Fabtech Tecnical Campus
College of Engineering & Research
The Future Begins Here.

Approved by AICTE, New Delhi; DTE, (M.S.), Mumbai & Affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Dist- Raigad & M.S.B.T.E., Mumbai.

DTE CODE- 6756 MSBTE Code-1615

A.Y.:2023-2024
For Graduation Courses
B. Tech in Mechanical Engineering

Course Outcomes (COs)

SEMETER-III **CLASS: S.Y.**

Sr. No.	Subject Name	Course Outcomes
1)	**Engineering Mathematics-III (BTBS301)**	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.
2	**Fluid Mechanics (BTMC302)**	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 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 centrifugal pump.
3	**Thermodynamics (BTMC303)**	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.
4.	**Material Science and Metallurgy(BTMES304)**	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
5.	**Machine Drawing and CAD Lab (BTMCL305)**	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

SEMETER-IV **CLASS: S.Y.**

Sr. No.	Subject Name	Course Outcomes
1.	**Manufacturing Processes-I (BTMC401)**	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
2.	**Theory of Machines- I (BTMC402)**	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.

3.	**Basic Human Rights (BTHM403)**	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
4.	**Strength of Materials (BTMES404)**	CO1 State the basic definitions of fundamental terms such as axial load, eccentric load, stress, strain, E, μ, 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 CO5 Analyze given beam for calculations of SF and BM CO6 Calculate slope and deflection at a point on cantilever /simply supported beam using double integration, Macaulay's , Area-moment and superposition methods
5	**Sheet Metal Engineering (BTMPE405B)**	CO1 Recognize common manufacturing processes of Sheet Metal Fabrication CO2 Understand the principles of design and fabricate of sheet metal products and recognize common material used in the industry CO3 Distinguish Shearing, Drawing and Pressing etc. processes. CO4 Know types of dies and formability. CO5 Select mechanical or hydraulic presses for the given process

SEMETER-V **CLASS: T.Y.**

Sr. No.	**Subject Name**	**Course Outcomes**
1.	**Heat Transfer**	CO1 Explain the laws of heat transfer and deduce

	(BTMC 501)	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, 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
2.	**Machine Design – I (BTMC 502)**	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
3.	**(Theory of Machines – II) BTMC 503**	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, aero

		planes, and road vehicles. CO6 Understand free and forced vibrations of single degree freedom systems
4.	**Automobile Engineering (BTAPE504D)**	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.)5 Analyze the environmental implications of automobile emissions. And suggest suitable regulatory modifications.
5.	**Renewable Energy Sources(BTMOE505B)**	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
6.	**Applied Thermodynamics(BTMC506)**	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.
7.	**Mechanical Engineering Lab – III (BTMCL 507)**	CO1 Understand the various heat transfer mode of heat transfer and its application and verify CO2 Learn the experimental methodology

		CO3 Explain various types of gear boxes, gear trains, belt and rope drives CO4 Interpreting physical principles and phenomenon of governor, gyroscopic, flywheel CO5 Apply design process to an open ended problem CO6 Determine suitable material and size for structural component of machine/system
8.	**IT – 2 Evaluation(BTMI408)**	CO1 To make the students aware of industrial culture and organizational setup CO2 To create awareness about technical report writing among the student.

SEMETER-VI **CLASS: T.Y.**

1.	**Manufacturing Processes - II (BTMC 601)**	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 Understanding plastic
2.	**Machine Design – II (BTMC602)**	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
3.	**IC Engines (BTMPE603A)**	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
4.	**Robotics (BTMPE604D)**	CO1 List the various components of a typical Robot, grippers, sensors, drive system and describe their functions CO2 Calculate the word to joint and joint to word coordinates using forward and reverse transformations CO3 Calculate the gripper forces, drive sizes, etc. CO4 Develop simple robot program for tasks such as pick and place, arc welding, etc. using some robotic language such as VAL-II, AL, AML, RAIL, RPL, VAL CO5 Evaluate the application of robots in applications such as Material Handling, process operations and Assembly and inspection CO6 Discuss the implementation issues and social aspects of robotics
5.	**Energy Conservation and Management(BTMOE605C)**	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
6.	**Mechanical Engineering Lab – IV**	CO1 Apply design process to an open ended problems CO2 Determine suitable material and size for structural component of machine/system CO3 Conduct test on IC Engines to study their performance.

		CO4 Draw performance curves of these machines/systems
7.	**B. Tech Seminar(BTMS607)**	CO1 To expose and make students aware with latest research and research publications CO2 To understand the research and research publication, references, citation CO3 To enhance the presentation skill CO4 To enhance the report writing CO5 To make the student aware about research publication sites
8.	**Mini Project (BTAP608)**	CO1Visit 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

SEMETER-VII **CLASS: B.TECH**

Sr. No.	Subject Name	Course Outcomes
1)	**Mechatronics (BTMC701)**	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

2)	**Industrial Engineering and Management (BTHM702)**	CO1 Impart fundamental knowledge and skill sets required in the Industrial Management and Engineering profession, which include the ability to apply basic knowledge ofmathematics, probability and statistics, and the domain knowledge of IndustrialManagement and Engineering CO2 Produce ability to adopt a system approach to design, develop, implement and innovate. C03 Understand the interactions between engineering, businesses, technological and environmental spheres in the modern society. CO4 Understand their role as engineers and their impact to society at the national and global context.
3)	**Advanced IC Engines (BTMPE703D)**	CO1 Define and Distinguish between Spark ignition and Compression ignition system. Describe Air- fuel supply systems in ic engines. CO2 Identify and Demonstrate normal and abnormal combustion in combustion chambers of IC engines. According to which able to analyse and Design combustion chambers. CO3 Recognize and discuss engine emissions formation, effects and various methods to reduce emissions and their measuring equipment's. CO4 Understand combustion and emission characteristics of an alternative energy sources and suggest appropriate applications of alternative fuels such as bio diesels, natural gas, LPG, hydrogen, etc. and their Engine modifications for using these fuels. CO5 Apply and interpret with the recent trends IC engine techniques such as HCCI, CRDI, GDI, etc. with latest measuring equipments
4)	**Entrepreneurship Development (BTMOE704B)**	CO1 enlarge the supply of entrepreneurs for rapid industrial development CO2 Develop small and medium enterprises sector which is necessary for generation of

		employment CO3 Industrialize rural and backward regions CO4 Provide gainful self-employment to educated young men and women CO5 Diversify the sources of entrepreneurship.
5)	**Intellectual Property Rights**	CO1 State the basic fundamental terms such as copyrights, Patents, Trademarks etc., CO2 Interpret Laws of copy-rights, Patents, Trademarks and various IP registration Processes. CO3 Exhibit the enhance capability to do economic analysis of IP rights, technology and innovation related policy issues and firms commercial strategies. CO4 Create awareness at all levels (research and innovation) to develop patentable technologies. CO5 Apply trade mark law, copy right law, patent law and also carry out intellectual property audits. CO6 Manage and safeguard the intellectual property and protect it against unauthorized use.

SEMETER-VIII **CLASS: B.TECH**

Sr. No.	**Subject Name**	Course Outcomes
1)	**Project /Internship (BTMP801/ BTMI801)**	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
2	**Fundamentals of Automotive Systems (BTMEC801A)**	CO1. Acquire fundamental knowledge of the various systems of an automobile, CO2. Associate the functions of each system with its design and layout, depict the various systems using simple schematics, and apply concepts learnt in core undergraduate courses to synthesize mathematical models of the various systems.

3	**Non-Conventional Energy Resources(BTMEC801F)**	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. Understand The Applications Of Different Renewable Energy Sources Like Biomass, Geothermal Energy Etc. CO5. Understand The Various Energy Storage Systems

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