H.K.E.Society's S.L.N.COLLEGE OF ENGINEERING RAICHUR
DEPARTMENT OF MECHANICAL ENGINEERING
COURSE OUTCOMES FOR AY 2022-23

Course Name	Mathematics I for Mechanical Engg Stream
Course code	BMATM101
CO1	Apply the knowledge of calculus to solve problems related to polar curves.
CO2	Learn the notion of partial differentiation to compute rate of change of multivariate functions.
CO3	Analyze the solution of linear and non-linear ordinary differential equations.
CO4	make use of matrix theory for solving the system of linear equations and compute eigenvalues and eigenvectors.
CO5	familiarize with modern mathematical tools namely MATHEMATICA/ MATLAB/ PYTHON/SCILAB
Course Name	Applied Physics for ME Stream
Course code	BPHYM102
CO1	Elucidate the concepts in oscillations, waves, elasticity and material failures
CO2	Discuss the fundamentals of Thermoelectric materials and their application
CO3	Summarize the low temperature phenomena and generation of low temperature
CO4	Explain the various material characterization techniques
CO5	Practice working in groups to conduct experiments in physics and perform precise and honest measurements
Course Name	Elements of Mechanical Engineering
Course code	BEMEM103
CO1	Explain the role of mechanical engineering in industry and society, fundamentals of steam and non-conventional energy sources
CO2	Describe different conventional and advanced machining processes, IC engines, propulsive devices, air-conditioning, refrigeration.
CO3	Explain different gear drives, gear trains, aspects of future mobility and fundamentals of robotics
CO4	Determine the condition of steam and its energy, performance parameters of IC engines, velocity ratio and power transmitted through power transmission systems.
Course Name	Introduction to C Programming
Course code	BSC1K104E
CO1	Elucidate the basic architecture and functionalities of a computer and also recognize the hardware parts
CO2	Apply programming constructs of C language to solve the real world problem
CO3	Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting
CO4	Explore user-defined data structures like structures, unions and pointers in implementing solutions
CO5	Design and Develop Solutions to problems using modular programming constructs using functions
Course Name	Smart Materials and Systems
Course code	BETCK105A
CO1	Make use emerging materials for construction
CO2	Decide the proper prefabricated building component
CO3	Use smart materials and methods in building construction
CO4	Implement BIM in building design
CO5	Prepare 3-D modelling and manufacture building component

Course Name	Communicative English
Course code	BENGK106
CO1	Understand and apply the Fundamentals of Communication Skills in their communication skills.
CO2	Identify the nuances of phonetics, intonation and enhance pronunciation skills.
CO3	To impart basic English grammar and essentials of language skills as per present requirement.
CO4	Understand and use all types of English vocabulary and language proficiency.
CO5	Adopt the Techniques of Information Transfer through presentation.
Course Name	SMSRUTIK KANNADA
Course code	BKSKK107
CO1	ಕನ ಡ , ತ ಮ ಕನ ಡದ ಸ ೃ ಯ ಅ ತ .
CO2	ಕನ ಡ ತ ದಪ ನ ಗ ದಆ ಕ ವ ಮ ಆ ಕ ವ ಗಳ ಂ ಕ ಕ ನ ಓ ಮ ನ ತ .
CO3	ಗಳ ತ ಮ ಸ ೃ ಯ ಬ ಅ ಆಸ ಯ ತ .
CO4	ಂ ಕ ವ ಗಳ ಪ ಚಯ ಅವ ಗಳ ದ ಷಯಗಳ ಂ ನ ಇ ತರ ವ ಗಳ ಬ ಳ ಕ ತ .
CO5	CO5 ಂ ಸ ೃ ಕ, ಜನಪದ ಪ ಸ ಕಥನಗಳ ಪ ಚಯ .
Course Name	Innovation and Design Thinking
Course code	BIDTK158
CO1	Appreciate various design process procedure
CO2	Generate and develop design ideas through different technique
CO3	Identify the significance of reverse Engineering to Understand products
CO4	Draw technical drawing for design ideas
CO5	Mathematics-II for Mechanical Engg Stream
Course Name	BMATM201
Course code	Apply the knowledge of multiple integrals to compute area and volume.
CO1	Understand the applications of vector calculus refer to solenoidal, irrotational vectors, line integral and surface integral.
CO2	Demonstrate partial differential equations and their solutions for physical interpretations.
CO3	Apply the knowledge of numerical methods in solving physical and engineering phenomena.
CO4	Get familiarize with modern mathematical tools namely Mathematica/MatLab/Python/Scilab
Course Name	Applied Chemistry for ME Stream
Course code	BCHEM202
CO1	Identify the terms andapplications processes involved in scientific and engineering
CO2	Explainthephenomenaofchemistrytodescribethemethodsofengineering processes
CO3	Solvetheproblemsin chemistrythatarepertinentinengineeringapplications
CO4	Applythebasicconceptsofchemistrytoexplainthechemicalpropertiesandprocesses
CO5	Analyze properties andmultidisciplin arysituations
Course Name	Computer-Aided Engineering Drawing
Course code	BCEDK203
CO1	Drawand communicate the objects with definite shape and dimensions
CO2	Recognize andDraw the shape and size of objects through different views
CO3	Develop the lateral surfaces of the object
CO4	Create a Drawing views using CAD software.

CO5	Identify the interdisciplinary engineering components or systems through its graphical representation
Course Name	Introduction to Civil Engineering
Course code	BESCK204A
CO1	Understand the various disciplines of civil engineering
CO2	Understand the infrastructure requirement for sustainable development
CO3	Compute the resultant and equilibrium of force systems.
CO4	Locate the centroid of plane and built-up sections
CO5	Compute the moment of inertia of plane and built-up sections.
Course Name	Introduction to Python Programming
Course code	BPLCK205B
CO1	Demonstrate proficiency in handling loops and creation of functions.
CO2	Identify the methods to create and manipulate lists, tuples and dictionaries.
CO3	Develop programs for string processing and file organization
CO4	Interpret the concepts of Object-Oriented Programming as used in Python.
Course Name	Professional Writing Skills in English
Course code	BPWSK206
CO1	To understand and identify the Common Errors in Writing and Speaking.
CO2	To Achieve better Technical writing and Presentation skills.
CO3	To read Technical proposals properly and make them to Write good technical reports.
CO4	Acquire Employment and Workplace communication skills.
CO5	To learn about Techniques of Information Transfer through presentation in different level.
Course Name	Indian Constitution
Course code	BICOK207
CO1	Analyse the basic structure of Indian Constitution.
CO2	Remember their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution.
CO3	know about our Union Government, political structure & codes, procedures.
CO4	Understand our State Executive & Elections system of India.
CO5	Remember the Amendments and Emergency Provisions, other important provisions given by the constitution.
Course Name	Scientific Foundations for Health
Course code	BSFHK258
CO1	To understand and analyse about Health and wellness (and its Beliefs) & It's balance for positive mindset.
CO2	Develop the healthy lifestyles for good health for their better future.
CO3	Build a Healthy and caring relationships to meet the requirements of good/social/positive life.
CO4	To learn about Avoiding risks and harmful habits in their campus and outside the campus for their bright future.
CO5	Prevent and fight against harmful diseases for good health through positive mindset.

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Course Name	TRANSFORM CALCULUS, FOURIER SERIES AND NUMERICAL TECHNIQUES
Course code	21MAT31
CO1	To solve ordinary differential equations using Laplace transform..
CO2	Demonstrate the Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory
CO3	To use Fourier transforms to analyze problems involving continuous-time signals and to apply Z-Transform techniques to solve difference equations
CO4	To solve mathematical models represented by initial or boundary value problems involving partial differential equations
CO5	Determine the extremals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.
Course Name	METAL CASTING FORMING & JOINING PROCESS (IPCC)
Course code	21ME32
CO1	Select appropriate primary manufacturing process and related parameters for obtaining initial shape and size of components.
CO2	Design and develop adequate tooling linked with casting, welding and forming operations.
CO3	Appreciate the effect of process parameters on quality of manufactured components
CO4	Demonstrate various skills in preparation of molding sand for conducting tensile, shear and compression tests using Universal sand testing machine.
CO5	Demonstrate skills in preparation of forging models involving upsetting, drawing and bending operations.
CO6	Demonstrate skills in preparation of Welding models.
Course Name	MATERIAL SCIENCE AND ENGINEERING (IPCC)
Course code	21ME33
CO1	Understand the atomic arrangement in crystalline materials and describe the periodic arrangement of atoms in terms of unit cell parameters.
CO2	Understand the importance of phase diagrams and the phase transformations.
CO3	Know various heat treatment methods for controlling the microstructure..
CO4	Correlate between material properties with component design and identify various kinds of defects.
CO5	Apply the method of materials selection, material data and knowledge sources for computer-aided selection of materials.
Course Name	THERMODYNAMICS
Course code	21ME34
CO1	Describe the fundamental concepts and principles of engineering thermodynamics.
CO2	Apply the governing laws of thermodynamics for different engineering applications.
CO3	Analyse the various thermodynamic processes, cycles and results.
CO4	Interpret and relate the impact of thermal engineering practices to real life problems.
Course Name	MACHINE DRAWING AND GD & T

Course code	21ME35
CO1	Interpret the Machining and surface finish symbols on the component drawings.
CO2	Apply limits and tolerances to assemblies and choose appropriate fits for given assemblies.
CO3	Illustrate various machine components through drawings
CO4	Create assembly drawings as per the conventions.
Course Name	Complex Analysis, Probability and Linear Programming
Course code	21MAT41
CO1	Use the concepts of an analytic function and complex potentials to solve the problems arising in fluid flow.
CO2	Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.
CO3	Apply discrete and continuous probability distributions in analyzing the probability models arising in the engineering field.
CO4	Analyze and solve linear programming models of real-life situations and solve LPP by the simplex method
CO5	Learn techniques to solve Transportation and Assignment problems.
Course Name	MACHINING SCIENCE AND JIGS & FIXTURES (IPCC)
Course code	21ME42
CO1	Demonstrate the Conventional CNC machines and advanced manufacturing process operations
CO2	Determine tool life, cutting force, and economy of the machining process.
CO3	Analyze the influence of various parameters on machine tools' performance.
CO4	Select the appropriate machine tools and process, the Jigs, and fixtures for various applications.
Course Name	FLUID MECHANICS (IPCC)
Course code	21ME43
CO1	Understand the basic principles of fluid mechanics and fluid kinematics
CO2	Acquire the basic knowledge of fluid dynamics and flow measuring instruments
CO3	Understand the nature of flow and flow over bodies and the dimensionless analysis
CO4	Acquire the compressible flow fundamental and basics of CFD packages and the need for CFD analysis.
CO5	Conduct basic experiments of fluid mechanics and understand the experimental uncertainties.
Course Name	MECHANICS OF MATERIALS
Course code	21ME44
CO1	Understand simple, compound, thermal stresses and strains their relations and strain energy.
CO2	Analyse structural members for stresses, strains and deformations.
CO3	Analyse the structural members subjected to bending and shear loads.
CO4	Analyse shafts subjected to twisting loads.
CO5	Analyse the short columns for stability.
Course Name	MECHANICAL MEASUREMENTS AND METROLOGY LABORATORY
Course code	21ME46
CO1	Understand Calibration of pressure gauge, thermocouple, LVDT, load cell, micrometer.
CO2	Apply concepts of Measurement of angle
CO3	Demonstrate measurements using Optical Projector/Tool maker microscope, Optical flats.

CO4	Analyse Screw thread parameters using 2-Wire or 3-Wire method, gear tooth profile using gear tooth Vernier/Gear tooth micrometre
CO5	Understand the concepts of measurement of surface roughness.
CO6	Demonstrate the use of Coordinate Measuring Machine (CMM) / Laser Scanner
Course Name	SPREAD SHEETS FOR ENGINEERS
Course code	21MT481
CO1	To create different plots and charts
CO2	To compute different functions, conditional functions and make regression analysis
CO3	To carryout iterative solutions for roots, multiple roots, optimization and non-linear regression analysis
CO4	To carryout matrix operations
CO5	To Understand VBA and UDF
CO6	To understand VBA subroutines and Macros
CO7	To carryout numerical integration and solving differential equations using different methods
Course Name	MANAGEMENT AND ECONOMICS
Course code	18ME51
CO1	Understand needs, functions, roles, scope and evolution of Management
CO2	Understand importance, purpose of Planning and hierarchy of planning and also54nalyse its types.
CO3	Discuss Decision making, Organizing, Staffing, Directing and Controlling.
CO4	Select the best economic model from various available alternatives.
CO5	Understand various interest rate methods and implement the suitable one. Estimate various depreciation values of commodities.
CO6	Prepare the project reports effectively.
Course Name	DESIGN OF MACHINE ELEMENTS I
Course code	18ME52
CO1	Apply the concepts of selection of materials for given mechanical components.
CO2	List the functions and uses of machine elements used in mechanical systems.
CO3	Apply codes and standards in the design of machine elements and select an element based on the Manufacturer's catalogue.
CO4	Analyse the performance and failure modes of mechanical components subjected to combined loading and fatigue loading using the concepts of theories of failure.
CO5	Demonstrate the application of engineering design tools to the design of machine components like shafts, couplings, power screws, fasteners, welded and riveted joints.
CO6	Understand the art of working in a team.
Course Name	DYNAMICS OF MACHINES
Course code	18ME53
CO1	Analyse the mechanisms for static and dynamic equilibrium.
CO2	Carry out the balancing of rotating and reciprocating masses
CO3	Analyse different types of governors used in real life situation.
CO4	Analyse the gyroscopic effects on disks, airplanes, stability of ships, two and four wheelers
CO5	Understand the free and forced vibration phenomenon.
CO6	Determine the natural frequency, force and motion transmitted in vibrating systems.
Course Name	TURBO MACHINES
Course code	18ME54
CO1	Model studies and thermodynamics analysis of turbomachines.
CO2	Analyse the energy transfer in Turbo machine with degree of reaction and utilisation factor.
CO3	Classify, analyse and understand various type of steam turbine.
CO4	Classify, analyse and understand various type of hydraulic turbine.
CO5	Understand the concept of radial power absorbing machine and the problems involved during its operation
Course Name	FLUID POWER ENGINEERING
Course code	18ME55
CO1	Identify and analyse the functional requirements of a fluid power transmission system for a given application.
CO2	Visualize how a hydraulic/pneumatic circuit will work to accomplish the function.

CO3	Design an appropriate hydraulic or pneumatic circuit or combination circuit like electro-hydraulics, electro- pneumatics for a given application.
CO4	Select and size the different components of the circuit.
CO5	Develop a comprehensive circuit diagram by integrating the components selected for the given application.
Course Name	OPERATIONS MANAGEMENT
Course code	18ME56
CO1	Explain the concept and scope of operations management in a business context
CO2	Recognize the role of Operations management among various business functions and its role in the organizations' strategic planning and gaining competitive advantage.
CO3	Analyze the appropriateness and applicability of a range of operations management systems/models in decision making.
CO4	Assess a range of strategies for improving the efficiency and effectiveness of organizational operations.
CO5	Evaluate a selection of frameworks used in the design and delivery of operations
Course Name	FLUID MECHANICS AND MACHINES LAB
Course code	18MEL57
CO1	Perform experiments to determine the coefficient of discharge of flow measuring devices.
CO2	Conduct experiments on hydraulic turbines and pumps to draw characteristics.
CO3	Test basic performance parameters of hydraulic turbines and pumps and execute the knowledge in real life situations.
CO4	Determine the energy flow pattern through the hydraulic turbines and pumps.
CO5	Exhibit his competency towards preventive maintenance of hydraulic machines.
Course Name	ENERGY CONVERSION LABORATORY
Course code	18MEL58
CO1	Perform experiments to determine the properties of fuels and oils.
CO2	Conduct experiments on engines and draw characteristics.
CO3	Test basic performance parameters of I.C. Engine and implement the knowledge in industry.
CO4	Identify exhaust emission, factors affecting them and exhibit his competency towards preventive maintenance of IC engines.
Course Name	ENVIRONMENTAL STUDIES
Course code	18CIV59
CO1	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale,
CO2	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.
CO3	Demonstrate ecology knowledge of a complex relationship between biotic and abiotic components.
CO4	Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.
Course Name	FINITE ELEMENT METHODS
Course code	18ME61
CO1	Identify the application and characteristics of FEA elements such as bars, beams, plane and iso-parametric elements.
CO2	Develop element characteristic equation and generation of global equation.
CO3	Formulate and solve Axi-symmetric and heat transfer problems.
CO4	Apply suitable boundary conditions to a global equation for bars, trusses, beams, circular shafts, heat transfer, fluid flow, axi-symmetric and dynamic problems
Course Name	DESIGN OF MACHINE ELEMENTS II
Course code	18ME62
CO1	Apply design principles for the design of mechanical systems involving springs, belts, pulleys, and wire ropes.
CO2	Design different types of gears and simple gear boxes for relevant applications.
CO3	Understand the design principles of brakes and clutches.
CO4	Apply design concepts of hydrodynamic bearings for different applications and select Anti friction bearings for different applications using the manufacturers, catalogue.
CO5	Apply engineering design tools to product design.
CO6	Become good design engineers through learning the art of working in a team.
Course Name	HEAT TRANSFER
Course code	18ME63

CO1	Understand the modes of heat transfer and apply the basic laws to formulate engineering systems.
CO2	Understand and apply the basic laws of heat transfer to extended surface, composite material and unsteady state heat transfer problems.
CO3	Analyze heat conduction through numerical methods and apply the fundamental principle to solve radiation heat transfer problems.
CO4	Analyze heat transfer due to free and forced convective heat transfer.
CO5	Understand the design and performance analysis of heat exchangers and their practical applications, Condensation and Boiling phenomena.
Course Name	COMPOSITE MATERIALS TECHNOLOGY
Course code	18ME645
CO1	Use different types of manufacturing processes in the preparation of composite materials
CO2	Analyze the problems on macro mechanical 88ehavior of composites
CO3	Analyze the problems on micromechanical 88ehavior of Composites
CO4	Determine stresses and strains relation in composites materials.
CO5	Understand and effective use of properties in design of composite structures
CO6	Perform literature search on a selected advanced material topic.
Course Name	INROSUCTION TO OPERATING SYSTEM
Course code	18CS654
CO1	Explain the fundamentals of operating system
CO2	Comprehend process management, memory management and storage management.
CO3	Familiar with various types of operating systems
Course Name	SUPPLY CHAIN MANAGEMENT
Course code	18ME653
CO1	Understand the framework and scope of supply chain management.
CO2	Build and manage a competitive supply chain using strategies, models, techniques and information technology.
CO3	Plan the demand, inventory and supply and optimize supply chain network.
CO4	Understand the emerging trends and impact of IT on Supply chain.
Course Name	COMPUTER AIDED MODELLING AND ANALYSIS LAB
Course code	18MEL66
CO1	Use the modern tools to formulate the problem, create geometry, descritize, apply boundary conditions to solve problems of bars, truss, beams, and plate to find stresses with different-loading conditions.
CO2	Demonstrate the ability to obtain deflection of beams subjected to point, uniformly distributed and varying loads and use the available results to draw shear force and bending moment diagrams.
CO3	Analyze and solve 1D and 2D heat transfer conduction and convection problems with different boundary conditions.
CO4	Carry out dynamic analysis and finding natural frequencies of beams, plates, and bars for various boundary conditions and also carry out dynamic analysis with forcing functions.
Course Name	HEAT TRANSFER LAB
Course code	18MEL67
CO1	Determine the thermal conductivity of a metal rod and overall heat transfer coefficient of composite slabs.
CO2	Determine convective heat transfer coefficient for free and forced convection and correlate with theoretical values.
CO3	Evaluate temperature distribution characteristics of steady and transient heat conduction through solid cylinder experimentally.
CO4	Determine surface emissivity of a test plate and Stefan Boltzmann constant
CO5	Estimate performance of a refrigerator and effectiveness of a fin and Double pipe heat exchanger
Course Name	CONTROL ENGINEERING
Course code	18ME71
CO1	Identify the type of control and control actions.
CO2	Develop the mathematical model of the physical systems.
CO3	Estimate the response and error in response of first and second order systems subjected standard input signals.
CO4	Represent the complex physical system using block diagram and signal flow graph and obtain transfer function.
CO5	Analyse a linear feedback control system for stability using Hurwitz criterion, Routh's criterion and root Locus technique in complex domain.

CO6	Analyse the stability of linear feedback control systems in frequency domain using polar plots,Nyquist and Bode plots.
Course Name	COMPUTER AIDED DESIGN AND MANUFACTURING
Course code	18ME72
CO1	Define Automation, CIM, CAD, CAM and explain the differences between these concepts. Solve simple
CO2	Explain the basics of automated manufacturing industries through mathematical models and analyze
CO3	Analyse the automated flow linestoreduce time and enhance productivity.
CO4	Explain the use of different computer applications in manufacturing, and able to prepare part programs for simple jobs on CNC machine tools and robot programming.
CO5	Visualize and appreciate the modern trends in Manufacturing like additive manufacturing, Industry 4.0 and applications of Internet of Things leading to Smart Manufacturing.
Course Name	OPERATIONS RESEARCH
Course code	18ME735
CO1	Understand the meaning, definitions, scope, need, phases and techniques of operations research. programming problems by graphical method,
CO2	Formulate as L.P.P and derive optimal solutions to linear Simplex method, Big-M method and Dual Simplex method.
CO3	Formulate as Transportation and Assignment problems and derive optimum solutions for transportation,Assignment and travelling salesman problems.
CO4	Solve problems on game theory for pure and mixed strategy under competitive environment.
CO5	Solve waiting line problems for M/M/1 and M/M/K queuing models.
CO6	Construct network diagrams and determine critical path, floats for deterministic and PERT networks including crashing of Networks
CO7	Determine minimum processing times for sequencing of n jobs-2 machines, n jobs-3 machines, n jobs-m machines and 2 jobs-n machines using Johnson's algorithm.
Course Name	MECHATRONICS
Course code	18ME744
CO1	Illustrate various components of Mechatronics systems.
CO2	Assess various control systems used in automation.
CO3	Design and conduct experiments to evaluate the performance of a mechatronics system or component with respect to specifications, as well as to analyse and interpret data.
CO4	Apply the principles of Mechatronics design to product design.
CO5	Function effectively as members of multidisciplinary teams.
Course Name	ENERGY AND ENVIRONMENT
Course code	18ME751
CO1	Understand energy scenario, energy sources and their utilization.
CO2	Understand various methods of energy storage, energy management and economic analysis.
CO3	Analyse the awareness about environment and eco system.
CO4	Understand the environment pollution along with social issues and acts.
Course Name	INTRODUCTION TO ARTIFICIAL INTELLIGENCE
Course code	18CS753
CO1	Identify the AI based problems
CO2	Apply techniques to solve the AI problems
CO3	Define learning and explain various learning techniques
CO4	Discuss on expert systems
Course Name	COMPUTRE AIDED MANUFACTURING LAB
Course code	18MEL76
Course Name	DESIGN LAB
Course code	18MEL77
CO1	Compute the natural frequency of the free and forced vibration of single degree freedom systems, critical speed of shafts.
CO2	Carry out balancing of rotating masses.
CO3	Analyse the governor characteristics.
CO4	Determine stresses in disk, beams, plates and hook using photo elastic bench.
CO5	Determination of Pressure distribution in Journal bearing
CO6	Analyse the stress and strains using strain gauges in compression and bending test and stress istribution in curved beams.
Course Name	ENERGY ENGINEERING
Course code	18ME81
CO1	Understand the construction and working of steam generators and their accessories.
CO2	Identify renewable energy sources and their utilization.

CO3	Understand principles of energy conversion from alternate sources including wind, geothermal, ocean,
Course Name	TRIBOLOGY
Course code	18ME822
CO1	Understand the fundamentals of tribology and associated parameters.
CO2	Apply concepts of tribology for the performance analysis and design of components experiencing relative motion.
CO3	Analyse the requirements and design hydrodynamic journal and plane slider bearings for a given application.
CO4	Select proper bearing materials and lubricants for a given tribological application.
CO5	Apply the principles of surface engineering for different applications of tribology.