# Department of Mechanical Engineering

**Name of Program: Mechanical Engineering** **Program Code: 631561210**

| **Class: S.Y.B.Tech.** | **Semester: Odd** |
|---|---|
| **Course Name: Engineering Mathematics-III** | **Course Code: BTBSC301** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Comprehend the fundamental knowledge of the Laplace and inverse Laplace transforms and their derivatives for elementary functions. |
| **CO2** | Apply the properties of Laplace and inverse Laplace transforms to solve simultaneous linear and linear differential equations with constant coefficients |
| **CO3** | Conceptualize the definitions and properties of Fourier transforms |
| **CO4** | Solve boundary value problems using Fourier transforms |
| **CO5** | Find the series solutions of the linear differential equations using Frobenius method |
| **CO6** | Find the solutions of partial differential equations governing real-world problems |
| **CO7** | Conceptualize limit, continuity, derivative and integration of complex functions |
| **CO8** | Evaluate complex integrals useful in real-world problems |

| **Class: S.Y.B.Tech.** | **Semester: Odd** |
|---|---|
| **Course Name: Materials Science and Metallurgy** | **Course Code: BTMEC302** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Study various crystal structures of materials |
| **CO2** | Understand mechanical properties of materials and calculations of same using appropriate equations |
| **CO3** | Evaluate phase diagrams of various materials |
| **CO4** | Suggest appropriate heat treatment process for a given application |
| **CO5** | Prepare samples of different materials for metallographic |
| **CO6** | Recommend appropriate NDT technique for a given application |

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# Department of Mechanical Engineering

**Name of Program: Mechanical Engineering** **Program Code: 631561210**

| **Class: S.Y.B.Tech.** | **Semester: Odd** |
|---|---|
| **Course Name: Fluid Mechanics** | **Course Code: BTMEC303** |

| **Course Outcomes** | |
|---|---|
| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
| **CO1** | Define fluid, define and calculate various properties of fluid |
| **CO2** | Calculate hydrostatic forces on the plane and curved surfaces and explain stability of floating bodies |
| **CO3** | Explain various types of flow. Calculate acceleration of fluid particles |
| **CO4** | Apply Bernoulli's equation and Navier-Stokes equation to simple problems in fluid mechanics |
| **CO5** | Explain laminar and turbulent flows on flat plates and through pipes |
| **CO6** | Explain and use dimensional analysis to simple problems in fluid mechanics |
| **CO7** | Understand boundary layer, drag and lift |

| **Class: S.Y.B.Tech.** | **Semester: Odd** |
|---|---|
| **Course Name: Machine Drawing and CAD** | **Course Code: BTMEC304** |

| **Course Outcomes** | |
|---|---|
| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
| **CO1** | Interpret the object with the help of given sectional and orthographic views. |
| **CO2** | Construct the curve of intersection of two solids |
| **CO3** | Draw machine element using keys, cotter, knuckle, bolted and welded joint |
| **CO4** | Assemble details of any given part. i. e. valve, pump , machine tool part etc. |
| **CO5** | Represent tolerances and level of surface finish on production drawings |
| **CO6** | Understand various creating and editing commands in Auto Cad |

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## Department of Mechanical Engineering

**Name of Program: Mechanical Engineering** **Program Code: 631561210**

| **Class: S.Y.B.Tech.** | **Semester: Odd** |
|---|---|
| **Course Name: Thermodynamics** | **Course Code: BTMEC305** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Define the terms like system, boundary, properties, equilibrium, work, heat, ideal gas, entropy etc. used in thermodynamics. |
| **CO2** | Study different laws of thermodynamics and apply these to simple thermal systems. |
| **CO3** | Study various types of processes like isothermal, adiabatic, etc. considering system with ideal gas and represent them on p-v and T-s planes. |
| **CO4** | Apply availability concept to non-flow and steady flow type systems. |
| **CO5** | Represent phase diagram of pure substance (steam) on different thermodynamic planes like p-v, T-s, h-s, etc. Show various constant property lines on them. |

| **Class: S.Y.B.Tech.** | **Semester: Odd** |
|---|---|
| **Course Name: Basic Human Rights** | **Course Code: BTHM3401** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Understand the history of human rights. |
| **CO2** | Learn to respect others caste, religion, region and culture. |
| **CO3** | Be aware of their rights as Indian citizen. |
| **CO4** | Understand the importance of groups and communities in the society. |
| **CO5** | Realize the philosophical and cultural basis and historical perspectives of human rights. |
| **CO6** | Make them aware of their responsibilities towards the nation. |

# Department of Mechanical Engineering

**Name of Program: Mechanical Engineering** **Program Code: 631561210**

| **Class: S.Y.B.Tech.** | **Semester: Odd** |
|---|---|
| **Course Name: Materials Science and Metallurgy Lab** | **Course Code: BTMEL307** |

| **Course Outcomes** | |
|---|---|
| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
| **CO1** | Interpret properties on stress-strain diagram and able to select different hardness machine as per requirement. |
| **CO2** | Set process parameters for different heat treatment processes. |
| **CO3** | Understand basics of selection of materials and failure |
| **CO4** | Select different NDT methods, depending on types of defects |

| **Class: S.Y.B.Tech.** | **Semester: Odd** |
|---|---|
| **Course Name : Fluid Mechanics Lab** | **Course Code: BTMEL308** |

| **Course Outcomes** | |
|---|---|
| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
| **CO1** | Understand laminar and Turbulent flow and determine Critical Reynolds number using Reynolds Apparatus |
| **CO2** | Verify Bernoulli's theorem |
| **CO3** | Determine pressure drop in flow though pipes and pipe fittings |
| **CO4** | Verify momentum equation using impact of jet apparatus |
| **CO5** | Determine viscosity using viscometer |
| **CO6** | Do calibration of pressure gauges, rotameter |
| **CO7** | Use manometers for pressure measurement |

# Department of Mechanical Engineering

**Name of Program: Mechanical Engineering** **Program Code: 631561210**

| **Class: S.Y.B.Tech.** | **Semester: Odd** |
|---|---|
| **Course Name : Machine Drawing and CAD Lab** | **Course Code: BTMEL309** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Draw Conventional representation of standard machine components, welds, materials etc. |
| **CO2** | Draw sectional view of a given machine component. |
| **CO3** | Develop Assemble view from details of given component i.e. valve, pump, machine tool part, etc. |
| **CO4** | Combine details of given machine component and draw assembled view. |
| **CO5** | Use various Auto-Cad commands to draw orthographic projection |
| **CO6** | Draw sectional view from pictorial view of given machine component using Auto-Cad |

| **Class: S.Y.B.Tech.** | **Semester: Odd** |
|---|---|
| **Course Name: Industrial Training- I** | **Course Code: BTMEF310** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | To make the students aware of industrial culture and organizational setup. |
| **CO2** | To create awareness about technical report writing among the student. |

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# Department of Mechanical Engineering

**Name of Program: Mechanical Engineering** **Program Code: 631561210**

| **Class: T.Y. B.Tech.** | **Semester: Odd** |
|---|---|
| **Course Name : Heat Transfer** | **Course Code: BTMEC501** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | 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 |
| **CO2** | Describe the critical radius of insulation, overall heat transfer coefficient, thermal conductivity and lumped heat transfer |
| **CO3** | Interpret the extended surfaces |
| **CO4** | Illustrate the boundary layer concept, dimensional analysis, forced and free convection under different conditions |
| **CO5** | Describe the Boiling heat transfer, mass transfer and Evaluate the heat exchanger and examine the LMTD and NTU methods applied to engineering problems |
| **CO6** | Explain the thermal radiation black body, emissivity and reflectivity and evaluation of view factor and radiation shields |

| **Class: T.Y. B.Tech.** | **Semester: Odd** |
|---|---|
| **Course Name : Applied Thermodynamics – I** | **Course Code: BTMEC502** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Define the terms like calorific value of fuel, stoichiometric air-fuel ratio, excess air, equivalent evaporation, boiler efficiency, etc |
| **CO2** | Study and Analyze gas power cycles and vapour power cycles and derive expressions for the performance parameters like thermal efficiency, Pm. |
| **CO3** | Classify various types of boiler, nozzle, steam turbine and condenser used in steam power plant. |
| **CO4** | Classify various types of IC engines. Sketch the cut section of typical diesel engine and label its components. Define the terms like TDC, BDC, rc, etc. |
| **CO5** | Draw P-v diagram for single-stage reciprocating air compressor, with and without clearance volume, and evaluate its performance. |
| **CO6** | Define the terms like calorific value of fuel, stoichiometric air-fuel ratio, excess air, equivalent evaporation, boiler efficiency, etc. |

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# Department of Mechanical Engineering

**Name of Program: Mechanical Engineering** **Program Code: 631561210**

| **Class: T.Y. B.Tech.** | **Semester: Odd** |
|---|---|
| **Course Name : Machine Design – I** | **Course Code: BTMEC503** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Formulate the problem by identifying customer need and convert into design specification |
| **CO2** | Understand component behavior subjected to loads and identify failure criteria |
| **CO3** | Analyze the stresses and strain induced in the component |
| **CO4** | Design of machine component using theories of failures |
| **CO5** | Design of component for finite life and infinite life when subjected to fluctuating load |
| **CO6** | Design of components like shaft, key, coupling, screw and spring |

| **Class: T.Y. B.Tech.** | **Semester: Odd** |
|---|---|
| **Course Name : Theory of Machines- II** | **Course Code: BTMEC504** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Identify and select type of belt and rope drive for a particular application |
| **CO2** | Evaluate gear tooth geometry and select appropriate gears, gear trains |
| **CO3** | Define governor and select/suggest an appropriate governor |
| **CO4** | Characterize flywheels as per engine requirement |
| **CO5** | Understand gyroscopic effects in ships, aeroplanes, and road vehicles. |
| **CO6** | Understand free and forced vibrations of single degree freedom systems |

## Department of Mechanical Engineering

**Name of Program: Mechanical Engineering** **Program Code: 631561210**

| **Class: T.Y. B.Tech.** | **Semester: Odd** |
|---|---|
| **Course Name : Metrology and Quality Control** | **Course Code: BTMEC505** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Identify techniques to minimize the errors in measurement |
| **CO2** | Identify methods and devices for measurement of length, angle, and gear and thread parameters, surface roughness and geometric features of parts. |
| **CO3** | Choose limits for plug and ring gauges. |
| **CO4** | Explain methods of measurement in modern machineries |
| **CO5** | Select quality control techniques and its applications |
| **CO6** | Plot quality control charts and suggest measures to improve the quality of product and reduce cost using Statistical tools. |

| **Class: T.Y. B.Tech.** | **Semester: Odd** |
|---|---|
| **Course Name : Product Design Engineering - II** | **Course Code: BTID506** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Create prototypes |
| **CO2** | Test the prototypes |
| **CO3** | Understand the product life cycle management with environmental concern |

## Department of Mechanical Engineering

**Name of Program: Mechanical Engineering** **Program Code: 631561210**

| **Class: T.Y. B.Tech.** | **Semester: Odd** |
|---|---|
| **Course Name : Automobile Engineering** | **Course Code: BTMEC506A** |
| **Course Outcomes** | |
| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
| **CO1** | Identify the different parts of the automobile. |
| **CO2** | Explain the working of various parts like engine, transmission, clutch, brakes. |
| **CO3** | Demonstrate various types of drive systems. |
| **CO4** | Apply vehicle troubleshooting and maintenance procedures. |
| **CO5** | Analyze the environmental implications of automobile emissions. And suggest suitable regulatory modifications. |
| **CO6** | Evaluate future developments in the automobile technology. |

| **Class: T.Y. B.Tech.** | **Semester: Odd** |
|---|---|
| **Course Name : Heat Transfer Lab** | **Course Code: BTMEL507** |
| **Course Outcomes** | |
| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
| **CO1** | Understand the various heat transfer mode of heat transfer and its application and verify |
| **CO2** | Learn the experimental methodology |
| **CO3** | Analyze the results obtained from the experiments |
| **CO4** | Draw conclusions based on the results of the experiments |

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# Department of Mechanical Engineering

**Name of Program: Mechanical Engineering** **Program Code: 631561210**

| **Class: T.Y. B.Tech.** | **Semester: Odd** |
|---|---|
| **Course Name : Applied Thermodynamics Lab** | **Course Code: BTMEL508** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Conduct test on Bomb calorimeter, nozzle, steam turbine, condenser, compressor etc. to study their performance. |
| **CO2** | Draw performance curves of these machines. |
| **CO3** | Analyze the results obtained from the tests. |
| **CO4** | Draw conclusions based on the results of the experiments |
| **CO5** | Based on your visit to Industry, sketch its layout and write specifications. |

| **Class: T.Y. B.Tech.** | **Semester: Odd** |
|---|---|
| **Course Name : Machine Design Practice- I** | **Course Code: BTMEL509** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Apply design process to an open ended problem |
| **CO2** | Determine suitable material and size for structural component of machine/system |
| **CO3** | Apply iterative technique in design including making estimate of unknown values for first computation and checking or revisiting and re-computing |
| **CO4** | Choose logically and defend selection of design factors |
| **CO5** | Design of components for given part/system i.e. shaft, keys, coupling, links, screws, springs etc. |
| **CO6** | Work effectively as a part of design group/team |

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# Department of Mechanical Engineering

**Name of Program: Mechanical Engineering** **Program Code: 631561210**

| **Class: T.Y.B. Tech.** | | **Semester: Odd** |
|---|---|---|
| **Course Name : Theory of Machines Lab- II** | | **Course Code: BTMEL510** |
| **Course Outcomes** | | |
| **Sr. No.** | **Upon successful completion of this course, the student will able to:** | |
| **CO1** | Explain various types of gear boxes, gear trains, belt and rope drives | |
| **CO2** | Interpreting physical principles and phenomenon of governor, gyroscopic, flywheel | |
| **CO3** | Measure vibration parameters in single degree of freedom systems | |
| **CO4** | Evaluating natural frequency of 1 dof | |

| **Class: T.Y. B.Tech.** | | **Semester: Odd** |
|---|---|---|
| **Course Name : Industrial Training II** | | **Course Code: BTMEF511** |
| **Course Outcomes** | | |
| **Sr. No.** | **Upon successful completion of this course, the student will able to:** | |
| **CO1** | To make the students aware of industrial culture and organizational setup. | |
| **CO2** | To create awareness about technical report writing among the student. | |

# Department of Mechanical Engineering

**Name of Program: Mechanical Engineering** **Program Code: 631561210**

| **Class: Fourth Year B.Tech.** | **Semester: Odd** |
|---|---|
| **Course Name Mechatronics** | **Course Code: BTMEC701** |
| **Course Outcomes** | |
| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
| **CO1** | Define sensor, transducer and understand the applications of different sensors and transducers |
| **CO2** | Explain the signal conditioning and data representation techniques |
| **CO3** | Design pneumatic and hydraulic circuits for a given application |
| **CO4** | Write a PLC program using Ladder logic for a given application |
| **CO5** | Understand applications of microprocessor and micro controller |
| **CO6** | Analyze PI, PD and PID controllers for a given application |

| **Class: Fourth Year B.Tech.** | **Semester: Odd** |
|---|---|
| **Course Name : CAD/CAM** | **Course Code: BTMEC702** |
| **Course Outcomes** | |
| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
| **CO1** | List and describe the various input and output devices for a CAD work station |
| **CO2** | Express and explain equations and applications of3-D geometries, CSG, B-rep, wireframe, surface and solid modeling |
| **CO3** | Write NC part program for the given component |
| **CO4** | Solve 1D, 2D, 3D statics structural problems using FEM |
| **CO5** | Explain various components of a typical FMS system, Robotics |
| **CO6** | Describe and differentiate the CAPP systems and CIM |

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# Department of Mechanical Engineering

**Name of Program: Mechanical Engineering** **Program Code: 631561210**

| **Class: Fourth Year B.Tech.** | **Semester: Odd** |
|---|---|
| **Course Name : Manufacturing Processes - III** | **Course Code: BTMEC703** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Differentiate clearly between NC and CNC machines |
| **CO2** | Prepare and execute a part program for producing a given product |
| **CO3** | Select appropriate non-traditional machining process for a given application |
| **CO4** | Compare different surface coating techniques |
| **CO5** | Explain different rapid prototyping techniques |
| **CO6** | Illustrate the working principle of various micro-manufacturing processes |

| **Class: Fourth Year B.Tech.** | **Semester: Odd** |
|---|---|
| **Course Name : Refrigeration and Air Conditioning** | **Course Code: BTMEC704E** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Understand the basic concept of refrigeration, refrigeration cycles and Applications |
| **CO2** | To evaluate COP of VAS and VCS |
| **CO3** | To study various refrigeration processes its applications and calculations of COP |
| **CO4** | Calculations of various psychometric properties ,SHF,GSHF,RSHF |
| **CO5** | To study various types of Air-conditioning systems |
| **CO6** | Cooling load calculations and design of ducts |

## Department of Mechanical Engineering

**Name of Program: Mechanical Engineering** **Program Code: 631561210**

| **Class: Fourth Year B.Tech.** | **Semester: Odd** |
|---|---|
| **Course Name : Wind Energy** | **Course Code: BTMEC705C** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Understand historical applications of wind energy |
| **CO2** | Understand and explain wind measurements and wind data |
| **CO3** | Determine Wind Turbine Power, Energy and Torque |
| **CO4** | Understand and explain Wind Turbine Connected to the Electrical Network AC and DC |
| **CO5** | Understand economics of wind energy |

| **Class: Fourth Year B.Tech.** | **Semester: Odd** |
|---|---|
| **Course Name : Manufacturing Processes Lab - II** | **Course Code: BTMEL706** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | To develop a manual part program of a given component on CNC Lathe using G and M codes. |
| **CO2** | Study of the effect of process parameters on Various operations |
| **CO3** | Study and examine various types of chips. |

# Department of Mechanical Engineering

**Name of Program: Mechanical Engineering** **Program Code: 631561210**

| **Class: Fourth Year B.Tech.** | **Semester: Odd** |
|---|---|
| **Course Name : Mechatronics Lab** | **Course Code: BTMEL707** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Understand the various types of sensors and their applications |
| **CO2** | Design a pneumatic circuit for a given application |
| **CO3** | Design a hydraulic circuit for a given application |
| **CO4** | Write a PLC program using Ladder logic |
| **CO5** | Experiment PID controller for controlling temperature |
| **CO6** | Demonstrate the capacitance sensor for measuring level |

| **Class: Fourth Year B.Tech.** | **Semester: Odd** |
|---|---|
| **Course Name : CAD/CAM Lab** | **Course Code: BTMEL708** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Construct CAD part models, assembly model and drafting of machine elements using CAD software. |
| **CO2** | Compute stresses in components subjected to simple structural loading using FE software |
| **CO3** | Write NC programs for turning and milling |
| **CO4** | Describe case study of industrial robots |

# Department of Mechanical Engineering

**Name of Program: Mechanical Engineering** **Program Code: 631561210**

| **Class: Fourth Year B.Tech.** | **Semester: Odd** |
|---|---|
| **Course Name : Seminar** | **Course Code: BTMEL709** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | State the exact title of the seminar |
| **CO2** | Explain the motivation for selecting the seminar topic and its scope |
| **CO3** | Search pertinent literature and information on the topic |
| **CO4** | Critically review the literature and information collected |
| **CO5** | Demonstrate effective written and verbal communication |

| **Class: Fourth Year B.Tech.** | **Semester: Odd** |
|---|---|
| **Course Name :** Industrial Training - III | **Course Code: BTMEL710** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | To make the students aware of industrial culture and organizational setup |
| **CO2** | To create awareness about technical report writing among the student. |

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## Department of Mechanical Engineering

**Name of Program: Mechanical Engineering** **Program Code: 631561210**

| **Class: Fourth Year B.Tech.** | **Semester: Odd** |
|---|---|
| **Course Name : Project Stage-I** | **Course Code: BTMEP711** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | State the exact title of the project and problem definition |
| **CO2** | Explain the motivation, objectives and scope of the project |
| **CO3** | Review the literature related to the selected topic of the project |
| **CO4** | Design the mechanism, components of the system and prepare detailed drawings. |
| **CO5** | Evaluate the cost considering different materials/manufacturing processes |

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# Department of Mechanical Engineering

**Name of Program: Mechanical Engineering** **Program Code: 631561210**

| **Class: S.Y.B.Tech.** | **Semester: Even** |
|---|---|
| **Course Name: Manufacturing Processes - I** | **Course Code: BTMEC401** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Identify castings processes, working principles and applications and list various defects in metal casting |
| **CO2** | Understand the various metal forming processes, working principles and applications |
| **CO3** | Classify the basic joining processes and demonstrate principles of welding, brazing and soldering. |
| **CO4** | Study center lathe and its operations including plain, taper turning, work holding devices and cutting tool. |
| **CO5** | Understand milling machines and operations, cutters and indexing for gear cutting. |
| **CO6** | Study shaping, planning and drilling, their types and related tooling's |

| **Class: S.Y.B.Tech.** | **Semester: Even** |
|---|---|
| **Course Name: Theory of Machines-I** | **Course Code: BTMEC402** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Define basic terminology of kinematics of mechanisms |
| **CO2** | Classify planar mechanisms and calculate its degree of freedom |
| **CO3** | Perform kinematic analysis of a given mechanism using ICR and RV methods |
| **CO4** | Perform kinematic analysis of a given mechanism analytically using vector or complex algebra method |
| **CO5** | Perform kinematic analysis of slider crank mechanism using Klein's construction and analytical approach |
| **CO6** | Define basic terminology of kinematics of mechanisms |

# Department of Mechanical Engineering

**Name of Program: Mechanical Engineering** **Program Code: 631561210**

| **Class: S.Y.B.Tech.** | **Semester: Even** |
|---|---|
| **Course Name: Strength of Materials** | **Course Code: BTMEC403** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | State the basic definitions of fundamental terms such as axial load, eccentric load, stress, strain, E, μ, etc. |
| **CO2** | Recognize the stress state (tension, compression, bending, shear, etc.) and calculate the value of stress developed in the component in axial/eccentric static and impact load cases. |
| **CO3** | Distinguish between uniaxial and multiaxial stress situation and calculate principal stresses, max. Shear stress, their planes and max. Normal and shear stresses on a given plane. |
| **CO4** | Analyze given beam for calculations of SF and BM |
| **CO5** | Calculate slope and deflection at a point on cantilever /simply supported beam using double integration, Macaulay‟s , Area-moment and superposition methods |
| **CO6** | Differentiate between beam and column and calculate critical load for a column using Euler's and Rankine‟s formulae |

| **Class: S.Y.B.Tech.** | **Semester: Even** |
|---|---|
| **Course Name: Numerical Methods in Mechanical Engineering** | **Course Code: BTMEC404** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Describe the concept of error |
| **CO2** | Illustrate the concept of various Numerical Techniques |
| **CO3** | Evaluate the given Engineering problem using the suitable Numerical Technique |
| **CO4** | Develop the computer programming based on the Numerical Techniques |

# Department of Mechanical Engineering

**Name of Program: Mechanical Engineering** **Program Code: 631561210**

| **Class: S.Y.B.Tech.** | **Semester: Even** |
|---|---|
| **Course Name: Product Design Engineering – I** | **Course Code: BTID405** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Create simple mechanical designs |
| **CO2** | Create design documents for knowledge sharing |
| **CO3** | Manage own work to meet design requirements |
| **CO4** | Work effectively with colleagues |

| **Class: S.Y.B.Tech.** | **Semester: Even** |
|---|---|
| **Course Name: Interpersonal Communication Skill & Self Development** | **Course Code: BTHM3402** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Acquire interpersonal communication skills |
| **CO2** | Develop the ability to work independently. |
| **CO3** | Develop the qualities like self-discipline, self-criticism and self-management. |
| **CO4** | Have the qualities of time management and discipline. |
| **CO5** | Present themselves as an inspiration for others |
| **CO6** | Develop themselves as good team leaders |

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# Department of Mechanical Engineering

**Name of Program: Mechanical Engineering** **Program Code: 631561210**

| **Class: S.Y.B.Tech.** | **Semester: Even** |
|---|---|
| **Course Name: Manufacturing Processes Lab – I** | **Course Code: BTMEL407** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Perform plain turning, step turning, knurling, and eccentric turning, chamfering and facing operations on lathe. |
| **CO2** | Prepare setup and fabricate composite job using milling, shaping and drilling machine. |
| **CO3** | Making spur gears on a milling machine. |
| **CO4** | Prepare sand casting setup using split pattern for simple component. |
| **CO5** | Perform joining of two plate using TIG/MIG welding. |
| **CO6** | Demonstrate cutting of a sheet metal using flame cutting. |

| **Class: S.Y.B.Tech.** | **Semester: Even** |
|---|---|
| **Course Name: Theory of Machines Lab- I** | **Course Code: BTMEL408** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Perform graphically kinematic analysis of any planar mechanism using ICR and RV methods. |
| **CO2** | Perform graphically kinematic analysis of slider crank mechanism using Klein's construction. |
| **CO3** | Demonstrate use of graphical differentiation method for kinematic analysis of slider crank mechanism or any other planar mechanism with a slider. |
| **CO4** | Sketch polar diagram for a Hooke's joint. |

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# Department of Mechanical Engineering

**Name of Program: Mechanical Engineering** **Program Code: 631561210**

| **Class: S.Y.B.Tech.** | **Semester: Even** |
|---|---|
| **Course Name: Strength of Materials Lab** | **Course Code: BTMEL409** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Compute tensile, compressive & shear properties of material using respective set-up |
| **CO2** | Compute torsion & impact strength of material using respective set-up |
| **CO3** | Compute the response of beam by deflection method |
| **CO4** | Exhibit ethical principle in engineering practices |

| **Class: S.Y.B.Tech.** | **Semester: Even** |
|---|---|
| **Course Name: Numerical Methods Lab** | **Course Code: BTMEL410** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Develop computer programming that is based on numerical techniques. |
| **CO2** | Use the appropriate Numerical Technique to evaluate the given Engineering issue. |
| **CO3** | Demonstrate how various Numerical Techniques work. |

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# Department of Mechanical Engineering

**Name of Program: Mechanical Engineering** **Program Code: 631561210**

| **Class: T.Y. B.Tech.** | **Semester: Even** |
|---|---|
| **Course Name: Manufacturing Processes- II** | **Course Code: BTMEC601** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Understand the process of powder metallurgy and its applications |
| **CO2** | Calculate the cutting forces in orthogonal and oblique cutting |
| **CO3** | Evaluate the machinability of materials |
| **CO4** | Understand the abrasive processes |
| **CO5** | Explain the different precision machining processes |
| **CO6** | Design jigs and fixtures for given application |

| **Class: T.Y. B.Tech.** | **Semester: Even** |
|---|---|
| **Course Name: Machine Design-II** | **Course Code: BTMEC602** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Define function of bearing and classify bearings. |
| **CO2** | Understanding failure of bearing and their influence on its selection. |
| **CO3** | Classify the friction clutches and brakes and decide the torque capacity and friction disk parameter. |
| **CO4** | Select materials and configuration for machine element like gears, belts and chain |
| **CO5** | Design of elements like gears, belts and chain for given power rating |
| **CO6** | Design thickness of pressure vessel using thick and thin criteria |

# Department of Mechanical Engineering

**Name of Program: Mechanical Engineering** **Program Code: 631561210**

| **Class: T.Y. B.Tech.** | **Semester: Even** |
|---|---|
| **Course Name: Applied Thermodynamics- II** | **Course Code: BTMEC603** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Understand the basic concept of IC engine, power cycles and combustion. |
| **CO2** | To evaluate engine performance and testing |
| **CO3** | To study various refrigeration processes its applications and calculations of COP |
| **CO4** | Calculations of various psychometric properties ,SHF,GSHF,RSHF |
| **CO5** | To study various type of power plants |
| **CO6** | Suggest suitable power plant for particular applications |

| **Class: T.Y. B.Tech.** | **Semester: Even** |
|---|---|
| **Course Name: I.C. Engines** | **Course Code: BTMEC604B** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Demonstrate a basic understanding of engine construction, function of various parts of an engine |
| **CO2** | Demonstrate combustion mechanism |
| **CO3** | Demonstrate importance and functions of various systems on an engine |
| **CO4** | Plot and analyze engine performance characteristics |
| **CO5** | Know the impact of vehicular pollution and ways to reduce or control the pollution |
| **CO6** | Understand Layout of Electric vehicle and Hybrid vehicles |

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# Department of Mechanical Engineering

**Name of Program: Mechanical Engineering** **Program Code: 631561210**

| **Class: T.Y. B.Tech.** | **Semester: Even** |
|---|---|
| **Course Name: Quantitative Techniques in Project Management** | **Course Code: BTMEC605A** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Define and formulate research models to solve real life problems for allocating limited resources by linear programming. |
| **CO2** | Apply transportation and assignment models to real life situations. |
| **CO3** | Apply queuing theory for performance evaluation of engineering and management systems. |
| **CO4** | Apply the mathematical tool for decision making regarding replacement of items in real life. |
| **CO5** | Determine the EOQ, ROP and safety stock for different inventory models. |
| **CO6** | Construct a project network and apply CPM and PERT method. |

| **Class: T.Y. B.Tech.** | **Semester: Even** |
|---|---|
| **Course Name: Human Resource Management** | **Course Code: BTMEC606C** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Describe trends in the labor force composition and how they impact human resource management practice. |
| **CO2** | Discuss how to strategically plan for the human resources needed to meet organizational goals and objectives. |
| **CO3** | Define the process of job analysis and discuss its importance as a foundation for human resource management practice |
| **CO4** | Explain how legislation impacts human resource management practice. |
| **CO5** | Compare and contrast methods used for selection and placement of human resources. |
| **CO6** | Describe the steps required to develop and evaluate an employee training program |
| **CO7** | Summarize the activities involved in evaluating and managing employee performance. |
| **CO8** | Identify and explain the issues involved in establishing compensation systems. |

## Department of Mechanical Engineering

**Name of Program: Mechanical Engineering** **Program Code: 631561210**

| **Class: T.Y. B.Tech.** | **Semester: Even** |
|---|---|
| **Course Name: Metrology and Quality Control Lab** | **Course Code: BTMEL607** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Measure linear, angular circular features, dimensional and geometric features |
| **CO2** | Measure surface roughness of components |
| **CO3** | Calibration of metrological equipment |

| **Class: T.Y. B.Tech.** | **Semester: Even** |
|---|---|
| **Course Name: Machine Design Practice-II** | **Course Code: BTMEL608** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Apply design process to an open ended problems |
| **CO2** | Determine suitable material and size for structural component of machine/system |
| **CO3** | Apply iterative technique in design including making estimate of unknown values for first computation and checking or revisiting and re-computing |
| **CO4** | Choose logically and defend selection of design factors |
| **CO5** | Design of components for given part/system i.e. shaft, keys, coupling, links, screws, springs etc. |
| **CO6** | Work effectively as a part of design group/team |
| **CO7** | Have good communication skill, orally, graphically as well as in writing |

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# Department of Mechanical Engineering

**Name of Program: Mechanical Engineering** **Program Code: 631561210**

| **Class: T.Y. B.Tech.** | **Semester: Even** |
|---|---|
| **Course Name: I.C. Engine Lab** | **Course Code: BTMEL609** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Conduct test on IC Engines to study their performance. |
| **CO2** | Draw performance curves of these machines/systems. |
| **CO3** | Analyze the results obtained from the tests. |
| **CO4** | Draw conclusions based on the results of the experiments |

| **Class: T.Y. B.Tech.** | **Semester: Even** |
|---|---|
| **Course Name: Refrigeration and Air Conditioning Lab** | **Course Code: BTMEL610** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Conduct test on Refrigeration and air conditioning test units to study their performance |
| **CO2** | Draw performance curves of these machines/systems. |
| **CO3** | Analyze the results obtained from the tests. |
| **CO4** | Draw conclusions based on the results of the experiments |

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# Department of Mechanical Engineering

**Name of Program: Mechanical Engineering** **Program Code: 631561210**

| **Class: T.Y. B.Tech.** | **Semester: Even** |
|---|---|
| **Course Name: Technical Project for Community Services** | **Course Code: BTMEL611** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Visit nearby places to understand the problems of the community |
| **CO2** | Select one of the problems for the study, state the exact title of the project and define scope of the problem |
| **CO3** | Explain the motivation, objectives and scope of the project |
| **CO4** | Evaluate possible solutions of the problem |
| **CO5** | Design, produce, test and analyze the performance of product/system/process |
| **CO6** | Modify, improve the product/system/process |

## Department of Mechanical Engineering

**Name of Program: Mechanical Engineering** **Program Code: 631561210**

| **Class: Fourth Year B.Tech.** | **Semester: Even** |
|---|---|
| **Course Name: Fundamentals of Automotive Systems** | **Course Code: BTMEP801A** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | Acquire fundamental knowledge of the various systems of an automobile. |
| **CO2** | Associate the functions of each system with its design and layout. |
| **CO3** | Depict the various systems using simple schematics. |
| **CO4** | Apply concepts learnt in core undergraduate courses to synthesize mathematical models of the various systems. |

| **Class: Fourth Year B.Tech.** | **Semester: Even** |
|---|---|
| **Course Name: Non-Conventional Energy Resources** | **Course Code: BTMEP801F** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | List Scale of quantities and take overview of current energy usage, Conventional sources of energy, non-conventional energy resources and Consumption by sector |
| **CO2** | Describe Solar energy incident on earth, solar spectrum and review of solar energy technologies, Solar Thermal devices |
| **CO3** | Explain Solar Photovoltaic devices, Performance and durability of solar devices and interpret Wind energy, technology and geographical aspects |
| **CO4** | Detail about Geothermal, Biomass energy |
| **CO5** | Explain Battery's types Testing and performance of batteries |
| **CO6** | Summarize Fuel cell, its processing, characterization , durability and describe Flywheels and super capacitors |

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# Department of Mechanical Engineering

**Name of Program: Mechanical Engineering** **Program Code: 631561210**

| **Class: Fourth Year B.Tech.** | **Semester: Even** |
|---|---|
| **Course Name: Project Phase-II** | **Course Code: BTMEP803** |

**Course Outcomes**

| **Sr. No.** | **Upon successful completion of this course, the student will able to:** |
|---|---|
| **CO1** | State the aim and objectives for this stage of the project |
| **CO2** | Construct and conduct the tests on the system/product |
| **CO3** | Analyze the results of the tests. |
| **CO4** | Discuss the findings, draw conclusions, and modify the system/product, if necessary. |

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