

## DEPARTMENT OF MECHANICAL ENGINEERING

### **B.Tech Third Semester**

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| Subject Name: M-III   |
| Subject Code: BTME301T  |
| At the End of course Students will be able to –   |
| CO-1: Apply Laplace Transform to solve ordinary differential equations, Integral equations and Integro-differential Equations.  |
| CO-2: Apply Fourier series in the analysis of periodic functions in terms sine and cosine encountered in engineering problems and Fourier Transform to solve integral equations.                                  |
| CO-3: Learn the concept of differentiating, integrating and expanding of analytic functions in complex numbers and their applications such as evaluation of integrals of complex functions                        |
| CO-4: Solve partial differential equations of first order, higher order with constant coefficients and of second order using method of separation of variables.   |
| CO-5: Analyze real world scenarios to recognize when matrices are appropriate, formulate problems about the scenarios, creatively model these scenarios in order to solve the problems using multiple approaches. |

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| Subject Name: MANUFACTURING PROCESSES   |
| Subject Code: BTME302T  |
| At the End of course Students will be able to –   |
| CO-1: Understand the importance of manufacturing processes, techniques of pattern making and molding with their properties. Design gating system along with selection of different types of melting furnaces and special casting process. |
| CO-2: Get acquainted with the basic concept of joining process, welding process and its types, defects and application.   |
| CO-3: Get acquainted with the forming process for metal, mechanics of forming process along with different types of rolling machine.  |
| CO-4: Understand and define press working process along with its classification, types and terminology, different types of dies and introduction to shaping operation.  |
| CO-5: Understand introduction to plastics, ceramics and glasses, its properties, application, forming and its shaping.  |

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| Subject Name: <b>FLUID MECHANICS</b>  |
| Subject Code: BTME303T  |
| At the End of course Students will be able to –   |
| CO-1: Analyze fluid behaviors based on properties and identify fluid flow types in practical applications.  |
| CO-2: Apply fluid statics principles to assess pressure distributions, determine buoyancy, and analyze stability.   |
| CO-3: Demonstrate proficiency in solving fluid dynamics problems using the Navier-Stokes equation, Bernoulli's equation, and related principles in various engineering scenarios. |
| CO-4: Differentiate laminar and turbulent flows, apply dimensional analysis techniques, and interpret dimensionless parameters.   |
| CO-5: Calculate energy losses in pipes, understand fluid behavior in series and parallel configurations, and analyze lift and drag forces.  |

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| Subject Name: Kinematics of Machine (KOM)  |
| Subject Code: BTME304T   |
| At the End of course Students will be able to –  |
| CO-1: Perform kinematic and dynamic analysis (Displacement, Velocity, acceleration, Inertia forces) of a given mechanism using graphical method. |
| CO-2: Understand the concept of compliant mechanisms.  |
| CO-3: Conceive or synthesize new mechanisms for specific requirements and Perform computer aided analysis of simple mechanisms.                  |
| CO-4: Construct cam profiles and analysis the follower motion.   |
| CO-5: Understand Geometry of gear, its types, analysis of forces and motions of gear teeth. Study of gear trains and governors.                  |

Subject Name: Machine Drawing and Solid Modeling

Subject Code: BTME305P

At the End of course Students will be able to –

CO-1: Interpret and describe basic elements of standard machine drawing like lines, dimensions, tolerances, symbols etc

CO-2: Create 2-D detailing, sectional views of machine elements from given isometric view.

CO-3: Understand and apply concepts of GD&T for creating part and assembly drawing.

## DEPARTMENT OF MECHANICAL ENGINEERING

### B.Tech Fourth Semester

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| Subject Name: MACHINING PROCESSES   |
| Subject Code: BTME401T  |
| At the End of course Students will be able to –                               |
| CO-1: Understand fundamentals of metal cutting                                |
| CO-2: Understand basic construction and operations of lathe shaping, planning |
| CO-3: Understand basics of milling and milling cutters. slotting              |
| CO-4: To know about the surface finishing processes.                          |
| CO-5: Understand the basic of drilling, boring, reaming and broaching.        |

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| Subject Name: Hydraulic Machines   |
| Subject Code: BTME402T   |
| At the End of course Students will be able to –  |
| CO-1: To classify fluid & their Properties under static and dynamic condition and apply the equations to various hydraulic components and working principles of various measuring devices. |
| CO-2: To establish the relationship between various properties & apply mathematical treatment to various problems related to fluid system & their Design                                   |
| CO-3: To introduce various principles & design of hydraulic Machines i.e. Turbines. Centrifugal and Positive Displacement Pump .   |
| CO-4: To explain the working Principles of Fluid mechanics and their Practical applications in designing the fluid systems   |
| CO-5: To appreciate the application of Similitude in the design of Hydraulic Machines.   |

Subject Name: :Mechanics of Materials

Subject Code: BTME403T

At the End of course Students will be able to –

CO-1: Demonstrate fundamental knowledge about various types of loading and stresses induced

CO-2: Draw the SFD and BMD for different types of loads and support conditions.

CO-3: Estimate the strain energy in mechanical elements. And analyse the deflection in beams.

CO-4: Can design shaft for various loading conditions.

CO-5: Understand theory of failure and effective designing of column and strut.

Subject Name: Engineering Thermodynamics

Subject Code: BTME404T

At the End of course Students will be able to –

CO-1: Explain thermodynamics concepts, relate laws of the ideal gas, identify various thermodynamic processes and apply the laws to determine the energy transfer in terms of heat and work.

CO-2: Explain the first law of thermodynamics and apply the law to evaluate open, closed systems, thermal components and devices.

CO-3: Interpret the second law of thermodynamics, entropy, and apply the law to evaluate heat engine, heat pump, and refrigerator performance

CO-4: Relate various steam properties, and analyze the different types of processes using steam as working fluid to determine the energy transfer in terms of heat and work.

CO-5: Compare various power cycles and analyze the cycles to determine the energy transfer in terms of heat, work and efficiency.

Subject Name: **Computer Programming**

Subject Code: **BTME405P**

At the End of course Students will be able to –

CO-1: Understand and explore concepts in basic programming like data types, input/output functions, operators, programming constructs and user defined functions.

CO-2: Develop capabilities of writing „C“ programs in optimized, robust and reusable code

CO-3: Apply appropriate concepts of data structures like arrays, structures implement programs for various applications

Subject Name: Professional Ethics Syllabus

Subject Code: BTME406T

At the End of course Students will be able to –

CO-1: Understand basic purpose of profession, professional ethics and various moral and social issues

CO-2: Analyze various moral issues and theories of moral development

CO-3: Realize their roles of applying ethical principles at various professional levels

CO-4: Identify their responsibilities for safety and risk benefit analysis

CO-5: Understand their roles in dealing various global issues

## DEPARTMENT OF MECHANICAL ENGINEERING

### B.Tech Fifth Semester

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| Subject Name: Heat Transfer  |
| Subject Code: BTME501T   |
| At the End of course Students will be able to –  |
| CO-1: Students will be able to define and compare the different modes of heat transfer and calculation of thermal resistance and heat transfer through plane and composite wall, cylinder and sphere with and without thermal contact resistances.   |
| CO-2: Students will be able to apply the concept of internal heat generation for the calculation of heat transfer for plane wall, cylinder and sphere and also learn about various types of fins and their significance in steady state conduction heat transfer calculations. It will also help them to understand the concept of unsteady state heat transfer. |
| CO-3: Students will be able to select and apply appropriate empirical correlations to estimate forced convection and free convection heat transfer, for internal and external flows.   |
| CO-4: Students will be able to evaluate heat transfer rate by radiation from ideal and actual surfaces and enclosures of different geometries.   |
| CO-5: Students will be able to evaluate heat exchanger performance for the given geometry and boundary conditions and design suitable heat exchanger geometry to deliver a desired heat transfer rate.   |

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| Subject Name: Energy Conversion -I   |
| Subject Code: BTME502T   |
| At the End of course Students will be able to –  |
| CO-1: Explain, classify, analyze layout of power plant, cogeneration principle of steam generators (i.e. Boilers), boiler mountings & accessories and evaluate performance parameters of boiler.   |
| CO-2: Explain the concepts of fluidized bed boilers and various draught system and evaluate performance parameters of natural draught system(i.e. chimney)   |
| CO-3: Explain the importance of steam nozzle and determine its throat area, exit area, exit velocity. Also compare impulse and reaction steam turbines and explain the concept of governing of steam turbine   |
| CO-4: Explain the methods of compounding of steam turbine, various energy losses in steam turbine and able to draw velocity diagrams of steam turbine blades to analyze the angles of the blades, work done, thrust, power, efficiencies of turbine. |
| CO-5: Explain, classify steam condensers, cooling towers and evaluate performance parameters   |

of surface condenser.

Subject Name: Design of Machine Elements

Subject Code: BTME503T

At the End of course Students will be able to –

CO-1: Apply principals of static loading for design of Cotter joint, Knuckle joint

CO-2: Design bolted, welded joints, power screws & pressure vessels

CO-3: Design the power transmission shaft & coupling

CO-4: Design components subjected to fatigue or fluctuating stresses. Also, will be able to apply principles for determining bending stresses for desing of curved beams e.g. crane hook, C-Frame.

CO-5: Design clutches, brakes and springs

Subject Name: Industrial Economics & Management-

Subject Code: BTME504T

At the End of course Students will be able to –

CO-1: Understand the concept of demand and supply and its relationship with the price

CO-2: Relate various factors of production with reference to different economic sectors

CO-3: Analyze the causes and effects of inflation and understand the market structure

CO-4: Acquire knowledge of various functions of management and marketing management

CO-5: Perceive the concept of financial management for the growth of business



Subject Name: **Mechanical Measurement and Metrology**

Subject Code: **BTME505T**

At the End of course Students will be able to –

CO-1: Students will be able to analyze statistical characteristic of systems.

CO-2: Students will be able asses the system response.

CO-3: Students will be able to understand the instrumentation process.

CO-4: Students will be able to understand limits fits and tolerance.

CO-5: Students will learn the basics of various metrology measurement terms and techniques.

## DEPARTMENT OF MECHANICAL ENGINEERING

### B.Tech Sixth Semester

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| Subject Name: <b>Automation In Production</b>   |
| Subject Code: <b>BTME601T</b>   |
| At the End of course Students will be able to –   |
| CO-1: Get Acquainted With Automation, Its Type's ,Strategies , Assembly Line Balancing And Its Analysis, Methods Of Work Part Transport |
| CO-2: Recognize fundamentals and constructional features of N.C, CNC and D.N.C machines and prepare a CNC program for given part.       |
| CO-3: Cultivate Information About Automated Material Handling Systems, Automated Storage And Retrieval System (AGVS,AS/RS) Its Analysis |
| CO-4: Get Acquainted With Automated Inspection (CAPP, CAQC, CMM) And Group Technology   |
| CO-5: Recognize CAD/CAM,CIM,FMS, Understand The Concepts Of Shop Floor Control  |

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| Subject Name: Energy Conversion-II   |
| Subject Code: BTME602T   |
| At the End of course Students will be able to –  |
| CO-1: Classify various types of I.C. Engines and explain the working of its various components and systems |
| CO-2: Analyze the effect of various operating variables on engine performance                              |
| CO-3: Understand the working of Gas Turbine and Jet propulsion system                                      |
| CO-4: Analyze the vapour compression refrigeration system and psychometric process.                        |
| CO-5: Understand the working of various types of compressors   |

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| Subject Name: Dynamics of Machines  |
| Subject Code: BTME603T  |
| At the End of course Students will be able to –   |
| CO-1: Comprehend the machine dynamics through basic principles to interpret their application and examine near to life problems due gyroscopic effects and determine the conditions for stability of ships, airplanes and automobile. |
| CO-2: Analyze dynamic force conditions in planer linkages and cams to determine required driving torque condition (graphically/ analytically).  |
| CO-3: Estimate the unbalanced forces due to rotating and reciprocating masses in a mechanical system and calculate (graphically/ analytically) the balancing masses required for safe/ smooth operation of these mechanical systems   |
| CO-4: Identify the requirement of flywheel, brakes, and dynamometers in a mechanical system and calculate inertia of flywheel and braking condition to be incorporated in engines and machines  |
| CO-5: Recognize and interpret the concept of vibration in various mechanical systems and distinguish vibration characteristics for 1 & 2 DOF systems to evaluate the conditions for its control/ use.                                 |

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| Subject Name: Production Planning and Control (Elective- I)  |
| Subject Code: BTME604T   |
| At the End of course Students will be able to –  |
| CO-1: Understand need of various functions in production planning and control for better management of manufacturing and/or service systems. |
| CO-2: Use qualitative and quantitative forecasting techniques for short, medium, and long range forecasting                                  |
| CO-3: Develop material requirements plans (MRP) as part of resource requirements planning systems.   |
| CO-4: Use heuristic decision rules to make lot-sizing decisions.   |
| CO-5: Develop quantitative models to manage independent demand inventory systems.  |

Subject Name: Advanced Manufacturing Techniques-(Elective II)

Subject Code: BTME605T

At the End of course Students will be able to –

CO-1: Understand and compare the different Non-Traditional machining process with their need, economics and application as well as historical development. Understand the basics of High speed grinding, Hot and Cold machining.

CO-2: Understand the basics of Abrasive Jet Machining (AJM), Ultrasonic Machining process and Water Jet Machining.

CO-3: Get acquainted with the Electro-Chemical Machining, Electrochemical Grinding, Electric Discharge Machining. Get acquainted with the Electron Beam, Laser Beam and Plasma Arc Machining.

CO-4: Know the basics of unconventional welding techniques and Solid Phase welding techniques

CO-5: Get acquainted with the basics of advance casting processes

## DEPARTMENT OF MECHANICAL ENGINEERING

### B.Tech Seventh Semester

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| Subject Name: <b>Elective – III: Advancements in Automobile Engineering</b>  |
| Subject Code: BTME701T   |
| At the End of course Students will be able to –  |
| CO-1: Classify and identify the main components of automobile. Explain the construction and working of I. C. Engine, fuel supply systems, cooling systems and lubrication systems used in automobile.  |
| CO-2: Illustrate the functions of different types of automobile clutches and gear boxes and their applications. Explain the working of transmission system, its components such as propeller shaft, drives, differential and axles.                        |
| CO-3: Describe the working of different steering systems, steering gear boxes and suspension systems. Identify the different components of steering, suspension and brake systems with their comparisons and applications.                                 |
| CO-4: Demonstrate the importance of safety considerations in automobiles and outline the recent technological development in automotive safety. Describe the automobile maintenance, Trouble shooting, service procedures, Overhauling and Engine tune up. |
| CO-5: Explain the working of Electric Car, Hybrid Electric vehicles and Fuel cell vehicles. Describe the importance of Alternative energy sources, Vehicle Pollution norms and different methods of pollution control                                      |

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| Subject Name: <b>Energy Conversion III</b>  |
| Subject Code: BTME702T  |
| At the End of course Students will be able to –   |
| CO-1: Students will be able to analyze the gas turbine and jet propulsion system on varied operating conditions.                                  |
| CO-2: Students will be able to recognize the hydraulic pumps and valves and can able to logically design the hydraulic circuit.                   |
| CO-3: Students will be able to recognize the air compressors and pneumatic control valves and can able to logically design the pneumatic circuit. |
| CO-4: Students will be able to understand solar power and future opportunities in solar power systems.  |

CO-5: Students will learn the basics of various non-conventional energy sources and their applications.

Subject Name: **Open Elective – II: Introduction to Renewable Energy Resources**

Subject Code: BEME703T

At the End of course Students will be able to –

CO-1: Recognize the need of renewable energy sources.

CO-2: Understand various solar thermal energy conversion systems and solar photovoltaic systems in detail.

CO-3: Describe different biogas plants, bio-diesel production method and potential of hydrogen as a fuel.

CO-4: Explain the working principle of Wind energy systems and ocean thermal energy conversion systems

CO-5: Describe the working of Fuel cell system, Geothermal & Magneto hydro dynamic (MHD) power generation systems and Understand the principles of energy conservation.

Subject Name: **Design of Transmission Systems**

Subject Code: **BTME704T**

At the End of course Students will be able to –

CO-1: Design journal and thrust bearings and selection of standard rolling contact bearings.

CO-2: Design flexible transmission drives like belts, chains and rope

CO-3: Design the positive transmission drives like gears as spur and Helical Gear.

CO-4: Design the positive transmission drives like gears as worm and Bevel Gears

CO-5: Design the energy storing components like Flywheels for various applications.

## DEPARTMENT OF MECHANICAL ENGINEERING

### B.Tech Eight Semester

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| Subject Name: <b>Industrial Engineering</b>                            |
| Subject Code: BTME801T   |
| At the End of course Students will be able to –                        |
| CO-1: Understanding the concept of productivity and method study.      |
| CO-2: Ability to measure work time and design ergonomic system.        |
| CO-3: To understand the concept of forecasting and breakeven analysis. |
| CO-4: To analysis maintenance and reliability of equipments.           |
| CO-5: To understand various quality control tools and techniques.      |

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| Subject Name: <b>Elective – IV: Computer Integrated Manufacturing</b>                         |
| Subject Code: BTME802T  |
| At the End of course Students will be able to –   |
| CO-1: To understand integration of business function with manufacturing planning and control. |
| CO-2: To apply fundamentals of robotics or industrial applications.                           |
| CO-3: To develop CNC programs for manufacturing applications.                                 |
| CO-4: To understand the process of Group technology for Flexible manufacturing system.        |
| CO-5: Get Acquainted With Automated Inspection (CAPP, CAQC, CMM) And Group Technology.        |

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| Subject Name: <b>Elective – V: Total Quality Management</b>  |
| Subject Code: <b>BTME803T</b>  |
| At the End of course Students will be able to –  |
| CO-1: To develop understanding of Quality concepts.  |
| CO-2: practically implement the Total Quality Principles to employees and supplier partnership.                                  |
| CO-3: Understanding of Statistical Process Control and Process Capability for enhancement of quality.                            |
| CO-4: practically implement the tools for Total Quality Principles.  |
| CO-5: Develop Understanding of Quality System, Quality Audits, Leadership & quality council & overview of software used for TQM. |

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| Subject Name: <b>Elective – VI: Energy Conservation &amp; Management</b>                   |
| Subject Code: <b>BTME804T</b>  |
| At the End of course Students will be able to –  |
| CO-1: Identify and classify areas of energy conservation in industries.                    |
| CO-2: Know the duties and responsibilities of an energy manager and energy auditor.        |
| CO-3: Analyze and modify existing working of the energy utilizing and generating machines. |
| CO-4: Know how to use instruments in energy audit process.                                 |
| CO-5: Implement proper energy saving techniques in boiler, furnaces etc.                   |