

BLDEA'S VACHANA PITAMAHA P.G.HALAKATTI COLLEGE OF ENGINEERING & TECHNOLOGY VIJAYAPUR
DEPARTMENT OF MECHANICAL ENGINEERING
Course Outcomes

2022 Scheme

Subject	Code	Course Outcomes	Statement
I Semester			
Mathematics I	BMATM101	C01	Apply the knowledge of calculus to solve problems related to polar curves.
		C02	Learn the notion of partial differentiation to compute rate of change of multivariate functions.
		C03	Analyze the solution of linear and non-linear ordinary differential equations.
		C04	Make use of matrix theory for solving the system of linear equations and compute eigenvalues and eigenvectors.
		C05	Familiarize with modern mathematical tools namely MATHEMATICA/MATLAB/ PYTHON/SCILAB
Applied Physics	BPHYM102 /202	C01	Elucidate the concepts in oscillations, waves, elasticity and material failures.
		C02	Discuss the fundamentals of Thermoelectric materials and their application
		C03	Summarize the low temperature phenomena and generation of low temperature
		C04	Explain the various material characterization techniques
		C05	Practice working in groups to conduct experiments in physics and perform precise and honest measurements.
Applied Chemistry	BCHEM102 /202	C01	Identify the terms and applications processes involved in scientific and engineering
		C02	Explain the phenomena of chemistry to describe the methods of engineering processes
		C03	Solve the problems in chemistry that are pertinent in engineering applications

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		C04	Apply the basic concepts of chemistry to explain the chemical properties and processes
		C05	Analyze properties and multidisciplinary situations processes associated with chemical substances in and multidisciplinary situations.
Elements of Mechanical Engineering	BEMEM103	C01	Explain the role of mechanical engineering in industry and society, fundamentals of steam and non-conventional energy sources
		C02	Describe different conventional and advanced machining processes, IC engines, propulsive devices, air-conditioning, refrigeration.
		C03	Explain different gear drives, gear trains, aspects of future mobility and fundamentals of robotics
		C04	Determine the condition of steam and its energy, performance parameters of IC engines, velocity ratio and power transmitted through power transmission systems.
Introduction to Civil Engineering	BESCK104A /204	C01	Understand the various disciplines of civil engineering
		C02	Understand the infrastructure requirement for sustainable development
		C03	Compute the resultant and equilibrium of force systems.
		C04	Locate the centroid of plane and built-up sections
		C05	Compute the moment of inertia of plane and built-up sections.
Introduction to Python Programming	BPLCK105B /205B	C01	Demonstrate proficiency in handling loops and creation of functions.
		C02	Identify the methods to create and manipulate lists, tuples and dictionaries.
		C03	Develop programs for string processing and file organization
		C04	Interpret the concepts of Object-Oriented Programming as used in Python.
Communicative English	BENGK106	C01	Understand and apply the Fundamentals of Communication Skills in their communication skills.
		C02	Identify the nuances of phonetics, intonation and enhance

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			pronunciation skills.
		C03	To impart basic English grammar and essentials of language skills as per present requirement.
		C04	Understand and use all types of English vocabulary and language proficiency.
		C05	Adopt the Techniques of Information Transfer through presentation.
Indian Constitution	BICOK107 /207	C01	Analyze the basic structure of Indian Constitution
		C02	Remember their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution.
		C03	know about our Union Government, political structure & codes, procedures.
		C04	Understand our State Executive & Elections system of India.
		C05	Remember the Amendments and Emergency Provisions, other important provisions given by the constitution
Innovation and Design Thinking	BIDTK158	C01	Appreciate various design process procedure
		C02	Generate and develop design ideas through different technique
		C03	Identify the significance of reverse Engineering to Understand products
		C04	Draw technical drawing for design ideas
			II Semester
Mathematics-II	BMATM201	C01	Apply the knowledge of multiple integrals to compute area and volume.
		C02	Understand the applications of vector calculus refer to solenoidal, irrotational vectors, line integral and surface integral.
		C03	Demonstrate partial differential equations and their solutions for physical interpretations.
		C04	Apply the knowledge of numerical methods in solving physical and engineering phenomena.
		C05	Get familiarize with modern mathematical tools namely Mathematica/MatLab/Python/Scilab
Applied Chemistry	BCHEM202	C01	Identify the terms and applications processes involved in scientific and engineering

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		CO 2	Explain the phenomena of chemistry to describe the methods of engineering processes
		CO 3	Solve the problems in chemistry that are pertinent in engineering applications
		CO 4	Apply the basic concepts of chemistry to explain the chemical properties and processes
		CO 5	Analyze properties processes associated with chemical substances in and multidisciplinary situations
Computer Aided Engineering Drawing	BCEDK203	CO 1	Draw and communicate the objects with definite shape and dimensions
		CO 2	Recognize and Draw the shape and size of objects through different views
		CO 3	Develop the lateral surfaces of the object
		CO 4	Create a Drawing views using CAD software
		CO 5	Identify the interdisciplinary engineering components or systems through its graphical representation.
Introduction to C Programming	BESCK104E/204E	CO 1	Elucidate the basic architecture and functionalities of a computer and also recognize the hardware parts.
		CO 2	Apply programming constructs of C language to solve the real world problem
		CO 3	Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting
		CO 4	Explore user-defined data structures like structures, unions and pointers in implementing solutions
		CO 5	Design and Develop Solutions to problems using modular programming constructs using functions
Renewable Energy Sources	BETCK105E/205E	CO 1	Describe the environmental aspects of renewable energy resources. In Comparison with various conventional energy systems, their prospects and limitations.
		CO 2	Describe the use of solar energy and the various components used in the energy production with respect to applications like-heating,

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			cooling, desalination, power generation.
		CO 3	Understand the conversion principles of wind and tidal energy
		CO 4	Understand the concept of biomass energy resources and green energy.
		CO 5	Acquire the basic knowledge of ocean thermal energy conversion and hydrogen energy.
Professional Writing Skills in English	BPWSK206	CO 1	To understand and identify the Common Errors in Writing and Speaking.
		CO 2	To Achieve better Technical writing and Presentation skills.
		CO 3	To read Technical proposals properly and make them to Write good technical reports.
		CO 4	Acquire Employment and Workplace communication skills.
		CO 5	To learn about Techniques of Information Transfer through presentation in different level.
Samskrutika Kannada	BKSKK207		
C01	ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಕುರಿತು ಅರಿವು ಮೂಡಿರುತ್ತದೆ.		
C02	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಕಲಿತು ಹೆಚ್ಚಿನ ಓದಿಗೆ ಮತ್ತು ಜ್ಞಾನಕ್ಕೆ ಸ್ಪೂರ್ತಿ ಮೂಡುತ್ತದೆ.		
C03	ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಹೆಚ್ಚಿಸುತ್ತದೆ.		
C04	ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ ಹಾಗೂ ಅವರುಗಳ ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ತಿಳಿದುಕೊಂಡು ನಾಡಿನ ಇನ್ನಿತರ ವ್ಯಕ್ತಿಗಳ ಬಗ್ಗೆ ತಿಳಿದುಕೊಳ್ಳಲು ಕೌತುಕ ಹೆಚ್ಚಿಸುತ್ತದೆ.		
C05	ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಹಾಗೂ ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.		

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Scientific Foundations of Health	BSFHK108-208	CO 1	To understand and analyze about Health and wellness (and its Beliefs) & It's balance for positive mindset
		CO 2	Develop the healthy lifestyles for good health for their better future.
		CO 3	Build a Healthy and caring relationships to meet the requirements of good/social/positive life.
		CO 4	To learn about Avoiding risks and harmful habits in their campus and outside the campus for their bright future.
		CO 5	Prevent and fight against harmful diseases for good health through positive mindset.
III SEMESTER (2021 -Scheme)			
Transform Calculus, Fourier Series and Numerical Techniques	21MAT 31	CO 1	To solve ordinary differential equations using Laplace transform
		CO 2	Demonstrate the Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory.
		CO 3	To use Fourier transforms to analyze problems involving continuous-time signals and to apply Z-Transform techniques to solve difference equations
		CO 4	To solve mathematical models represented by initial or boundary value problems involving partial differential equations
		CO 5	Determine the extremals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.
Metal Casting Forming & Joining Process (IPCC)	21ME32	CO 1	Select appropriate primary manufacturing process and related parameters for obtaining initial shape and size of components.
		CO 2	Design and develop adequate tooling linked with casting, welding and forming operations.
		CO 3	Appreciate the effect of process parameters on quality of manufactured components
		CO 4	Demonstrate various skills in preparation of molding sand for conducting tensile, shear and compression tests using Universal sand testing machine.

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		CO 5	Demonstrate skills in preparation of forging models involving upsetting, drawing and bending operations.
		CO 6	Demonstrate skills in preparation of Welding models.
Material Science and Engineering (IPCC)	21ME33	CO 1	Understand the atomic arrangement in crystalline materials and describe the periodic arrangement of atoms in terms of unit cell parameters.
		CO 2	Understand the importance of phase diagrams and the phase transformations.
		CO 3	Know various heat treatment methods for controlling the microstructure
		CO 4	Correlate between material properties with component design and identify various kinds of defects.
		CO 5	Apply the method of materials selection, material data and knowledge sources for computer-aided selection of materials.
Thermodynamics	21ME34	CO 1	Describe the fundamental concepts and principles of engineering thermodynamics.
		CO 2	Apply the governing laws of thermodynamics for different engineering applications
		CO 3	Analyze the various thermodynamic processes, cycles and results
		CO 4	Interpret and relate the impact of thermal engineering practices to real life problems.
Machine Drawing and GD & T	21MEL35	CO 1	Interpret the Machining and surface finish symbols on the component drawings.
		CO 2	Apply limits and tolerances to assemblies and choose appropriate fits for given assemblies.
		CO 3	Illustrate various machine components through drawings
		CO 4	Create assembly drawings as per the conventions.
Social Connect &	21SCR36/46	CO 1	Understand social responsibility
		CO 2	Practice sustainability and creativity

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Responsibilities		CO 3	Showcase planning and organizational skills
Constitution of India and Professional Ethics	21CIP37/47	CO 1	Analyze the basic structure of Indian Constitution.
		CO 2	Remember their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution
		CO 3	Know about our Union Government, political structure & codes, procedures.
		CO 4	Understand our State Executive & Elections system of India.
		CO 5	Remember the Amendments and Emergency Provisions, other important provisions given by the constitution.
Introduction to PYTHON	21ME381	CO 1	Demonstrate proficiency in handling of loops and creation of functions.
		CO 2	Identify the methods to create and manipulate lists, tuples and dictionaries.
		CO 3	Discover the commonly used operations involving regular expressions and file system.
		CO 4	Examine working of PDF and word file formats
IV semester(2021 -Scheme)			
Complex Analysis, Probability and Linear Programming	21ME41	CO 1	Use the concepts of an analytic function and complex potentials to solve the problems arising in fluid flow.
		CO 2	Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.
		CO 3	Apply discrete and continuous probability distributions in analyzing the probability models arising in the engineering field.
		CO 4	Analyze and solve linear programming models of real-life situations and solve LPP by the simplex method
		CO 5	Learn techniques to solve Transportation and Assignment problems.
Machining Science	21ME42	CO 1	Demonstrate the Conventional CNC machines and advanced

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And Jigs & Fixtures (IPCC)			manufacturing process operations
		CO 2	Determine tool life, cutting force, and economy of the machining process
		CO 3	Analyze the influence of various parameters on machine tools' performance
		CO 4	Select the appropriate machine tools and process, the Jigs, and fixtures for various applications
Fluid Mechanics (IPCC)	21ME43	CO 1	Understand the basic principles of fluid mechanics and fluid kinematics
		CO 2	Acquire the basic knowledge of fluid dynamics and flow measuring instruments
		CO 3	Understand the nature of flow and flow over bodies and the dimensionless analysis
		CO 4	Acquire the compressible flow fundamental and basics of CFD packages and the need for CFD analysis.
		CO 5	Conduct basic experiments of fluid mechanics and understand the experimental uncertainties.
Mechanics Of Materials	21ME44	CO 1	Understand simple, compound, thermal stresses and strains their relations and strain energy
		CO 2	Analyze structural members for stresses, strains and deformations.
		CO 3	Analyze the structural members subjected to bending and shear loads.
		CO 4	Analyze shafts subjected to twisting loads.
		CO 5	Analyze the short columns for stability.
Biology for Engineers	21BE45	CO 1	Elucidate the basic biological concepts via relevant industrial applications and case studies
		CO 2	Evaluate the principles of design and development, for exploring

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			novel bioengineering projects
		CO 3	Corroborate the concepts of biomimetics for specific requirements
		CO 4	Think critically towards exploring innovative bio based solutions for socially relevant problems.
Mechanical Measurements and Metrology Laboratory	21MEL46	CO 1	Understand Calibration of pressure gauge, thermocouple, LVDT, load cell, micrometer.
		CO 2	Apply concepts of Measurement of angle
		CO 3	Demonstrate measurements using Optical Projector/Tool maker microscope, Optical flats
		CO 4	Analyze Screw thread parameters using 2-Wire or 3-Wire method, gear tooth profile using gear tooth Vernier/Gear tooth micrometer
		CO 5	Understand the concepts of measurement of surface roughness.
		CO 6	Demonstrate the use of Coordinate Measuring Machine (CMM) / Laser Scanner
Sanskritika Kannada 21KSK37/47	<p>ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಕಲಿಕೆಯಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಆಗುವ ಪರಿಣಾಮಗಳು (course Outcomes):</p> <ol style="list-style-type: none"> 1. ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯವಾಗುತ್ತದೆ. 2. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಅಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಅಧುನಿಕ ಕಾವ್ಯಗಳು ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಆಸಕ್ತಿಯು ಮೂಡುತ್ತದೆ. 3. ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯವಾಗುತ್ತದೆ. 4. ಕನ್ನಡ ಭಾಷಾಭಾ.ಸ. ಸಾಮಾನ್ಯ ಕನ್ನಡ ಹಾಗೂ ಆಡಳಿತ ಕನ್ನಡದ ಪದಗಳ ಪರಿಚಯವಾಗುತ್ತದೆ. 		
Spread Sheets For Engineers	21ME481	CO 1	To create different plots and charts
		CO 2	To compute different functions, conditional functions and make regression analysis
		CO 3	To carryout iterative solutions for roots, multiple roots, optimization and non-linear regression analysis
		CO 4	To carryout matrix operations
		CO 5	To Understand VBA and UDF

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		CO 6	To understand VBA subroutines and Macros
		CO 7	To carryout numerical integration and solving differential equations using different methods
Universal Human Values-II: Understanding Harmony and Ethical Human Conduct	21UHV49	CO 1	To become more aware of themselves, and their surroundings (family, society, nature) they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
		CO 2	They would have better critical ability. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
		CO 3	It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.
V Semester (2018 Scheme)			
Management and Engineering Economics	18ME51	CO 1	Understand needs, functions, roles, scope and evolution of Management
		CO 2	Understand importance, purpose of Planning and hierarchy of planning and also analyze its types
		CO 3	Discuss Decision making, Organizing, Staffing, Directing and Controlling.
		CO 4	Select the best economic model from various available alternatives.
		CO 5	Understand various interest rate methods and implement the suitable one.
		CO 6	Estimate various depreciation values of commodities.
		CO 7	Prepare the project reports effectively.
Design Of Machine Elements- I	18ME52	CO 1	Apply the concepts of selection of materials for given mechanical components.
		CO 2	List the functions and uses of machine elements used

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			in mechanical systems.
		CO 3	Apply codes and standards in the design of machine elements and select an element based on the Manufacturer's catalogue.
		CO 4	Analyze the performance and failure modes of mechanical components subjected to combined loading and fatigue loading using the concepts of theories of failure.
		CO 5	Demonstrate the application of engineering design tools to the design of machine components like shafts, couplings, power screws, fasteners, welded and riveted joints.
		CO 6	Understand the art of working in a team.
Dynamics of Machinery	18ME53	CO 1	Analyze the mechanisms for static and dynamic equilibriums in order to determine forces and couples.
		CO 2	Carryout the balancing of rotating and reciprocating masses in order to determine the magnitude and angular position of balancing masses.
		CO 3	Analyze different types of governors used in real life situation.
		CO 4	Analyze the gyroscopic effects on disks, airplanes, stability of ships, two and four wheelers
		CO 5	Understand the free and forced vibration phenomenon.
		CO 6	Determine the natural frequency, force and motion transmitted in vibrating systems.
Turbo Machines	18ME54	CO 1	Model studies and thermodynamics analysis of turbo machines.
		CO 2	Analyze the energy transfer in Turbo machine with degree of reaction and utilization factor.

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		CO 3	Classify, analyze and understand various type of steam turbine.
		CO 4	Classify, analyze and understand various type of hydraulic turbine.
		CO 5	Understand the concept of radial power absorbing machine and the problems involved during its operation.
Fluid Power Engineering	18ME55	CO 1	Identify and analyze the functional requirements of a fluid power transmission system for a given application.
		CO 2	Visualize how a hydraulic/pneumatic circuit will work to accomplish the function.
		CO 3	Design an appropriate hydraulic or pneumatic circuit or combination circuit like electro-hydraulics, electro- pneumatics for a given application.
		CO 4	Select and size the different components of the circuit.
		CO 5	Develop a comprehensive circuit diagram by integrating the components selected for the given application
Operations Management	18ME56	CO 1	Explain the concept and scope of operations management in a business context
		CO 2	Recognize the role of Operations management among various business functions and its role in the organizations' strategic planning and gaining competitive advantage.
		CO 3	Analyze the appropriateness and applicability of a range of operations management systems/models in decision making.
		CO 4	Assess a range of strategies for improving the efficiency and effectiveness of organizational operations.

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		CO 5	Evaluate a selection of frameworks used in the design and delivery of operations
Fluid Mechanics and Machinery	18MEL57	CO 1	Perform experiments to determine the coefficient of discharge of flow measuring devices.
		CO 2	Conduct experiments on hydraulic turbines and pumps to draw characteristics.
		CO 3	Test basic performance parameters of hydraulic turbines and pumps and execute the knowledge in real life situations.
		CO 4	Determine the energy flow pattern through the hydraulic turbines and pumps
		CO 5	Exhibit his competency towards preventive maintenance of hydraulic machines
Energy Conversion Laboratory	18MEL58	CO 1	Perform experiments to determine the properties of fuels and oils.
		CO 2	Conduct experiments on engines and draw characteristics.
		CO 3	Test basic performance parameters of I.C. Engine and implement the knowledge in industry.
		CO 4	Identify exhaust emission, factors affecting them
Environmental Studies	18ME59	CO 1	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale,
		CO 2	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.
		CO 3	Demonstrate ecology knowledge of a complex relationship between biotic and abiotic components.
		CO 4	Apply their ecological knowledge to illustrate and

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			graph a problem and describe the realities that managers face when dealing with complex issues.
VI Semester(2018 Scheme)			
Finite Element Methods	18ME61	CO 1	Identify the application and characteristics of FEA elements such as bars, beams, plane and iso-parametric elements.
		CO 2	Develop element characteristic equation and generation of global equation.
		CO 3	Formulate and solve Axi-symmetric and heat transfer problems.
		CO 4	Apply suitable boundary conditions to a global equation for bars, trusses, beams, circular shafts, heat transfer, fluid flow, axi-symmetric and dynamic problems.
Design Of Machine Elements II	18ME62	CO 1	Apply design principles for the design of mechanical systems involving springs, belts, pulleys, and wire ropes.
		CO 2	Design different types of gears and simple gear boxes for relevant applications.
		CO 3	Understand the design principles of brakes and clutches.
		CO 4	Apply design concepts of hydrodynamic bearings for different applications and select Anti friction bearings for different applications using the manufacturers, catalogue.
		CO 5	Apply engineering design tools to product design.
		CO 6	Become good design engineers through learning the art of working in a team.
		CO 1	Understand the modes of heat transfer and apply the

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Heat Transfer	18ME63		basic laws to formulate engineering systems.
		CO 2	Understand and apply the basic laws of heat transfer to extended surface, composite material and unsteady state heat transfer problems.
		CO 3	Analyze heat conduction through numerical methods and apply the fundamental principle to solve radiation heat transfer problems.
		CO 4	Analyze heat transfer due to free and forced convective heat transfer.
		CO 5	Understand the design and performance analysis of heat exchangers and their practical applications, Condensation and Boiling phenomena.
PROFESSIONAL ELECTIVE 1 (Non Traditional Machining)	18ME641	CO 1	Understand the compare traditional and non-traditional machining process and recognize the need for Non-traditional machining process.
		CO 2	Understand the constructional features, performance parameters, process characteristics, applications, advantages and limitations of USM, AJM and WJM.
		CO 3	Identify the need of Chemical and electro-chemical machining process along with the constructional features, process parameters, process characteristics, applications, advantages and limitations.
		CO 4	Understand the constructional feature of the equipment, process parameters, process characteristics, applications, advantages and limitations EDM & PAM.
		CO 5	Understand the LBM equipment, LBM parameters, and characteristics. EBM equipment and mechanism of metal removal, applications, advantages and limitations LBM & EBM.

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Refrigeration and Air Conditioning	18ME642	CO 1	Illustrate the principles, nomenclature and applications of refrigeration systems.
		CO 2	Explain vapour compression refrigeration system and identify methods for performance improvement
		CO 3	Study the working principles of air, vapour absorption, thermoelectric and steam-jet and thermo acoustic refrigeration systems.
		CO 4	Estimate the performance of air-conditioning systems using the principles of psychrometry.
		CO 5	Compute and Interpret cooling and heating loads in an air-conditioning system.
		CO 6	Identify suitable refrigerant for various refrigerating systems.
Theory Of Elasticity	18ME643	CO 1	Understand the Basic field equations of linear elastic solids, force, stress, strain and equilibrium in solids.
		CO 2	Analyse the 2D structural elements, beams, cylinders.
		CO 3	Use analytical techniques to predict deformation, internal force and failure of simple solids and structural components
		CO 4	Analyze the Axisymmetric structural elements.
		CO 5	Analyze the structural members subjected to torsion
		CO 6	Determine the thermal stresses in plain stress and plane stain conditions.
ADVANCED VIBRATIONS	18ME644	CO 1	Characterize the single and multi degrees of freedom systems subjected to free and forced vibrations with and without damping.
		CO 2	Apply the method of vibration measurements and its

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			controlling.
		CO 3	Determine vibratory responses of SDOF and MDOF systems to harmonic, periodic and non periodic excitation
		CO 4	Analyze the mathematical model of a linear vibratory system to determine its response
		CO 5	Obtain linear mathematical models of real life engineering systems
		CO 6	Use the concept of dynamic vibrations for a continuous system.
Composite MaterialsTechnology	18ME645	CO 1	Use different types of manufacturing processes in the preparation of composite materials
		CO 2	Analyze the problems on macro mechanical behaviour of composites
		CO 3	Analyze the problems on micromechanical behaviour of Composites
		CO 4	Determine stresses and strains relation in composites materials.
		CO 5	Understand and effective use of properties in design of composite structures
		CO 6	Perform literature search on a selected advanced material topic
Non-Conventional Energy Sources	18ME651	CO 1	Describe the environmental aspects of non-conventional energy resources. In Comparison with various conventional energy systems, their prospects and limitations.

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		CO 2	Know the need of renewable energy resources, historical and latest developments.
		CO 3	Describe the use of solar energy and the various components used in the energy production with respect to applications like-heating, cooling, desalination, power generation, drying, cooking etc.
		CO 4	Appreciate the need of Wind Energy and the various components used in energy generation and know the classifications.
		CO 5	Understand the concept of Biomass energy resources and their classification, types of biogas Plants-applications
		CO 6	Compare Solar, Wind and bio energy systems, their prospects, Advantages and limitations.
		CO 7	Acquire the knowledge of fuel cells, wave power, tidal power and geothermal principles and applications.
Computer Aided Modeling and Analysis Lab	15MEL66	CO 1	Use the modern tools to formulate the problem, create geometry, discretize and apply boundary conditions to solve problems of bars, truss, beams, and plate to find stresses with different-loading conditions.
		CO 2	Demonstrate the ability to obtain deflection of beams subjected to point, uniformly distributed and varying loads and further to use the available results to draw shear force and bending moment diagrams.
		CO 3	Analyze and solve 1D and 2D heat transfer conduction and convection problems with different boundary conditions.
		CO 4	Carry out dynamic analysis and finding natural frequencies of beams, plates, and bars for various

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Course Outcomes

			boundary conditions and also carry out dynamic analysis with forcing functions and analyze the results.
Heat Transfer Lab	18MEL67	CO 1	Determine the thermal conductivity of a metal rod and overall heat transfer coefficient of composite slabs.
		CO 2	Determine convective heat transfer coefficient for free and forced convection and correlate with theoretical values.
		CO 3	Evaluate temperature distribution characteristics of steady and transient heat conduction through solid cylinder experimentally.
		CO 4	Determine surface emissivity of a test plate and Stefan Boltzmann constant
		CO 5	Estimate performance of a refrigerator and effectiveness of a fin and Double pipe heat exchanger
VII Semester(2018 Scheme)			
Control Engineering	18ME71	CO 1	Identify the type of control and control actions
		CO 2	Develop the mathematical model of the physical systems.
		CO 3	Estimate the response and error in response of first and second order systems subjected standard input signals.
		CO 4	Determine the gain / transfer function of a complex system using Block Diagram Algebra and Signal flow graph technique
		CO 5	Analyze the stability of linear feedback control systems using, Routh Hurwitz criterion, Root Locus Technique, Bode Plot, Polar plot and Nyquist Plots

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Computer Integrated Design and Manufacturing	18ME72	CO 1	To impart knowledge of CIM and Automation and different concepts of automation by developing mathematical models.
		CO 2	To make students to understand the Computer Applications in Design and Manufacturing [CAD / CAM) leading to Computer integrated systems. Enable them to perform various transformations of entities on display devices.
		CO 3	To expose students to automated flow lines, assembly lines, Line Balancing Techniques, and Flexible Manufacturing Systems.
		CO 4	To expose students to computer aided process planning, material requirement planning, capacity planning etc
		CO 5	To expose the students to CNC Machine Tools, CNC part programming, and industrial robots.
		CO 6	To introduce the students to concepts of Additive Manufacturing, Internet of Things, and Industry 4.0, leading to Smart Factory.
Total Quality Management	18ME734	CO 1	Explain the various approaches of TQM
		CO 2	Infer the customer perception of quality
		CO 3	Analyze customer needs and perceptions to design feedback systems..
		CO 4	Apply statistical tools for continuous improvement of systems
		CO 5	Apply the tools and technique for effective

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Course Outcomes

			implementation of TQM.
Additive Manufacturing	18ME741	CO 1	Demonstrate the knowledge of the broad range of AM processes, devices, capabilities and materials that are available.
		CO 2	Understand the various software tools, processes and techniques that enable advanced /additive manufacturing.
		CO 3	Apply the concepts of additive manufacturing to design and create components that satisfy product Development / prototyping requirements, using advanced/additive manufacturing devices and processes.
		CO 4	Understand characterization techniques in additive manufacturing.
		CO 5	Understand the latest trends and business opportunities in additive manufacturing.
Energy and Environment	18ME751	CO 1	Understand energy scenario, energy sources and their utilization.
		CO 2	Understand various methods of energy storage, energy management and economic analysis.
		CO 3	Analyze the awareness about environment and eco system
		CO 4	Understand the environment pollution along with social issues and acts
Automotive Engineering	18ME752	CO 1	Identify the different parts of an automobile and its

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Course Outcomes

			working.
		CO 2	Understand the working of transmission and braking systems.
		CO 3	Understand the working of steering and suspension systems and their applications.
		CO 4	Selection and applications of various types of fuels and injection systems.
		CO 5	Analyze the cause of automobile emissions, its effects on environment and methods to reduce the emissions.
Compter Integrated Maufacturing Lab	18MEL76	CO 1	Understand CNC Lathe part programming techniques for Turning, Facing, Chamfering, Grooving, Step turning, Taper turning, Circular interpolation etc.
		CO 2	Generate CNC Mill Part programming for Point to point motions, Line motions, Circular interpolation, Contour motion, Pocket milling- circular, rectangular, Mirror commands etc.
		CO 3	Apply Canned Cycles for Drilling, Peck drilling, Boring, Tapping, Turning, Facing, Taper turning Thread cutting etc.
		CO 4	Apply simulation techniques for Tool Path generation for different machining operations of small components using CNC Lathe & CNC Milling Machine.
		CO 5	Apply high end CAM packages for machining complex parts; use state of art cutting tools and related cutting parameters and optimize cycle time.
		CO 6	Understand & write programs for Robot control; understand the operating principles of hydraulics,

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Course Outcomes

			pneumatics and electro pneumatic systems.
Design Laboratory	18MEL76	CO 1	Compute the natural frequency of the free and forced vibration of single degree freedom systems, critical speed of shafts.
		CO 2	Carry out balancing of rotating masses.
		CO 3	Analyse the governor characteristics.
		CO 4	Determine stresses in disk, beams, plates and hook using photo elastic bench.
		CO 5	Determination of Pressure distribution in Journal bearing
		CO 6	Analyze the stress and strains using strain gauges in compression and bending test and stress distribution in curved beams.
Project Work Phase - 1	18MEP78	CO 1	Undertake problem, identification, formulation and solution.
		CO 2	Design and develop a functional product prototype while working in a team.
		CO 3	Use fundamental knowledge and skills in mechanical engineering and supply it effectively on a project to solve contemporary issues

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VIII Semester(2018 Scheme)			
Energy Engineering	18ME81	CO 1	Understand the construction and working of steam generators and their accessories.
		CO 2	Identify renewable energy sources and their utilization.
		CO 3	Understand principles of energy conversion from alternate sources including wind, geothermal, ocean, biomass, nuclear, hydel and tidal.
Tribology	18ME822	CO 1	Understand the fundamentals of tribology and associated parameters.
		CO 2	Apply concepts of tribology for the performance analysis and design of components experiencing relative motion.
		CO 3	Analyze the requirements and design hydrodynamic journal and plane slider bearings for a given application.
		CO 4	Select proper bearing materials and lubricants for a given tribological application.
		CO 5	Apply the principles of surface engineering for different applications of tribology.
Internship	18MEI85	CO 1	Undertake problem, identification, formulation and solution.
		CO 2	Design and develop a functional product prototype while working in a team.
		CO 3	Use fundamental knowledge and skills in mechanical engineering and supply it effectively on a project to solve contemporary issues