calculation, computational tools to automate product development process, redesign from customer feedback and control of technological systems.
CO402052.2. ILLUSTRATE the concepts and USE the developed skill-set of use of computational tools (FEA, CFD, MBD, FSI, CAE) to automate the complete product development process.
CO402052.3. EVALUATE the knowledge of new developments and innovations in technological systems to carry forward to next stage of employment after passing your Undergraduate Degree Examination.
CO402052.4. APPRAISE how technologies have transformed people's lives and can be used to SOLVE challenges associated with climate change, efficient energy use, security, health, education and transport, which will be coming your ways in the coming future.
CO402052.5. PRIORITIZE the concept of quality and standards, including systems reliability, safety and fitness for the intended purpose.
CO402052.6. INVENT yourself to face the challenges of future technologies and their associated Problems.

Subject 15: Project (Stage - II) (402053)

Attheend ofthis course,Students willbe ableto

CO402053.1. IMPLEMENT systems approach.
CO402053.2. CONCEPTUALIZE a novel idea / technique into a product.
CO402053.3. THINK in terms of a multi-disciplinary environment.
CO402053.4. TAKE ON the challenges of teamwork, and DOCUMENT all aspects of design work.
CO402053.5. UNDERSTAND the management techniques of implementing a project.
CO402053.6. DEMONSTRATE the final product for Functionality, Designability, and Manufacturability.