

Brahma Valley college of engineering and Research Institute, Nashik
Department of Mechanical Engineering
Course outcomes

Year	Course Name	Course Outcome No.	Course Outcome
	202041 - Solid Mechanics	CO1	DEFINE various types of stresses and strain developed on determinate and indeterminate members.
		CO2	DRAW Shear force and bending moment diagram for various types of transverse loading and support
		CO3	COMPUTE the slope & deflection, bending stresses and shear stresses on a beam.
		CO4	CALCULATE torsional shear stress in shaft and buckling on the column.
		CO5	APPLY the concept of principal stresses and theories of failure to determine stresses on a 2-D element
		CO6	UTILIZE the concepts of SFD & BMD, torsion and principal stresses to solve combined loading application based problems.
	202042 - Solid Modeling and Drafting	CO1	UNDERSTAND basic concepts of CAD system, need and scope in Product Lifecycle Management
		CO2	UTILIZE knowledge of curves and surfacing features and methods to create complex solid geometry
		CO3	CONSTRUCT solid models, assemblies using various modeling techniques & PERFORM mass property analysis, including creating and using a coordinate system
		CO4	APPLY geometric transformations to simple 2D geometries
		CO5	USE CAD model data for various CAD based engineering applications viz. production drawings, 3D printing, FEA, CFD, MBD, CAE, CAM, etc.
		CO6	USE PMI & MBD approach for communication
	202043 - Engineering Thermodynamics	CO1	DESCRIBE the basics of thermodynamics with heat and work interactions
		CO2	APPLY laws of thermodynamics to steady flow and non-flow processes
		CO3	APPLY entropy, available and non-available energy for an Open and Closed System
		CO4	DETERMINE the properties of steam and their effect on performance of vapour power cycle
		CO5	ANALYSE the fuel combustion process and products of combustion.
		CO6	SELECT various instrumentations required for safe and efficient operation of steam generator
	202044 - Engineering Materials and Metallurgy	CO1	COMPARE crystal structures and ASSESS different lattice parameters.
		CO2	CORRELATE crystal structures and imperfections in crystals with mechanical behaviour of materials
		CO3	DIFFERENTIATE and DETERMINE mechanical properties using destructive and non-destructive testing of materials.
		CO4	IDENTIFY & ESTIMATE different parameters of the system viz., phases, variables, component, grains, grain boundary, and degree of freedom, etc.
		CO5	ANALYSE effect of alloying element & heat treatment on properties of ferrous & nonferrous alloy.
		CO6	SELECT appropriate materials for various applications.
203156 - Electrical and Electronics Engineering	CO1	APPLY programming concepts to UNDERSTAND role of Microprocessor and Microcontroller in embedded systems	
	CO2	DEVELOP interfacing of different types of sensors and other hardware devices with Atmega328 based Arduino Board	
	CO3	UNDERSTAND the operation of DC motor, its speed control methods and braking.	
	CO4	DISTINGUISH between types of three phase induction motor and its characteristic features	
	CO5	EXPLAIN about emerging technology of Electric Vehicle (EV) and its modular subsystems	
	CO6	CHOOSE energy storage devices and electrical drives for EVs	
202045 - Geometric Dimensioning and Tolerancing Lab	CO1	SELECT appropriate IS and ASME standards for drawing	
	CO2	READ & ANALYSE variety of industrial drawings	
	CO3	APPLY geometric and dimensional tolerance, surface finish symbols in drawing	
	CO4	EVALUATE dimensional tolerance based on type of fit, etc.	
	CO5	SELECT an appropriate manufacturing process using DFM, DFA, etc	
		CO1	SOLVE higher order linear differential equations and its applications to model and analyze mass spring systems




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SE	207002 - Engineering Mathematics - III	CO2	APPLY Integral transform techniques such as Laplace transform and Fourier transform to solve differential equations involved in vibration theory, heat transfer and related mechanical engineering applications
		CO3	APPLY Statistical methods like correlation, regression in analyzing and interpreting experimental data applicable to reliability engineering and probability theory in testing and quality control
		CO4	PERFORM Vector differentiation & integration, analyze the vector fields and APPLY to fluid flow problems
		CO5	SOLVE Partial differential equations such as wave equation, one and two dimensional heat flow equations
	202047 - Kinematics of Machinery	CO1	APPLY kinematic analysis to simple mechanisms
		CO2	ANALYZE velocity and acceleration in mechanisms by vector and graphical method
		CO3	SYNTHESIZE a four bar mechanism with analytical and graphical methods
		CO4	APPLY fundamentals of gear theory as a prerequisite for gear design
		CO5	CONSTRUCT cam profile for given follower motion
	202048 - Applied Thermody namics	CO1	DETERMINE COP of refrigeration system and ANALYZE psychrometric processes.
		CO2	DISCUSS basics of engine terminology, air standard, fuel air and actual cycles.
		CO3	IDENTIFY factors affecting the combustion performance of SI and CI engines.
CO4		DETERMINE performance parameters of IC Engines and emission control	
CO5		EXPLAIN working of various IC Engine systems and use of alternative fuels.	
CO6		CALCULATE performance of single and multi-stage reciprocating compressors and DISCUSS rotary positive displacement compressors	
202049 - Fluid Mechanics	CO1	DETERMINE various properties of fluid	
	CO2	APPLY the laws of fluid statics and concepts of buoyancy	
	CO3	IDENTIFY types of fluid flow and terms associated in fluid kinematics	
	CO4	APPLY principles of fluid dynamics to laminar flow	
	CO5	ESTIMATE friction and minor losses in internal flows and DETERMINE boundary layer formation over an external surface	
	CO6	CONSTRUCT mathematical correlation considering dimensionless parameters, also ABLE to predict the performance of prototype using model laws	
202050 - Manufac turing Processes	CO1	SELECT appropriate moulding, core making and melting practice and estimate pouring time, solidification rate and DESIGN riser size and location for sand casting process	
	CO2	UNDERSTAND mechanism of metal forming techniques and CALCULATE load required for flat rolling	
	CO3	DEMONSTRATE press working operations and APPLY the basic principles to DESIGN dies and tools for forming and shearing operations	
	CO4	CLASSIFY and EXPLAIN different welding processes and EVALUATE welding characteristics	
	CO5	DIFFERENTIATE thermoplastics and thermosetting and EXPLAIN polymer processing techniques	
	CO6	UNDERSTAND the principle of manufacturing of fibre-reinforce composites and metal matrix composites	
202051 - Machine Shop	CO1	PERFORM welding using TIG/ MIG/ Resistance/Gas welding technique	
	CO2	MAKE Fibre-reinforced Composites by hand lay-up process or spray lay-up techniques	
	CO3	PERFORM cylindrical/surface grinding operation and CALCULATE its machining time	
	CO4	DETERMINE number of indexing movements required and acquire skills to PRODUCE a spur gear on a horizontal milling machine	
	CO5	PREPARE industry visit report	
	CO6	UNDERSTAND procedure of plastic processing	
202052 - Project Based Learning - II	CO1	IDENTIFY the real-world problem (possibly of interdisciplinary nature) through a rigorous literature survey and formulate / set relevant aims and objectives	
	CO2	ANALYZE the results and arrive at valid conclusions.	
	CO3	PROPOSE a suitable solution based on the fundamentals of mechanical engineering by possibly integration of previously acquired knowledge	
	CO4	CONTRIBUTE to society through proposed solutions by strictly following professional ethics and safety measures.	
	CO5	USE of technology in proposed work and demonstrate learning in oral and written form.	
	CO6	DEVELOP ability to work as an individual and as a team member.	



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302041: Numerical and Statistical Methods	CO1	SOLVE system of equations using direct and iterative numerical methods.
	CO2	ESTIMATE solutions for differential equations using numerical techniques
	CO3	DEVELOP solution for engineering applications with numerical integration.
	CO4	DESIGN and CREATE a model using a curve fitting and regression analysis.
	CO5	APPLY statistical Technique for quantitative data analysis.
	CO6	DEMONSTRATE the data, using the concepts of probability and linear algebra.
302042: Heat and Mass Transfer	CO1	ANALYZE & APPLY the modes of heat transfer equations for one dimensional thermal system.
	CO2	DESIGN a thermal system considering fins, thermal insulation and & Transient heat conduction
	CO3	EVALUATE the heat transfer rate in natural and forced convection & validate with experimentation results.
	CO4	INTERPRET heat transfer by radiation between objects with simple geometries, for black and grey surfaces
	CO5	ABILITY to analyze the rate of mass transfer using Fick's Law of Diffusion and understands mass diffusion in different coordinate systems.
	CO6	DESIGN & ANALYSIS of heat transfer equipment's and investigation of its performance.
302043: Design of Machine Elements	CO1	DESIGN AND ANALYZE the cotter and knuckle Joints, levers and components subjected to eccentric loading
	CO2	DESIGN shafts, keys and couplings under static loading conditions.
	CO3	ANALYZE different stresses in power screws and APPLY those in the procedure to design screw jack.
	CO4	EVALUATE dimensions of machine components under fluctuating loads.
	CO5	EVALUATE & INTERPRET the stress developed on the different type of welded and threaded joints
	CO6	APPLY the design and development procedure for different types of springs.
302044: Mechatron ics	CO1	DEFINE key elements of mechatronics, principle of sensor and its characteristics.
	CO2	UTILIZE concept of signal processing and MAKE use of interfacing systems such as ADC, DAC, Digital I/O.
	CO3	DETERMINE the transfer function by using block diagram reduction technique.
	CO4	EVALUATE Poles and Zero, frequency domain parameter for mathematical modeling for mechanical system
	CO5	APPLY the concept of different controller modes to an industrial application.
	CO6	DEVELOP the ladder programming for industrial application
302045- Advanced Forming & Joining Processes	CO1	ANALYSE the effect of friction in metal forming deep drawing and IDENTIFICATION of surface defects and their remedies in deep drawing operations
	CO2	ASSESS the parameters for special forming operation and SELECT appropriate special forming operation for particular applications
	CO3	ANALYSE the effect of HAZ on microstructure and mechanical properties of materials
	CO4	CLASSIFY various solid state welding process and SELECT suitable welding processes for particular applications
	CO5	CLASSIFY various advanced welding process and SELECT suitable welding processes for particular applications
	CO6	INTERPRET the principles of sustainable manufacturing and its role in manufacturing industry
302045- Machining Science & Technolo gy	CO1	DEFINE metal cutting principles and mechanics of metal cutting and tool life.
	CO2	DESCRIBE features of gear and thread manufacturing processes.
	CO3	SELECT appropriate grinding wheel and demonstrate the various surface finishing processes
	CO4	SELECT appropriate jigs/fixtures and to draw the process plan for a given component
	CO5	SELECT & EVALUATE various parameters of process planning
	CO6	GENERATE CNC program for Turning / Milling processes and generate tool path using CAM software
302046: Digital Manufactu ring Laborator y	CO1	DEVELOP a component using conventional machines, CNC machines and Additive Manufacturing Techniques
	CO2	ANALYZE cutting tool parameters for machining given job
	CO3	DEMONSTRATE simulation of manufacturing process using Digital Manufacturing Tools
	CO4	SELECT and DESIGN jigs and Fixtures for a given component
	CO5	DEMONSTRATE different parameters for CNC retrofitting and reconditioning





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302047: Skill Development	CO1	APPLY & DEMONSTRATE procedure of assembly & disassembly of various machines.
	CO2	DESIGN & DEVELOP a working/model of machine parts or any new product.
	CO3	EVALUATE fault with diagnosis on the machines, machine tools and home appliances.
	CO4	IDENTIFY & DEMONSTRATE the various activities performed in an industry such as maintenance, design of components, material selection.
302049: Artificial Intelligence & Machine Learning	CO1	DEMONSTRATE fundamentals of artificial intelligence and machine learning
	CO2	APPLY feature extraction and selection techniques.
	CO3	APPLY machine learning algorithms for classification and regression problems.
	CO4	DEVISE AND DEVELOP a machine learning model using various steps.
	CO5	EXPLAIN concepts of reinforced and deep learning
	CO6	SIMULATE machine learning model in mechanical engineering problems.
302050: Computer Aided Engineering	CO1	DEFINE the use of CAE tools and DESCRIBE the significance of shape functions in finite element formulations
	CO2	APPLY the various meshing techniques for better evaluation of approximate results.
	CO3	APPLY material properties and boundary condition to SOLVE 1-D and 2-D element stiffness matrices to obtain nodal or elemental solution.
	CO4	ANALYZE and APPLY various numerical methods for different types of analysis.
	CO5	EVALUATE and SOLVE non-linear and dynamic analysis problems by analyzing the results obtained from analytical and computational method
	CO6	GENERATE the results in the form of contour plot by the USE of CAE tools.
302051: Design of Transmission Systems	CO1	APPLY the principle of Spur & Helical gear design for industrial application and PREPARE a manufacturing drawing with the concepts of GD&T.
	CO2	EXPLAIN and DESIGN Bevel & Worm gear considering design parameters as per design standards
	CO3	SELECT & DESIGN Rolling and Sliding Contact Bearings from manufacturer's catalogue for a typical application considering suitable design parameters.
	CO4	DEFINE and DESIGN various types of Clutches, Brakes, used in automobile.
	CO5	APPLY various concept to DESIGN Machine Tool Gear box, for different applications
	CO6	ELABORATE various modes of operation, degree of hybridization and allied terms associated with hybrid electric vehicles
302052-A: Composite Materials	CO1	DEFINE & COMPARE composites with traditional materials
	CO2	IDENTIFY & ESTIMATE different parameters of the Polymer Matrix Composite
	CO3	CATEGORISE and APPLY Metal Matrix Process from possessions landscape.
	CO4	DETERMINE volume/weight fraction and strength of Composites.
	CO5	SELECT appropriate testing and inspection method for composite materials
	CO6	SELECT composites materials for various applications
302052-B: Surface Engineering	CO1	DEFINE the basic's principle & mechanism of surface degradation.
	CO2	ANALYSE & SELECT correct corrosion prevention techniques for a different service condition.
	CO3	DEMONSTRATE the role of surface engineering of materials to modify/improve the surface properties
	CO4	SELECT the suitable surface heat treatments to improve the surface properties.
	CO5	APPLY the surface modification technique to modify surface properties.
	CO6	ANALYSE & EVALUTE various surface coating defects using various testing/characterization method.
302053: Measurement Laboratory	CO1	EVALUATE causes of errors in Vernier calipers, micrometers by performing experiments in standard metrological conditions, noting deviations at actual and by plotting cause and effect diagram, to reduce uncertainty in measurement.
	CO2	ANALYSE strain measurement parameters by taking modulus of elasticity in consideration to acknowledge its usage in failure detection and force variations
	CO3	EXAMINE surface Textures, surface finish using equipment's like Talysurf and analyze surface finish requirements of metrological equipment's like gauges, jaws of vernier calipers, micrometers, magnifying glasses of height gauge and more, to optimize surface finish accuracy requirements and cost of measurement.
	CO4	MEASURE the dimensional accuracy using Comparator and limit gauges and appraise their usage in actual measurement or comparison with standards set to reduce measurement lead time




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	CO5	PERFORM Testing of Flow rate, speed and temperature measurements and their effect on performance in machines and mechanisms like hydraulic or pneumatic trainers, lathe machine etc. to increase repeatability and reproducibility.
	CO6	COMPILE the information of opportunities of entrepreneurship/business in various sectors of metrology like calibrations, testing, coordinate and laser metrology etc in an industry visit report
302054: Fluid Power & Control Laborator y	CO1	DEFINE working principle of components used in hydraulic and pneumatic systems.
	CO2	IDENTIFY & EXPLAIN various applications of hydraulic and pneumatic systems.
	CO3	SELECT an appropriate component required for hydraulic and pneumatic systems using manufactures' catalogues
	CO4	SIMULATE & ANALYSE various hydraulic and pneumatic systems for industrial/mobile applications
	CO5	DESIGN a hydraulic and pneumatic system for the industrial applications
	CO6	DESIGN & DEMONSTRATE various IoT, PLC based controlling system using hydraulics and pneumatics
302055: Internship/ Mini project	CO1	DEMONSTRATE professional competence through industry internship.
	CO2	APPLY knowledge gained through internships to complete academic activities in a professional manner
	CO3	CHOOSE appropriate technology and tools to solve given problem.
	CO4	DEMONSTRATE abilities of a responsible professional and use ethical practices in day to day life.
	CO5	DEVELOP network and social circle, and DEVELOPING relationships with industry people.
	CO6	ANALYZE various career opportunities and DECIDE career goals.
Mini project	CO1	EXPLAIN plan and execute a Mini Project with team.
	CO2	IMPLEMENT hardware/software/analytical/numerical techniques, etc.
	CO3	DEVELOP a technical report based on the Mini project
	CO4	DELIVER technical seminar based on the Mini Project work carried out
402041: Heating, Ventilation , Air Conditioni ng and Refrigerati on	CO1	ANALYZE different air-craft refrigeration systems and EXPLAIN the properties, applications and environmental issues of different refrigerants.
	CO2	ANALYZE multi pressure refrigeration system used for refrigeration applications.
	CO3	DISCUSS types of compressors, condensers, evaporators and expansion valves along with regulatory and safety controls and DESCRIBE Transcritical and ejector refrigeration systems.
	CO4	ESTIMATE cooling load for air conditioning systems used with concern of design conditions and indoor quality of air.
	CO5	DESIGN air distribution system along with consideration of ventilation and infiltration.
	CO6	EXPLAIN the working of types of desiccants, evaporative, thermal storage, radiant cooling, clean room and heat pump systems.
402042: Dynamics of Machinery	CO1	APPLY balancing technique for static and dynamic balancing of multi cylinder inline and radial engines
	CO2	ANALYZE the gyroscopic couple or effect for stabilization of Ship, Airplane and Four wheeler vehicles
	CO3	ESTIMATE natural frequency for single DOF un-damped & damped free vibratory systems
	CO4	DETERMINE response to forced vibrations due to harmonic excitation, base excitation and excitation due to unbalance forces
	CO5	ESTIMATE natural frequencies, mode shapes for 2 DOF un-damped free longitudinal and torsional vibratory systems
	CO6	DESCRIBE noise and vibration measuring instruments for industrial / real life applications along with suitable method for noise and vibration control.
402043: Turbomac hinery	CO1	VALIDATE impulse moment principle using flat, inclined and curved surfaces and INVESTIGATE performance characteristics of hydraulic turbines.
	CO2	DETERMINE performance parameters of impulse and reaction steam turbine along with discussion of nozzles, governing mechanism & losses.
	CO3	MEASURE performance parameters of single & multistage centrifugal pumps along with discussion of cavitation and selection
	CO4	EXPLAIN performance parameters of centrifugal compressor along with discussion of theoretical aspects of axial compressor.
402044: Automobil e Design	CO1	COMPREHEND the steps involved in the design process of Principal Engine Components
	CO2	GAIN the knowledge and design of Engine Sub-Systems
	CO3	COMPUTE the critical dimensions of chassis components involved in the Steering System and Differential and final drive of a vehicle.
	CO4	SELECT the tyres and wheels required for automobile vehicle and design the various types automotive brakes.
	CO5	UNDERSTAND the design concepts of Automotive Suspension system
	CO6	POSSES the knowledge of Vehicle Packaging and System Integration, NVH
	CO1	EXPLAIN the design aspect of heat exchanger considering fouling factor for Heat Transfer Applications




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402044B: Design of Heat Transfer Equipments	CO2	SELECT and DESIGN the double tube heat exchangers for process industry
	CO3	DESIGN the Shell & Tube Heat Exchangers for specified conditions
	CO4	DESIGN the condensers and evaporators for refrigeration applications
	CO5	DESIGN the compact heat exchangers
	CO6	ANALYSE the performance of counter and cross flow cooling tower.
402044C - Modern Machining Processes	CO1	UNDERSTAND and ANALYZE the mechanism, process parameters of mechanical assisted modern machining processes.
	CO2	UNDERSTAND the mechanism, construction and working of laser, plasma and electron beam assisted machining
	CO3	CLASSIFY and ANALYZE the mechanism, process parameters of the chemical and electrochemical machining.
	CO4	RELATE and ANALYZE the mechanism and select process parameters Electrical Discharge Machining for an application.
	CO5	ILLUSTRATE the application of micromachining processes
402044D: Industrial Engineering	CO1	EVALUATE the productivity and IMPLEMENT various productivity improvement techniques
	CO2	APPLY work study techniques and UNDERSTANDS its importance for better productivity.
	CO3	DEMONSTRATE the ability to SELECT plant location, appropriate layout and material handling equipment
	CO4	USE of Production planning and control tools for effective planning, scheduling and managing the shop floor control.
	CO5	PLAN inventory requirements and EXERCISE effective control on manufacturing requirements.
	CO6	APPLY Ergonomics and legislations for human comfort at work place and UNDERSTANDS the role of value engineering in improving productivity.
402044E: Internet of Things	CO1	EXPLAIN the Applications/Devices, Protocols and Communication Models of IoT
	CO2	DEMONSTRATE small Mechanical Engineering IoT oriented applications using Sensors, Actuators, Microcontrollers and Cloud
	CO3	SELECT commonly used IoT Simulation Hardware platforms
	CO4	APPLICATION of Interfacing and Communication Technologies for IoT
	CO5	ILLUSTRATE IoT Application Development and Security of IoT Ecosystem
	CO6	EVALUATE Present and Future Domain specific Applications of IoT Ecosystem
402044F: Computational Fluid Dynamics	CO1	DISTINGUISH and ANALYZE the governing equations of fluid mechanics and heat transfer in various formulations
	CO2	ANALYZE and MODEL the conduction and advection problems
	CO3	ANALYZE and MODEL the Convection-Diffusion problems
	CO4	IDENTIFY and EVALUATE the External/Internal flow and its simulation
	CO5	DISTINGUISH and COMPARE concepts of stability and turbulence.
	CO6	USE and APPLY a CFD tool for effectively solving practical Fluid-Structure Interaction problems
402045A: Product Design and Development	CO1	UNDERSTAND Product design and Product development processes
	CO2	UNDERSTAND Processes, tools and techniques for Market Survey & Product Specification Finalization
	CO3	UNDERSTAND Processes, tools and techniques for Concept Inception, Verification and selection
	CO4	UNDERSTAND Processes, tools and techniques for Concept Exploration & Development
	CO5	UNDERSTAND Processes, tools and techniques for Design Verification and Validation
	CO6	UNDERSTAND Processes, tools and techniques for Robust Design and Development
402045B: Experimental Methods in Thermal Engineering	CO1	IDENTIFY the suitable instrument for measuring parameters as per performance characteristics
	CO2	ANALYZE experimental data by using different statistical techniques and estimate error
	CO3	DISTINGUISH different methods of temperature measurements and thermal radiation
	CO4	CLASSIFY various pressure measurement instruments and their comparison
	CO5	EXPLAIN different flow measurement methods and flow visualization techniques
	CO6	APPLY knowledge of modern engineering experimentation, including calibration, data acquisition, analysis and interpretation using different AI and ML techniques
	CO1	USE and CLASSIFY the fundamentals of Additive Manufacturing Technologies for engineering applications.




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402045C: Additive Manufacturing	CO2	IDENTIFY and CATEGORIZE the methodology to manufacture the products using light-based photo-curing, LASER based technologies and STUDY their applications, benefits.
	CO3	IDENTIFY and CATEGORIZE the methodology to manufacture the products using extrusion-based deposition, inkjet-based technologies and STUDY their applications, benefits.
	CO4	SYNTHESIZE, RECOMMEND and DESIGN the suitable material and process for fabrication and build behavior of varieties of product.
	CO5	DESIGN and CONSTRUCT the AM equipment's for appropriate applications and the input CAD model
	CO6	DEVELOP the knowledge of additive manufacturing for various real-life applications
	402045D: Operations Research	CO1
CO2		SELECT appropriate model for queuing situations and sequencing situations and FIND the optimal solutions using models for different situations.
CO3		FORMULATE various management problems and SOLVE them using Linear programming using graphical method and simplex method.
CO4		FORMULATE variety of problems such as transportation, assignment, travelling salesman and SOLVE these problems using linear programming approach.
CO5		PLAN optimum project schedule for network models arising from a wide range of applications and for replacement situations find the optimal solutions using appropriate models for the situation
CO6		APPLY concepts of simulation and Dynamic programming
402045E: Augmented Reality and Virtual Reality	CO1	UNDERSTAND fundamental Computer Vision, Computer Graphics and Human-Computer Interaction Techniques related to VR/AR
	CO2	UNDERSTAND Geometric Modeling Technique
	CO3	UNDERSTAND the Virtual Environment
	CO4	ANALYZE and EVALUATE VR/AR Technologies
	CO5	APPLY various types of Hardware and Software in Virtual Reality systems
	CO6	DESIGN and FORMULATE Virtual/Augmented Reality Applications
402046: Data Analytics Laboratory	CO1	UNDERSTAND the basics of data analytics using concepts of statistics and probability.
	CO2	APPLY various inferential statistical analysis techniques to describe data sets and withdraw useful conclusions from acquired data set.
	CO3	EXPLORE the data analytics techniques using various tools
	CO4	APPLY data science concept and methods to solve problems in real world context
	CO5	SELECT advanced techniques to conduct thorough and insightful analysis and interpret the results
402047: Project (Stage I)	CO1	IMPLEMENT systems approach.
	CO2	CONCEPTUALIZE a novel idea / technique into a product.
	CO3	THINK in terms of a multi-disciplinary environment.
	CO4	TAKE ON the challenges of teamwork, and DOCUMENT all aspects of design work.
	CO5	UNDERSTAND the management techniques of implementing a project.
	CO6	DEMONSTRATE the final product for Functionality, Design ability, and Manufacturability
402048: Computer Integrated Manufacturing	CO1	EXPLAIN CIM and factory automation
	CO2	UNDERSTAND the integration of hardware and software elements for CIM
	CO3	APPLY CNC program for appropriate manufacturing techniques.
	CO4	ANALYZE processes planning, quality and MRP integrated with computers
	CO5	INTERPRET flexible, cellular manufacturing and group technology
	CO6	ANALYZE the effect of IOT, Industry-4.0 and cloud base manufacturing
402049: Energy Engineering	CO1	EXPLAIN the power generation scenario, the layout components of thermal power plant and ANALYZE the improved Rankine cycle
	CO2	ANALYZE the performance of steam condensers, cooling tower system; RECOGNIZE an environmental impact of energy systems and methods to control the same.
	CO3	EXPLAIN the layout, component details of diesel engine plant, hydel and nuclear energy systems
	CO4	ANALYZE gas and improved power cycles.
	CO5	EXPLAIN the fundamentals of renewable energy systems
	CO6	EXPLAIN basic principles of energy management, storage and economics of power generation.
402050A:	CO1	UNDERSTAND basic concepts of quality and RELATE various quality tools
	CO2	DEVELOP analytical competencies to SOLVE problems on control charts and process capability




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Quality & Reliability Engineering	CO3	UNDERSTAND fundamental concepts of reliability
	CO4	EVALUATE system reliability
	CO5	IDENTIFY various failure modes and CREATE fault tree diagram
	CO6	UNDERSTAND the concept of reliability centered maintenance and APPLY reliability tests methods.
402050B: Energy Audit and Management	CO1	EXPLAIN the energy need and role of energy management
	CO2	CARRY OUT an energy audit of the Institute/Industry/Organization
	CO3	ASSESS the ENCON opportunities using energy economics
	CO4	ANALYSE the energy conservation performance of Thermal Utilities
	CO5	ANALYSE the energy conservation performance of Electrical Utilities
	CO6	EXPLAIN the energy performance improvement by Cogeneration and WHR method
402050C: Manufacturing System and Simulation	CO1	UNDERSTAND the concepts of manufacturing system, characteristics, type, etc.
	CO2	UNDERSTAND the concepts of Facilities, manufacturing planning & control and Support System
	CO3	UNDERSTAND the concepts of manufacturing towards solving productivity related problems
	CO4	DEVELOP a virtual model to solve industrial engineering related issues such as capacity. utilization, line balancing.
	CO5	BUILDING tools to view and control simulations and their results
	CO6	PLAN the data representation & Evaluate the results of the simulation
402050D: Engineering Economics and Financial Management	CO1	UNDERSTAND the business environment, concepts of economics and demand-supply scenario.
	CO2	APPLY the concepts of costing and pricing to evaluate the pricing of mechanical components
	CO3	UNDERSTAND accounting systems and analyze financial statements using ratio analysis
	CO4	SELECT and PREPARE the appropriate type of budget and understand the controlling aspects of budget
	CO5	UNDERSTAND the international business and trade system functioning
	CO6	DEMONSTRATE understanding of financing decisions of new ventures and performance
402050E: Organizational Informatics	CO1	Demonstrate an understanding of the scope, purpose and value of information systems in an organization
	CO2	Understand the constituents of the information system.
	CO3	Demonstrate the Understanding of the management of product data and features of various PLM aspects
	CO4	Relate the basic concepts of manufacturing system and the ERP functionalities in context of information usage
	CO5	Understand the manufacturing execution system and its applications in functional areas.
	CO6	Outline the role of the information system in various types of business and allied emerging technologies.
402050F: Computational Multi Body Dynamics	CO1	APPLY the basic terminology and concepts used in Multibody Dynamics to solve varieties of motion related applications
	CO2	IDENTIFY and EVALUATE the types of joints, its kinematics and relevant transformations
	CO3	DISTINGUISH and COMPARE the formulation methods
	CO4	DERIVE equations of motion and EVALUATE the kinematics and dynamics of rigid Planar inter-connected bodies
	CO5	DERIVE equations of motion and EVALUATE the kinematics of rigid Spatial inter-connected bodies
	CO6	APPLY MBD tool effectively and SIMULATE it to solve and validate practical Multibody Dynamics problems and its solutions
402051A: Process Equipment Design	CO1	INTERPRET the different parameters involved in design of process Equipments.
	CO2	ANALYZE thin and thick walled cylinder
	CO3	DESIGN cylindrical vessel, spherical vessel, tall vessels and thick walled high pressure vessels
	CO4	DESIGN different process Equipments and select pump, compressor etc. and auxiliary services
	CO5	EVALUATE Process parameters and their correlation
	CO6	APPLY the concepts of process equipment design for specific applications
	CO1	DESCRIBE fundamentals, needs and scopes of renewable energy systems.




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402051B: Renewable Energy Technologies	CO2	EXPLAIN performance aspects of flat and concentric solar collectors along with applications
	CO3	DESIGN solar photovoltaic system for residential applications
	CO4	DESIGN AND ANALYSIS of wind energy conversion system
	CO5	APPLY Installation practices of Wind and Solar Photovoltaic Systems for grid connection.
	CO6	DETERMINE performance parameters of bio-energy conversion systems.
402051C: Automation and Robotics	CO1	UNDERSTAND the basic concepts of Automation
	CO2	UNDERSTAND the basic concepts of Robotics
	CO3	IDENTIFY and EVALUATE appropriate Drive for Robotic Applications
	CO4	COMPARE and SELECT End-effectors and Sensors as per Application
	CO5	DEVELOPE the Mathematical Modeling Approaches of Robot
	CO6	EVALUATE the fundamentals of robot programming and CLASSIFY the Applications
402051D: Industrial Psychology and Organizational Behavior	CO1	DEMONSTRATE fundamental knowledge about need and scope of industrial - organizational psychology and behavior.
	CO2	ANALYZE the job requirement, have understanding of fatigue, boredom and improve the job satisfaction
	CO3	UNDERSTAND the approaches to enhance the performance.
	CO4	KNOWLEDGE of theories of organizational behavior, learning and social-system
	CO5	UNDERSTAND the mechanism of group behavior, various aspects of team, leadership and conflict management
	CO6	EVALUATE the organizational culture, manage the change and understands organizational development approaches.
402051E: Electric and Hybrid Vehicle	CO1	UNDERSTAND the basics related to e-vehicle
	CO2	CLASSIFY the different hybrid vehicles
	CO3	IDENTIFY and EVALUATE the Prime Movers, Energy Storage and Controllers
	CO4	DISCOVER and CATAGORIZE the Electric Vehicle Configuration with respect to Propulsion, Power distribution and Drive-Train Topologies
	CO5	DEVELOP body frame with appropriate suspension system and TESTING of for e-Vehicles.
	CO6	CLASSIFY and EVALUATE Battery Charging techniques and management.
402052: Mechanical Systems Analysis Laboratory	CO1	DEVELOP an understanding of the Systems Engineering Process and the range of factors that influence the product need, problem-specific information collection, Problem Definition, Task Specification, Solution Concept inception, Concept Development, System's Mathematical Modelling, Synthesis, Analysis, final solution Selection, Simulation, Detailed Design, Construction, Prototyping, Testing, fault-finding, Diagnosis, Performance Analysis, and Evaluation, Maintenance, Modification, Validation, Planning, Production, Evaluation and use of a system using manual calculation, computational tools
	CO2	ILLUSTRATE the concepts and USE the developed skill-set of use of computational tools (FEA, CFD, MBD, FSI, CAE) to automate the complete product development process.
	CO3	EVALUATE the knowledge of new developments and innovations in technological systems to carry forward to next stage of employment after passing your Undergraduate Degree Examination.
	CO4	APPRAISE how technologies have transformed people's lives and can be used to SOLVE challenges associated with climate change, efficient energy use, security, health, education and transport, which will be coming your ways in the coming future.
	CO5	PRIORITIZE the concept of quality and standards, including systems reliability, safety and fitness for the intended purpose
	CO6	INVENT yourself to face the challenges of future technologies and their associated Problems




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CIVIL**SEM-II**

Day & Date	2019 Course Time : 11:00 AM To 01:30 PM
Wednesday 21-06-2023	Waste Water Engineering (301012)
Friday 23-06-2023	Design of RC Structures (301013)
Monday 26-06-2023	Remote Sensing and GIS (301014)
Friday 30/06/2023	ELECTIVE-II Advanced Engineering Geology with Rock Mechanics (301015 a)
	ELECTIVE-II Soft Computing Techniques (301015 b)
	ELECTIVE-II Advanced Surveying. (301015 c)
	ELECTIVE-II Advanced Geotechnical Engineering (301015 d)
	ELECTIVE-II Architecture and Town Planning (301015 e)
	ELECTIVE-II Solid Waste Management (301015 f)

SEM-I

Day & Date	2019 Course Time : 11:00 AM To 01:30 PM
Tuesday 06-06-2023	Hydrology and Water Resources Engineering (301001)
Thursday 08-06-2023	Water Supply Engineering (301002)
Saturday 10-06-2023	Design of Steel Structures (301003)
Tuesday 13-06-2023	Engineering Economics and Financial Management (301004)
Thursday 15-06-2023	ELECTIVE-I Advanced Fluid Mechanics and Hydraulic Machines (301005 a)
	ELECTIVE-I Research Methodology and IPR (301005 b)
	ELECTIVE-I Construction Management. (301005 c)
	ELECTIVE-I Advanced Concrete Technology (301005 d)
	ELECTIVE-I Matrix Methods of Structural Analysis (301005 e)
	ELECTIVE-I Advanced Mechanics of Structures (301005 f)




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