

Department of Mechanical Engineering

Bachelor of Technology in Mechanical Engineering

Program Outcomes

POs:

[PO.1]. Engineering knowledge: An ability to apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to get the solution of the engineering problems.

[PO.2]. Problem analysis: Ability to Identify, formulates, review research literature, and Analyze complex engineering problems.

[PO.3]. Design/Development Of Solutions: Ability to design solutions for complex Engineering Problems by considering social, Economical and Environmental aspects.

[PO.4]. Conduct investigations of complex problems: Use research-based knowledge to design, conduct analyse experiments to get valid conclusion.

[PO.5]. Modern tool usage: ability to create, select, and apply appropriate techniques, and to model complex engineering activities with an Understand of the limitations.

[PO.6]. The engineer and society: Ability to apply knowledge by considering social health, safety, legal and cultural issues.

[PO.7]. Environment and sustainability: Understand of the impact of the adopted engineering solutions in social and environmental contexts.

[PO.8]. Ethics: Understand of the ethical issues of the civil engineering and Apply ethical principles in engineering practices.

[PO.9]. Individual and teamwork: Ability to work effectively as an individual or in team, as a member or as a leader.

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[PO.10]. Communication: An ability to communicate clearly and effectively through different modes of communication.

[PO.11]. Project management and finance: Ability to handle project and to manage finance related issue.

[PO.12]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning.

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Program Specific Outcomes

PSOs:

[PSO.1]. Engineering Drawing & Modeling: Use modern CAD tools and appropriate design standards to develop component and system drawings.

[PSO.2]. Manufacturing: Apply the knowledge of manufacturing processes to develop a component with appropriate consideration for productivity, quality and cost.

[PSO.3]. Preventive Maintenance of Mechanical Systems: Demonstrate knowledge and Understand of the principles of preventive maintenance and apply those to develop schedule for machine tools.

[PSO.4]. Demonstrate & communicate: Ability to demonstrate the knowledge, skill to Analyze the cause and effect on Mechanical



Department of Mechanical Engineering

Semester I

Department of Mechanical Engineering

Subject: Engineering Chemistry

Code: BTE22011

3 Credits | Semester 1

Course Outcomes: At the end of the course, students will be able to:

- [CO1]** Understand the skills required to succeed in graduate school, the chemical industry or professional school.
- [CO2]** Acquire a foundation of chemistry of sufficient breadth and depth to enable them to understand and critically interpret the primary chemical literature.
- [CO3]** Recognize the exigency and importance of engineering chemistry in the use of industrial and domestic determination.
- [CO4]** Design economically and new methods of synthesis of new materials and apply their knowledge for protection of environment and application in their field.
- [CO5]** Understand an insight into latest (R&D oriented) topics, to enable the engineering student upgrade the existing technologies and pursue further research.

Subject: Engineering Mathematics–I

Code: BTE21001

Credit - 4 | Semester 1

Course Outcomes: At the end of the course, students will be able to:

- [CO1]** Remember the differential and integral calculus to notions of curvature and to improper integrals. Apart from some other applications, they will have a basic Understand of Beta and Gamma functions.
- [CO2]** Understand the fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
- [CO3]** Demonstrate the tool of power series and Fourier series for learning advanced Engineering Mathematics.
- [CO4]** Analyze functions of several variables that is essential in most branches of engineering
- [CO5]** Evaluate the essential tool of matrices and linear algebra in a comprehensive manner.

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Subject: Basic Electrical Engineering

Code: BTE21003

Credits- 4 | Semester 1

Course Outcomes: At the end of the course, students will be able to:

- [CO1] Understand the basic knowledge of electrical quantities such as current, voltage, power, energy and frequency
- [CO2] Predict the behavior of any electrical and magnetic circuits.
- [CO3] Formulate and solve complex AC, DC circuits.
- [CO4] Identify the type of electrical machine used for that particular application.
- [CO5] Realize the requirement of transformers in transmission and distribution of electric power and other applications.

Subject: Engineering Mechanics

Code: BTE22009

Credits- 3 | Semester I

Course Outcomes: At the end of the course, students will be able to:

- [CO1] Identify the force systems for given conditions by Apply the basics of mechanics.
- [CO2] Determine unknown force(s) of different engineering systems.
- [CO3] Apply the principles of friction in various conditions for useful purposes.
- [CO4] Find the centroid and center of gravity of various components in engineering systems.
- [CO5] Select the relevant simple lifting machine(s) for given purposes.

Department of Mechanical Engineering

Subject: Engineering Chemistry Lab

Code: BTE22015

Credits- 1 | Semester I

Course Outcomes: At the end of the course, students will be able to:

- [CO1]** Understand the principles of chemistry relevant to the study of science and engineering
- [CO2]** Estimate rate constants of reactions from concentration of reactants/products as a function of time
- [CO3]** Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc.
- [CO4]** Differentiate hard and soft water, solve the related numerical problems on water purification and its significance in industry and daily life.

Subject: Basic Electrical Engineering Lab

Code: BTE21005

Credits- 1 | Semester I

Course Outcomes: At the end of the course, students will be able to:

- [CO1]** Understand different meters and instruments for measurement of electrical quantities
- [CO2]** Understand the linear and nonlinear characteristics of different types of loads experimentally
- [CO3]** Design and experiment potential divider circuits
- [CO4]** Experimentally verify the basic circuit theorems
- [CO5]** Measure power and power factor in ac circuits

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Subject: Engineering Mechanics Lab

Code: BTE22013

Credits- 1 | Semester I

Course Outcomes: At the end of the course, students will be able to:

- [CO1] Identify the force systems for given conditions by Apply the basics of mechanics.
- [CO2] Determine unknown force(s) of different engineering systems.
- [CO3] Apply the principles of friction in various conditions for useful purposes.
- [CO4] Find the centroid and centre of gravity of various components in engineering systems.
- [CO5] Select the relevant simple lifting machine(s) for given purposes.

Subject: Engineering Graphics & Design

Code: BTE21004

Credits- 2 | Semester I

Course Outcomes: At the end of the course, students will be able to:

- [CO1] Perform basic sketching techniques
- [CO2] Understand of architectural and engineering scales will increase.
- [CO3] Draw orthographic projections and sections.
- [CO4] Draft the engineered drawings in practical application
- [CO5] Become familiar with office practice and standards.



Department of Mechanical Engineering

Semester II

Department of Mechanical Engineering

Subject: Engineering Physics

Code: BTE22010

4 Credits | Semester II

Course Outcomes: At the end of the course, students will be able to:

- [CO1] Identify and understand the kinds of experimental results, which are incompatible with classical Physics leading to the development of a quantum theory of matter and light.
- [CO2] Use basic concepts to Analyze and design a wide range of semiconductor devices.
- [CO3] Understand & solve different types of wave equations.
- [CO4] Use the principles of optics to solve various complex engineering problems.
- [CO5] Use fundamental laws and relations to solve problems in electricity, electromagnetism.

Subject: Engineering Mathematics –II

Code: BTE22008

4 Credits | Semester II

Course Outcomes: At the end of the course,

- [CO1] Remember the mathematical tools needed in Evaluate the multiple integrals and their usage.
- [CO2] Understand the effective mathematical tools for the solutions of differential equations that model physical processes.
- [CO3] Demonstrate the tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems
- [CO4] Calculate the analytic function.
- [CO5] Evaluate complex integrals by using Cauchy-Goursat integral theorem.

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Subject: Programming for Problem Solving

Code: BTE21259

3 Credits | Semester II

Course Outcomes: At the end of the course, students will be able to:

- [CO1] Formulate simple algorithms for arithmetic and logical problems.
- [CO2] Test and execute the programs and correct syntax and logical errors and to implement conditional branching, iteration and recursion
- [CO3] Apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
- [CO4] Use arrays, pointers and structures to formulate algorithms and programs
- [CO5] Decompose a problem into functions and synthesize a complete program using divide and conquer approach.
- [CO6] Understand various types of files and operations on them

English for Communication

Code: BTE22370

3 Credits | Semester II

Course Outcomes: At the end of the course, students will be able to:

- [CO1] Understand the basic of the communication and represent communication process and to know the practical implementations in the work place.
- [CO2] Understand verbal and non-verbal modes of communication effectively in practical situations
- [CO3] Analyze vocalics and basic grammar.
- [CO4] Create competence in reading and writing.
- [CO5] Evaluate speaking process.

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Subject: Constitution of India

Code: BTE25095

0 Credits | Semester II

Course Outcomes: At the end of the course, students will be able to

[CO1] Understand the emergence and evolution of Indian Constitution. Understand and analyse federalism in the Indian context

[CO1] Understand and explain the significance of Indian Constitution as the fundamental law of the land.

[CO2]. Exercise his fundamental rights in proper sense at the same time identifies his responsibilities in national building.

[CO3] Analyse the Indian political system, the powers and functions of the Union, State and Local Governments in detail

[CO4] Understand Electoral Process, Emergency provisions and Amendment procedure.

Subject: Engineering Physics Lab

Code: BTE21261

1 Credits | Semester II

Course Outcomes: At the end of the course, students will be able to

[CO1] Understand calculation of specific resistance of wire by Carey Foster bridge

[CO2] Calculate thermal conductivity of poor conductors

[CO3] Measure resonance frequency and quality factor of LCR Circuit & RC circuit with AC current

[CO4] Understand the characteristics of transistors, photoelectric cells and determine operational parameters associated with their performance.

[CO5] Work with laboratory sodium light and lasers. Understand method to measure the wavelength of the light emitted from a laser and Sodium light.

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Subject: Programming for Problem Solving Lab

Code: BTE21262

Credits- 2 | Semester II

Course Outcomes: At the end of the course, students will be able to;

- [CO1]** Formulate simple algorithms for arithmetic and logical problems. To translate the algorithms to programs (in C language). To test and execute the programs and correct syntax and logical errors.
- [CO2]** Program for solving simple numerical method problems, namely root finding of function, differentiation of function and simple integration.
- [CO3]** Decompose a problem into functions and synthesize a complete program using divide and conquer approach.
- [CO4]** Analyze the complexity of problems, modularize the problems into small modules and then convert them into programs.

Subject: Engineering Workshop Practice

Code: BTE22267

2 Credits | Semester II

Course Outcomes: At the end of the course, students will be able to;

- [CO1]** Acquire skills in basic engineering practice to identify, select and use various marking, measuring, and holding, striking and cutting tools & equipment's and machines
- [CO2]** Understand job drawing and complete jobs as per specifications in allotted time
- [CO3]** Inspect the job for the desired dimensions and shape
- [CO4]** Operate, control different machines and equipment's adopting safety practices



Department of Mechanical Engineering

Semester III

Department of Mechanical Engineering

Subject: Strength of Materials

Code: BTE25289

4 Credits | Semester III

Course Outcomes: At the end of the course, students will be able to;

- [CO1]** Remember the definition of stress. Find the changes in axial, lateral and volumetric dimensions
- [CO2]** Understand the phenomenon of shear force and bending moment and draw the S.F. & B.M diagrams of for UDL and Point loads.
- [CO3]** Apply various approaches to calculate thermal stresses, in bodies of uniform section and composite sections. Obtain expressions for instantaneous stress developed in bodies subjected to different loads.
- [CO4]** Analyze the theory of bending and deflection of beam.
- [CO5]** Evaluate and Compare strength and weight of solid and hollow shafts of the same length and material and compute the stress and deflection of the closed coil helical spring.

Subject: Engineering Mathematics III

Code: BTE23022

4 Credits | Semester III

Course Outcomes: At the end of the course, students will be able to;

- [CO1]** Understand the concept of partial differential equations, theory of probability and its applications on engineering problems, theory of data distribution, standard deviation and different charts.
- [CO2]** Apply concept of differential equation, concept of statics in data sampling for solving general engineering problems.
- [CO3]** Analyze the process of partial differentiation, probability, statically formulation and data sampling.
- [CO4]** Evaluate the result of the partial differentiation and its applications, probability, statics and sampling of data.

Department of Mechanical Engineering

Subject: Basic Electronics Engineering

Code: BTE24082

3 Credits | Semester III

Course Outcomes: At the end of the course, students will be able to;

- [CO1] Understand the principles of semiconductor devices and their applications.
- [CO2] Design an application using Operational amplifier
- [CO3] Apply the use of timing circuits and oscillators.
- [CO4] Analyze the analog and digital signals using logic gates, flip-flop as a building block of digital systems.
- [CO5] Learn the basics of Electronic communication system.

Subject: Material Science

Code: BTE23048

3 Credits | Semester III

COURSE OUTCOMES: By the end of this course, students will be able to:

- [CO1] Understand the crystal structures and atomic bonds. Classification of ferrous metals and their properties
- [CO2] Describe non-ferrous metals, cutting tool materials and composites along with their properties. Principle of corrosion, their types and its prevention methods along with the various surface engineering processes.
- [CO3] Apply various parameters to understand the properties and compositions of materials.
- [CO4] Analyze the various phase diagrams of ferrous metals and alloys, composition and use of non-ferrous metals.
- [CO5] Evaluate different methods of failure analysis and testing of materials.

Department of Mechanical Engineering

Subject: Thermodynamics

Code: BTE23050

4 Credits | Semester III

COURSE OUTCOMES: By the end of this course, students will be:

- [CO1] Understand the concept of system and surroundings, energy balance involving heat and work interactions.
- [CO2] Describe about the temperature scales and laws of thermodynamics.
- [CO3] Apply the various forms of measurements involved in thermodynamic processes.
- [CO4] Analyze the thermodynamic cyclic processes.
- [CO5] Evaluate the changes in thermodynamic properties of substances & performance of energy conversion devices

Subject: Environmental Science

Code: BTE24085

0 Credits | Semester III

COURSE OUTCOMES: By the end of this course, students will be:

- [CO1] Understand the importance of environment and stability of ecosystem.
- [CO2] Describe Ecosystem, pollutions and their controls.
- [CO3] Apply the sources of energy to make the environment ecofriendly and to make life for sustainability.
- [CO4] Analyze the solid waste management and environmental management policy and Acts.
- [CO5] Evaluate the use of parameters involved in environmental pollution controls, use of energy resource management etc.

Department of Mechanical Engineering

Subject: Strength of Materials Lab

Code: BTE23051

1 Credits | Semester III

Course Outcomes: At the end of the course, students will be able to

- [CO1] Conduct tension test on Materials like steel etc.
- [CO2] Conduct compression tests on spring, etc.
- [CO3] Determine hardness of metals.
- [CO4] Determine the strength of materials by different test.
- [CO5] Conduct the torsion test to find modulus of rigidity.

Subject: Basic Electronics Engineering Lab

Code: BTE24087

1 Credits | Semester III

Course Outcomes: At the end of the course, students will be able to

- [CO1] Analysis of Resistive Circuits and Solution of resistive circuits with independent sources.
- [CO2] Understand two Terminal Element Relationships for inductors, capacitors, and analysis of magnetic circuits.
- [CO3] Acquire the knowledge about the characteristics and working principles of Semiconductor diodes, Bipolar Junction Transistor
- [CO4] Understand an insight about the basic introduction of Digital electronics.



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Subject: Machine Drawing Lab

Code: BTE23269

2 Credits | Semester III

Course Outcomes: At the end of the course, students will be able to

[CO1] Understand the types of thread & their uses.

[CO2] Draw different types of joints with specific dimensions.

[CO3] Draw different types of coupling with their use.

[CO4] Understand the use of bearing and pulleys with their drawing.

[CO5] Draw assembly of mechanical devices.



Department of Mechanical Engineering

Semester IV

Department of Mechanical Engineering

Subject: Applied Thermodynamics

Code: BTE24277

4 Credits | Semester IV

Course Outcomes: At the end of the course, students will be able to

- [CO1] Understand phenomena occurring in high speed compressible flows.
- [CO2] Apply various practical power cycles and heat pump cycles.
- [CO3] Analyze energy conversion in various thermal devices such as combustors, air coolers, nozzles, diffusers, steam turbines and reciprocating compressors
- [CO4] Evaluate the air quality after humidification or dehumidification using psychometric chart.

Subject: Fluid Mechanics & Machinery

Code: BTE24371

4 Credits | Semester IV

Course Outcomes: At the end of the course, students will be able to

- [CO 1] Understand various properties of fluids in solving the problems
- [CO 2] Understand working of pumps and turbines.
- [CO 3] Apply Bernoulli's equation for solutions in fluids
- [CO 4] Analyse fluid forces - drags and lift on immersed bodies
- [CO 5] Evaluate the dimensionless parameters.

Department of Mechanical Engineering

Subject: Theory of Machines

Code: BTE24276

4 Credits | Semester IV

Course Outcomes: At the end of the course, students will be able to

- [CO1] Understand mechanisms in real life applications.
- [CO2] Apply static and dynamic force analysis of slider crank mechanism & kinematic analysis of simple mechanisms.
- [CO3] Analyse the flywheel for engines.
- [CO4] Evaluate moment of inertia of rigid bodies experimentally.

Subject: Mechanical Measurement and Control

Code: BTE24083

3 Credits | Semester IV

Course Outcomes: At the end of the course, students will be able to;

- [CO1] Remember the measurement systems, units and dimensions, calibration and correction.
- [CO2] Understand the concept of interchangeability and explain the various linear and angular measurement systems.
- [CO3] Apply the working principle of auto collimator, CMM and list the applications of them
- [CO4] Apply the various form measurements like thread, gear, straightness, flatness, roundness and surface finish
- [CO5] Analyze the working of miscellaneous measuring equipment for measuring temperature, velocity, pressure.

Department of Mechanical Engineering

Subject: Biology for Engineers

Code: BTE23018

3 Credits | Semester IV

Course Outcomes: At the end of the course, students will be able to;

- [CO1] Understand the biological concepts from an engineering perspective
- [CO2] Understand the concepts of biological sensing and its challenges
- [CO3] Understand development of artificial systems mimicking human action
- [CO4] Integrate biological principles for developing next generation technologies

Subject: Applied Thermodynamics Lab

Code: BTE24277

1 Credits | Semester IV

Course Outcomes: At the end of the course, students will be able to

- [CO1] Understand the thermodynamic properties of systems including Pressure, Temperature, Internal energy, Enthalpy, Specific heat, Entropy, Property tables, the ideal gas equation of state.
- [CO2] Understand the processes in thermodynamic systems including work, heat transfer, mass and energy balances, the first and second laws of thermodynamics and changes in exergy.
- [CO3] Apply thermodynamic systems including heat engine cycles such as: the Carnot-, Otto-, Diesel-, Stirling-, Brayton- and Rankine cycle, Refrigerant cycles are also included.
- [CO4] Analyse working of impulse and reaction turbines
- [CO5] Evaluate heat balance sheet for a boiler

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Subject: Fluid Mechanics and Machinery Lab

Code: BTE24372

1 Credits | Semester IV

Course Outcomes: At the end of the course, students will be able to;

- [CO1] Understand preventive maintenance of hydraulic turbines
- [CO2] Apply Bernoulli's Theorem to determine the coefficient of discharge of flow measuring devices.
- [CO3] Analyze performance parameters of hydraulic turbines and pumps and execute the knowledge in real life situations.
- [CO4] Evaluate the energy flow pattern through the hydraulic turbines and pumps.
- [CO5] Create characteristics curves of hydraulic turbines and pumps with the experimental data.

Subject: Theory of Machines Lab

Code: BTE24278

1Credits | Semester IV

Course Outcomes: At the end of the course, students will be able to;

- [CO1] Understand mechanisms in real life applications
- [CO2] Apply kinematic analysis on simple mechanisms.
- [CO3] Apply static and dynamic force analysis on slider crank mechanism.
- [CO4] Analyze velocity and acceleration of mechanisms by vector and graphical methods.
- [CO5] Evaluate moment of inertia of rigid bodies experimentally.

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Subject: Mechanical Measurement and Control Lab

Code: BTE24088

1Credits | Semester IV

Course Outcomes: At the end of the course, students will be able to

- [CO1] Understand the working of various measuring instruments.
- [CO2] Apply Matlab Real-Time programming to collect process data.
- [CO3] Analyze controller designs to regulate and control various processes and systems.
- [CO4] Evaluate the data collected by instruments to determine actual value.

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Semester V

Department of Mechanical Engineering

Subject: Heat & Mass Transfer

Code: BTE25117

4 Credits | Semester V

Course Outcomes: At the end of the course, students will be able to

- [CO1] Formulate and analyze a heat transfer problem involving any of the three modes of heat transfer
- [CO2] Obtain exact solutions for the temperature variation using analytical methods where possible or employ approximate methods or empirical correlations to evaluate the rate of heat transfer
- [CO3] Design devices such as heat exchangers and estimate the insulation needed to reduce heat losses where necessary.
- [CO4] Design heat exchangers based on the LMTD and ϵ - NTU analysis.

Subject: Solid Mechanics

Code: BTE25282

4 Credits | Semester V

Course Outcomes: At the end of the course, students will be able to

- [CO1] Understand the concepts and principles, understand the theory of elasticity including strain/displacement and Hooke's law relationships; and perform calculations, relative to the strength and stability of structures and mechanical components;
- [CO2] Define the characteristics and calculate the magnitude of combined stresses in individual members and complete structures; Analyze solid mechanics problems using classical methods and energy methods;
- [CO3] Analyse various situations involving structural members subjected to combined stresses by application of Mohr's circle of stress; locate the shear center of thin wall beams; and
- [CO4] Calculate the deflection at any point on a beam subjected to a combination of loads; solve for stresses and deflections of beams under unsymmetrical loading; apply various failure criteria for general stress states at points; solve torsion problems in bars and thin walled members.

Department of Mechanical Engineering

Subject: Manufacturing Process I

Code: BTE25283

3 Credits | Semester V

Course Outcomes: At the end of the course, students will be able to;

- [CO1] Understand the different conventional and unconventional manufacturing methods employed for making different products.
- [CO2] Understand overview of the mechanical behavior and application of tools used in machining purpose.
- [CO3] Examine the different Techniques involved in traditional machining process.
- [CO4] Understand the manufacturing process of complex shape products.
- [CO5] Analyze the basic components of Lathe machine, Milling Machine, Drilling machine, Grinding Machine and different tools handled.

Subject: Design of Machine Element

Code: BTE25120

3 Credits | Semester V

Course Outcomes: At the end of the course, students will be able to;

- [CO1] Understand the design methodologies employed for the design of various machine components
- [CO2] examine the product dimension and meet quality standard of the products.
- [CO3] Understand the work on safety and design features of different parts used in various applications
- [CO4] Estimate the fatigue strength of the machine components based on their safety features.

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Subject: Professional Practice, Law & Ethics

Code: BTE25299

3 Credits | Semester V

Course Outcomes: At the end of the course, students will be able to;

- [CO1]** Understand the constitutes professional practice, introduction of various stakeholders and their respective roles; Understand the fundamental ethics governing the profession.
- [CO2]** Understand a good insight into contracts and contracts management in Mechanical engineering, dispute resolution mechanisms, laws governing engagement of labour.
- [CO3]** Understand of Intellectual Property Rights, Patents.
- [CO4]** Understand the types of roles they are expected to play in the society as practitioners of the mechanical engineering profession.
- [CO5]** Develop good ideas of the legal and practical aspects of their profession.

Subject: Essence of Indian Knowledge Tradition

Code: BTE25095

0 Credits | Semester V

Course Outcomes: At the end of the course, students will be able to;

- [CO1]** Understand basic principles of thought process, reasoning and differencing.
- [CO2]** Understand the Indian Knowledge Systems, Indian perspective of modern scientific world-view and basic principles of Yoga and holistic health care systems.
- [CO3]** Understand the focuses on Indian philosophical traditions, Indian linguistic tradition and Indian artistic tradition.
- [CO4]** Evaluate the legal mechanism of traditional knowledge protection to show the difference between IPR and non-IPR system.

Department of Mechanical Engineering

Subject: Heat & Mass Transfer Lab

Code: BTE25123

1Credits | Semester V

Course Outcomes: At the end of the course, students will be able to:

- [CO1] Understand how heat transfer occurs for different equipment and worked out the parameters studied in theory
- [CO2] Design devices such as heat exchangers and estimate the insulation needed to reduce heat losses where necessary.
- [CO3] Obtain exact solutions for the temperature variation using analytical methods where possible or employ approximate methods or empirical correlations to evaluate the rate of heat transfer.
- [CO4] Formulate and analyze a heat transfer problem involving any of the three modes of heat transfer.

Subject: Manufacturing Process -I Lab

Code: BTE25284

1Credits | Semester V

Course Outcomes: At the end of the course, students will be able to;

- [CO1] Understand the idea for selecting materials for patterns. Types and allowances of patterns used in casting and analyze the components of molds. Design core, core print and gating system in metal casting processes
- [CO2] Understand the application of arc and TIG welding processes.
- [CO3] Understand the application of soldering and brazing process.
- [CO4] Develop process-maps for metal forming processes using plasticity principles. Identify the effect of process variables to manufacture defect free products.
- [CO5] Understand the principles of forging and rolling operation and develop material using powder metallurgy technique.

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Subject: Design of Machine Elements Lab

Code: BTE25374

1 Credits | Semester V

Course Outcomes: At the end of the course, students will be able to:

[CO1] Understand e the concepts discussed in Design of Machine Elements.

[CO2] Visualize and understand the development of stresses in structural members and experimental determination of stresses in members.

[CO3] Analyze the fatigue strength of the machine components.

[CO4] Design and examine the strength of gears and bearings.

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Semester VI

Department of Mechanical Engineering

Subject: Manufacturing Process - II

Code: BTE25119

4 Credits | Semester VI

Course Outcomes: At the end of the course, students will be able to:

[CO1] Understand the basic theories of machining and selection of machine tool.

[CO2] Understand the principles behind working of each machine tools

[CO3] Apply the knowledge of kinematics in the constructional and operational features of shaper, planner, milling, drilling, sawing and broaching machines.

[CO4] Analyze the basic functions of different machine tools.

[CO5] Evaluate the different formulas used in analysis of machining operations.

Subject: Refrigeration & Air Conditioning

Code: BTE26164

4 Credits | Semester VI

Course Outcomes: At the end of the course, students will be able to

[CO 1] Understand the various thermodynamic cycles used in refrigeration and air conditioning.

[CO 2] Apply the knowledge of basic science in refrigeration.

[CO 3] Analyze various theories and their mathematical equations by real data.

[CO 4] Evaluate the performance of different refrigeration system.

[CO 5] Creating curiosity to learn about new development in field of refrigeration and A.C.

Department of Mechanical Engineering

Subject: Internal Combustion Engine

Code: BTE26300

3 Credits | semester VI

Course Outcomes: At the end of the course, students will be able to

[CO 1] Understand the theories of various power cycles.

[CO2] Understand the working principles and mathematical relations for various cycles.

[CO3] Analyze the factor affecting performance of various cycles.

[CO4] Creating a learning ability about new development in the field of I. C. Engines.

[CO5] Evaluate the performance of thermodynamic cycles and relative comparison among them.

Subject: Microprocessors in Automation

Code: BTE26167

3 Credits | Semester VI

Course Outcomes: At the end of the course, students will be able to

[CO1] Understand the use of microprocessors for automation.

[CO2] Apply the knowledge of microcontrollers to implement in atomization.

[CO3] Analyze the system and suggesting best possible selection of controllers.

[CO4] Develop codes for controlling any physical system.

[CO5] Understand the broad knowledge of section criteria for microprocessor.

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Subject: Mechatronic Systems

Code: BTE26166

3 Credits | Semester VI

Course Outcomes: At the end of the course, students will be able to

[CO1] Understand the theories about various types of sensors and transducers.

[CO2] Understand the various mechanical, electrical and pneumatic actuation systems.

[CO3] Evaluate the basic mathematical building blocks for mechanical, electrical, thermal and fluid actuation system and its interfacing of input/output requirements.

[CO4] Apply Knowledge of mechatronics in proper selection of sensor and transducer for specific purpose.

[CO5] Understand new development in the field of mechatronics.

Subject: Total Quality Management

Code: BTE26375

3 Credits | Semester VI

COURSE OUTCOMES: At the end of the course, students will be able to

[CO1] Understand the different principles of quality control.

[CO2] Understand the role and responsibilities of a quality engineer.

[CO3] Analyze different tools used for quality checkup.

[CO4] Evaluate the tools used in quality control using numerical problems.

[CO5] Understand newly adopted quality control tools.

Department of Mechanical Engineering

Subject: Composite Materials

Code: BTE26168

3 Credits | Semester VI

Course Outcomes: At the end of the course, students will be able to

- [CO1] Understand an overview of the mechanical behaviour and application of composite materials.
- [CO2] Understand the classification, processing, characterization of various composite materials.
- [CO3] Analyze difference between composite materials and other available engineering materials.
- [CO4] Evaluate the metallurgical changes in composite materials from its parent material.
- [CO5] Understand new development in the field of composite materials.

Subject: Organizational Behavior

Code: BTE24060

3 Credits | Semester VI

Course Outcomes: At the end of the course, students will be able to

- [CO1] Understand the dynamics of human behaviour in work context.
- [CO2] Understand the determinants of work behaviour from different levels.
- [CO3] Develop competencies of Analyze behavioral issues in the work environment
- [CO4] Understand the key ideas and issues in OB that influence the way people behave in organizational setting

Department of Mechanical Engineering

Subject: Mechanical Software (Solid Works)

Code: BTE25125

1 Credits | Semester VI

Course Outcomes: At the end of the course, students will be able to

- [CO1] Understand 2-D and 3-D modeling using different software tools.
- [CO2] Apply basic knowledge of design to convert into solid modeling.
- [CO3] Analyze various metal forming operation by simulation.
- [CO4] Creating assembly drawing of mechanical components.
- [CO5] Remember various drawing tools and their specific use.

Subject: Manufacturing Process-II Lab

Code: BTE26302

1 Credits | Semester VI

Course Outcomes: At the end of the course, students will be able to

- [CO1] Identify the various machine tools and form generated by them.
- [CO2] Understand the various parts of cutting tools, single point, multi-point cutting tool.
- [CO3] Correctly select the machine tool for specific purpose.
- [CO4] Understand the components, mechanism of motion and power transmission in machine tool.
- [CO5] Understand the various concepts of maintenance of machine tools.

Department of Mechanical Engineering

Subject: Refrigeration & Air Conditioning Lab

Code: BTE26172

1 Credits | Semester VI

Course Outcomes: At the end of the course, students will be able to

- [CO1] Understand types, working principles and construction of Refrigeration and Air Conditioning systems.
- [CO2] Evaluate the performance of refrigeration and air conditioning system
- [CO3] Enlist properties of refrigerants, their applications and effects on environment.
- [CO4] Remember various components and controls used in refrigeration and air conditioning
- [CO5] Estimate cooling and heating loads in refrigeration and air conditioning.

Department of Mechanical Engineering

Semester VII

Department of Mechanical Engineering

Subject: Automation in Manufacturing

Code: BTE27320

3 Credits | Semester VII

Course Outcomes: At the end of the course, students will be able to

- [CO1] Understand the concept and types of automation
- [CO2] Assessment of degree and level of automation
- [CO3] Understand process of automation.
- [CO4] To get the knowledge of various elements of manufacturing automation – CAD/CAM, sensors, pneumatics, hydraulics and CNC
- [CO5] Understand transfer lines and advanced industrial automation.

Subject: Power Plant Engineering

Code: BTE27211

3 Credits | Semester VII

Course Outcomes: At the end of the course, students will be able to

- [CO1] Analyze different types of sources and mathematical expressions related to thermodynamics and various terms and factors involved with power plant operation.
- [CO2] Analyze the working and layout of steam power plants and the different systems comprising the plant and discuss about its economic and safety impacts.
- [CO3] Combine concepts of previously learnt courses to define the working principle of diesel power plant, its layout, safety principles and compare it with plants of other types.
- [CO4] Understand the working principle and basic components of the nuclear power plant and the economic and safety principles involved with it.
- [CO5] Understand the applications of power plants while extend their knowledge to power plant economics and environmental hazards and estimate the costs of electrical energy production.

Department of Mechanical Engineering

Subject: Finite Element Analysis

Code: BTE27321

3 Credits | Semester VII

Course Outcomes: At the end of the course, students will be able to

- [CO1] Summarize the basics of finite element formulation.
- [CO2] Apply finite element formulations to solve one-dimensional Problems.
- [CO3] Apply finite element formulations to solve two-dimensional scalar Problems.
- [CO4] Apply finite element method to solve two-dimensional Vector problems.
- [CO5] Apply finite element method to solve problems on iso parametric element and dynamic Problems.

Subject: Gas Dynamics and Jet Propulsion

Code: BTE27212

3 Credits | Semester VII

Course Outcomes: At the end of the course, students will be able to

- [CO1] Understand the basic difference between incompressible and compressible flow.
- [CO2] Understand the phenomenon of shock waves and its effect on flow.
- [CO3] Understand basic knowledge of jet propulsion and Rocket Propulsion.
- [CO4] Apply gas dynamics principles in the Jet and Space Propulsion.

Department of Mechanical Engineering

Subject: Sustainable Development

Code: BTE27322

3 Credits | Semester VII

Course Outcomes: At the end of the course, students will be able to

- [CO1] Understand the national and global environmental, economic and social issues and the principles of different sustainable development frameworks
- [CO2] Apply the sustainable development principles during the planning of developmental activities.
- [CO3] Understand the practice and policy of sustainable pathways to development.
- [CO4] Understand how development leaders can apply various attributes of sustainability (environmental, economic and social).
- [CO5] Understand the current international policy landscape for the Sustainable Development Goals.

Subject: Internet of Things

Code: BTE27323

3 Credits | Semester VII

Course Outcomes: At the end of the course, students will be able to

- [CO1] Understand the concepts of Internet of Things
- [CO2] Analyze basic protocols in wireless sensor network.
- [CO3] Design IoT applications in different domain and be able to analyze their performance.
- [CO4] Implement basic IoT applications on embedded platform
- [CO5] Application of IoT in automation of Commercial and Real world examples

Department of Mechanical Engineering

Subject: CAD-CAM Lab

Code: BTE27209

2 Credits | Semester VII

Course Outcomes: At the end of the course, students will be able to

[CO1] Draw 3D and Assembly drawing using CAD software

[CO2] Demonstrate manual part programming with G and M codes using CAM

[CO3] Design IoT applications in different domain and be able to analyze their performance.

[CO4] Create 3 D Model on any CAD software like Pro/E, UG, CATIA, etc.

[CO5] Developing any four part programs lathe and milling operations

Department of Mechanical Engineering

Semester VIII

Department of Mechanical Engineering

Subject: Energy Conservation and Management

Code: BTE28252

3 Credits | Semester VIII

Course Outcomes: At the end of the course, students will be able to

[CO1] Understand and analyze the energy data of industries

[CO2] Understand energy accounting and balancing

[CO3] Conduct energy audit and suggest methodologies for energy savings and

[CO4] Utilize the available resources in optimal ways

Subject: Process Planning and Cost Estimation

Code: BTE27213

3 Credits | Semester VIII

Course Outcomes: At the end of the course, students will be able to

[CO1] Understand the concepts of process planning and cost estimation for various products

[CO2] Understand the functions of production control, various production system, different aspects of product development and break-even analysis.

[CO3] Understand the problems in lack of product planning, quantity determination in batch production and analysis of process capabilities in a multi-product system.

[CO4] Calculate the economic order quantity & economic lot size in inventory control.

Department of Mechanical Engineering

Subject: Principles of Management

Code: BTE28377

3 Credits | Semester VIII

Course Outcomes: At the end of the course, students will be able to

- [CO1] Understand of management functions in an organization.
- [CO2] Understand the principles and remember the applications of principles of management related to public and private administration in relation to production activities.
- [CO3] Apply human relation skills for motivating the employees.
- [CO4] Develop Logical and Analytical ability to apply Analyze problems related to production.

Subject: Automobile Engineering

Code: BTE28249

3 Credits | Semester VIII

Course Outcomes: At the end of the course, students will be able to

- [CO1] Understand the function of each automobile component and have a clear idea about the overall vehicle performance.
- [CO2] Understand the Construction, working and other details about Internal Combustion Engines used in automobiles.
- [CO3] Understand Construction, working, preventive maintenance, trouble shooting and diagnosis of various Automobile Systems.
- [CO4] Understand importance and features of different systems like axle, differential, brakes, steering, suspension, and balancing etc.

Department of Mechanical Engineering

Subject: Design of Transmission Systems

Code: BTE28250

3 Credits | Semester VIII

Course Outcomes: At the end of the course, students will be able to

- [CO1] Design transmission systems for engines and machines.
- [CO2] Understand the principles and procedure for the design of Mechanical power Transmission components.
- [CO3] Understand the standard procedure available for Design of Transmission of Mechanical elements
- [CO4] Understand the standard data and catalogues

Subject: Renewable Energy Technologies

Code: BTE28378

3 Credits | Semester VIII

Course Outcomes: At the end of the course, students will be able to;

- [CO1] Understand the basic principles of energy conversion processes and devices used therein
- [CO2] Identify suitable renewable source and technology for a given requirement.
- [CO3] Undertake field projects in these areas.
- [CO4] Develop capability to do basic design of bio gas plant.

Department of Mechanical Engineering

Subject: Project Management

Code: BTE28352

3 Credits | Semester VIII

Course Outcomes: At the end of the course, students will be able to;

[CO1] Understand key concepts of project management and project lifecycle

[CO2] Apply the Project Management Techniques.

[CO3] Understand the Project Management Planning Process.

[CO4] Understand the Project Management Team concepts.

Subject: Artificial Intelligent & Machine Learning

Code: BTE28350

3 Credits | Semester VIII

Course Outcomes: At the end of the course, students will be able to;

[CO1] Identify problems that are amenable to solution by AI methods.

[CO2] Design and carry out an empirical evaluation of different algorithms on a problem formalization, and state the conclusions that the evaluation supports.

[CO3] Understand of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.

[CO4] Design and implement various machine-learning algorithms in a range of real-world applications.

[CO5] Understand the Machine Learning algorithms and the paradigms of supervised and un-supervised learning.

Department of Mechanical Engineering

Subject: Cyber Security Laws, Standards & IPR

Code: BTE28351

3 Credits | Semester VIII

Course Outcomes: At the end of the course, students will be able to;

[CO 1] Understand the concept of cyber security risk assessment.

[CO 2] Understand the performance and troubleshoot cyber security systems.

[CO 3] Implement cyber security solutions.

[CO 4] Use cyber security, information assurance, and cyber/computer forensics software/tools.