



DEPARTMENT of MECHANICAL ENGINEERING

Vision

To be the centre for excellence and centre of learning for innovation, incubation and research in the domain of product design, thermal engineering and manufacturing technology thereby path finder for professionalism, entrepreneurship and new knowledge contributing to the common masses.

Mission

To educate and train undergraduate and post graduate students in Mechanical Engineering by inculcating the values for discipline, quality and transparency and profession development in the job and self-employment emphasis industry based practices.

Program Education Objectives (PEO's)

PEO1: To prepare technocrats that can satisfy the need of mechanical and allied industries.

PEO2: To develop critical thinking, problem solving skills, research aptitude and career and professionalism among the students.

PEO3: To improve and expand technical and professional skills of students through effective teaching-learning and industry interaction.

Knowledge and Attitude Profile (WK):

WK1	A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.
WK2	Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.
WK3	A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

WK4	Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.
WK5	Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.
WK6	Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.
WK7	Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.
WK8	Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.
WK9	Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

Programm Outcomes

PO1	Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
PO2	Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4).
PO3	Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5).
PO4	Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
PO5	Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6).
PO6	The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
PO7	Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
PO8	Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

PO9	Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences.
PO10	Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
PO11	Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

Program Specific Outcomes(PSO's)

PSO1	Ability to design, analysis and problem solving skills using basic principle of mechanical engineering.
PSO2	Ability to impart technical and professional skills through industry institute interaction.
PSO3	Develop practical skills for the benefits of society.

Course Outcomes

Second Year (S.Y.B.Tech) Subjects Course Outcomes (2024 Course)

Semester – III

After completion of course, student will be able to

Subject Code	Engineering Thermodynamics (101301)
CO1	Describe the fundamental concepts of thermodynamics with energy interactions in thermodynamic systems.
CO2	Apply laws of thermodynamics to processes and cycles.
CO3	Determine changes in thermodynamic properties of substances.
CO4	Examine the properties of steam and their effect on performance of vapour power cycle.
CO5	Analyze the fuel combustion process and determine boiler performance.

After completion of course, student will be able to

Subject Code	Solid Mechanics (101302)
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CO1	Calculate stress and strain developed on determinate and indeterminate members.
CO2	Determine Shear force and bending moment and draw SFD & BMD for various types of transverse loading.
CO3	Compute the bending stresses, shear stresses and Torsional stresses on a beam.
CO4	Calculate slope and deflection on beam.
CO5	CO5: Determine stresses on a 2-D element by applying the concept of principal stresses; analyze failure of members using different theories of failure

After completion of course, student will be able to

Subject Code	Material Science and Metallurgy (101303)
CO1	Determine Miller indices and identify imperfections in crystal.
CO2	Determine mechanical properties using destructive and non-destructive testing of materials.
CO3	Interpret iron carbon diagram.
CO4	Apply the knowledge of heat treatment to study various phases of materials.
CO5	Discuss the effects of alloying elements on ferrous and non-ferrous materials

After completion of course, student will be able to

Subject Code	MDM-1 Engineering Mathematics-III (170304A)
CO1	Solve higher order linear differential equations using appropriate techniques.
CO2	Apply Laplace transform and Z-Transform to solve differential equations, difference equations.
CO3	Apply vector calculus concepts to analyze problems and solve system of linear equations by using numerical methods.
CO4	Analyze discrete and continuous random variables using Binomial, Poisson and Normal distributions.
CO5	Analyze data through hypothesis tests like Chi-square and t-tests.

After completion of course, student will be able to

Subject Code	Open Elective Course - 1 Intellectual Property Rights and Ethics (171305A)
CO1	Understand the basics of intellectual property rights.

CO2	Learn the patent filing process.
CO3	Understand the copyright/trademark/industrial design and filing process.
CO4	Understand the importance of ethics in their personal and professional life.
CO5	Learn the workplace responsibilities and rights as an engineer in the industry.

After completion of course, student will be able to

Subject Code	Renewable Energy (171305B)
CO1	Describe the basics of renewable energy.
CO2	Explain the constructional details and working of hydro-electric power plant.
CO3	Describe the fundamentals and technology to harness solar energy.
CO4	Explain the wind energy conversion system.
CO5	Discuss the bio-energy conversion pathways

After completion of course, student will be able to

Subject Code	Health, Care and Management Systems (171305C)
CO1	Explain the structure and functions of key human body systems relevant to healthcare and diagnosis.
CO2	Identify common health issues and describe their causes and symptoms.
CO3	Apply principles and uses of basic biomedical instruments for diagnosis and patient monitoring.
CO4	Analyze the role of advanced medical devices and imaging systems in clinical decision-making and treatment.
CO5	Apply hospital management systems and digital health technologies like EHR, telemedicine, and emergency tracking in healthcare scenarios

After completion of course, student will be able to

Subject Code	Smart City and Infrastructure (171305D)
CO1	Describe the concept, features, and components of smart cities with relevant examples.
CO2	Demonstrate the structure and regulatory mechanisms of smart city development in context of Indian and international benchmarks.
CO3	Apply GIS and remote sensing techniques for spatial analysis and infrastructure planning in smart cities.

CO4	Relate smart transportation technologies and their role in improving urban mobility and sustainability.
CO5	Suggest smart solutions for urban water, air and waste management using IOT technologies

After completion of course, student will be able to

Subject Code	Entrepreneurship Development (172306)
CO1	Explain the concept of entrepreneurship and its importance in economic and social development.
CO2	Identify, evaluate, and validate innovative business ideas using market research techniques.
CO3	Analyze startup funding options, revenue models, and financial feasibility of new businesses.
CO4	Demonstrate the ability to pitch business ideas effectively to potential stakeholders.
CO5	Develop a structured business plan incorporating all key aspects of entrepreneurship.

After completion of course, student will be able to

Subject Code	VEC Courses - 1 Universal Human Values (173307)
CO1	Explore a holistic vision of life, including the self and surroundings.
CO2	Recognize the co-existence of self, realize harmony, and comprehend the true happiness.
CO3	Apply strategies that foster harmony in family and society through effective communication and relationship-building to cultivate social well-being.
CO4	Execute self-regulations to mutually fulfilling human behavior and enriching interaction with nature to realize harmony.
CO5	Emphasize the implications of a holistic approach in terms of ethical human conduct, and transit towards value based life.

After completion of course, student will be able to

Subject Code	Community Engagement /Field Projects (101308)
CO1	Explore relevance between theory and practice through community-based problem learning.
CO2	Identify real-life socio-technical problems and develop the solution.

CO3	Implement a wisdom of empathy and social responsibility to meet complex global challenges.
CO4	Develop innovative ideas in collaboration with society through community-based research methods.
CO5	Analyze the need of research projects and develop a plan for betterment of public service values through active citizenship.

After completion of course, student will be able to

Subject Code	Material Testing Laboratory (101309)
CO1	Determine mechanical properties using destructive and non-destructive testing of materials.
CO2	Analyze effect of alloying element and heat treatment on properties of ferrous and non-ferrous alloy.
CO3	Identify and estimate different parameters of the system viz; phases, grains, grain boundary, etc.
CO4	Determine various types of stresses and strain developed on members.
CO5	Compute bending stresses and shear stresses on a beam.

Second Year (S.Y.B.Tech) Subjects Course Outcomes (2024 Course)

Semester – IV

After completion of course, student will be able to

Subject Code	Fluid Mechanics (101401)
CO1	Determine various properties of fluid and apply the laws of fluid statics and concepts of buoyancy.
CO2	Understand types of fluid flow and terms associated with fluid kinematics.
CO3	Solve fluid flow problems using Euler's and Bernoulli's equations.
CO4	Analyze internal flows and losses through pipes.
CO5	Analyze external flow and relationship between physical quantities using Dimensional analysis.

After completion of course, student will be able to

Subject Code	Machines and Mechanisms (101402)
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CO1	Demonstrate mechanisms in real life applications and calculate the degrees of freedom.
CO2	Analyze velocity and acceleration of mechanisms by graphical method.
CO3	Synthesize a four bar and slider crank mechanism by analytical method.
CO4	Apply fundamentals of gear theory as a prerequisite for gear design.
CO5	Construct cam profile for given follower motions

After completion of course, student will be able to

Subject Code	Manufacturing Processes (101403)
CO1	Explain the construction and working of conventional machining processes.
CO2	Discuss different welding processes and their characteristics.
CO3	Describe casting processes and their applications.
CO4	Apply the knowledge of press working to design press components.
CO5	Explain different moulding processes.

After completion of course, student will be able to

Subject Code	Artificial Intelligence (170404A)
CO1	Explain the basic principles and scope of Artificial Intelligence and its relevance to different engineering disciplines.
CO2	Apply search algorithms for solving simple engineering problems.
CO3	Understand and differentiate between types of machine learning and data representations.
CO4	Identify and analyze AI applications in domains such as predictive maintenance, smart cities, automation, and control systems.
CO5	Recognize ethical, social, and professional issues in deploying AI solutions in engineering contexts.

After completion of course, student will be able to

Subject Code	Introduction to Cyber Security (171405A)
CO1	Explain the architecture, communication and governance of cyberspace and web technologies.

CO2	Identify and relate specific cybercrime incidents to relevant provisions of the IT Act 2000.
CO3	Apply basic practices to ensure privacy and security on social media platforms.
CO4	Apply security practices and legal guidelines to ensure safe E-Commerce and digital payment systems.
CO5	Demonstrate configuration and management of secure digital devices and tools.

After completion of course, student will be able to

Subject Code	Business Economics (172406)
CO1	Understand the role of economics in business decision-making and analyze real-world economic scenarios.
CO2	Apply demand and supply principles to determine market equilibrium and pricing strategies.
CO3	Analyze cost structures, profitability and break-even points in business operations.
CO4	Evaluate the impact of business cycles, inflation, and government economic policies on industries.
CO5	Develop pricing strategies based on competitive analysis and consumer demand.

After completion of course, student will be able to

Subject Code	Environmental Studies (173407)
CO1	Describe the importance of environmental studies and the sustainable use of natural resources.
CO2	Explain the structure and function of ecosystems and the significance of biodiversity.
CO3	Identify various types of environmental pollution and their control measures.
CO4	Discuss key environmental issues, policies and their impact on society.
CO5	Observe and report environmental conditions and features through field activities.

After completion of course, student will be able to

Subject Code	Foreign Languages (174408)
CO1	Learn the basic phonetics, alphabets and sounds of the selected foreign language.
CO2	Interpret and use everyday vocabulary to manage simple social interaction.

CO3	Form simple sentences using basic grammatical structures and sentence patterns.
CO4	CO4: Participate in simple conversations and everyday communication situations relevant to academic, social and professional contexts.
CO5	CO5: Demonstrate cultural awareness and appropriate language behaviour to facilitate global and cross-cultural interactions.

After completion of course, student will be able to

Subject Code	Machine Shop (101409)
CO1	Apply the knowledge of machining technique to prepare a component on lathe machine.
CO2	Apply the knowledge of injection moulding to prepare a component.
CO3	Apply 'M' Codes and 'G' codes of part programming to prepare a component on CNC machine.
CO4	Summarize the knowledge gained during industry visit.

Third Year (T.Y.B.Tech) Subjects Course Outcomes (2024 Course)

Semester – V

After completion of course, student will be able to

Subject Code	Heat Transfer (101501)
CO1	Analyze and apply modes of heat transfer equations for a one-dimensional thermal system.
CO2	Design a thermal system considering fins, thermal insulation and transient heat conduction.
CO3	Evaluate the heat transfer rate in natural and forced convection & validate with experimentation results.
CO4	Interpret heat transfer by radiation between objects with simple geometries, for black and grey surfaces.
CO5	Design and analysis of heat transfer equipment and investigation of its performance.

After completion of course, student will be able to

Subject Code	Machine Design – I (101502)
CO1	Design the cotter and knuckle Joints, levers and components subjected to eccentric

	loading.
CO2	Design shafts, keys and couplings as per the international standards.
CO3	Analyze different stresses in power screws.
CO4	Design different types of springs.
CO5	Evaluate the stress developed on the different type of welded and threaded joints.

After completion of course, student will be able to

Subject Code	Numerical Methods and Optimization (101503)
CO1	Apply numerical methods to find the roots of equations and solve systems of equations.
CO2	Apply numerical differentiation techniques to solve ODE and PDE.
CO3	Apply numerical integration techniques to solve engineering applications.
CO4	Apply curve fitting techniques using the least squares method to obtain the best fit for experimental data.
CO5	Formulate and solve linear programming problems using graphical and simplex methods for engineering optimization and industrial decision-making.

After completion of course, student will be able to

Subject Code	Composite Materials (101504A)
CO1	Explain the fundamentals of composite materials.
CO2	Demonstrate basics and progressive techniques of composite materials.
CO3	Analyze the macro and micro mechanical behavior of the lamina.
CO4	Select appropriate testing and inspection methods for composite materials.
CO5	Select composite materials for various applications.

After completion of course, student will be able to

Subject Code	Hydraulics and Pneumatics (101504B)
CO1	Understand working principle of components used in hydraulic & pneumatic systems.
CO2	Analyze various actuators and fluid power controllers in hydraulic systems.

CO3	Selection of appropriate components required for hydraulic and pneumatic systems.
CO4	Analyze hydraulic and pneumatic systems for industrial applications.
CO5	Design a system according to the requirements.

After completion of course, student will be able to

Subject Code	Machining Science and Technology (101504C)
CO1	Explain the fundamentals of metal cutting, during machining processes.
CO2	Apply grinding concepts to select suitable grinding wheels for manufacturing applications.
CO3	Select Jigs and fixtures for industrial applications.
CO4	Classify different advanced machining processes.
CO5	Evaluate various parameters of process planning.

After completion of course, student will be able to

Subject Code	Systems in Mechanical Engineering (170505A)
CO1	Apply knowledge of thermodynamics concepts.
CO2	Explain basic laws of thermodynamics, heat transfer and their applications.
CO3	Select different materials for different applications.
CO4	Explain the basics of engineering components.
CO5	Describe and get exposure to the latest trends in manufacturing processes.

After completion of course, student will be able to

Subject Code	Data Structures and Algorithms (170505B)
CO1	Understand basic concepts of data structures.
CO2	Apply the concepts of stacks and queues.
CO3	Implement appropriate non-linear data structures.
CO4	Demonstrate searching and sorting techniques in engineering data handling.

CO5	Illustrate real-world engineering case studies using data structures.
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After completion of course, student will be able to

Subject Code	Engineering Measurements (170505C)
CO1	Evaluate the performance of transducers used for mechanical parameters like displacement, speed, vibration, force, and torque.
CO2	Calibrate pressure and vacuum measuring devices using standard dead-weight or vacuum testing rigs.
CO3	Select appropriate temperature sensors for precise thermal monitoring.
CO4	Evaluate the operational dynamics of industrial fluid flow and level sensors based on principles.
CO5	Demonstrate miscellaneous sensors according to their working principles.

After completion of course, student will be able to

Subject Code	Sensors and Actuators (170505D)
CO1	Apply knowledge of IoT building blocks, architectures, and components to develop and implement simple IoT applications for real-world applications.
CO2	Analyze sensor/transducer performance, signal conditioning, and data acquisition to assess measurement accuracy and errors.
CO3	Apply principles of temperature, pressure, force, flow, and level sensors to select and use appropriate sensors for measurement applications.
CO4	Examine the operating principles and performance characteristics of position, proximity, and motion sensors to compare and select appropriate sensors for specific measurement and control applications.
CO5	Evaluate performance, working principles and control mechanisms of electrical, fluid power, and specialized actuators for various automation and control system applications.

After completion of course, student will be able to

Subject Code	Infrastructure and Planning (170505E)
CO1	Explain the role and types of urban infrastructure, key planning data and standards, and the planning process with stakeholder roles.
CO2	Apply concepts of water supply, sanitation, stormwater, and solid waste management to plan and propose basic urban infrastructure improvements.

CO3	Apply transport and land-use planning concepts to improve urban mobility, accessibility, and sustainability
CO4	Develop rural planning strategies using government schemes to improve village infrastructure, housing, and livelihoods.
CO5	Implement rural infrastructure and connectivity solutions using GIS and other planning tools.

After completion of course, student will be able to

Subject Code	Web Development (170505F)
CO1	Understand a basic of web application.
CO2	Develop structured web pages using HTML.
CO3	Apply styling and layout design principles to create visually appealing web interfaces.
CO4	Develop responsive and user-friendly web pages using modern design frameworks and layout approaches.
CO5	Create and publish functional websites using modern website development tools.

After completion of course, student will be able to

Subject Code	Applied Data Science (170505G)
CO1	Apply statistics and probability methods to solve real-life problems.
CO2	Demonstrate the Data Science Process and how its components interact.
CO3	Apply basic tools (plots, graphs, summary statistics) to carry out EDA.
CO4	Solve real life problems using regression techniques.
CO5	Apply machine learning algorithms for real world applications.

After completion of course, student will be able to

Subject Code	Electrical Machines (170505H)
CO1	Understand the principles of electromechanical energy conversion, torque equation, and constructional features of electric motors.
CO2	Apply characteristics and speed control methods of DC motors to select suitable drives for applications.

CO3	Examine performance characteristics of three-phase induction motors for selection and control in mechanical loads.
CO4	Compare single-phase motors to select appropriate types for domestic and light industrial use.
CO5	Apply operating principles and control methods of synchronous, BLDC, stepper, and servo motors in engineering applications.

After completion of course, student will be able to

Subject Code	Modeling and Additive Manufacturing Laboratory (101506)
CO1	Develop fully constrained 2D sketches of mechanical components using CAD tools.
CO2	Create 3D models and assemblies of mechanical components using appropriate constraints.
CO3	Prepare detailed production drawings for parts and assemblies with standard annotations.
CO4	Generate G-code and slice 3D models using suitable printing parameters.
CO5	Fabricate and evaluate mechanical components using 3D printing technology.

Third Year (T.Y.B.Tech) Subjects Course Outcomes (2024 Course)

Semester – VI

After completion of course, student will be able to

Subject Code	Machine Design – II (101601)
CO1	Design of mechanical components subjected to fluctuating loads.
CO2	Design of Spur & Helical gear for industrial applications.
CO3	Design of Bevel and Worm gear for industrial applications.
CO4	Selection of bearings from the manufacturer's catalogue for a typical application, considering design parameters.
CO5	Design a machine tool gearbox for different applications.

After completion of course, student will be able to

Subject Code	Computer-Aided Engineering (101602)
CO1	Apply FEA concepts and methods to analyze engineering problems.

CO2	Apply the various meshing techniques for better evaluation of approximate results.
CO3	Evaluate the structural response of bar and truss elements under mechanical and thermal loading to determine stresses, displacements, and reaction forces.
CO4	Evaluate the effectiveness of 2D and 3D finite element models in solving engineering structural problems.
CO5	Apply the principles of nonlinear analysis and AI in CAE to analyze engineering systems and enhance design performance.

After completion of course, student will be able to

Subject Code	Mechanical Drives (101603A)
CO1	Analyze the performance parameters of belt and chain drive systems.
CO2	Compare different types of clutches and evaluate their working principles.
CO3	Analyze various braking systems and their mechanisms.
CO4	Analyze turning moment diagrams.
CO5	Analyze the geometry, velocity ratio, and torque characteristics of various Continuous Variable Transmission systems.

After completion of course, student will be able to

Subject Code	Turbomachinery (101603B)
CO1	Validate impulse moment principle using flat, inclined and curved surfaces and analyze performance characteristics of impulse hydraulic turbines.
CO2	Analyze performance characteristics of reaction hydraulic turbines.
CO3	Analyze performance parameters of single & multistage centrifugal pumps along with discussion of cavitation and selection.
CO4	Analyze performance parameters of impulse and reaction steam turbine.
CO5	Analyze performance parameters of centrifugal compressors along with a discussion of the theoretical aspects of axial compressors.

After completion of course, student will be able to

Subject Code	Metrology and Quality Control (101603C)
CO1	Explain principles and standards used in engineering metrology.

CO2	Apply surface roughness measuring instruments, comparators for precision inspection and design gauges.
CO3	Apply quality control tools for problem-solving.
CO4	Analyze TQM principles in manufacturing systems.
CO5	Analyze statistical concepts and techniques used in quality control and process improvement.

After completion of course, student will be able to

Subject Code	Piping Design (101604A)
CO1	Explain the function and classification of piping systems.
CO2	Select appropriate piping materials based on service conditions.
CO3	Apply piping codes and standards in design.
CO4	Perform basic piping stress and flexibility analysis.
CO5	Prepare piping layouts, isometric drawings, and support schemes.

After completion of course, student will be able to

Subject Code	Modern I. C. Engines (101604B)
CO1	Describe the construction and working of I C Engines.
CO2	Compare various fuels used in I C engines and describe modern fuel supply systems.
CO3	Measure performance and emissions of I C Engine.
CO4	Analyze the combustion process in I C engines.
CO5	Compare cooling, lubrication and ignition system of I C Engines.

After completion of course, student will be able to

Subject Code	Robotics (101604C)
CO1	Explain different types of robot configurations with relevant terminology.
CO2	Select suitable sensors, actuators and drives for robotic systems.
CO3	Apply the principles of kinematics to determine the motion and positioning of robotic systems.

CO4	Explain the fundamentals of robot dynamics and manipulator mechanism design.
CO5	Demonstrate the use of sampling, quantization, and machine learning concepts in intelligent robotic and automation applications.

After completion of course, student will be able to

Subject Code	Automotive Technology (170605A)
CO1	Compare the various chassis and drive-trains of an automobile.
CO2	Analyze axles, wheels, tyres and the steering system of an automobile.
CO3	Select suspension and braking systems of an automobile.
CO4	Measure and analyze the performance of an automobile and describe the safety aspects.
CO5	Discuss electrical systems and assess modern propulsion technologies of an automobile.

After completion of course, student will be able to

Subject Code	Database Systems (170605B)
CO1	Explain the basic concepts, architecture, and components of database systems.
CO2	Convert ER diagrams into equivalent relational database schemas.
CO3	Normalize relational schemas using functional dependencies.
CO4	Explain the purpose and components of SQL in relational database systems.
CO5	Identify various transaction states and common transaction operations.

After completion of course, student will be able to

Subject Code	Industrial Control Components (170605C)
CO1	Analyze process variables, control system types, and process characteristics, and evaluate examples of process control loops in industry.
CO2	Apply knowledge of transmitters, signal standards, protocols, and converters to evaluate their role in process control systems.
CO3	Design and apply control actions and tuning methods to optimize controller performance and system stability.
CO4	Evaluate control valve selection, sizing, and design based on key characteristics and industry standards.

CO5	Analyze and evaluate valve accessories and actuators for optimal performance in process control systems.
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After completion of course, student will be able to

Subject Code	Embedded System in IoT (170605D)
CO1	Explain fundamentals of embedded systems, including components, classifications, design metrics, and the role of microcontrollers.
CO2	Apply IoT hardware design concepts using microcontroller platforms, interfaces, and communication modules with effective power management.
CO3	Apply IoT communication models, protocols, data transmission, and basic cloud integration concepts.
CO4	Analyze Embedded C programming, real-time processing, RTOS concepts, and low power design techniques in IoT-based embedded systems.
CO5	Evaluate end-to-end IoT system design, security mechanisms, and real-world IoT applications across domains.

After completion of course, student will be able to

Subject Code	Governing Policies (170605E)
CO1	Understand infrastructure, governance, and policy implementation in urban and rural development.
CO2	Analyze economic aspects of infrastructure, apply demand forecasting, cost-benefit analysis, financing mechanisms, and PPP models.
CO3	Apply national infrastructure programs, policies, and regulations to plan and assess urban and rural development projects.
CO4	Implement planning and management tools for urban and rural infrastructure projects.
CO5	Apply concepts of sustainable and inclusive infrastructure by integrating climate resilience, risk reduction, resource efficiency, digital governance, and global case insights.

After completion of course, student will be able to

Subject Code	Application Development (170605F)
CO1	Apply the client-side technologies for web development.
CO2	Develop user interfaces using component-based design approaches.

CO3	Apply the server-side technologies for web development.
CO4	Create effective web applications for business functionalities using the latest web development platforms.
CO5	Deploy web applications in collaborative environments.

Third Year B.Tech. Mechanical Engineering – Honors in Vehicle Engineering

Semester – V

After completion of course, student will be able to

Subject Code	Systems in Automobile Engineering (101507)
CO1	Compare the chassis and drive train of an automobile.
CO2	Analyze axles, wheels, tyres and the steering system of an automobile.
CO3	Select suspension and braking systems of an automobile.
CO4	Measure and analyze the performance of an automobile and describe the safety aspects.
CO5	Discuss electrical systems and assess modern propulsion technologies of an automobile

After completion of course, student will be able to

Subject Code	Design of Automotive Systems (101607)
CO1	Apply principles of industrial design used in automotive systems.
CO2	Design IC engine components.
CO3	Design brake and suspension system.
CO4	Design chassis and body.
CO5	Model vehicle dynamics and measure noise and vibrations.

Fourth Year (B.E.) Subjects Course Outcomes(2019 Course)

Semester – VII

After completion of course, student will be able to

Subject Code	Heating Ventilation Air-Conditioning and Refrigeration (402041)
C401.1	Analyse Different Air-Craft Refrigeration Systems And Explain The Properties, Applications And Environmental Issues Of Different Refrigerants.
C401.2	Understand Multi-Stage Compression Cycles And Multistage Evaporator Systems.
C401.3	Discuss Types Of Compressors, Condensers, Evaporators And Expansion Valves Along With Regulatory And Safety Controls And Describes Transcritical And Ejector Refrigeration Systems.
C401.4	Estimate Cooling Load For Air Conditioning Systems Used With Concern Of Design Conditions And Indoor Quality Of Air.
C401.5	Design Air Distribution System Along With Consideration Of Ventilation And Infiltration.
C401.6	Explain The Working Of Types Of Desiccants, Evaporative, Thermal Storage, Radiant Cooling, Clean Room And Heat Pump Systems.

After completion of course, student will be able to

Subject Code	Dynamics of Machinery (402042)
C402.1	Apply balancing technique for static and dynamic balancing of multi cylinder inline and radial engines.
C402.2	Analyze the gyroscopic couple or effect for stabilization of Ship, Airplane and Four wheeler vehicles.
C402.3	Estimate natural frequency for single DOF un-damped & damped free vibratory systems.
C402.4	Determine response to forced vibrations due to harmonic excitation, base excitation and excitation due to unbalance forces.
C402.5	Estimate natural frequencies, mode shapes for 2 DOF un-damped free longitudinal and torsional vibratory systems.
C402.6	Describe noise and vibration measuring instruments for industrial / real life applications along with suitable method for noise and vibration control.

After completion of course, student will be able to

Subject Code	Turbomachinery (402043)
C403.1	Validate Impulse Momentum Principle Using Flat, Inclined And Curved Surfaces And Investigate Performance Characteristics Of Hydraulic Turbines
C403.2	Determine Performance Parameters Of Impulse And Reaction Steam Turbine Along With Discussion Of Nozzles, Governing Mechanism & Losses.
C403.3	Measure Performance Parameters Of Single & Multistage Centrifugal Pumps Along With Discussion Of Cavitation And Selection.
C403.4	Explain Performance Parameters Of Centrifugal Compressor Along With Discussion Of Theoretical Aspects Of Axial Compressor.

After completion of course, student will be able to

Subject Code	Elective – III Industrial Engineering (402044D)
C404D.1	Evaluate productivity and Implement various productivity improvement techniques.
C404D.2	Apply work study techniques and Understand its importance for better productivity.
C404D.3	Students will be able to demonstrate the ability to select plant location, appropriate layout and material handling equipment.
C404D.4	Students will be able to use production planning and control tools for effective planning, scheduling and managing the shop floor control.
C404D.5	Students will be able to plan inventory requirements and Exercise effective control on manufacturing requirements.
C404A.6	Students will be able to apply ergonomics and legislations for human comfort at work place and understand the role of value engineering in improving productivity.

After completion of course, student will be able to

Subject Code	Elective – IV - Product Design and Development - (402045)
C405A.1	Understand product design and product development processes.
C405A.2	Understand processes, tools and techniques for market survey & product specification finalization
C405A.3	Understand processes, tools and techniques for concept inception, verification and selection.
C405A.4	Understand processes, tools and techniques for concept exploration & development
C405A.5	Understand processes, tools and techniques for design verification and validation

C405A.6	Understand processes, tools and techniques for robust design and development
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After completion of course, student will be able to

Subject Code	Data Analytics Laboratory (402046)
C406.1	Understand the basics of data analytics using concepts of statistics and probability.
C406.2	Apply various inferential statistical analysis techniques to describe data sets and withdraw useful conclusions from acquired data set.
C406.3	Explore the data analytics techniques using various tools
C406.4	Apply data science concept and methods to solve problems in real world context
C406.5	Select advanced techniques to conduct thorough and insightful analysis and interpret the results

After completion of course, student will be able to

Subject Code	Project (Stage - I) (402047)
C407.1	Implement systems approach.
C407.2	Conceptualize a novel idea / technique into a product.
C407.3	Think in terms of a multi-disciplinary environment.

Final Year (B.E.) Subjects Course Outcomes (2019 Course)

Semester – VIII

After completion of course, student will be able to

Subject Code	Computer Integrated Manufacturing (402048)
C408.1	Explain CIM and factory automation.
C408.2	Understand the integration of hardware and software elements for CIM.
C408.3	Apply CNC program for appropriate manufacturing techniques.
C408.4	Analyze processes planning, quality and MRP integrated with computers.
C408.5	Interpret flexible, cellular manufacturing and group technology.
C408.6	Analyze the effect of IOT, industry-4.0 and cloud base manufacturing.

After completion of course, student will be able to

Subject Code	Energy Engineering (402049)
C409.1	Describe power generation scenario and analyze Rankine cycle and Cogeneration cycle.
C409.2	Analyze steam condensers and illustrate the methods to control environmental impact of thermal power plant.
C409.3	Analyze hydroelectric power plant and explain nuclear power plant.
C409.4	Analyze the performance of diesel power plant and gas power plant.
C409.5	Discuss various non-conventional power plants.
C409.6	Describe power plant instruments and to estimate the power plant economics.

After completion of course, student will be able to

Subject Code	Elective - V (402050)
C410.1	Explain the energy need and role of energy management
C410.2	Carry out an energy audit of the institute/industry/organization
C410.3	Assess the ENCON opportunities using energy economics
C410.4	Analyse the energy conservation performance of thermal utilities
C410.5	Analyse the energy conservation performance of electrical utilities
C410.6	Explain the energy performance improvement by cogeneration and WHR method

After completion of course, student will be able to

Subject Code	Elective - VI (402051)
C411.1	Demonstrate fundamental knowledge about need and scope of industrial - organizational psychology and behavior
C411.2	Analyze the job requirement, have understanding of fatigue, boredom and improve the job satisfaction
C411.3	Understand the approaches to enhance the performance
C411.4	Knowledge of theories of organizational behavior, learning and social-system

C411.5	Understand the mechanism of group behavior, various aspects of team, leadership and conflict management
C411.6	Evaluate the organizational culture, manage the change and understands organizational development approaches

After completion of course, student will be able to

Subject Code	Mechanical Systems Analysis Laboratory (402052)
C412.1	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.
C412.2	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.
C412.3	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.
C412.4	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.
C412.5	PRIORITIZE the concept of quality and standards, including systems reliability, safety and fitness for the intended purpose.
C412.6	INVENT yourself to face the challenges of future technologies and their associated Problems.

After completion of course, student will be able to

Subject Code	Project (Stage - II) (402053)
C413.1	Implement systems approach
C413.2	Conceptualize a novel idea / technique into a product
C413.3	Think in terms of a multi-disciplinary environment
C413.4	Take on the challenges of teamwork, and document all aspects of design work

C413.5	Understand the management techniques of implementing a project
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