

Haldia Institute of Technology

(An Autonomous Institution Under Maulana Abul Kalam Azad University of Technology, West Bengal)

Course outcomes for B. Tech in Mechanical Engineering

(Applicable from the academic session 2020-2021)

SEMESTER-III

Subject Name: Economics for Engineers

Subject Code: HM-HU 301

Course Outcomes:

1. Understand the basic concepts and terminology used in engineering economics.
2. Use the concepts of cash flows, time value of money in evaluation of investments and projects in real life.
3. Able to compare and evaluate alternatives based on present, annual, rate of return, and benefit over cost analyses.
4. Identify and analyse the impact of depreciation, taxation and other economic factors on feasibility of real life projects.
5. Recognize the economic impact of engineering solutions and Conduct sensitivity analysis on key compounding parameters, so as make financially prudent decisions in everyday life
6. Understand major principles of economic analysis for decision making among alternative courses of action in engineering.

Subject Name: Mathematics-III

Subject Code: BS-M 301

Course Outcomes:

1. Solve field problems in engineering involving PDEs.
2. Formulate the solved problems involving random variables and apply statistical methods for analysing experimental data.
3. Analyze and solve engineering problems using Laplace Series .
4. Solve engineering problems using Complex Integration.
5. Know the basic properties of the Fourier transform, and how to use it to solve linear constant coefficient PDE's.
6. Utilize technology tools to find geometric, graphical and (optionally) numeric techniques for the analysis of solutions in engineering problems

Subject Name: Engineering Mechanics

Subject Code: ES-ME 301

Course Outcomes:

1. Define, describe and determine the types and nature of the physical parameters like force, moment, energy, work, stress and strain etc applied on mechanical systems.
2. Classify and explain the effects of the above physical parameters as applied on mechanical systems for proper comprehension.
3. Establish a proper understanding of the fundamental concepts of mechanics of rigid and deformable solids, including static and dynamic equilibrium, geometry of motion and deformation, and material constitutive behavior.
4. Solve complex engineering problems in solid mechanics in a systematic manner.
5. Demonstrate the physical parameters in real life situations and compute the available data and solve the practical mechanical problems.
6. Draw diagrams involving various physical parameters for proper illustration and analysis of physical parameters and available data for proper solution of practical mechanical problems.

Subject Name : Thermodynamics

Subject Code : PC-ME 301

Course Outcomes:

1. Apply the knowledge of mathematics, science and engineering fundamentals to model the energy conversion phenomenon.
2. Identify and formulate power production based on the fundamentals laws of thermal engineering.
3. Instill upon to envisage appropriate experiments related to heat engines.
4. Investigate the effectiveness of energy conversion process in mechanical power generation for the benefit of mankind.
5. Appreciate concepts learnt in fundamentals laws of thermodynamics from which learning ideas how to sustain in energy crisis and think beyond curriculum in the field of alternative and renewable sources of energy.
6. Communicate effectively the concepts of internal combustion engines and try to think

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beyond curriculum in alternative sources of energy.

Subject Name : Fluid Mechanics

Subject Code : PC-ME 302

Course Outcomes:

1. Understand the basic concept of fluid flow and properties of fluids.
2. Understand the principles of fluid statics, kinematics and dynamics.
3. Analyze fluid flow problems with the application of the momentum and energy equations.
4. Understand concept of buoyancy, viscosity and importance of viscosity in real flows.
5. Perform dimensional analysis for problems in fluid mechanics.
6. Understand the concept of boundary layer formation.

Subject Name : Material Science

Subject Code : PC-ME 303

Course Outcomes:

1. Student will be able to identify crystal structures for various materials and understand the defects in such structures.
2. Understand how to tailor material properties of ferrous and non-ferrous alloys.
3. Identify the properties of metals with respect to crystal structure and grain size.
4. Interpret the phase diagrams of materials.
5. Classify and Distinguish different types of cast irons, steels and non ferrous alloys.
6. Describe the concept of heat treatment of steels & strengthening mechanisms.

Subject Name : Fluid Mechanics Lab

Subject Code : PC-ME 391

Course Outcomes:

1. Understand of basic physics of fluids.
2. Apply knowledge to calculate and design engineering applications involving fluid.
3. Understand the flow systems in terms of mass, momentum, and energy balance.
4. Acquire knowledge about current research topics about fluid mechanics.
5. Understand to analyze practical problems in all power plants and chemical industries
6. Conduct experiments (in teams) in pipe flows and open-channel flows and interpreting data from model studies to prototype cases, as well as documenting them in engineering reports.

Subject Name : Material Testing Lab

Subject Code : PC-ME 392

Course Outcomes:

1. Determine toughness value of industrial specimens.
2. Analyze various heat treatment methods for a given specimen to observe mechanical properties and grain size.
3. Find surface or subsurface defects relevant to almost all manufacturing industries.
4. Evaluate the mechanical properties like drawability, endurance limit of a steel specimen necessary for material selection in design and development.
5. Apply knowledge of mathematics and engineering in calculating the mechanical properties of structural materials.
6. Able to communicate effectively the mechanical properties of materials.

Subject Name : Machine Drawing

Subject Code : PC-ME 393

Course Outcomes:

1. Gain knowledge about the various practices with regard to the dimensioning, sectioning and development of views.
2. Understand product symbols for standard components in mechanical, electrical and electronic systems and joints.
3. Understand the sectional views of machine parts and the assembly drawing of mechanical components.
4. Prepare of the part or assembly drawings as per the conventions.
5. Interpret machine drawings that in turn help the students in the preparation of the production drawings.
6. Understand and practice the Auto-CAD software for drawing orthographic and isometric projections.

SEMESTER-IV

Subject Name : Strength of Materials

Subject Code : PC-ME 401

Course Outcomes:

1. Establish an understanding of the fundamental concepts of mechanics of deformable solids; including static equilibrium, geometry of deformation, and material constitutive behavior.
2. Explain the basic mechanical principles underlying modern approaches for design of various types of structural members subjected to axial load, torsion, bending, transverse shear, and combined loading.
3. Solve engineering problems in solid mechanics in a systematic manner and Build the necessary theoretical background for further structural analysis and design courses.
4. Draw shear force and bending moment diagram as well as analyze the shear force and bending moment at each and every section of a member.
5. Explain the failure criteria for different types of material (ductile and brittle) and design the machine component depending upon the best suitable failure criteria for that material.
6. Select appropriate materials in design considering engineering properties, sustainability, cost and weight.

Subject Name : Applied Thermodynamics

Subject Code : PC-ME 402

Course Outcomes:

1. Apply the knowledge of mathematics, science and engineering fundamentals to model the energy conversion phenomenon.
2. Identify and formulate power production based on the fundamentals laws of thermal engineering.
3. Instill upon to envisage appropriate experiments related to heat engines.
4. Investigate the effectiveness of energy conversion process in mechanical power generation for the benefit of mankind.
5. Appreciate concepts learnt in fundamentals laws of thermodynamics from which learning ideas how to sustain in energy crisis and think beyond curriculum in the field of alternative and renewable sources of energy.
6. Communicate effectively the concepts of internal combustion engines and try to think beyond curriculum in alternative sources of energy.

Subject Name : Metrology & Measurement

Subject Code : PC-ME 403

Course Outcomes:

1. Understand the need, history for the development of new concepts with metrology and measurement.
2. Know different instruments those are available for linear, angular, roundness and roughness measurements.
3. Get the idea about appropriate method for determination of accuracy based on product function and manufacturing capability, sustainability, and environmental constraints.
4. Identify the role of Sensors and Transducers in the process of Measurement and instrumentation.
5. Function on Quality control and quality assurances divisions in industries.
6. Apply critical and analytical thinking skills in problem solving situations in real life.

Subject Name : Manufacturing Process

Subject Code : PC-ME 404

Course Outcomes:

1. Select appropriate Manufacturing Processing to manufacture any component.
2. Interpret foundry practices like pattern making, mold making, Core making and Inspection of defects.
3. Differentiate various metal forming processes such as Hot and Cold Working, Rolling, Forging, Extrusion and Drawing Processes.
4. Classify different plastic molding processes, Extrusion of Plastic and Thermoforming.
5. Select appropriate Joining Processes to join Work piece.

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6. Implement the Knowledge of Gained Subject in Industry.

Subject Name : Theory of Machines

Subject Code : PC-ME 405

Course Outcomes

1. Define different terminologies of linkages, kinematic pairs, kinematic chains and mechanisms and power transmission systems, describe the working mechanism of different linkages, kinematic pairs, kinematic chains and mechanisms and determine the velocity, acceleration, force, power required etc. for different linkages, joints, mechanisms and power transmitting devices.
2. Classify and explain different types of linkages, kinematic pairs, kinematic chains, mechanisms and power transmission systems.
3. Establish a proper understanding of kinematics and kinetics of different linkages, kinematic pairs, kinematic chains, mechanisms and power transmission systems.
4. Solve complex engineering problems addressing velocity, acceleration, force and power transmitted for different linkages, kinematic chains, mechanisms and power transmission systems.
5. Demonstrate the working mechanisms of different linkages, kinematic pairs, kinematic chains, mechanisms and power transmission systems and analyze their performances by developing mathematical models.
6. Draw schematic diagrams, velocity diagrams and acceleration diagrams of different linkages, kinematic pairs, kinematic chains, mechanisms and power transmission systems and perform dimensional synthesis of the above systems.

Subject Name : Strength of Materials Lab

Subject Code : PC-ME 491

Course Outcomes:

1. Design and conduct experiments, acquire data, analyze and interpret data.
2. Understand the behavior of structural elements such as bars, beams, and columns subjected to tension, compression, shear, bending, and torsion by means of experiments.
3. Physical insight into the behavior of materials and structural elements including distribution of stress and strain, deformation, and failure modes.
4. Deformation of spring stiffness and able to design spring as per required strength.
5. Find the hardness of various materials.
6. Write individual and group reports on present objectives, describe test procedures and results, synthesize and discuss the test results, present conclusions.

Subject Name : Theory of Machines Lab

Subject Code : PC-ME 492

Course Outcomes:

1. Identify the subsystems and components of different machines and mechanisms.
2. Explain the operating principles of different machines and mechanisms and sketch the schematic diagram of those machines and mechanisms.
3. Derive the relation between the operating parameters of the machines and the outputs from the machines.
4. Perform experimental studies on different mechanisms and machines.
5. Analyze and interpret the experimental results.
6. Write a laboratory report and work in a team.

Subject Name : Manufacturing Processes Lab

Subject Code : PC-ME 493

Course Outcomes:

1. Build practical knowledge about Pattern Making; pattern material, pattern allowances and types of patterns casting processes.
2. Apply practical understanding for use of moulding tools: green sand moulding, gating system, risering system, core making.
3. Plan and create jobs using forging processes.
4. Understand and plan for machining of gears
5. Relate the job manufactured from practical relevance point of view
6. Prepare a sheet metal Job.

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Subject Name : Metrology and Measurement lab

Subject Code : PC-ME 494

Course Outcomes:

1. Student will be able to demonstrate the knowledge/skill on standards, calibration process and analyze the characteristics of instruments keeping in mind technical, economical, safety issues.
2. Student will be able to demonstrate the knowledge/skill on measurement of length, angle and form surface measurement
3. Set up testing strategies and select proper instruments to evaluate performance characteristics
4. Evaluate possible causes of discrepancy in practical experimental observations in comparison to theory
5. Primarily via team-based laboratory activities, students will demonstrate the ability to interact effectively on a social and interpersonal level with fellow students, and will demonstrate the ability to divide up and share task responsibilities to complete assignments.
6. Prepare professional quality textual and graphical presentations of laboratory data and computational results.

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SEMESTER-V

Subject Name : Numerical Methods & Computer Programming

Subject Code : CS-ME 501

Course Outcomes:

1. Understand the use of numerical methods in scientific computing.
2. Calculate and interpret the errors in numerical methods.
3. Apply the concept of numerical interpolation and approximation of functions.
4. Solve numerical integration and differentiation.
5. Solve numerical solution of ordinary differential equations.
6. Formulate algorithms and programming.

Subject Name : Heat Transfer

Subject Code : PC-ME 501

Course Outcomes:

1. Explain the laws of heat transfer and deduce the general heat conduction equation and to explain it for 1-D steady state heat transfer in regular shape bodies, Interpret the extended surfaces.
2. Describe the critical radius of insulation, overall heat transfer coefficient, thermal conductivity and lumped heat transfer.
3. Illustrate the boundary layer concept, dimensional analysis, forced and free convection under different conditions
4. Explain the thermal radiation black body, emissivity and reflectivity and evaluation of view factor and radiation shields
5. Evaluate the heat exchanger and examine the LMTD and NTU methods applied to engineering problems.
6. Describe the Boiling heat transfer, mass transfer.

Subject Name : Machining Principles & Machine Tools

Subject Code : PC-ME 502

Course Outcomes:

1. Understand the theory of metal cutting and Identify the mechanism of metal cutting process.
2. Recognize the working principles of machine tools and various operations performed.
3. Explain various finishing processes and gear manufacturing.
4. Thorough knowledge and evaluate tool geometry and tool materials.
5. Know and appraising about advanced manufacturing processes.
6. Follow certain advancements of finishing process like honing copying in the field of machining principles and machine tools.

Subject Name : Design of Machine Elements

Subject Code : PC-ME 503

Course Outcomes:

1. Develop ability to utilizing knowledge of mathematics, science and engineering outcomes.
2. Explain the fundamentals of stress analysis, theories of failure and material science in the design of machine components.
3. Make proper assumptions with respect to material, factor of safety, static and dynamic loads for various machine components.
4. Develop an ability to design a system, component or process to meet desired needs within realistic constraints.
5. Use the techniques, skills and modern engineering tools necessary for engineering practice.
6. Develop an ability to identify, formulate and solve engineering problems.

Subject Name : IC Engines

Subject Code : PC-ME 504

Course Outcomes:

1. Explain basic concepts of actual cycles with analysis and to describe the fundamental concepts of IC engines along with its working principles.
2. Interpret different alternative fuels and its emissions, then the method to control these emissions.
3. Analyze different electronic fuel injection system, supercharging and its effect on performance of SI and CI engine.

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4. Explain performance parameters and characteristics; and calculation of performance parameters.
5. Explain Brayton cycle and Classify the essential components of gas turbine along with its performance improving methods.
6. Illustrate the working principle of different types of Jet propulsive engines and Rockets.

Subject Name : Essence of Indian Knowledge Tradition

Subject Code : MC 501

Course Outcomes:

1. Understand the concept of Traditional knowledge and its importance.
2. Explain the need and importance of protecting traditional knowledge.
3. Illustrate the various enactments related to the protection of traditional knowledge.
4. Interpret the concepts of Intellectual property to protect the traditional knowledge.
5. Explain the importance of Traditional knowledge in Agriculture and Medicine.

Subject Name : Computer Programming Lab

Subject Code : CS-ME 591

Course Outcomes:

1. Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems.
2. Apply numerical methods to obtain approximate solutions to mathematical problems.
3. Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.
4. Analyse and evaluate the accuracy of common numerical methods.
5. Implement numerical methods in Matlab.
6. Write efficient, well-documented Matlab code and present numerical results in an informative way.

Subject Name : Machine Tools Lab

Subject Code : PC-ME 591

Course Outcomes:

1. Evaluate the cutting forces (P_z and P_x or P_y) in straight turning at different feeds and velocities
2. Analyze the average cutting temperature in turning under different speed – feed combinations.
3. Identify chip formation mechanism and relevant matters (type, color & thickness) in turning mild steel and evaluate the role of variation of cutting velocity and feed on chip reduction coefficient /cutting ratio and shear angle.
4. Determine tool – wear and evaluation and analysis of tool life in turning mild steel by HSS or carbide tool.
5. Perform Geometrical and kinematic test of a centre lathe or a drilling machine.
6. Select a machining operation and corresponding machine tool for a specific application in real time.

Subject Name : Thermal Engineering Lab

Subject Code : PC-ME 592

Course Outcomes:

1. Apply the knowledge of mathematics, science and engineering fundamentals to model the energy conversion.
2. Evaluate by experiment the water equivalent of a bomb calorimeter and thereby calculate the calorific value of any unknown fuel.
3. Evaluate the exhaust smoke and exhaust emission by ORSAT Apparatus and understand the preventive measures.
4. Perform test in a single cylinder diesel engine and determine the performance parameters like fuel consumption, BP, Fuel efficiency, air consumption.

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5. Determine the performance parameters of a multi cylinder petrol engine and also perform the morse test to evaluate the power of an individual cylinder.
6. Understand the different parts and working of different types boiler.

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SEMESTER-VI

Subject Name: Air-conditioning & Refrigeration

Subject Code: PC-ME 601

Course Outcomes:

1. Understand various refrigeration cycles and evaluate performance using Mollier charts and/or refrigerant property tables.
2. Illustrate the fundamental principles and applications of refrigeration and air conditioning system.
3. Conduct test on vapor compression refrigeration systems to obtain cooling capacity and coefficient of performance.
4. Estimate the condition of steam and performance of vapour power cycle and vapour compression cycle.
5. Determine cooling load for air conditioning systems used for various applications
6. Apply the concept of psychometric charts and estimate various essential properties related to Psychrometry and processes.

Subject Code: PC-ME 602

Subject Name: Modern Manufacturing Processes

Course Outcomes:

1. Identify the background behind the development of unconventional machining processes and to understand the basic principles, equipment, merits, demerits and applications of various non-traditional machining processes.
2. Understand various material processing techniques for critical components.
3. Analyse the influence of process parameters in various non-traditional machining processes.
4. Understand various micro machining processes.
5. Understand and select various measurement techniques in micro machining processes.
6. Capture the international market with latest mechanical industry needs with the knowledge and support of advanced manufacturing techniques, so student with this judgment will be absorbed in any mechanical industry.

Subject Code: PC-ME 603

Subject Name: Machine Design

Course Outcomes:

1. Understand and apply principles of gear design to spur gears and industrial spur gear boxes.
2. Become proficient in Design of Helical and Bevel Gear.
3. Develop capability to analyse Rolling contact bearing and its selection from manufacturer's Catalogue.
4. Learn a skill to design different automobile components.
5. Inculcate an ability to design belt drives and selection of belt and rope drives.
6. Achieve an expertise in design of Sliding contact bearing in industrial applications.

Subject Code: PC-ME 604

Subject Name: Production & Operations Management

Course Outcomes:

1. Define and distinguish the different types of production system and their characteristics, types of managerial decision-making, and the role and function of different units of PPC and establish their inter-relationship, and model production system by a closed loop control system.
2. Predict (Forecast) the market and production demands by using different mathematical and statistical techniques and judge the accuracy of forecasting.
3. Define the vocabularies of inventory control system, classify inventories based on certain attributes, and determine the Economic Order Quantity (EOQ) and associated cost following different inventory models and will be able to estimate lot size for MRP systems.
4. Optimize the machine scheduling using several priority (rule) such as SPT, EDD, Critical ratio etc., solve multiple machine scheduling problems by application of Jhonson's Algorithm and construct the Gantt chart, and able to justify and use Distributed Artificial Intelligence (DAI) techniques to realize distributed scheduling (DS).

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5. Construct 'Network (Arrow) Diagram' and determine the 'Critical Path' for a project considering deterministic (CPM) and probabilistic approach (PERT) and the project cost.
6. Apply different Quality control approaches to various production systems and optimize assembly line balancing.

Subject Code: OE-ME 601A

Subject Name: Computer Integrated Manufacturing

Course Outcomes:

1. Establish the need of automation and its' benefits, define, characterize and distinguish the different types of automation and automated manufacturing systems cater to different types of production strategy.
2. Outline the principles of operation of NC & CNC machine tools, their constructions, control systems used, the features of Turning centres, machining centres, and hybrid (multi-tasking) machines.
3. Design and analyse the open and closed loop control systems of NC/CNC machine tools, develop the DDA interpolation expressions (Summation formulae) for linear and circular trajectory, and analyse the DNC and adaptive control systems.
4. Able to prepare process plan for Turning centres and Machining centres and write the manual part program and for complex mechanical components.
5. Apply data management and its importance for decision making in CIMS environment.
6. Design Flexible manufacturing cell after carrying out Group technology study and finally creating FMS.

Subject Code: OE-ME 601B

Subject Name: Mechatronics

Course Outcomes:

1. Identification of key elements of mechatronics system and its representation in terms of block diagram.
2. Understanding the concept of signal processing and use of interfacing systems such as ADC, DAC, digital I/O.
3. Interfacing of Sensors, Actuators using appropriate DAQ micro-controller.
4. Time and Frequency domain analysis of system model (for control application).
5. PID control implementation on real time systems.
6. Development of PLC ladder programming and implementation of real life system.

Subject Code: OE-ME 601C

Subject Name: Artificial Intelligence

Course Outcomes:

1. Understand the various searching techniques, constraint satisfaction problem and example problems- game playing techniques.
2. Apply these techniques in applications which involve perception, reasoning and learning.
3. Explain the role of agents and how it is related to environment and the way of evaluating it and how agents can act by establishing goals.
4. Acquire the knowledge of real-world Knowledge representation.
5. Analyse and design a real-world problem for implementation and understand the dynamic behaviour of a system.
6. Use different machine learning techniques to design AI machine and enveloping applications for real world problems.

Subject Code: MC 601

Subject Name: Constitution of India

Course Outcomes:

1. Understand the evolution and structural composition of Indian Constitution.
2. Apply the different articles/clauses of the constitution in interpretation of complex relationship among the different organs/institutions of India.
3. Analyse union-state power distribution as a medium of decentralization in a true federal structure like India.
4. Evaluate the three organs of the state in the contemporary scenario.

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5. Instil the knowledge of Indian political scenario amidst the emerging challenges in the social and economic scenario.
6. Demonstrate critical thinking in terms of diplomatic skills to create socio- economic and political stability in national scenario.

Subject Code: PC-ME 691

Subject Name: Air-conditioning & Refrigeration Lab

Course Outcomes:

1. Illustrate the fundamental principles and applications of refrigeration and air conditioning system
2. Understand the calculations of for evaluating the performance of refrigeration and air conditioning system
3. Present the properties, applications and environmental issues of different refrigerants
4. Obtain coefficient of performance by conducting test on vapour compression refrigeration systems test rig with continuous flow of water.
5. Calculate cooling load for air conditioning systems
6. Operate and analyse the ice plant apparatus.

Subject Code: PC-ME 692

Subject Name: Modern Manufacturing Process Lab

Course Outcomes:

1. Understand and recognize constructional features and modes of operations of CNC.
2. Identify different axes, machine zero, home position, systems and controls of CNC machines.
3. Create and simulate CNC turning part program and to identify errors and to make components on CNC turning centre.
4. Develop and simulate CNC milling part program and identify errors and to manufacture components on CNC milling machine.
5. Study geometry of robot manipulator, actuators and grippers.
6. Study the various process parameters and their effect on the component machined on ECM & EDM.

Subject Code: PC-ME 693

Subject Name: Design Practice Lab

Course Outcomes:

1. Design various 2D & 3D models of mechanical components in AUTOCAD, CATIA, PRO E or similar softwares.
2. Design and prepare spur gear using codes.
3. Analyze the stress strain of various mechanical components using different software packages.
4. Investigate the load-deformation behavior of various mechanical components using different software packages.
5. Develop various parts of a mechanical components and assemble them.
6. Conduct group projects, maintain timeliness and follow method oriented approach to problem solving.

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SEMESTER-VII

Subject Code: PC-ME 701

Subject Name: Power Plant Engineering

Course Outcomes:

1. Demonstrate Basic knowledge of Different types of Power Plants, site selection criteria of each one of them.
2. Understanding of Thermal Power Plant Operation, turbine governing, different types of high pressure boilers including supercritical and supercharged boilers, Fluidized bed combustion systems.
3. Design of chimney in thermal power plants, knowledge of cooling tower operation, numerical on surface condenser design.
4. Explain the basic knowledge of Different types of Nuclear power plants including Pressurized water reactor, Boiling water reactor, gas cooled reactor, liquid metal fast breeder reactor.
5. Understanding of Power Plant Economics, Energy Storage including compressed air energy and pumped hydro etc.
6. Discuss environmental and safety aspects of power plant operation.

Subject Code: PE-ME 701A

Subject Name: Automobile Engineering

Course Outcomes:

1. Understand the working principle of automobile.
2. Understand and analyse the fuel injection system, lighting, lubrication, steering system and cooling process of a
3. automobile.:
4. Understand and apply the knowledge of flywheel, clutch, gear box ,universal joint in a automobile.
5. Understand and analyse the knowledge of suspension system and design of the front and rear axle of automobile. Evaluate the power system of automobile.
6. Understand about the maintenance of automobile.

Subject Code: PE-ME 701B

Subject Name: Computational Fluid Dynamics

Course Outcomes:

1. Understand the differential equations for flow phenomena and numerical methods for their solution.
2. Analyse different mathematical models and computational methods for fluid flow and heat transfer simulations.
3. Formulate computational problems related to fluid flows and heat transfer.
4. Estimate the accuracy of a numerical solution by comparison to known solutions of simple test problems and by mesh refinement studies.
5. Evaluate forces in both internal and external flows.
6. Explain different CFD Solution Procedures using softwares.

Subject Code: PE-ME 701C

Subject Name: Alternative Fuel and Renewable Energy

Course Outcomes:

1. Understand of renewable and non-renewable sources of energy
2. Gain knowledge about working principle of various solar energy systems
3. Understand the application of wind energy and wind energy conversion system.
4. Develop capability to do basic design of bio gas plant.
5. Understand the applications of different renewable energy sources like ocean thermal, hydro, Geo-thermal energy etc.
6. Explain electric energy conversion system.

Subject Code: PE-ME 702A

Subject Name: Industrial Engineering

Course Outcomes:

1. Understand the concepts of Industrial Engineering.
2. Explain production systems and their characteristics.
3. Describedifferentaspectsofworksystemdesignandfacilitiesdesignpertinent to manufacturing industries.

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4. Apply forecasting and scheduling techniques, time study and work measurement techniques and inventory management tools to the various production systems.
5. Analyze and Evaluate complex Industrial problems.
6. Create a new facility layout and material handling technique in order to increase productivity.

Subject Code: PE-ME 702B

Subject Name: Operations Research

Course Outcomes:

1. Understand the concepts of Operation Research.
2. Explain objectives of various operations research tools.
3. Formulate different industrial problems with respect to the different Operations Research tools.
4. Apply different operations research tools to solve those industrial problems.
5. Analyse and evaluate after solution of those Industrial problems.
6. Create new decision-making tools, optimization tool, scheduling techniques etc. for solving industrial problems.

Subject Code: PE-ME 702C

Subject Name: Principles and Practices of Management

Course Outcomes:

1. Understand the evolutionary development of management thought and general principles of management.
2. Understand the management functions in an organization.
3. Explain different aspects of planning, decision making, staffing etc. of management.
4. Apply management techniques to the organization in order to increase profit.
5. Analyze and evaluate the outcomes after application of the management techniques.
6. Create a new management technique in order to increase profit of an organization.

Subject Code: OE ME 701 A

Subject Name: Enterprise Resource Planning

Course Outcomes:

1. Develop model for ERP for large projects
2. Develop model for E-commerce architecture for any application
3. Describe the advantages, strategic value, and organizational impact of utilizing an ERP system for the management of information across the functional areas of a business: sales and marketing, accounting and finance, human resource management, and supply chain.
4. Demonstrate a working knowledge of how data and transactions are integrated in an ERP system to manage the sales order process, production process, and procurement process.
5. Evaluate organizational opportunities and challenges in the design system within a business scenario.

Subject Code: OE-ME 701B

Subject Name: Marketing Management

Course Outcomes:

1. Identify the scope and significance of Marketing in Domain Industry.
2. Examine marketing concepts and phenomenon to current business events In the Industry.
3. Coordinate the various marketing environment variables and interpret them for designing marketing strategy for business firms
4. Relate Marketing Mix as a framework for Marketing Decision making.
5. Illustrate market research skills for designing innovative marketing strategies for business firms
6. Practice marketing communication skills relevant to the corporate world.

Subject Code: OE-ME 701C

Subject Name: Internet of Things

Course Outcomes:

1. Describe what IoT is and how it works today
2. Recognise the factors that contributed to the emergence of IoT
3. Design and program IoT devices
4. Use real IoT protocols for communication

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5. Secure the elements of an IoT device
6. Design an IoT device to work with a Cloud Computing infrastructure

Subject Code: MC 701

Subject Name: Environmental Science

Course Outcomes:

1. Articulate the interconnected and interdisciplinary nature of environmental studies.
2. Demonstrate an integrative approach to environmental issues with a focus on sustainability.
3. Use critical thinking, problem-solving, and the methodological approaches of the social sciences, natural sciences, and humanities in environmental problem solving.
4. Communicate complex environmental information to both technical and non-technical audiences;
5. Understand and evaluate the global scale of environmental problems.
6. Reflect critically on their roles, responsibilities, and identities as citizens, consumers and environmental actors in a complex, interconnected world.

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SEMESTER-VIII

Subject Code: PE-ME 801A

Subject Name: Additive Manufacturing

Course Outcomes:

1. To discuss the basic principles underlying additive manufacturing processes.
2. Demonstrate a basic technical understanding of the physical principles, materials, and operation of the types of AM processes.
3. Demonstrate the ability to identify characteristics of parts that are fabricated by AM processes.
4. To define on how to model and simulate some AM processes to predict the results of material processing operations.
5. Understand models of material processing phenomena and apply them to simulate AM process operations.
6. Explain about the relationships between AM process phenomena and part accuracy and surface finish.

Subject Code: PE-ME 801B

Subject Name: Quantity Production Method

Course Outcomes:

1. Understand Engineering Production levels and types of production; piece, batch, lot, mass and quantity production.
2. Recognize and understand the need, degrees and types of automation and role of automation in industrial production.
3. Understand the concepts of various Quantity Production methods.
4. Plan, schedule, design and use jigs and fixtures for batch production in machine shops.
5. Analyze Productivity and quality enhancement in Quantity production
6. Understand the use of some modern technologies in the area of Quantity Production Methods.

Subject Code: PE-ME 801C

Subject Name: Engineering Tribology

Course Outcomes:

1. Develop knowledge on surface topography
2. Know how to model a rough engineering surface
3. Understand the fundamental principles in the field of tribology.
4. Analyze the mechanisms of friction and wear in mechanical system.
5. Establish the concepts on the design of lubrication system.
6. Apply the concept of surface engineering in industrial applications.

Subject Code: PE-ME 802A

Subject Name: Supply Chain Management

Course Outcomes:

1. Students will be able to develop a sound understanding of the important role of supply chain management in today's business environment.
2. Students will be familiar with current supply chain management trends, understand and apply the current supply chain theories, practices and concepts utilizing case problems and problem-based learning situations.
3. Students will be able learn to use and apply computer-based supply chain optimization tools including the use of selected state of the art supply chain software suites currently used in business.
4. Students will be able to design, develop and utilize critical management skills such as negotiating, working effectively within a diverse business environment, ethical decision making and use of information technology.
5. Students will be able to instill the knowledge of supply chain design and demonstrate critical thinking, team building and presentation skills as applied to supply chain problems.
6. Students will be able to apply critical and analytical thinking skills in problem solving situations in real life complex industrial scenario.

Subject Code: PE ME 802 B

Subject Name: Total Quality Management

Course Outcomes:

1. Students will be able to understand and discuss various dimensions of product and service quality.

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2. Students will be able to assess and apply different TQM Principles for quality improvement in organization.
3. Students will be able to distinguish various TQM tools and techniques used in Manufacturing and Service sectors.
4. Students will be able to utilize QFD tool to design and develop a new product as per customer requirements.
5. Students will be able to explain various ISO Standards and Quality systems practiced in various sector.
6. Students will be able to summarize the basic concepts in total quality management relevant to manufacturing and service Sectors.

Subject Code: PE-ME 802C

Subject Name: Management Information System

Course Outcomes:

1. Understand the technologies used in the field of management information systems;
2. Understand the development and implementation process of information systems.
3. Understand the role of the ethical, social, and security issues of information systems.
4. Explain the role of information systems in organizations, the strategic management processes, with the implications for the management.
5. Apply the understanding of how various information systems like DBMS work together to accomplish the information objectives of an organization.
6. Apply critical-thinking skills in identifying information systems problems and investigate existing literature about hardware and software solutions to problems.

Subject Code: PE-ME 803A

Subject Name: Industrial Automation and Instrumentation

Course Outcomes:

1. Illustrate with various automation technologies in manufacturing and process industries.
2. Understand various automation tools and methods in manufacturing industry.
3. Explain various control and automation method in process industries.
4. Define with various communication technologies in manufacturing and process industries.
5. Expose to various control techniques employed in process automation.
6. Develop automation system for manufacturing and process industries

Subject Code: PE-ME 803B

Subject Name: Industry 4.0

Course Outcomes:

1. Develop knowledge of basics, drivers and enablers of Industry 4.0
2. Gain knowledge of modern methods and techniques of planning, dimensioning, design and optimization of Industry 4.0 production systems
3. Develop knowledge and understanding of value chains in Industry
4. Formulate methods and techniques of production system planning and optimization through the application of theoretical learning content in the context of case studies
5. Structure and documentation of innovative problem solutions using modern technologies for information acquisition and processing.
6. Apply the knowledge to design and develop CPPS considering machine tool 4.0

Subject Code: PE-ME 803C

Subject Name: Fluid Power Control

Course Outcomes:

1. Illustrate different types of fluid power control systems and their applications.
2. Understand and analyse working principles of different components of a hydraulic pump and actuators.
3. Analyse about various hydraulic valves with their designs.
4. Discuss about working and applications of different components of pneumatic systems.
5. Understand and analyse working principles Electro-pneumatic control systems.
6. Explain the design of various fluid power systems for specific applications.

Subject Code: OE -ME 801A

Subject Name: Human Resource Management

Course Outcomes:

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Course outcomes for B. Tech in Mechanical Engineering

(Applicable from the academic session 2020-2021)

1. To develop the understanding of the concept of human resource management and to understand its relevance in organizations.
2. Explain the Human Resource Planning.
3. To develop necessary skill set for application of various HR issues like Recruitment and Selection, Human Resource Development etc.
4. Define the Industrial Relations in India, Workers' Participation in Management, Discipline Management.
5. To analyse the strategic issues and strategies required to select and develop manpower resources.
6. To integrate the knowledge of HR concepts to take correct business decisions.

Subject Code: OE -ME 801B

Subject Name: Entrepreneurship

Course Outcomes:

1. Understand the nature of entrepreneurship
2. Understand the function of the entrepreneur in the successful, commercial application of innovations
3. Confirm an entrepreneurial business idea
4. Identify personal attributes that enable best use of entrepreneurial opportunities
5. Explore entrepreneurial leadership and management style.
6. Define various e-commerce applications

Subject Code: OE -ME 801C

Subject Name: Industrial Safety

Course Outcomes:

1. Analyze the effect of release of toxic substances
2. Understand the industrial laws, regulations and source models.
3. Apply the methods of prevention of fire and explosions.
4. Understand the relief and its sizing methods.
5. Understand the methods of hazard identification and preventive measures.
6. Explain Accident compensation considering various laws.