

**Nirma University
Institute of Technology
School of Engineering
Mechanical Engineering Department**

B.Tech. Mechanical Engineering

Engineering Drawing and Workshop [1 0 4 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

- 1 relate the applications of engineering drawing and drawing standards with various disciplines of engineering, and construct the basic engineering curves,
- 2 apply the principles of orthographic and isometric projections for various solid geometries,
- 3 make use of computer aided drafting tools for preparing engineering drawings,
- 4 summarize the understanding of workshop practices and make use of various tools for given jobs.

2ME301 Material Science and Engineering [3 0 2 4]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. relate mechanical properties with structure of materials,
2. recommend heat treatment of steel material using phase diagram,
3. select material for intended application,
4. analyze the microstructure of ferrous and nonferrous material.

2ME302 Manufacturing Processes-I [3 0 2 4]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. illustrate the basics of manufacturing processes,
2. interpret the effect of process parameters on manufacturing processes,
3. appraise casting and welding processes for function requirement,
4. recommend suitable metal forming processes for a given application

2ME303

Thermodynamics

[3 0 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. infer basic concepts related to thermodynamics,
2. summarize thermodynamic properties of gases and steam and apply it to related system analysis,
3. apply the laws of thermodynamics for various processes,
4. explain concepts of entropy, irreversibility and exergy and apply it to various processes,
5. analyze air standard and power generation cycle, and, compute their performance

2ME304

Theory of Machines

[3 0 2 4]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. infer the concepts of machines and mechanisms,
2. analyse planar mechanisms for displacement, velocity and acceleration by graphical and analytical methods,
3. make use of out static and dynamic force analysis for various planer mechanisms by graphical and analytical methods,
4. analyse various motion transmission elements like gears, gear trains and cams.

2ME305

Mechanics of Solids

[2 1 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. identify various types of stresses developed in structural elements,
2. analyse structural elements under the effect of force systems,
3. relate properties of materials, principal stresses and theories of failure,
4. analyze machine elements subjected to friction force.

2ME306

Introduction to Computer Aided Drafting

[0 0 2 1]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. develop the 3D features like extrude, revolve, sweep, blend (loft), swept blend,
2. develop 3D features for constructions of hole, rib, round chamfer, patterns, datum planes, datum axis and others,
3. build assembly of components using solid modelling software,
4. create 2D drawings of mechanical components from their assembly and parts.

2ME401

Metrology & Quality Control

[3 0 2 4]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. relate engineering aspects of metrology,
2. make use of various measuring instruments,
3. assess the correctness of measuring instrument,
4. identify suitable quality control tool for given application.

2ME402

Fluid Mechanics and Hydraulic Machines

[3 0 2 4]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. demonstrate the fundamentals of fluid statics, kinematics and dynamics and their applications,
2. apply the principles of energy conservation and dimensional analysis to solve fluid flow problems,
3. demonstrate the applications of impact of jet for various hydraulic machines,
4. evaluate the performance of pumps and hydro turbines.

2ME403

Manufacturing Processes – II

[3 0 2 4]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. make use of machining processes for making different jobs,
2. select appropriate unconventional machining process for a given application,
3. appraise gear manufacturing processes and surface processing operations for functional requirement,
4. develop a part program for CNC turning and machining centers.

2ME404

Dynamics of Machines

[3 0 2 4]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. make use of dynamic force analysis of engine parts and analyze gyroscopic effect,
2. formulate the equations of motion for linear single D.O.F. free, damped and forced vibratory systems,
3. apply the concept of vibration isolation and absorber considering 2 D.O.F for mechanical systems,
4. estimate the unbalance for different rotating and reciprocating mechanical systems analytically, graphically and experimentally.

2ME405

Introduction to Machine Design

[0 0 2 1]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. develop the fundamental concepts of mechanical design process,
2. design simple machine components like lever, springs, power screws,
3. design power transmitting elements such as shaft, keys and couplings.

2ME501

Machine Design – I

[3 0 2 4]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. explain the concepts of design philosophy,
2. design welded joints, riveted joints, pressure vessels and components subjected to buckling,
3. evaluate the fatigue life of mechanical components,
4. design mechanical systems like hydraulic press, clutch and brakes.

2ME502

Automation and Control

[3 0 2 4]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. model and analyze the control system,
2. apply the concepts of traditional and advance automation systems,
3. select the appropriate sensors, actuator and controller for the automation systems,
4. make use of simulation software for automation applications.

2ME503

Heat and Mass Transfer

[3 0 2 4]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. assess the principles of steady and unsteady state heat conduction,
2. interpret the principles of heat transfer by convection,
3. apply the concepts of radiation heat transfer for practical applications,
4. infer the principles of heat transfer for applications such as boiling and condensation, heat exchanger design and mass transfer.

2ME601

Energy Systems- I

[3 0 2 4]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. infer various refrigeration systems and analyze their performance,
2. make use of basics of psychrometry and apply it to related processes,
3. explain various subsystems of IC engine and analyze the performance,
4. evaluate the performance of various compressors.

2ME602

Machine Design - II

[3 0 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. design power transmission elements and systems,
2. design material handling equipment,
3. make use of the design concepts for IC engine components,
4. select rolling contact bearings and design sliding contact bearings.

2ME701

Manufacturing Technology and Management

[3 0 2 4]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. explain types of tools, their geometries and cutting fluids used for various machining processes,
2. elaborate mechanics of machining,
3. design jigs and fixtures for a give application,
4. appraise the concepts of production management.

2ME702

Energy Systems -II

[3 0 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. analyze performance of vapour and gas power cycles,
2. explain the construction and working of various components of thermal and nuclear power plants,
3. evaluate the performance parameters of gas turbines and combined cycle power plants,
4. justify the necessity of alternative energy sources.

2ME703

Minor Project

[0 0 0 4]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. make use of acquired knowledge for the problem identification and definition,
2. analyse the technical aspects of the project with a comprehensive and systematic approach,
3. propose and select the appropriate solution,
4. appraise the importance of an individual / team for effective execution,
5. compile and conclude the project with effective communication amongst peers, mentors and society.

2ME704

Summer Internship

[0 0 0 0]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. perceive a better understanding of the engineering workplace,
2. adapt competencies necessary for professional career,
3. value interpersonal and human relationship skills,
4. build the foundation for industrial internship / major project.

2ME801

Major Project/ Internship

[0 0 22 11]

Major Project

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. make use of acquired knowledge for the problem identification and definition related to industry / research / societal need,
2. analyse the technical aspects of the project with a comprehensive and systematic approach,
3. select the appropriate modern tool(s) and technique(s) for problem solving,
4. propose and select the appropriate and cost effective solution,
5. appraise the importance of an individual / team for effective execution,
6. value the health, environment, safety and ethical practices during the project,
7. perceive the possibility of scalability and scope of intellectual property rights,
8. compile and conclude the project with effective communication amongst peers, mentors and society,
9. develop life-long learning skills for productive career.

2MEDE03

Stress Analysis

[3 0 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. evaluate stresses and strains in mechanical components,
2. develop the mathematical models for stress analysis of two dimensional problems,
3. select suitable experimental stress analysis technique for analyzing stress and strain field.
4. relate the stress, strain and material behavior.

2MEDE04

Process Planning and Cost Estimation

[3 0 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. select the process, equipment and tools for various industrial products,
2. show the importance of process planning activities,
3. explain the concept of cost estimation,
4. estimate the production time and cost for various parts.

2MEDE05

Composite Materials

[3 0 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. explain the various types of composite materials,
2. compare various manufacturing methods of composite materials,
3. determine mechanical properties of composite materials,
4. elaborate the failure mechanisms for composite materials.

2MEDE06

Foundry Technology

[3 0 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. select appropriate foundry equipment for casting processes,
2. design a mould for various casting processes,
3. make use of software for gating system design,
4. interpret the various factors affecting casting quality.

2MEDE51

Experimental Methods

[2 0 2 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. analyze the experimental data and apply statistical methods,
2. make use of various instruments for engineering applications,
3. apply the concepts of design of experiments,
4. utilize data acquisition system for experimentation.

2MEDE52

Robotic Engineering

[2 0 2 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. select the suitable manipulator for the given application,
2. apply concept of coordinate transformation to analyze relative motions,
3. formulate the mathematical relations for kinematic analysis of robotic manipulator,
4. integrate the structural design, actuator selections, drive system, sensor and control system necessary to implement a robot in a specific job task,
5. build the robotic model and tasks using industrial robots, simulations tools and components.

2MEDE53

Industrial Design

[2 0 2 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. apply the concepts of product planning and development,
2. apply the ergonomic considerations for design of the component,
3. appraise the importance of aesthetic in design,
4. create a new product based on the current market scenario

2MEDE54

Mechanism Analysis and Design

[2 0 2 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. analyze the planar mechanism,
2. synthesize the planar mechanism for a given application,
3. analyze the spatial mechanism,
4. develop the mathematical model for dynamic force analysis of the mechanisms.

2MEDE55 Maintenance Engineering and Asset Management [2 0 2 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. compare various maintenance systems and strategies,
2. propose the methodology to apply concepts of reliability, failure and trend analyses,
3. develop the system of maintenance planning and scheduling,
4. show the role of condition monitoring techniques for industrial applications.

2MEDE07 Gas Dynamics [3 0 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. explain the fundamentals of compressible flow,
2. illustrate the principles of normal shock formation and their effects,
3. apply the principles of compressible flow to constant area duct subjected to friction/heat transfer,
4. classify wind tunnels and evaluate the forces acting on submerged bodies.

2MEDE08 Gas Dynamics [3 0 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. explain the various microfabrication processes,
2. select the suitable type of micro sensors and micro actuators,
3. appreciate the role of surface micromachining in Micro Electro Mechanical Systems,
4. design and analyse of Micro Electro Mechanical Systems.

2MEDE09 Machine Tool Design [3 0 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. design structural elements of machine tools,
2. select the configuration of speed and feed regulation for required application,
3. analyze the dynamic behavior of machine tools,
4. explain the testing and alignment of machine tools.

2MEDE10

Fatigue Creep Fracture

[3 0 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. appreciate the significance of LEFM and EPFM.
2. evaluate fatigue life of the components.
3. apply the concepts of fracture mechanics in design, life prediction and fracture control plans
4. analyze the failure of components happening due to creep, fatigue and fracture

2MEDE11

Advanced Metal Forming

[3 0 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. explain the effect of various stress-strain phenomena on metal forming,
2. make use of formability prediction and analysis tools,
3. justify use of High Energy Rate Forming techniques for formability enhancement,
4. select appropriate metal forming technique for given applications.

2MEDE12

Advanced Welding Technology

[3 0 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. relate physics of welding and weld design aspects,
2. show use of newer welding technologies and their applications,
3. elaborate the role of inspection, quality control and safety in welding,
4. interpret weld drawings and specifications.

2MEDE13

Quality and Reliability Engineering

[3 0 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. make use of statistical process control tools for improvements of quality,
2. formulate the design of experiment,
3. interpret experimental data using statistical analysis,
4. appraise an importance of reliability engineering.

2MEDE14

Surface Engineering

[3 0 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. relate mechanical properties surface quality,
2. recommend suitable surface modification process for the given application,
3. select coating techniques for modification of surfaces,
4. appraise the importance of surface characterization techniques.

2MEDE56

Fundamentals of Computational Fluid Dynamics

[2 0 2 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. summarize the governing equations and concepts in fluid mechanics and heat transfer,
2. make use of matrix solution methods and grids for CFD analysis,
3. apply the finite difference methods for problem solving,
4. make use of finite volume technique for problem solving,
5. interpret and apply the concepts of turbulence modelling.

2MEDE57

Heat Exchangers

[2 0 2 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. explain the basic thermo-hydraulic design principles for heat exchanger,
2. design the tube-in-tube and shell and tube heat exchangers,
3. apply principles of design for furnaces and two-phase heat exchangers,
4. evaluate the thermo-hydraulic performance of compact heat exchangers.
5. explain the mechanical design aspects for heat exchangers.

2MEDE58

Refrigeration Engineering

[2 0 2 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. classify refrigerants and understand their desirable properties,
2. analyse vapour compression and vapour absorption systems,
3. explain low temperature and unconventional refrigeration systems,
4. illustrate the working of various industrial refrigeration system and its control.

2MEDE59

Automobile Engineering

[2 0 2 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. demonstrate the various forces acting on automobiles and apply the related basic principles of engineering to it.
2. explain the application, working and construction details of various automobile systems/subsystems
3. apply the knowledge of automobile systems/subsystems for troubleshooting and remedy
4. appraise various air pollution control techniques used in automobiles and basic automobile laws

2MEDE60

Condition Monitoring of Mechanical Equipment [2 0 2 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. appreciate the necessity of condition monitoring of mechanical systems,
2. select the appropriate condition monitoring technique,
3. analyze the signals from machine to monitor the condition,
4. select the suitable instrumentation for condition monitoring.

2MEDE61 Basics of Machine Learning

[2 0 2 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. explain the basics of machine learning methods,
2. apply linear and nonlinear models for supervised learning,
3. make use of support vector machine (SVM) techniques and unsupervised learning,
4. apply machine learning techniques to solve problems in Mechanical Engineering domain.

2MEDE62 Mobile Robotics

[2 0 2 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. select the suitable locomotion configuration for mobility of robot,
2. model and analyze the mobile robot of different wheel configuration,
3. apply suitable concept for perception, localization, planning and navigation of robot,
4. develop conceptual design, program, and simulation for mobile robots.

2MEDE63 Tribology

[2 0 2 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. explain different bearing materials with their properties and list the advantages and disadvantages,
2. analyse wear mechanism in the machine elements,
3. select appropriate lubricant and lubrication techniques,
4. analyse the failure of components due to tribological phenomena.

2MEDE64 Failure Analysis

[2 0 2 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. interpret the mode of failure based on fractured surface,
2. relate the loading condition with failure of a component,
3. identify the methodology for prevention of failures,
4. analyze the failure of mechanical engineering component.

2MEDE65 CNC Technology and Programming

[2 0 2 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. select appropriate cutting parameters, cutting tools to machine a component,
2. develop a part program for a given component,
3. test a part program for full proofing before production,
4. make use of CAM software to develop and optimize a part program.

2MEDE66 Hydraulics and Pneumatics

[2 0 2 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. outline the importance of fluid power systems for an industrial automation,
2. identify the various components of hydraulic and pneumatic systems,
3. design control circuits using hydraulic and pneumatic components,
4. recommend electrical control for automatic systems.

2MEDE67 Work Study

[2 0 2 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. illustrate the importance of productivity for the organization,
2. apply the tools of method study to streamline the production,
3. evaluate the different techniques of work measurement,
4. compare the various wage and incentive schemes for the improvement of productivity.

2MEDE15 Air Conditioning Engineering

[3 0 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. explain the basics of psychometric process and thermal comfort,
2. estimate the cooling load of the space to be air conditioned,
3. design air distribution and air handling systems,
4. relate the principle, working and control of various air conditioning systems.

2MEDE16 Theory and Design of Steam and Gas Turbines [3 0 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. design and analyse the steam nozzles,
2. apply the thermal design principles to steam turbines,
3. explain the working principles of gas turbines and jet propulsion,
4. appraise the working of combined cycle power plant.

2MEDE17 Advanced Machining Methods [3 0 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. select relevant advanced machining method for given applications,
2. evaluate the effect of various process parameters on the performance of mechanical and chemical based machining,
3. justify the use of high energy beam machining processes for a given application,
4. appraise the role of micro and nano machining.

2MEDE18 Computer Integrated Manufacturing [3 0 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. appreciate the role of communication and networking in CIM environment,
2. appraise the role cellular manufacturing,
3. build the flexible manufacturing system for a given application,
4. elaborate the importance of computer assisted process planning and control.

2MEDE19 Operations Research [3 0 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. formulate the linear programming problem,
2. develop mathematical models for decision making problems,
3. make use of network analysis for project management,

4. appraise the importance of replacement and queuing theories.

2MEDE20

Supply Chain Management

[3 0 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. explain the use of supply chain concepts and strategies,
2. appraise the role of network design in supply chain,
3. decide the appropriate demand forecasting method,
4. discuss the importance of appropriate production planning and inventory control policies in a supply chain.

2MEDE21

Rapid Prototyping

[3 0 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. explain the techniques for processing of CAD models for rapid prototyping,
2. summarize various rapid prototyping techniques,
3. make use of appropriate tooling for rapid prototyping process,
4. appraise the role of rapid prototyping technique for reverse engineering.

2MEDE22

Tool Engineering

[3 0 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. explain principles of tool design,
2. design tools used in rolling, forging and extrusion process,
3. develop tools for press work using appropriate software,
4. propose jig and fixture design for various practical applications.

2MEDE23

Vehicle Dynamics

[3 0 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. relate the fundamental approach in vehicle dynamics to apply motion, force and energy analysis,
2. analyse the acceleration performance, braking performance and road loads on vehicle,
3. explain the forces acting between the tire and the road during the operation of a vehicle,
4. evaluate the concepts related to ride comfort, cornering and steering, and suspension systems.

2MEDE24

Basics of Energy Conservation and Management

[3 0 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. summarize the overall energy scenario of country and the world,
2. interpret concepts of energy management,
3. analyse various energy and waste recovery systems and apply conservation techniques for effective energy utilization,
4. apply the concepts of pinch technology for heat exchanger networking.

2MEDE25

Alternate Fuels for Transportation

[3 0 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. explain various alternate fuels for transportation system,
2. assess combustion characteristics and engine impairments,
3. identify importance of emission control and choose methodology to control it,
4. appraise modern systems of transportation.

2MEDE68 Advanced Mechanical Vibrations

[2 0 2 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. model mechanical systems for vibration analysis,
2. interpret the results of modal analysis of multi DOF systems,
3. analyze vibration response of continuous mechanical systems and non-linear systems,
4. determine the vibration characteristics using experimental approach.

2MEDE69 Optimization Techniques

[2 0 2 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. explain the concepts of optimizations and their application for decision making,
2. model the system using linear, nonlinear and stochastic programming techniques,
3. apply unconventional optimization techniques for engineering problems,
4. make use of software tools for optimization.

2MEDE70 Finite Element Analysis

[2 0 2 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. formulate the structural engineering and heat transfer problems into finite element model,
2. derive and solve the stiffness matrix, displacement matrix and load vectors for one/two dimensional structural and heat transfer problems,
3. apply the capabilities of finite element software to solve the multiphysics problems,
4. appreciate the applications and limitations of FEA.

2MEDE71 Mechatronics

[2 0 2 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. model, analyse and control engineering system,
2. identify the sensors, actuators and controllers for given applications,
3. develop PLC programs for a given task,
4. design and evaluate performance of mechatronics system.

Open Elective Courses

2MEOE51 Introduction to Robotics [2 0 2 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. relate the concept of robotics and its applications in engineering,
2. apply the coordinate transformation with respect to robotic systems,
3. formulate the mathematical relations for forward and inverse kinematic analysis and trajectory generation of robotic manipulator,
4. determine forces at end effector and select the actuator and sensor for a robot in a specific job task.

2MEOE52 Introduction to Automobile Engineering [2 0 2 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. demonstrate the various forces acting on vehicles
2. explain the application, working and construction details of various automobile systems
3. apply the knowledge of automobile systems/subsystems for troubleshooting
4. explain various air pollution control techniques used in automobiles.

2MEOE26 Basics of Quality Management [3 0 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. define quality management and the need of quality,
2. illustrate the use of statistical quality control,
3. justify the use of various quality improvement concepts, tools with examples,
4. discuss the quality tools, techniques and philosophies through case studies.

2MEOE27 Renewable Energy Sources [3 0 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. interpret the importance of Renewable Energy Sources in the present era,
2. explain various methods for power generation by using different type of non-conventional and renewable energy sources,
3. apply the knowledge of converting energy resources like solar, wind , biomass, tidal, wave, ocean thermal, and geothermal energy for power generation,
4. outline the working and applications of fuel cells and usage of bio-fuels

2MEOE01 Thermal Management of Electronic Systems [3 0 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. appraise the importance of thermal management of electronic systems,
2. distinguish the various heat transfer modes,
3. select various cooling methods for electronic systems,
4. solve thermal management related problems using simulation tools.

2MEOE28 Thermal Management of Electronic Systems [3 0 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. appraise the importance of supply chain concepts and strategies,
2. justify the role of logistics and network design in supply chain,
3. distinguish demand forecasting methods used for supply chain management,
4. elaborate the role of inventory and aggregate planning in a supply chain.

Minor in Robotics and Automation

2MEMN01 Fundamentals of Mechatronics [3 0 0 3]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. demonstrate knowledge of mechanical and electronic (mechatronics) system,
2. explain functionality of various components used in mechanical and electronic (mechatronics) system,
3. select the sensors, actuators and controllers for given application,
4. design and analyze mechatronics system.

2MEMN02 Mobile Robotics [3 1 0 4]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. apply mathematical concepts for kinematic and dynamic analysis of mobile robot,
2. analyze different configuration of mobile robot for practical applications,
3. evaluate control and navigation aspects of mobile robot.

2MEMN03 Industrial Automation

[4 0 0 4]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. select the appropriate automation system for the given application,
2. apply the concept of automation to industry,
3. develop the program for PLC based industrial systems.

2MEMN51 Robotics & Automation Laboratory

[0 0 2 1]

Course Learning Outcomes (CLOs):

After successful completion of the course, the student will be able to: -

1. plan the navigation and trajectory of mobile robot
2. design and simulate automation system components
3. select sensors and actuator for robotics and automation system
4. analyze the control system