



**Godavari Foundation's**  
**GODAVARI COLLEGE OF ENGINEERING**  
**AND POLYTECHNIC, JALGAON**

**Semester – III**

**Engineering Mathematics-III (BTES301)**

**Course Outcomes:**

CO1	Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits.
CO2	Solve problems related to Fourier transform, Laplace transform and applications to Communication systems and Signal processing.
CO3	Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-step iterative methods used in modern scientific computing.
CO4	Perform vector differentiation and integration, analyze the vector fields and apply to Electromagnetic fields.
CO5	Analyze conformal mappings, transformations and perform contour integration of complex functions in the study of electrostatics and signal processing.

**FLUID MECHANICS (BTMC302)**

**Course Outcomes:**

CO1	Explain basic properties of fluid, fluid statics, kinematics and dynamics.
CO2	Identify various types of flow, flow patterns and their significance.
CO3	Explain concepts of flow through pipes, boundary layer theory, forces on immersed bodies and dimensionless parameters.
CO4	Derive various equations in fluid mechanics such as Euler's, Bernoulli's, Momentum, Continuity etc.
CO5	Solve the problems related to properties of fluid, fluid kinematics, fluid dynamics, laminar flow, pipe flow, dimensional analysis, boundary layer theory, and forces on immersed bodies.

## **THERMODYNAMICS (BTMC303)**

### **Course Outcomes:**

CO1	Define the terms like system, boundary, properties, equilibrium, work, heat, ideal gas, entropy etc. used in thermodynamics.
CO2	Studied different laws of thermodynamics and apply these to simple thermal systems to study energy balance
CO3	Studied Entropy, application and disorder.
CO4	Studied various types of processes like isothermal, adiabatic, etc. considering system with ideal gas and represent them on p-v and T-s planes.
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.

## **MATERIAL SCIENCE AND METALLURG ( BTMES304)**

### **Course Outcomes:**

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 metallography
CO6	Recommend appropriate NDT technique for a given application

## **MD CAD LAB (BTMCL305)**

### **Course Outcomes:**

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	Represent tolerances and level of surface finish on production drawings
CO5	Understand various creating and editing commands in Auto Cad

## Semester – IV

### **MANUFACTURING PROCESS I (BTMC401)**

#### **Course Outcomes:**

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

### **THEORY OF MACHINE I (BTMC402)**

#### **Course Outcomes:**

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	Introduction of different types of lubrication system.
CO5	Perform kinematic analysis of slider crank mechanism using Klein's construction and analytical approach
CO6	Perform balancing of unbalance forces in rotating masses, different types of single/multi cylinder reciprocating engines in different positions.

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## **BASIC HUMAN RIGHTS (BTHM403)**

### **Course Outcomes:**

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

## **STRENGTH OF MATERIAL (BTMES404)**

### **Course Outcomes:**

CO1	State the basic definitions of fundamental terms such as axial load, eccentric load, stress, strain, E, $\mu$ , principle stresses, etc.
CO2	Analyze the stresses and strain energy in different load cases
CO3	Design the columns based on deflection
CO4	Design a beam based on bending and shafts based on torsion
	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

## **FLUID MACHINERY (BTMPE405C)**

### **Course Outcomes:**

CO1	Understand and apply momentum equation
CO2	Understand and explain Hydrodynamic Machines
CO3	Explain difference between impulse and reaction turbines
CO4	Find efficiencies, draw velocity triangles
CO5	Explain governing mechanisms for hydraulic turbines
CO6	Explain working of various types of pumps, draw velocity diagrams, do simple Calculations
CO7	Design simple pumping systems

## Semester – V

### **HEAT TRANSFER (BTMC501)**

#### **Course Outcomes:**

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	Interpret the extended surfaces
CO3	Illustrate the boundary layer concept, dimensional analysis, forced and free convection under different conditions
CO4	Describe the Boiling heat transfer, Evaluate the heat exchanger and examine the LMTD and NTU methods applied to engineering problems
CO5	Explain the thermal radiation black body, emissivity and reflectivity and evaluation of view factor and radiation shields

### **MACHINE DESIGN I (BTMC502)**

#### **Course Outcomes:**

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

### **THEORY OF MACHINE II (BTMC503)**

#### **Course Outcomes:**

CO1	Identify and select type of belt drive for a particular application
CO2	Evaluate gear tooth geometry and select appropriate gears, gear trains
CO3	Characterize flywheels as per application requirement
CO4	Understand gyroscopic effects in ships, aeroplanes, and road vehicles.
CO5	Understand free and forced vibrations of single degree freedom systems

## **AUTOMOBILE ENGINEERING (BTAPE504D)**

### **Course Outcomes:**

CO1	Identify the different parts of the automobile.
CO2	Explain the working of various parts like engine, transmission, clutch, brakes etc.,
CO3	Demonstrate various types of drive systems; front and rear wheels, two and four wheel drive.
CO4	Apply vehicle troubleshooting and maintenance procedures.
CO5	Analyze the environmental implications of automobile emissions. And suggest suitable regulatory modifications.

## **RENEWABLE ENERGY SOURCES (BTMOE505B)**

### **Course Outcomes:**

CO1	Explain the difference between renewable and non-renewable energy
CO2	Describe working of solar collectors
CO3	Explain various applications of solar energy
CO4	Describe working of other renewable energies such as wind, biomass , nuclear

## **APPLIED THERMODYNAMICS (BTMC506)**

### **Course Outcomes:**

CO1	Define the terms like calorific value of fuel, stoichiometric air-fuel ratio, excess air, equivalent evaporation, boiler efficiency, etc. Calculate minimum air required for combustion of fuel.
CO2	Studied and Analyze gas power cycles and vapour power cycles and derive expressions for the performance parameters like thermal efficiency.
CO3	Classify various types of boilers, nozzle, steam turbine and condenser used in steam power plant.
CO4	Classify various types condenser, nozzle and derived equations for its efficiency.
CO5	Draw P-v diagram for single-stage reciprocating air compressor, with and without clearance volume, and evaluate its performance. Differentiate between reciprocating and rotary air compressors.

## Semester – VI

### **MANUFACTURING PROCESS II (BTMC601)**

#### **Course Outcomes:**

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	Explain the different precision machining processes
CO5	Understanding plastic

### **MACHINE DESIGN II (BTMC602)**

#### **Course Outcomes:**

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.
CO5	Design of elements like gears, belts for given power rating

### **IC ENGINE (BTMPE603A)**

#### **Course Outcomes:**

CO1	Understand various types of I.C. Engines and Cycles of operation.
CO2	Analyze the effect of various operating variables on engine performance
CO3	Identify fuel metering and fuel supply systems for different types of engines
CO4	Understand normal and abnormal combustion phenomena in SI and CI engines
CO5	Evaluate performance Analysis of IC Engine and Justify the suitability of IC Engine for different application
CO6	Understand the conventional and non-conventional fuels for IC engines and effects of emission formation of IC engines, its effects and the legislation standards

## **PRODUCT LIFE CYCLE MANAGEMENT (BTMPE604B)**

### **Course Outcomes:**

CO1	Outline the concept of PLM.
CO2	Illustrate the PDM system and its importance.
CO3	Illustrate the product design process.
CO4	Build the procedure for new product development.
CO5	Classify and compare various technology forecasting methods.
CO6	Outline the stages involved in PLM for a given product.

## **ENERGY CONSERVATION AND MANAGEMENT** **(BTMOE605C)**

### **Course Outcomes:**

CO1	Understand energy problem and need of energy management
CO2	Carry out energy audit of simple units
CO3	Study various financial appraisal methods
CO4	Analyze cogeneration and waste heat recovery systems
CO5	Do simple calculations regarding thermal insulation and electrical energy conservation



## Semester – VII

### **MECHATRONIX (BTMC701)**

#### **Course Outcomes:**

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	Analyse PI, PD and PID controllers for a given application

### **INDUSTRIAL ENGINEERING & MANAGEMENT (BTMC702)**

#### **Course Outcomes:**

CO1	Impart fundamental knowledge and skill sets required in the Industrial Management and Engineering profession, which include the ability to apply basic knowledge of mathematics, probability and statistics, and the domain knowledge of Industrial Management and Engineering
CO2	Produce ability to adopt a system approach to design, develop, implement and innovate integrated systems that include people, materials, information, equipment and energy.
CO3	Understand the interactions between engineering, businesses, technological and environmental spheres in the modern society.
CO4	Select materials and Understand their role as engineers and their impact to society at the national and global context. configuration for machine element like gears.

### **NON-CONVENTIONAL MACHINING (BTMPE703C)**

#### **Course Outcomes:**

CO1	Classify Non-conventional machining processes.
CO2	Understand working principle and mechanism of material removal in various non
CO3	Identify process parameters their effect and applications of different processes.
CO4	Summarized merits and demerits of non-conventional machining processes.
CO5	Explain the mechanism to design hybrid processes such as ELID grinding, EDCG, EDCM,
CO6	Understand mechanism and working principle of micro machining using non-conventional

## **SUSTAINABLE DEVELOPMENT (BTMOE704E)**

### **Course Outcomes:**

CO1	Explain the difference between development and sustainable development
CO2	Explain challenges of sustainable development and climate change
CO3	Explain sustainable development indicators
CO4	Analyze sustainable energy options
CO5	Understand social and economic aspects of sustainable development

## **ENGINEERING ECONOMICS (BTMOE705E)**

### **Course Outcomes:**

CO1	Apply the appropriate engineering economics analysis method(s) for problem solving: present worth, annual cost, rate-of-return, payback, break-even, Benefit-cost ratio.
CO2	Evaluate the cost effectiveness of individual engineering projects using the methods learned and draw inferences for the investment decisions.
CO3	Compare the life cycle cost of multiple projects using the methods learned, and make a quantitative decision between alternate facilities and/or systems.
CO4	Compute the depreciation of an asset using standard Depreciation techniques to assess its impact on present or future value.
CO5	Apply all mathematical approach models covered in solving engineering economics problems: mathematical formulas, interest factors from tables, Excel functions and graphs. Estimate reasonableness of the results.
CO6	Examine and evaluate probabilistic risk assessment methods.
CO7	Compare the differences in economic analysis between the private and public sectors. Recognize the limits of mathematical models for factors hard to quantify.
CO8	Develop and demonstrate teamwork, project management, and professional communications skills

## Semester – VIII

### **FUNDAMENTAL OF AUTOMOTIVE SYSTEM (BTMEC801A)**

#### **Course Outcomes:**

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, and
CO4	Apply concepts learnt in core undergraduate courses to synthesize mathematical models of the various systems.

### **NON CONVENTIONAL ENERGY RESOURCES (BTMEC801F)**

#### **Course Outcomes:**

CO1	Understand of renewable and non-renewable sources of energy
CO2	Gain knowledge about working principle of various solar energy systems
CO3	Understand the application of wind energy and wind energy conversion system
CO4	Develop capability to do basic design of bio gas plant.
CO5	Understand the applications of different renewable energy sources like ocean thermal, hydro, geothermal energy etc.