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MAULANA MUKHTAR AHMAD NADVI TECHNICAL CAMPUS

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Mansoora P.O.Box. No.144, Malegaon, Dist. Nashik
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Department Of Mechanical Engineering

Course Outcomes

Course Code	Course Name	COs	Course Outcomes
			Course Pattern 2019 SE Mechanical
			SE Mechanical SEM - III
202041	Solid Mechanics	1	Define various types of stresses and strain developed on determinate and indeterminate members.
		2	Draw Shear force and bending moment diagram for various types of transverse loading and support.
		3	Compute the slope & deflection, bending stresses and shear stresses on a beam.
		4	Calculate torsional shear stress in shaft and buckling on the column.
		5	Apply the concept of principal stresses and theories of failure to determine stresses on a 2-D element.
		6	Utilize the concepts of SFD & BMD, torsion and principal stresses to solve combined loading application based problems.
202042	Solid Modeling and Drafting	1	Understand basic concepts of CAD system, need and scope in Product Lifecycle Management
		2	Utilize knowledge of curves and surfacing features and methods to create complex solid geometry
		3	Construct solid models, assemblies using various modeling techniques & PERFORM mass property analysis, including creating and using a coordinate

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			system
		4	Apply geometric transformations to simple 2D geometries
		5	Use CAD model data for various CAD based engineering applications viz. production drawings, 3D printing, FEA, CFD, MBD, CAE, CAM, etc.
		6	Use PMI & MBD approach for communication
202043	Engineering Thermodynamics	1	DESCRIBE the basics of thermodynamics with heat and work interactions.
		2	APPLY laws of thermodynamics to steady flow and non-flow processes.
		3	APPLY entropy, available and non available energy for an Open and Closed System,
		4	DETERMINE the properties of steam and their effect on performance of vapour power cycle.
		5	ANALYSE the fuel combustion process and products of combustion.
		6	SELECT various instrumentations required for safe and efficient operation of steam generator.
		1	COMPARE crystal structures and ASSESS different lattice parameters.
		2	CORRELATE crystal structures and imperfections in crystals with mechanical behaviour of materials.

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202044	Engineering Materials and Metallurgy	3	DIFFERENTIATE and DETERMINE mechanical properties using destructive and non-destructive testing of materials.
		4	IDENTIFY & ESTIMATE different parameters of the system viz., phases, variables, component, grains, grain boundary, and degree of freedom. etc.
		5	ANALYSE effect of alloying element & heat treatment on properties of ferrous & nonferrous alloy.
		6	SELECT appropriate materials for various applications.
203156	**Electrical and Electronics Engineering**	1	APPLY programming concepts to UNDERSTAND role of Microprocessor and Microcontroller in embedded systems
		2	DEVELOP interfacing of different types of sensors and other hardware devices with Atmega328 based Arduino Board
		3	UNDERSTAND the operation of DC motor, its speed control methods and braking
		4	DISTINGUISH between types of three phase induction motor and its characteristic features
		5	EXPLAIN about emerging technology of Electric Vehicle (EV) and its modular subsystems
		6	CHOOSE energy storage devices and electrical drives for EVs

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Course Code	Course Name	COs	Course Outcomes
202045	Geometric Dimensioning and Tolerancing Lab	1	SELECT appropriate IS and ASME standards for drawing
		2	READ & ANALYSE variety of industrial drawings
		3	APPLY geometric and dimensional tolerance, surface finish symbols in drawing
		4	EVALUATE dimensional tolerance based on type of fit, etc.
		5	SELECT an appropriate manufacturing process using DFM, DFA, etc.

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	Course Pattern 2019 SE Mechanical		
	SE Mechanical SEM - IV		
Course Code	Course Name	COs	Course Outcomes
207002	Engineering Mathematics - III	1	SOLVE higher order linear differential equations and its applications to model and analyze mass spring systems.
		2	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.
		3	APPLY Statistical methods like correlation, regression in analyzing and interpreting experimental data applicable to reliability engineering and probability theory in testing and quality control.
		4	APPLY Statistical methods like correlation, regression in analyzing and interpreting experimental data applicable to reliability engineering and probability theory in testing and quality control.
		5	PERFORM Vector differentiation & integration, analyze the vector fields and APPLY to fluid flow problems
202047	Kinematics of Machinery	1	APPLY kinematic analysis to simple mechanisms
		2	ANALYZE velocity and acceleration in mechanisms by vector and graphical method

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		3	SYNTHESIZE a four bar mechanism with analytical and graphical methods
		4	APPLY fundamentals of gear theory as a prerequisite for gear design
		5	CONSTRUCT cam profile for given follower motion
202048	**Applied Thermodynamics**	1	DETERMINE COP of refrigeration system and ANALYZE psychrometric processes.
		2	DISCUSS basics of engine terminology,air standard, fuel air and actual cycles.
		3	IDENTIFY factors affecting the combustion performance of SI and CI engines.
		4	DETERMINE performance parameters of IC Engines and emission control.
		5	EXPLAIN working of various IC Engine systems and use of alternative fuels.
		6	CALCULATE performance of single and multi stage reciprocating compressors and DISCUSS rotary positive displacement compressors
202049	**Fluid Mechanics**	1	DETERMINE various properties of fluid
		2	APPLY the laws of fluid statics and concepts of buoyancy

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		3	IDENTIFY types of fluid flow and terms associated in fluid kinematics
		4	APPLY principles of fluid dynamics to laminar flow
		5	ESTIMATE friction and minor losses in internal flows and DETERMINE boundary layer formation over an external surface
		6	CONSTRUCT mathematical correlation considering dimensionless parameters, also ABLE to predict the performance of prototype using model laws
202050	Manufacturing Processes	1	SELECT appropriate moulding, core making and melting practice and estimate pouring time, solidification rate and DESIGN riser size and location for sand casting process
		2	UNDERSTAND mechanism of metal forming techniques and CALCULATE load required for flat rolling
		3	DEMONSTRATE press working operations and APPLY the basic principles to DESIGN dies and tools for forming and shearing operations
		4	CLASSIFY and EXPLAIN different welding processes and EVALUATE welding characteristics
		5	DIFFERENTIATE thermoplastics and thermosetting and EXPLAIN polymer processing techniques

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		6	UNDERSTAND the principle of manufacturing of fibre-reinforce composites and metal matrix composites
202051	Machine Shop	1	PERFORM welding using TIG/ MIG/ Resistance/Gas welding technique
		2	MAKE Fibre-reinforced Composites by hand lay-up process or spray lay-up techniques
		3	PERFORM cylindrical/surface grinding operation and CALCULATE its machining time
		4	DETERMINE number of indexing movements required and acquire skills to PRODUCE a spur gear on a horizontal milling machine
		5	PREPARE industry visit report
		6	UNDERSTAND procedure of plastic processing
202052	**Project Based Learning - II**	1	IDENTIFY the real-world problem (possibly of interdisciplinary nature) through a rigorous literature survey and formulate / set relevant aims and objectives.
		2	ANALYZE the results and arrive at valid conclusions.
		3	PROPOSE a suitable solution based on the fundamentals of mechanical engineering by possibly integration of previously acquired knowledge.

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		4	CONTRIBUTE to society through proposed solutions by strictly following professional ethics and safety measures.
		5	USE of technology in proposed work and demonstrate learning in oral and written form.
		6	DEVELOP ability to work as an individual and as a team member.

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TE Mechanical SEM - V			
Course Code	**Course Name**	**COs**	**Course Outcomes**
302042	**Numerical and Statistical Methods**	1	**SOLVE** system of equations using direct and iterative numerical methods.
		2	**ESTIMATE** solutions for differential equations using numerical techniques.
		3	**DEVELOP** solution for engineering applications with numerical integration.
		4	**DESIGN** and **CREATE** a model using a curve fitting and regression analysis. .
		5	**APPLY** statistical Technique for quantitative data analysis.
		6	**DEMONSTRATE** the data, using the concepts of probability and linear algebra.
302042	**Heat and Mass Transfer**	1	**ANALYZE & APPLY** the modes of heat transfer equations for one dimensional thermal system.
		2	**DESIGN a** thermal system considering fins, thermal insulation and & Transient heat conduction.
		3	**EVALUATE** the heat transfer rate in natural and forced convection & validate with experimentation results.

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		4	**INTERPRET** heat transfer by radiation between objects with simple geometries, for black and grey surfaces .
		5	**ABILITY** to analyze the rate of mass transfer using Fick's Law of Diffusion and understands mass diffusion in different coordinate systems
		6	**DESIGN & ANALYSIS** of heat transfer equipment and investigation of its performance.
302043	**Design of Machine Elements**	1	**DESIGN AND ANALYZE** the cotter and knuckle Joints, levers and components subjected to eccentric loading.
		2	**DESIGN** shafts, keys and couplings under static loading conditions.
		3	**ANALYZE** different stresses in power screws and **APPLY** those in the procedure to design screw jack.
		4	**EVALUATE** dimensions of machine components under fluctuating loads. .
		5	**EVALUATE & INTERPRET** the stress developed on the different type of welded and threaded joints.
		6	**APPLY** the design and development procedure for different types of springs.

		1	**DEFINE** key elements of mechatronics, principle of sensor and its characteristics.

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302044	**Mechatronics**	2	**UTILIZE** concept of signal processing and **MAKE** use of interfacing systems such as ADC, DAC, Digital I/O.
		3	**DETERMINE** the transfer function by using block diagram reduction technique.
		4	**EVALUATE** Poles and Zero, frequency domain parameter for mathematical modeling for mechanical system. .
		5	**APPLY** the concept of different controller modes to an industrial application.
		6	**DEVELOP** the ladder programming for industrial application.
302061	**Fundamentals Computer Aided Engineering**	1	**DEFINE** the use of CAE tools and **DESCRIBE** the significance of shape functions in finite element formulations.
		2	**APPLY** the various meshing techniques for better evaluation of approximate results.
		3	**APPLY** material properties and boundary condition to SOLVE 1-D and 2-D element stiffness matrices to obtain nodal or elemental solution.
		4	**DEVELOP** code for a component for CNC machines.
		5	

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			DESCRIBE various methods of Automation and Robot Architecture.
		6	**GENERATE** the results in the form of contour plot by the **USE** of CAE tools.
302046	**Digital Manufacturing Laboratory**	1	**DEVELOP** a component using conventional machines, CNC machines and Additive Manufacturing Techniques. .
		2	**ANALYZE** cutting tool parameters for machining given job.
		3	**DEMONSTRATE** simulation of manufacturing process using Digital Manufacturing Tools.
		4	**SELECT** and **DESIGN** jigs and Fixtures for a given component. .
		5	**DEMONESTRATE** different parameters for CNC retrofitting and reconditioning.
302047	**Skill Development**	1	**APPLY& DEMONSTRATE** procedure of assembly & disassembly of various machines.
		2	**DESIGN & DEVELOP** a working/model of machine parts or any new product.
		3	**EVALUATE** fault with diagnosis on the machines, machine tools and home appliances.
		4	**IDENTIFY & DEMONSTRATE** the various activities performed in an industry such as maintenance, design of components, material selection.

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Course Pattern 2019 TE Mechanical			
TE Mechanical SEM - VI			
Course Code	**Course Name**	**COs**	**Course Outcomes**
302049	Artificial Intelligence & Machine Learning	1	**DEMONSTRATE** fundamentals of artificial intelligence and machine learning.
		2	**APPLY** feature extraction and selection techniques.
		3	**APPLY** machine learning algorithms for classification and regression problems.
		4	**DEVISE AND DEVELOP** a machine learning model using various steps.
		5	**EXPLAIN** concepts of reinforced and deep learning.
		6	**SIMULATE** machine learning model in mechanical engineering problems.
302050	Computer Aided Engineering	1	**DEFINE** the use of CAE tools and **DESCRIBE** the significance of shape functions in finite element formulations.
		2	**APPLY** the various meshing techniques for better evaluation of approximate results.
		3	**APPLY** material properties and boundary condition to SOLVE 1-D and 2-D element stiffness matrices to obtain nodal or elemental solution.
		4	**ANALYZE** and **APPLY** various numerical methods

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			for different types of analysis.
		5	**EVALUATE** and **SOLVE** non-linear and dynamic analysis problems by analyzing the results obtained from analytical and computational method.
		6	**GENERATE** the results in the form of contour plot by the USE of CAE tools.
302051	Design of Transmission Systems	1	**APPLY** the principle of Spur & Helical gear design for industrial application and PREPARE a manufacturing drawing with the concepts of GD&T.
		2	**EXPLAIN** and **DESIGN** Bevel & Worm gear considering design parameters as per design standards.
		3	**SELECT&DESIGN** Rolling and Sliding Contact Bearings from manufacturer's catalogue for a typical application considering suitable design parameters. .
		4	**DEFINE** and **DESIGN** various types of Clutches, Brakes, used in automobile.
		5	**APPLY** various concept to **DESIGN** Machine Tool Gear box, for different applications
		6	**ELABORATE** various modes of operation, degree of hybridization and allied terms associated with hybrid electric vehicles.

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302054	Fluid Power & Control Laboratory	1	DEFINE working principle of components used in hydraulic and pneumatic systems.
		2	IDENTIFY & EXPLAIN various applications of hydraulic and pneumatic systems.
		3	SELECT an appropriate component required for hydraulic and pneumatic systems using manufactures' catalogues.
		4	SIMULATE & ANALYSE various hydraulic and pneumatic systems for industrial/mobile applications.
		5	DESIGN a hydraulic and pneumatic system for the industrial applications.
		6	DESIGN & DEMONESTRATE various IoT, PLC based controlling system using hydraulics and pneumatics.
302055	Internship/Mini project	1	DEMONSTRATE professional competence through industry internship.
		2	APPLY knowledge gained through internships to complete academic activities in a professional manner.
		3	CHOOSE appropriate technology and tools to solve given problem.

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		4	**DEMONSTRATE** abilities of a responsible professional and use ethical practices in day to day life.
		5	**DEVELOP** network and social circle, and **DEVELOPING** relationships with industry people.
		6	**ANALYZE** various career opportunities and **DECIDE** career goals.

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Course Pattern 2019 BE Mechanical			
BE Mechanical SEM - VI			
Course Code	Course Name	COs	Course Outcomes
402041	Heating, Ventilation, Air Conditioning and Refrigeration Teaching	1	**ANALYSE** different air-craft refrigeration systems and **EXPLAIN** the properties, applications and environmental issues of different refrigerants.
		2	**ANALYSE** multi pressure refrigeration system used for refrigeration applications.
		3	**DISCUSS** types of compressors, condensers, evaporators and expansion valves along with regulatory and safety controls and **DESCRIBES** Transcritical and ejector refrigeration systems.
		4	**ESTIMATE** cooling load for air conditioning systems used with concern of design conditions and indoor quality of air.
		5	**DESIGN** air distribution system along with consideration of ventilation and infiltration.
		6	**EXPLAIN** the working of types of desiccants, evaporative, thermal storage, radiant cooling, clean room and heat pump systems.
402042	Dynamics of Machinery	1	**APPLY** balancing technique for static and dynamic balancing of multi cylinder inline and radial engines.
		2	**ANALYZE** the gyroscopic couple or effect for stabilization of Ship, Airplane and Four wheeler

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			vehicles.
		3	**ESTIMATE** natural frequency for single DOF un-damped & damped free vibratory systems.
		4	**DETERMINE** response to forced vibrations due to harmonic excitation, base excitation and excitation due to unbalance forces.
		5	**ESTIMATE** natural frequencies, mode shapes for 2 DOF un-damped free longitudinal and torsional vibratory systems.
		6	**DESCRIBE** noise and vibration measuring instruments for industrial / real life applications along with suitable method for noise and vibration control.
402043	**Turbomachinery**	1	**VALIDATE** impulse moment principle using flat, inclined and curved surfaces and **INVESTIGATE** performance characteristics of hydraulic turbines.
		2	**DETERMINE** performance parameters of impulse and reaction steam turbine along with discussion of nozzles, governing mechanism & losses.
		3	**MEASURE** performance parameters of single & multistage centrifugal pumps along with discussion of cavitation and selection.
		4	**EXPLAIN** performance parameters of centrifugal compressor along with discussion of theoretical aspects of axial compressor.

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402047	Project (Stage I)	1	Implement systems approach.
		2	To conceptualize a novel idea / technique into a product.
		3	To think in terms of a multi-disciplinary environment.
		4	To take on the challenges of teamwork, and document all aspects of design work
		5	To understand the management techniques of implementing a project

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Course Pattern 2019 BE Mechanical			
BE Mechanical SEM - VIII			
Course Code	Course Name	COs	Course Outcomes
402048	Computer Integrated Manufacturing	1	**EXPLAIN** CIM and factory automation.
		2	**UNDERSTAND** the integration of hardware and software elements for CIM
		3	**APPLY** CNC program for appropriate manufacturing techniques.
		4	**ANALYZE** processes planning, quality and MRP integrated with computers.
		5	**INTERPRET** flexible, cellular manufacturing and group technology.
		6	**ANALYZE** the effect of IOT, Industry-4.0 and cloud base manufacturing.
402049	Energy Engineering	1	**EXPLAIN** the power generation scenario, the layout components of thermal power plant and **ANALYZE** the improved Rankine cycle.
		2	**ANALYZE** the performance of steam condensers, cooling tower system; **RECOGNIZE** an environmental impact of energy systems and methods to control the same.
		3	**EXPLAIN** the layout, component details of diesel engine plant, hydel and nuclear energy systems.

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		4	**ANALYZE** gas and improved power cycles.
		5	**EXPLAIN** the fundamentals of renewable energy systems.
		6	**EXPLAIN** basic principles of energy management, storage and economics of power generation.
402052	**Mechanical Systems Analysis Laboratory**	1	**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 to automate product development process, redesign from customer feedback and control of technological systems.
		2	**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.
		3	**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.

Al Jamia Mohammediyah Education Society's

MAULANA MUKHTAR AHMAD NADVI TECHNICAL CAMPUS

Approved by AICTE, New Delhi
Recognised by DTE, Mumbai & Govt. of Maharashtra
Affiliated to Savitribai Phule Pune University, Pune

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		4	**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.
		5	**PRIORITIZE** the concept of quality and standards, including systems reliability, safety and fitness for the intended purpose.
		6	**INVENT** yourself to face the challenges of future technologies and their associated Problems.
402053	**Project (Stage II)**	1	Implement systems approach.
		2	To conceptualize a novel idea / technique into a product.
		3	To think in terms of a multi-disciplinary environment.
		4	To take on the challenges of teamwork, and document all aspects of design work.
		5	To understand the management techniques of implementing a project.