

Course Outcome Statements of 2018 Scheme

The below table represents the 2018 Scheme Course Outcome Statements of the courses offered from 3rd semester to 8th semester of Mechanical Engineering.

3rd Semester

Course Name	Transform Calculus, Fourier Series & Numerical Techniques
Course Code	18MAT31
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.
CO2	Demonstrate Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory.
CO3	Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems.
CO4	Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.
CO5	Determine the externals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.

Course Name	Mechanics of materials
Course Code	18ME32
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Analyse the stresses and strains for straight, stepped, tapered and composite bars.
CO2	Analyse structural members subjected to stresses, strains, deformations, bending, shear loads
CO3	Analyse shafts subjected to twisting loads, short columns for stability and understand theories of failure, concept of strain energy.

Course Name	Basic thermodynamics
Course Code	18ME33
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Explain fundamentals of thermodynamics and evaluate energy interactions across the boundary of thermodynamic systems.
CO2	Evaluate the feasibility of cyclic and noncyclic processes using first law of thermodynamics.
CO3	Apply the knowledge of entropy, reversibility and irreversibility to solve numerical problems and apply second law of thermodynamics to closed and open systems and determine the quality of energy transfers and change in properties.
CO4	Interpret behavior of pure substances and its applications to practical problems.

Course Name	Material Science
Course Code	18ME34

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Code	
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Understand the mechanical properties of metals and their alloys.
CO2	Analyze the various modes of failure and understand the microstructures of ferrous and nonferrous materials.
CO3	Describe the processes of heat treatment of various alloys.
CO4	Acquire the Knowledge of composite materials and their production process as well as applications.
CO5	Understand the properties and potentialities of various materials available and material selection procedures.

Course Name	Metal cutting and forming
Course Code	18ME35A
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Explain the construction & specification of various machine tools.
CO2	Discuss different cutting tool materials, tool nomenclature & surface finish.
CO3	Apply mechanics of machining process to evaluate machining time.
CO4	Analyze tool wear mechanisms and equations to enhance tool life and minimize machining cost.
CO5	Understand the concepts of different metal forming processes.
CO6	Apply the concepts of design of sheet metal dies to design different dies for simple sheet metal components.

Course Name	Computer aided machine drawing
Course Code	18ME36A
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Draw sectional views, true shape of simple geometric solids, projections of machine parts from pictorial views.
CO2	Identify various thread parameters, types of thread forms and fasteners and be able sketch them.
CO3	Construct the assembled view of various keys, knuckle joint, cotter joint and couplings in right proportions based on the given rod/shaft diameter.
CO4	Produce a 3d model of components in CAD software (Solid Edge) and sketch the assembly of engineering items.
CO5	Produce various component views from the 3d model of part or assembly and create BOM of assemblies.

Course Name	Material testing lab
Course Code	18ME37A
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Acquire experimentation skills in the field of material testing.
CO2	Develop theoretical understanding of the mechanical properties of materials by performing experiments.
CO3	Apply the knowledge to analyse a material failure and determine the failure inducing agents
CO4	Apply the knowledge of testing methods in related areas.

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CO5	Understand how to improve structure/behaviour of materials for various industrial applications.
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Course Name	Workshop and Machine Shop Practice
Course Code	18MEL38A
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Execute various machining operations on lathe by reading working drawings and operational symbols by selecting cutting parameters and tooling
CO2	Perform various machining operations on shaping machine
CO3	Prepare fitting models according to drawings using hand tools
CO4	Grasp demonstrations of several power tools commonly used in machine shops

Course Name	Constitution of India, Professional Ethics and Cyber Law
Course Code	18CPC39
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Have constitutional knowledge and legal literacy.
CO2	Understand Engineering and Professional ethics and responsibilities of Engineers
CO3	Understand the the cybercrimes and cyber laws for cyber safety measures.

5th Semester

Course Name	Management and economics
Course Code	18ME51
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Understand needs, functions, roles, scope and evolution of Management
CO2	Understand importance, purpose of Planning and hierarchy of planning and also analyse its types.
CO3	Discuss Decision making, Organizing, Staffing, Directing and Controlling. Select the best economic model from various available alternatives.
CO4	Understand various interest rate methods and implement the suitable one
CO5	Estimate various depreciation values of commodities. Prepare the project reports effectively.

Course Name	Design of machine elements 1
Course Code	18ME52
CO1	Apply the concepts of design, selection of materials, codes and standards in the design of machine elements
CO2	Analyze the performance and failure modes of mechanical components subjected to combined and fatigue loading using the concepts of theories of failure and stress concentration.
CO3	Design machine components like shafts, couplings, power screws, fasteners, welded and riveted joints.
CO4	Design and develop solutions to industrial problems by working in a team using modern tools

Course	Dynamics of machines
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Name	
Course Code	18ME53
Course Outcomes(Cos): At the end of the course the student will be able to :	
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 situations.
CO4	Analyse the gyroscopic effects on disks, airplanes, stability of ships, two and four wheelers
CO5	Understand the free and forced vibration phenomenon and Determine the natural frequency, force and motion transmitted in vibrating systems

Course Name	Turbo machines
Course Code	18ME54
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Solve the fluid flow problems in turbomachines using the principles of dimensional analysis and to carryout thermodynamic analysis of Turbomachines.
CO2	Analyse the energy transfer in various Turbomachines with degree of reaction and utilisation factor.
CO3	Apply the principles of turbomachines in predicting the power generation by various types of steam turbines.
CO4	Apply the principles of turbomachines in predicting the power generation by various types of hydraulic turbines.
CO5	Apply the concepts of radial flow power absorbing turbomachines in analyzing the power consumption by the centrifugal machines.

Course Name	Fluid Power Engineering
Course Code	18ME55
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Explain the working of the various elements of the fluid power transmission system for a given application.
CO2	Visualize how a hydraulic or pneumatic circuit element will work in combination to accomplish the desired functions.
CO3	Design an appropriate hydraulic or pneumatic circuit or combinational circuit like electro-hydraulics, electro-pneumatics for a given application.
CO4	Develop comprehensive circuit diagram by integrating the components selected for a given application and analyze the performance

Course Name	Operations Management
Course Code	18ME56
Course Outcomes(Cos): At the end of the course the student will be able to :	
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.

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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	FM Lab
Course Code	18MEL57
Course Outcomes(Cos): At the end of the course the student will be able to :	
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	EC Lab
Course Code	18MEL58
Course Outcomes(Cos): At the end of the course the student will be able to :	
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 IC engines 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
Course Outcomes(Cos): At the end of the course the student will be able to :	
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.

7th Semester

Course Name	Control Engineering
Course Code	18ME71
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Identify the type of control and control actions.

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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	CADAM
Course Code	18ME72
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Apply the basic concepts of automation, CIM, CAD, CAM and CAPP in manufacturing industries.
CO2	Develop solutions for computer graphics and manufacturing matrices problems in production systems.
CO3	Design and develop the part programs for simple jobs on CNC machine tools and robot programming.
CO4	Elaborate the modern trends in Manufacturing like additive manufacturing, line balancing, Industry 4.0 and applications of Internet of Things leading to Smart Manufacturing.

Course Name	Operations Research
Course Code	18ME735
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	solve LPP using graphical and analytical methods.
CO2	analyze various parameters by arranging required jobs on available machines in sequence.
CO3	solve competitive situations to obtain optimal strategies. analyze network diagrams with respect to duration and cost associated with projects.
CO4	solve waiting line problems for M/M/1 and M/M/K queuing models.
CO5	derive optimum solutions for transportation, assignment and travelling salesman problems.

Course Name	Additive Manufacturing
Course Code	18ME741
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Demonstrate the knowledge of the broad range of AM processes, devices, capabilities and materials that are available.
CO2	Understand the various software tools, processes and techniques that enable advanced/additive manufacturing.
CO3	Apply the concepts of additive manufacturing to design and create components that satisfy product development/prototyping requirements, using advanced/additive manufacturing devices and processes.
CO4	Understand characterization techniques in additive manufacturing.
CO5	Understand the latest trends and business opportunities in additive manufacturing.

Course	Energy and Environment
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Name	
Course Code	18ME751
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Understand energy scenario, energy sources and their utilization, methods of energy storage, energy management and economic analysis
CO2	Carry out energy audits, visit treatment plants and solve existing problems
CO3	Show awareness about the environment and different ecosystems
CO4	Understand environmental pollution along with social issues and acts

Course Name	CIM Lab
Course Code	18MEL76
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Choose G-Codes and M-codes for the CNC part programming of turning and milling used in CNC simulation software.
CO2	Design and develop the simulation models of turning, drilling and milling operations in CAM packages.
CO3	Summarize the importance of automation in industries through exposure to FMS, Robotics, and Hydraulics and Pneumatics.

Course Name	Design Lab
Course Code	18MEL77
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	To understand the working principles of machine elements such as Governors, Gyroscopes etc.,
CO2	To identify forces and couples in rotating mechanical system components.
CO3	To identify vibrations in machine elements and design appropriate damping methods and to determine the critical speed of a rotating shaft.
CO4	To measure strain in various machine elements using strain gauges.
CO5	To determine the minimum film thickness, load carrying capacity, frictional torque and pressure distribution of journal bearing.
CO6	To determine strain induced in a structural member using the principle of photo-elasticity.

4th Semester

Course Name	Complex Analysis, Probability and Statistical Methods
Course Code	18MAT41
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory.
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 engineering field.

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CO4	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.
CO5	Construct joint probability distributions and demonstrate the validity of testing the hypothesis.

Course Name	Applied Thermodynamics
Course Code	18ME42
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Apply thermodynamic concepts to analyze the performance of gas and vapour power cycles.
CO2	Understand combustion of fuels and performance of I C engines.
CO3	Understand the principles and applications of refrigeration systems.
CO4	Apply Thermodynamic concepts to determine performance parameters of refrigeration and airconditioning systems.
CO5	Understand the working principle of Air compressors and Steam nozzles, applications, relevance of air and identify methods for performance improvement.

Course Name	Fluid mechanics
Course Code	18ME43
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Identify and calculate the key fluid properties used in the analysis of fluid behavior.
CO2	Explain the principles of pressure measurement, fluid statics buoyancy and floatation
CO3	Apply the knowledge of fluid kinematics while addressing problems of chemical and mechanical engineering
CO4	Describe the principles of fluid dynamics, laminar and turbulent flow.
CO5	Explain the concept of boundary layer in fluid flow and apply dimensional analysis to form dimensionless numbers in terms of input output variables
CO6	Illustrate and explain the concept of compressible fluid flow and CFD

Course Name	Kinematics of machines
Course Code	18ME44
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Design and develop different types of mechanisms and its inversions
CO2	analyze velocity and acceleration of different mechanisms using analytical and graphical methods
CO3	Design and develop Cam follower mechanisms for different motions
CO4	Analyze the motions of gears and gear trains for different applications

Course Name	Metal casting and welding
Course Code	18ME45B
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Understand and compare various casting process and details of steps involved in casting of ferrous

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	and non-ferrous metals)
CO2	Understand the working principles of melting furnaces used in casting
CO3	Understand the concept of solidification, degasification and their importance
CO4	Understand and compare various welding process and metallurgical aspects in welding, soldering and brazing
CO5	Understand the methods for the quality assurance of components made of casting and joining process
CO6	Communicate effectively the topics related to the course

Course Name	Mechanical Measurements and metrology
Course Code	18ME46B
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Understand the objectives of metrology, methods of measurement, standards of measurement & various measurement parameters.
CO2	Explain tolerance, limits of size, fits, geometric and position tolerances, gauges and their design and understand the working principle of different types of comparators.
CO3	Describe measurement of major & minor diameter, pitch, angle and effective diameter of screw threads. Measure gear parameters.
CO4	Explain measurement systems, transducers, intermediate modifying devices and terminating devices.
CO5	Describe functioning of force, torque, pressure, strain and temperature measuring devices.

Course Name	Metrology Lab
Course Code	18MEL47B
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Demonstrate the calibration pressure gauge, thermocouple, LVDT, load cell, micrometer.
CO2	Apply concepts of Measurement of angle using Sine Centre/ Sine Bar/ Bevel Protractor, alignment using Autocollimator/ Roller set.
CO3	Demonstrate measurements using Optical Projector/Tool maker microscope, Optical flats.
CO4	Analyze tool forces using Lathe/Drill tool dynamometer
CO5	Analyze Screw thread parameters using 2-Wire or 3-Wire method, gear tooth profile using gear tooth Vernier/Gear tooth micrometer
CO6	Understand the concepts of measurement of surface roughness

Course Name	Foundry, forging and welding lab
Course Code	18MEL48B
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Demonstrate skills in preparation and conduction of various tests on molding sand
CO2	Demonstrate skills in preparation of sand molds using single and split pattern and cores
CO3	Demonstrate skills in preparation of forging models involving upsetting, drawing and bending operations
CO4	Demonstrate skills in preparation of welded joints using Arc Welding equipment

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6th Semester

Course Name	Finite element analysis
Course Code	18ME61
Course Outcomes(Cos): At the end of the course the student will be able to :	
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 2
Course Code	18ME62
Course Outcomes(Cos): At the end of the course the student will be able to :	
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
Course Outcomes(Cos): At the end of the course the student will be able to :	
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	Nontraditional machining
Course Code	18ME641
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Understand the compare traditional and non-traditional machining process and recognize the need for



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	Non- traditional machining process.
CO2	Understand the constructional features, performance parameters, process characteristics, applications, advantages and limitations of USM, AJM and WJM.
CO3	Identify the need of Chemical and electro-chemical machining process along with the constructional features, process parameters, process characteristics, applications, advantages and limitations.
CO4	Understand the constructional feature of the equipment, process parameters, process characteristics, applications, advantages and limitations EDM & PAM. CO5: Understand the LBM equipment, LBM parameters, and characteristics. EBM equipment and mechanism of metal removal, applications, advantages and limitations LBM & EBM.

Course Name	CAMA Lab
Course Code	18MEL66
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Use the modern tools to formulate the problem, create geometry, descriteze, 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	NCES
Course Code	18ME651
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Describe the environmental aspects of non-conventional energy resources. In Comparison with various conventional energy systems, their prospects and limitations. Know the need of renewable energy resources, historical and latest developments.
CO2	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.
CO3	Appreciate the need of Wind Energy and the various components used in energy generation and know the classifications.
CO4	Compare Solar, Wind and bio energy systems, their prospects, Advantages and limitations.
CO5	Understand the concept of Biomass, fuel cells, wave power, tidal power and geothermal energy resources and their classification, applications.

Course Name	HT Lab
Course Code	18MEL67
Course Outcomes(Cos): At the end of the course the student will be able to :	
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.

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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

8th Semester

Course Name	Energy Engineering
Course Code	18ME81
Course Outcomes(Cos): At the end of the course the student will be able to :	
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, biomass, nuclear, hydel and tidal.

Course Name	NDTE
Course Code	18ME823
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Classify various non-destructive testing methods.
CO2	Check different metals and alloys by visual inspection method.
CO3	Explain and perform non-destructive tests like: Liquid penetrant test, Magnetic particle test, Ultrasonic test, X- ray and Gamma ray radiography, Leak Test, Eddy current test.
CO4	Identify defects using relevant NDT methods.
CO5	Differentiate various defect types and select the appropriate NDT methods for better evaluation.
CO6	Document the testing and evaluation of the results.

Course Name	Project work
Course Code	18MEP83
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	identify and communicate the gaps available in the literature and frame objectives, develop methodology for respective identified problem areas.
CO2	design, fabricate, conduct experimentation and communicate the results
CO3	analyze prepare necessary documents such as phase wise reports and final reports

Course Name	Technical seminar
Course Code	18MES84
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Identify the changing trends in engineering knowledge and practice
CO2	Carry out the comprehend technical literature and document work

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CO3	Demonstrate the competence in listening, speaking, and presentation
CO4	Demonstrate the integrity of different modes of communication

Course Name	Internship
Course Code	18MEI85
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Identify and study the technological development in the respective domain and develop a technical artifact.
CO2	Develop work habits and attitudes necessary for job success and build a record of work experience


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Course Outcome Statements of 2021 Scheme

The below table represents the 2021 Scheme Course Outcome Statements of the courses offered from 3rd to 5th semester of Mechanical Engineering.

3rd Semester	
Course Name TRANSFORM CALCULUS, FOURIER SERIES & NUMERICAL TECHNIQUES	
Course Code 21MAT31	
Course Outcomes(COs): At the end of the course the student will be able to :	
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 externals 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	
Course Outcomes(COs): At the end of the course the student will be able to :	
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	
Course Outcomes(COs): At the end of the course the student will be able to :	
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	



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Course Outcomes(COs): At the end of the course the student will be able to :

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

21MEL35

Course Outcomes(COs): At the end of the course the student will be able to :

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

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ

Course Code

21SKS37/47

Course Outcomes(COs): At the end of the course the student will be able to :

CO1	ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯವಾಗುತ್ತದೆ
CO2	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳ ಮತ್ತೆ ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಆಸಕ್ತಿಯು ಮೂಡುತ್ತದೆ
CO3	ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯವಾಗುತ್ತದೆ
CO4	ಕನ್ನಡ ಭಾಷಾಭ್ಯಾಸ, ಸಾಮಾನ್ಯ ಕನ್ನಡ ಹಾಗೂ ಆಡಳಿತ ಕನ್ನಡದ ಪದಗಳ ಪರಿಚಯವಾಗುತ್ತದೆ

Course Name

ಬಳಕೆ ಕನ್ನಡ

Course Code

21KKBK37/47

Course Outcomes(COs): At the end of the course the student will be able to :

CO1	To understand the necessity of learning of local language for comfortable life
CO2	To Listen and understand the Kannada language properly.
CO3	To communicate (converse) in Kannada language in their daily life with kannada speakers.
CO4	To speak in polite conversation.

Course Name

CONSTITUTION OF INDIA AND PROFESSIONAL ETHICS (CIP)

Course Code

21CIP37/47

Course Outcomes(COs): At the end of the course the student will be able to :

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

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Course Name INTRODUCTION TO PYTHON	
Course Code 21ME381	
Course Outcomes(COs): At the end of the course the student will be able to :	
CO1	Demonstrate proficiency in handling of loops and creation of functions.
CO2	Identify the methods to create and manipulate lists, tuples and dictionaries.
CO3	Discover the commonly used operations involving regular expressions and file system
CO4	Examine working of PDF and word file formats

4th Semester	
Course Name COMPLEX ANALYSIS, PROBABILITY AND LINEAR PROGRAMMING	
Course Code 21MATME41	
Course Outcomes(Cos): At the end of the course the student will be able to :	
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	
Course Outcomes(Cos): At the end of the course the student will be able to :	
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	
Course Code 21ME43	
Course Outcomes(Cos): At the end of the course the student will be able to :	
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	
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Understand simple, compound, thermal stresses and strains their relations and strain energy

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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
21MEL46

Course Outcomes(Cos): At the end of the course the student will be able to :

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

Course Outcomes(Cos): At the end of the course the student will be able to :

CO1	To create different plots and charts • To compute different functions, conditional functions and make regression analysis
CO2	To carryout iterative solutions for roots, multiple roots, optimization and non-linear regression analysis • To carryout matrix operations
CO3	To Understand VBA and UDF • To understand VBA subroutines and Macros
CO4	To carryout numerical integration and solving differential equations using different methods

5th Semester

Course Name
THEORY OF MACHINES
Course Code
21ME51

Course Outcomes(Cos): At the end of the course the student will be able to :

CO1	Knowledge of mechanisms and their motion and the inversions of mechanisms
CO2	Analyse the velocity, acceleration of links and joints of mechanisms.
CO3	Analyse the mechanisms for static and dynamic equilibrium.
CO4	Carry out the balancing of rotating and reciprocating masses
CO5	Analyse different types of governors used in real life situation. Also analyze the free and forced vibration phenomenon.

Course Name
THERMO-FLUIDS ENGINEERING (IPCC)

Course Code
21ME52

CO1	Apply the concepts of testing of I. C. Engines and evaluate their performance, and evaluate the performance of Reciprocating compressor
CO2	Apply and analyse the concepts related to Refrigeration and Air conditioning, and get conversant with

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	Psychrometric Charts, Psychrometric processes, human comfort conditions.
CO3	Explain the construction, classification and working principle of the Turbo machines and apply of Euler's turbine equation to evaluate the energy transfer and other related parameters. Compare and evaluate the performance of positive displacement pumps.
CO4	Classify, explain and analyse the various types of hydraulic turbines and centrifugal pumps
CO5	Classify, explain and analyse various types of steam turbines and centrifugal compressor.

Course Name FINITE ELEMENT ANALYSIS	
Course Code 21ME53	
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Identify the application and characteristics of FEA elements such as bars, beams, plane and isoparametric 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 MODERN MOBILITY & AUTOMOTIVE MECHANICS	
Course Code 21ME54	
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Understand the working of different systems employed in automobile
CO2	Analyse the limitation of present day automobiles
CO3	Evaluate the energy sources suitability
CO4	Apply the knowledge for selection of automobiles based on their suitability

Course Name DESIGN LAB	
Course Code 21MEL55	
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Compute the natural frequency of the free and forced vibration of single degree freedom systems, critical speed of shafts. Carry out balancing of rotating masses and gyroscope phenomenon.
CO2	Analyse the governor characteristics. Determine stresses in disk, beams and plates using photo elastic bench.
CO3	Determination of Pressure distribution in Journal bearing. Analyse the stress and strains using strain gauges in compression and bending test
CO4	To realize different mechanisms and cam motions

Course Name BASICS OF MATLAB	
Course Code 21ME581	
Course Outcomes(Cos): At the end of the course the student will be able to :	
CO1	Able to implement loops, branching, control instruction and functions in MATLAB programming environment.
CO2	Able to program curve fitting, numerical differentiation and integration, solution of linear equations in MATLAB and solve electrical engineering problems.

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CO3	Able to understand implementation of ODE using ode 45 and execute Solutions of nonlinear equations and DFT in MATLAB.
CO4	Able to simulate MATLAB Simulink examples

Course Name RESEARCH METHODOLOGY & INTELLECTUAL PROPERTY RIGHTS	
Course Code 21RMI56	
Course Outcomes(COs): At the end of the course the student will be able to :	
CO1	To know the meaning of engineering research.
CO2	To know the procedure of Literature Review and Technical Reading
CO3	To know the fundamentals of patent laws and drafting procedure
CO4	Understanding the copyright laws and subject matters of copyrights and designs
CO5	Understanding the basic principles of design rights

Course Name ENVIRONMENTAL STUDIES	
Course Code 21CIV57	
Course Outcomes(COs): At the end of the course the student will be able to :	
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 a biotic components
CO4	Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.


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Course Outcome Statements of 2022 Scheme

The below table represents the 2022 Scheme Course Outcome Statements of the courses offered for 3rd semester of Mechanical Engineering.

Course Name MECHANICS OF MATERIALS	
Course Code BME301	
Course Outcomes(COs): At the end of the course the student will be able to :	
CO1	Understand the concepts of stress and strain in simple and compound bars.
CO2	Explain the importance of principal stresses and principal planes & Analyse cylindrical pressure vessels under various loadings
CO3	Apply the knowledge to understand the load transferring mechanism in beams and stress distribution due to shearing force and bending moment
CO4	Evaluate stresses induced in different cross-sectional members subjected to shear loads
CO5	Apply basic equation of simple torsion in designing of circular shafts & Columns

Course Name MANUFACTURING PROCESS (IPCC)	
Course Code BME302	
Course Outcomes(COs): At the end of the course the student will be able to :	
CO1	Describe the casting process and prepare different types of cast products. Acquire knowledge on Pattern, Core, Gating, Riser system and to use Jolt, Squeeze, and Sand Slinger Moulding machines.
CO2	Compare the Gas fired pit, Resistance, Coreless, Electrical and Cupola Metal Furnaces. Compare the Gravity, Pressure die, Centrifugal, Squeeze, slush and Continuous Metal mold castings.
CO3	Understand the Solidification process and Casting of Non-Ferrous Metals
CO4	Describe the Metal Arc, TIG, MIG, Submerged and Atomic Hydrogen Welding processes etc. used in manufacturing.
CO5	Describe the methods of different joining processes and thermal effects in joining process

Course Name MATERIAL SCIENCE AND ENGINEERING (IPCC)	
Course Code BME303	
Course Outcomes(COs): At the end of the course the student will be able to :	
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 BASIC THERMODYNAMICS	
Course Code BME304	
Course Outcomes(COs): At the end of the course the student will be able to :	

CO1	Explain fundamentals of thermodynamics and evaluate energy interactions across the boundary of thermodynamic systems.
CO2	Apply 1st law of thermodynamics to closed and open systems and determine quantity of energy transfers.
CO3	Evaluate the feasibility of cyclic and non-cyclic processes using 2nd law of thermodynamics
CO4	Apply the knowledge of entropy, reversibility and irreversibility to solve numerical problems and Interpret the behaviour of pure substances and its application in practical problems.
CO5	Recognize differences between ideal and real gases and evaluate thermodynamic properties of ideal and real gas mixtures using various relations.

Course Name INTRODUCTION TO MODELLING AND DESIGN FOR MANUFACTURING	
Course Code BMEL305	
Course Outcomes(COs): At the end of the course the student will be able to :	
CO1	Create and modify and form-based design
CO2	Use design tools for moulded parts
CO3	Demonstrate proficiency in the setup and creation of a design
CO4	Simulate the assembly of machine components in 3D environment

Course Name SMART MATERIALS & SYSTEMS	
Course Code BME306B	
Course Outcomes(COs): At the end of the course the student will be able to :	
CO1	Apply the knowledge for materials characterisation
CO2	Evaluate the materials based on actuation
CO3	Select and justify appropriate materials for specific application

Course Name ADVANCED PYTHON PROGRAMMING	
Course Code BME358A	
Course Outcomes(COs): At the end of the course the student will be able to :	
CO1	Develop algorithmic solutions to simple computational problems
CO2	Develop and execute simple Python programs.
CO3	Use functions to decompose a Python program
CO4	Process compound data using Python data structures.
CO5	Utilize Python packages in developing software applications.

Course Name SOCIAL CONNECT & RESPONSIBILITY	
Course Code BSCK307	
Course Outcomes(COs): At the end of the course the student will be able to :	
CO1	Communicate and connect to the surrounding.
CO2	Create a responsible connection with the society
CO3	Involve in the community in general in which they work
CO4	Notice the needs and problems of the community and involve them in problem -solving
CO5	Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical

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	solutions to individual and community problems
CO6	Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes



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