

**COURSE OUTCOMES**  
**Sixth Semester B. Tech.**

**BTME601T Automation In Production**

After successful completion of this course the student will be able to:

- CO601.1 Get Acquainted With Automation, Its Type's ,Strategies , Assembly Line Balancing And Its Analysis, Methods Of Work Part Transport
- CO601.2 Recognize fundamentals and constructional features of N.C, CNC and D.N.C machines and prepare a CNC program for given part.
- CO601.3 Get Acquainted With The Robotic Configuration, Types Of Links, Joints, Grippers, Industrial Robotics And Robot Applications.
- CO601.4 Cultivate Information About Automated Material Handling Systems, Automated Storage And Retrieval System (AGVS,AS/RS) Its Analysis
- CO601.5 Get Acquainted With Automated Inspection (CAPP, CAQC, CMM) And Group Technology.
- CO601.6 Recognize CAD/CAM,CIM,FMS, Understand The Concepts Of Shop Floor Control

**BTME602T Energy Conversion-II**

After successful completion of this course the student will be able to:

- CO602.1 Classify various types of I.C. Engines and explain the working of its various components and systems.
- CO602.2 Analyze the effect of various operating variables on engine performance
- CO602.3 Understand the working of Gas Turbine and Jet propulsion system
- CO602.4 Analyze the vapour compression refrigeration system and psychometric process.
- CO602.5 Understand the working of various types of compressors

**BTME603T Dynamics of Machines**

After successful completion of this course the student will be able to:

- CO603.1 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.
- CO603.2 Analyze dynamic force conditions in planer linkages and cams to determine required driving torque condition (graphically/ analytically).
- CO603.3 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.
- CO603.4 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.
- CO603.5 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.

### **BTME604T Mechanical Vibrations (Elective- I)**

After successful completion of this course the student will be able to:

- CO604.1 Establish mathematical model and determine natural frequencies of single and two DOF systems
- CO604.2 Apply different methods to design vibration absorbers.
- CO604.3 Understand vibrations in multi degree of freedom system and able to prepare vibration models
- CO604.4 Analyse vibrations in continuous systems
- CO604.5 Use finite element method in vibration analysis.
- CO604.6 To measure and analyse vibrations using vibration monitoring devices

### **BTME604T Synthesis of Mechanisms (Elective- I)**

After successful completion of this course the student will be able to:

- CO604.1 Critically analyze the existing machines and mechanisms
- CO604.2 Synthesize mechanisms quickly using graphical technique
- CO604.3 Synthesize mechanisms using analytical technique and prepare computer algorithms.
- CO604.4 Synthesize mechanisms using coupler curves as per the motion requirement
- CO604.5 Understand spatial mechanisms and apply it for design of robotic manipulators

### **BTME604T Operation Research (Elective- I)**

After successful completion of this course the student will be able to:

- CO604.1 Recognize the importance and value of Operations Research and mathematical modeling in solving practical problems in industry
- CO604.2 convert given situation to mathematical form and determine optimal settings.
- CO604.3 understand Operations Research models and apply them to real-life problems;
- CO604.4 manage projects for minimum total cost and smooth level of resources.
- CO604.5 make decisions related to age of replacement of equipment
- CO604.6 develop simulation of real life system to analyze and optimize system concerned.

### **BTME604T Production Planning and Control (Elective- I)**

After successful completion of this course the student will be able to:

- CO604.1 Understand need of various functions in production planning and control for better management of manufacturing and/or service systems.
- CO604.2 Use qualitative and quantitative forecasting techniques for short, medium, and long range forecasting.
- CO604.3 Develop material requirements plans (MRP) as part of resource requirements planning systems.
- CO604.4 Use heuristic decision rules to make lot-sizing decisions.
- CO604.5 Develop capacity requirements plans as part of resource requirements planning systems.
- CO604.6 Develop quantitative models to manage independent demand inventory systems.

### **BTME604T Convective Heat Transfer (Elective- I)**

After successful completion of this course the student will be able to:

- CO604.1 Explain the fundamental and advanced principles of forced and natural convection heat transfer processes.
- CO604.2 Apply the principles of natural convective to estimate the heat dissipation from external flow devices.
- CO604.3 Solve the problem of internal flow natural convection.
- CO604.4 Relate to the current challenges and opportunities in the field of turbulent convective heat transfer.
- CO604.5 Formulate and solve problems related to external wall flows and convection heat transfer.

### **BTME604T Power Plant Engineering (Elective- I)**

After successful completion of this course the student will be able to:

- CO604.1 Student will be able to understand the components, fuel and its associated terminologies and complete working of steam power plant .Also will be able to learn about advantages, drawbacks and environmental impact .
- CO604.2 Students will get acquainted with working of Gas Turbine power plant and Diesel electric power plant, their comparison with other power plants and also Introduce to captive power plant.
- CO604.3 Student will be able to understand the complete working of hydroelectric power plant ,its advantages and comparison with other power plants.
- CO604.4 Student will be able to understand the importance of Nuclear power generation in India, working of various nuclear reactors and complete working of nuclear power plant, waste disposal and its impact on environment and also its comparison with other power plants.
- CO604.5 Student will be able to understand the concept of combined power plant and gets acquainted with the emerging power generation technologies. Also will be able to undertake the power load analysis and economic analysis of power generation system.

### **BTME605T Tribology (Elective- II)**

After successful completion of this course the student will be able to:

- CO605.1 Select materials and lubricants to suggest a tribological solution to a particular situation.
- CO605.2 Understand the concept of thermal equilibrium and heat balance
- CO605.3 Apply the basic knowledge to design simple journal bearings
- CO605.4 Design thrust and step bearings
- CO605.5 Design and selection of antifriction bearings
- CO605.6 Understand friction and effects as wear, wear mechanisms, wear resistant materials

### **BTME605T Tool Design (Elective- II)**

After successful completion of this course the student will be able to:

- CO605.1 Design single point and multi-point cutting tools.
- CO605.2 Design various press working cutting operation dies for given sheet metal parts, also will be able to suggest heat treatment cycle for these dies.
- CO605.3 Understand terminologies and design considerations related to press working bending, forming and drawing dies.
- CO605.4 Explain and classify various forging dies and design machine forging dies.
- CO605.5 Design simple blow and injection molds for plastic parts.

## **BTME605T Advanced Manufacturing Techniques (Elective- II)**

After successful completion of this course the student will be able to:

- CO605.1 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.
- CO605.2 Understand the basics of Abrasive Jet Machining (AJM), Ultrasonic Machining process and Water Jet Machining.
- CO605.3 Get acquainted with the Electro-Chemical Machining, Electrochemical Grinding, Electric Discharge Machining.  
Get acquainted with the Electron Beam, Laser Beam and Plasma Arc Machining.
- CO605.4 Know the basics of unconventional welding techniques and Solid Phase welding techniques.
- CO605.5 Get acquainted with the basics of advance casting processes.

## **BTME605T CNC & Robotics (Elective- II)**

After successful completion of this course the student will be able to:

- CO605.1 Understand fundamentals of NC, CNC and DNC.
- CO605.2 Understand basic drives and work holding devices used in CNC
- CO605.3 Understand NC programming.
- CO605.4 Understand history and classification of robots
- CO605.5 Understand Robot end effectors, motion control, programming languages and applications

## **BTME605T Design of Heat Exchangers (Elective- II)**

After successful completion of this course the student will be able to:

- CO605.1 Understand the basic design methodologies for heat exchanger, different techniques of heat exchanger analysis and be aware of common heat exchangers with their constructions and working principles
- CO605.2 Learn how to design common types of heat exchangers; namely shell-and-tube, tube and tube, compact heat exchanger and heat pipes micro heat exchangers and double pipe heat exchangers etc.
- CO605.3 Select various TEMA standards and software tool in the designing of different types of heat exchanger.
- CO605.4 Formulate the mathematical model for heat exchanger
- CO605.5 Apply the various concepts to design Direct contact heat exchangers (cooling towers) & Condensers and evaluate the performance of cooling tower

## **BTME605T Advanced I C Engines (Elective- II)**

After successful completion of this course the student will be able to:

- CO605.1 Understand basics of IC Engine, types of IC Engine, working cycle, cooling and lubrication system
- CO605.2 Understand basic fuel, Alternate fuels and fuel supply system in IC engine
- CO605.3 Understand combustion phenomenon in in SI and CI engine.

- CO605.4 Understand the various performance parameters of an engine, testing procedure and its analysis.
- CO605.5 Illustrate emission norms its emission control for engine. Comprehend the different technological advances in engines.

### **BTME606P Skill Development**

After successful completion of this course the student will be able to:

- [1] Apply knowledge of mathematics, science, and engineering to mechanical engineering problems.
- [2] An ability to design and conduct experiments, as well as to analyze and interpret data.
- [3] An ability to design systems, components, or processes to meet desired needs.
- [4] An ability to function on multi-disciplinary teams.
- [5] An ability to identify, formulate, and solve engineering problems.
- [6] An understanding of professional and ethical responsibility.
- [7] An ability to communicate effectively with written, oral, and visual means.
- [8] The broad education necessary to understand the impact of engineering solutions in a global and societal context.
- [9] A recognition of the need for and an ability to engage in life-long learning.
- [10] A knowledge of contemporary issues.
- [11] An ability to use modern engineering techniques, skills, and computing tools necessary for engineering practice.
- [12] An ability to work professionally in either thermal or mechanical systems areas.

### **BTME607P Summer Internship**

After successful completion of this course the student will be able to:

- 1. Internships provide exposure to the real world
- 2. Internships give a platform to establish critical networking connections
- 3. Internships allow to learn more about yourself
- 4. Internships equip with more than just technical skills
- 5. Internships allow to gain a competitive edge

## **BTME601P Automation In Production**

After successful completion of this course the student will be able to:

- CO601P. 1 Recognize automation, corroborating this knowledge with case studies on automation systems. study and analyze the material handling systems, robots and GT
- CO601P. 2 Demonstrate NC programming (manual/apt)
- CO601P. 3 Simulate program on CNC milling/ lathe
- CO601P. 4 Work on CNC milling/ lathe

## **BTME602P Energy Conversion-II**

After successful completion of this course the student will be able to:

- CO602P. 1 **Identify** different components of IC engine, type of compressor , VCR system
- CO602P. 2 **Demonstrate** and **Determine** performance of I,C, engine ,compressor and VCR system
- CO602P. 3 **Construct** Heat balance sheet for single/multi cylinder CI and SI engine.
- CO602P. 4 **Apply** Mores Test on Multi cylinder S.I. Engine
- CO602P. 5 **Analyze** the thermodynamic performance of Gas turbine
- CO602P. 6 Develop an ability to optimize future engine designs for specific sets of constraints (fuel economy, performance, emissions)

## **BTME603P Dynamics of Machines**

After successful completion of this course the student will be able to:

- CO602P. 1 Demonstrate the concept of gyroscopic effect through the working model.
- CO602P. 2 Analyze the performance of mechanisms and Perform dynamic force analysis of linkages and cams.
- CO602P. 3 Demonstrate record and interpret data of vibration characteristics of mechanical vibratory systems.
- CO602P. 4 Perform analysis of brakes, dynamometers and flywheels.
- CO602P. 5 Identify the importance of safety, team work and effective communication for conduction of activity.