CSMSS

Chhatrapati Shahu Maharaj Shikshan Sanstha's

CHH. SHAHU COLLEGE OF ENGINEERING

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Approved by AICTE New Delhi, DTE (Govt. of Maharashtra) and affiliated to Dr. BATU, Lonere (Raigad). **DTE Code: 2533**

Department of Mechanical Engineering

A.Y. 2023-24

Semester	Subject Code	Name of subject	Co No.	Course outcomes
III	BTBS301	Engineering Mathematic -III	1	Students will be able to solve higher order linear differential equation using appropriate techniques for modeling andanalyzing electrical circuits.
			2	Students will be able to solve problem related to Fourier transform and application to communication systems and signal processing.
			3	Students will be able to obtain interpolating polynomials, numerically differentiate and integrate functions, numericalsolutions of differential equations using single step and multi-step iterative methods used in modern scientific computing.
			4	Students will be able to perform vector differentiation and integration, analyze the vector fields and apply to electromagnetic fields.
			5	Students will be able to analyze conformal mappings, transformations and perform contour integration of complex functions in the study of electrostatics and signal processing.
III	BTMC302	Fluid Mechanics	1	Students will be able to define fluid properties and principles of fluid statics, including viscosity, surface tension, Pascal's law, and hydrostatic pressure.
			2	Students will be able to define continuity and Bernoulli's equations and use them to analyze fluid flow in devices such as pitot tubes and Venturimeters.
			3	Students will be able to compare laminar and turbulent flow characteristics in pipes and evaluate energy losses using Darcy's and Chezy's equations.
			4	Students will be able to solve problems related to forces on immersed bodies and boundary layer theory.
			5	Students will be able to examine dimensional analysis methods to derive dimensionless numbers and ensure dimensional homogeneity
III	BTMC303	Thermodynamics	1	Students will be able to define key terms related to thermodynamic system, work and heat transfer.
			2	Students will be able to explain the different laws of thermodynamics and discuss their application to simple thermal systems.

			3	Students will be able to illustrate the concept of entropy and its relation to disorder, including its practical applications.
			4	Students will be able to examine various types of thermodynamic processes, such as isothermal and adiabatic, for systems involving ideal gases, and represent these processes on p-v and t-s diagrams.
			5	Students will be able to construct phase diagrams of pure substances (such as steam) on different thermodynamic planes (e.g., p-v, t-s, h-s), and plot various constant property lines on these diagrams.
III	BTMES304	Materials science and metallurgy	1	Students will be able to analyze the structure of materials at different levels and understand concept of mechanical behavior of materials and calculations of same using appropriate equations
			2	Students will be able to explain the concept of phase and phase diagram and understand the basic terminologies associated with metallurgy.
			3	Students will be able to Understand and suggest the heat treatment process and Suggest appropriate heat treatment process for a given application.
			4	Students will be able to Prepare samples of different materials for metallography.
			5	Students will be able to Understand the strengthening mechanisms and suggest appropriateNDT technique.
III	BTMCL305	Machine Drawing and Cad Lab	1	Students will be able to interpret the object with the help of given sectional and orthographic views.
			2	Students will be able to construct the curve of intersection of two solids
			3	Students will be able to draw machine element using keys, cotter, knuckle ,bolted and welded joints
			4	Students will be able to assemble details of any given parts i.e. Valve. Pumps, machine tool parts etc.
			5	Students will be able to represent tolerances and level of surface finish on production drawing
			6	Students will be able to explain different types of 2D and 3D commands.

III	BTMCL306	Mechanical Engineering Lab-I	1	Students will be able to evaluate bernoulli's theorem
			2	Students will be able to determine critical reynolds number using reynolds apparatus
			3	Students will be able to determine viscosity using viscometer
			4	Students will be able to determine brinell hardness and rockwell hardness number
			5	Students will be able to study microstructures of cast irons
			6	Students will be able to study microstructures of non-ferrous alloys
IV	BTMC401	Manufacturing Process-I	1	Student will be able to Identify castings processes and its working principles.
			2	Student will be able to Select various metal forming processes.
			3	Student will be able to Classify the basic joining processes.
			4	Student will be able to describe center lathe and its operations.
			5	Student will be able to Explain milling machines operations and cutting Tool.
			6	Students will be able to compare shaping, planning and drilling machines and its operations
IV	BTMC402	Theory of Machine-I	1	Students will be able to define basic terms related to kinematics of mechanisms
			2	Students will be able to perform kinematic analysis of a given mechanism using icr and rv methods
			3	Students will be able to explain terms related to friction and lubrication
			4	Students will be able to explain clutch, brakes and dynamometers
			5	Students will be able to draw cam profile for given follower motion
IV	BTMC403	Basic Human Rights	1	Students will be able to analyze an understanding of human rights in global and national perspective
			2	Students will be able to explain the issues concerned with human rights. of migrant workers and disabled people
			3	Students will be able to describe Land water and forest issues and role of NGO for it in Human rights context
			4	Students will be able to apply Human rights from Constitution of India
			5	Students will be able to interpret Universal declaration of human rights

IV	BTMES404	Strength of Materials	1	Students will be able to state the basic definitions of fundamental terms such as axial load, eccentric load, stress, strain, e, principle stresses, etc.
			2	Students will be able to analyze the stresses and strain energy in different load cases and also able to design the columns based on deflection
			3	Students will be able to design a beam based on bending, shear and shafts based on torsion
			4	Students will be able to analyze given beam for calculations of shear force and bending moment
			5	Students will be able to calculate slope and deflection at a point on cantilever /simply supported beam using double integration, area-moment and superposition methods
IV	BTMPE405 B	Sheet Metal Engineering	1	Students will be able to describe materials used for sheet metal product.
			2	Students will be able to differentiate blanking & piercing operation.
			3	Students will be able to compare shallow & deep drawing Process.
			4	Students able to select mechanical & hydraulic press for the given process.
			5	Students will be able to write case study for given sheet metal product.
IV	BTMCL406	Mechanical Engineering Lab-II	1	Perform plain turning, step turning, knurling, eccentric turning, chamfering and facing operations on lathe.
			2	Prepare setup and fabricate composite job using milling, shaping and drilling machine
			3	Perform graphically kinematic analysis of any planar mechanism using icr and rv methods.
			4	Perform graphically kinematic analysis of slider crank mechanism using klein's construction.
			5	To perform tensile test on universal machine
V	BTMC 501	Heat Transfer	1	Students will be able to define the important modes of heat transfer and state their applications
			2	Students will be able to apply the general one and three dimensional heat conduction equations for steady state with and without heat generation
			3	Students will be able to analyze the heat transfer rate in natural and forced convection and evaluate through experimentation investigation
			4	Students will be able to discuss the radioactive heat transfer between different surfaces
			5	Students will be to evaluate the thermal design performance of various Heat Exchangers.
V	BTMC 502		1	Students will be able to explain traditional and modern design methods, including ISO 9000 standards, and integrate aesthetic and ergonomic considerations into design.

		Machine Design – I	2	Students will be able to explain theories of failure and use these theories to design machine elements such as cotter and knuckle joints under static loading conditions.
			3	Students will be able to explain stress concentration and fatigue failure, and use Soderberg and Goodman diagrams to design components subjected to fluctuating loads.
			4	Students will be able to design transmission shafts, keys, and couplings, considering factors such as strength, rigidity, and compliance with ASME code standards.
			5	Students will be able to explain different types of joints and design threaded joints, mechanical springs, power screws, and welded joints.
V	BTMC 503	Theory of Machines-II	1	Students will be able to explain the terms related to belt and rope drive and their applications in engineering.
			2	Students will be able to explain the terms related to toothed gear and their applications in engineering.
			3	Student will be able to calculate velocity ratio for given gear train
			4	Students will able to explain gyroscopic effects in ships, aero planes, and road vehicles.
			5	Students will be able to solve numerical on free and forced vibrations of single degree freedom Systems
V	BTAPE504D	Automobile Engineering	1	Students will be able to identify the different parts of the automobile.
			2	Students will be able to explain the working of various parts like Steering Systems and Suspension Systems
			3	Students will be able to identify and demonstrate various types of clutch, gear box and different drive systems; front and rear wheels, two and four wheel drive
			4	Students will be able to identify and explain various types of brake system, wheels and tyres in automobile
			5	Students will be able to analyze the environmental implications of automobile emissions and also able to apply vehicle troubleshooting and maintenance procedure and identify and explain electrical system in vehicles

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V	BTMC506	Applied Thermodynamics	1	Students will be able to define key terms used in fuels and combustion and calculate the air required for the combustion of fuel.
			2	Students will be able to classify the different types of boilers and boiler draught and select them for different applications based on performance.
			3	Students will be able to explain and analyze gas power cycles, steam nozzle and vapor power cycles, and derive expressions for performance parameters.
			4	Students will be able to classify various types of condensers and nozzles, and derive equations related to their efficiency.
			5	Students will be able to construct p-v diagrams for single-stage reciprocating air compressors, with and without clearance volume, evaluate their performance, and differentiate between reciprocating and rotary air compressors.
V	BTMOE505B	Renewable energy sources	1	Students will be able to Recall basic concepts of solar energy.
			2	Students will be able to explain the different types of solar collectors.
			3	Students will be able to Identify various applications of solar energy
			4	Students will be able to differentiate wind, biomass energies
			5	Students will be able to Compare the other renewable energy sources such as OTEC, Tidal, Geo-thermal, hydro-electric and Nuclear Energy.
V	BTMCL507	Mechanical Engineering Lab-III	1	Apply the general one and three dimensional heat conduction equations for steady state with and without heat generation.
			2	Analyze the heat transfer rate in natural and forced convection and evaluate through experimentation investigation.
			3	Students will be able to apply design principles to calculate the dimensions of machine component, and compile these calculations into a design report for practical application.
			4	Student will be able to analyze component behavior subjected to loads & identify failure criteria.
			5	Students will able to understand gear theory to design various gear trains and gear box.
			6	Students will able to demonstrate the kinematics of cams and followers, flywheel, governors, and their characteristics and also design cams and followers for specified motion profiles.

VI	BTMC 601	Manufacturing processes- II	1	Students will be able to explain the abrasive machining process and its parameters and grindability of the materials.
			2	Students will be able to describe the cutting tool geometry and apply its effect on the various machining performance parameters.
			3	Students will be able to apply a cutting tool material for a specific application with reference to tool wear, cutting forces and temperature generation during cutting process.
			4	Students will be able to illustrate the applications of powder metal processing using basic Knowledge of powder metallurgy.
			5	Students will be able to describe the ceramic, glass and plastic processing and strengthening techniques to meet the specific application requirement.
VI	BTMC 602	Machine Design-II	1	Students will be able to define rolling contact bearings and choose appropriate ones from a manufacturer's catalogue for specific applications.
			2	Students will be able to describe failure theories and design spur and helical gears suitable for industrial applications.
			3	Students will be able to design bevel gears and worm gears for various industrial applications.
			4	Students will be able to select suitable belt and chain drives, and design flywheels while accounting for stresses and power requirements.
			5	Students will be able to differentiate between clutches and brakes and design these components for automotive applications.
VI	BTMPE603A	IC Engines	1	Students will be able to describe various types of I.C. Engines and its operation.
			2	Students will be able to compare normal and abnormal combustion phenomena and the combustion process in SI and CI engines.
			3	Students will be able to understand the various engine systems and analyze the effect of various operating variables on engine performance.
			4	Students will able to explain various alternative fuel and recent trends in I.C. engine
			5	Students will be able to Classify the different configurations of electric vehicles and Hybrid vehicles.

VI	BTMPE604D	Robotics	1	Students will be able to explain various components used in robotics systems and related terms like work envelope, configuration etc.
			2	Students will be able to calculate joint and word coordinates using forward and inverse transformations.
			3	Students will able to explain construction and working of drives used in robotics.
			4	Students will able to explain construction and working of sensors and end effectors used in robotics.
			5	Students will be able to write a robot program using various programming languages.
			6	Students will be able discuss implementation issues and social aspects of robotics along with robotics application
VI	BTMOE605C	Energy conservation and management	1	Students will be able to describe energy problem and need of energy management
			2	Students will be able to Illustrate energy audit of simple units
			3	Students will be able to Choose various financial appraisal methods
			4	Students will be able to Examine cogeneration, heating, Insulation and waste heat recovery systems.
			5	Students will be able to Predict Energy Conservation in Electric Utility and Industry.
VI	BTMCL606	Mechanical Engineering Lab-IV	1	Students will be able to analyze the importance of process parameters in metal cutting operations.
			2	Students will be able to develop CNC program using G-code and M-code.
			3	Students will be able to analyze the design requirements of machine components and assemblies for practical applications.
			4	Students will be able to design a complex assembly and individual component drawings using CAD tools and present a detailed design report with calculations.
			5	Students will be able to demonstrate different types of Boilers.
			6	Students will be able to take trail on single & two stage reciprocating compressor.

VII	BTMEC701	Mechatronics	1	Students will be able to explain working of various sensors used in mechatronics systems and their applications in engineering.
			2	Students will be able to explain signal conditioning & data representation techniques
			3	Students will able to design pneumatic and hydraulic circuits for a given application
			4	Students will be able to write a plc program using ladder logic for a given application
			5	Students will be able to apply block diagram reduction techniques in order to find a transfer function for a given system using.
			6	Students will be able to solve problems related to control systems by using the analytical skills.
VII	BTMOE704B	Entrepreneurship Development	1	Students will be able to associate with rapid industrial development and discover entrepreneurship opportunities
			2	Students will be able to develop small and medium enterprises sector which is necessary for generation of employment
			3	Students will be able to predict potential of rural and backward regions for industrialization
			4	Students will be able to develop gainful self-employment to educated young men and women
			5	Students will be able to select the sources of entrepreneurship
VII	BTMPE703C	Non-Conventional Machining	1	Students will be able to Classify non-conventional machining processes
			2	Students will be able to compare working principle and mechanism of material removal in various nonconventional machining processes.
			3	Students will be able to Identify vaious process parameters and their effect on different materials.
			4	Students will be able to explain merits and demerits of non-conventional machining processes
			5	Students will be able to describe different parts of non-conventional machines.
			6	Students will be able to understand mechanism and working principle of micro machining using non-conventional processes.
VII	BTMEC705B	Intellectual Property Rights	1	Students will be able to state the basic fundamental terms such as copyrights, patents, trademarks etc.,
			2	Students will be able to interpret laws of copy-rights, patents, trademarks and various ip registration processes.

			3	Students will be able to exhibit the enhance capability to do economic analysis of ip rights, technology and innovationrelated policy issues and firms commercial strategies.
			4	Students will be able to create awareness at all levels (research and innovation) to develop patentable technologies.
			5	Students will be able to apply trade mark law, copy right law, patent law and also carry out intellectual property audits
			6	Students will be manage and safeguard the intellectual property and protect it against unauthorized use
VII	BTMEC704	Industrial Engineering and Management	1	Students will be able to explain the historical development of management theories and apply fundamentalprinciples of planning and organizing to real-world scenarios.
			2	Students will be able to describe human resource management strategies that enhance organizationalperformance and employee satisfaction.
			3	Students will be able to classify various production and operations management systems and apply them to enhancecorporate profitability and competitiveness.
			4	Students will be able to apply operational systems for maximum efficiency and effectiveness.
			5	Students will be able to describe the historical development of industrial engineering and apply key principles toimprove workplace efficiency.
			6	Apply ergonomic principles to design safer and more efficient work environments.
VII	BTMCL706	Mechanical Engineering Lab-V	1	Students will be able to demonstration of various types of sensors.
			2	Students will be able to perform speed control of various types of electrical motors.
			3	Students will be able to develop pneumatics circuits on pneumatic trainer kit.
			4	Students will be able to develop electro-pneumatics circuits on electro-pneumatic trainer kit.
			5	Students will be able to develop hydraulic circuits on hydraulic trainer kit.
			6	Students will be able to perform programming plc for given task.

			3	Students will be able to exhibit the enhance capability to do economic analysis of ip rights, technology and innovationrelated policy issues and firms commercial strategies.
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			2	Students will be able to describe human resource management strategies that enhance organizationalperformance and employee satisfaction.
			3	Students will be able to classify various production and operations management systems and apply them to enhancecorporate profitability and competitiveness.
			4	Students will be able to apply operational systems for maximum efficiency and effectiveness.
			5	Students will be able to describe the historical development of industrial engineering and apply key principles toimprove workplace efficiency.
			6	Apply ergonomic principles to design safer and more efficient work environments.
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			2	Students will be able to perform speed control of various types of electrical motors.
			3	Students will be able to develop pneumatics circuits on pneumatic trainer kit.
			4	Students will be able to develop electro-pneumatics circuits on electro-pneumatic trainer kit.
			5	Students will be able to develop hydraulic circuits on hydraulic trainer kit.
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VIII	BTMEC801A	Fundamentals of Automotive System	1	Students will be able to describe fundamental knowledge of the various systems of an automobile.
			2	Students will be able to Associate the functions of each system with its design and layout
			3	Students will be able to demonstrate the various systems using simple schematics
			4	Students will be able to Apply concepts learnt in core undergraduate courses to synthesize mathematical models of the various systems.
			5	Students will be able to explain Hybrid powertrains
VIII	BTMEC801F	Non-Conventional Energy Resources	1	Students will be able to recall the Importance of non-conventional energy resources over conventional resources of energy.
			2	Students will be able to demonstrate the schematics of non-conventional energy resources The advantages and limitations of these technologies in comparison to conventional sources of energy will also be examined.
			3	Students will be able to identify the solar energy, Utilization of it, Principles involved in solar energy collection and conversion of it to electricity generation.
			4	Students will be able to examine the technologies involved in Solar energy, Wind, Batteries, Fuel cells, and Geothermal conversion.
			5	Students will be able to Examine The technologies involved in Solar energy, Wind, Batteries, Fuel cells, and Geothermal conversion.

C.S.M.S.S.Chh. Shahu College of Engineering * Dept. of Mechanical Engg. *

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