

## Department of Mechanical , CAY- (Odd semester, 2021-22)

	<b>PROGRAM SPECIFIC OUTCOMES [PSO's]</b>	
	At the end of the program graduates will be able to:	
<b>PSO1</b>	Apply engineering knowledge & analytical skills to design components for applications in the field of machine tools and thermal & fluid systems.	
<b>PSO2</b>	Carry out experiments on models & prototypes of mechanical systems to evaluate their performance.	
<b>PSO3</b>	Use professional best engineering practices & strategies for operation & maintenance of mechanical systems & processes.	

<b>Course Name:</b>	Engineering Mathematics III		
<b>Course Code</b>	MEC301		
<b>Faculty Name:</b>	Satyanarayana Naqula		
<b>Year</b>	2	<b>Sem</b>	3

CO Number	Course Outcome
MEC301.1	Students will be able to Define Laplace Transforms and Inverse Laplace Transforms for standard functions; Define harmonic functions and Orthog
MEC301.2	Students will be able to Obtain the Laplace Transforms, Inverse Laplace Transforms of combinations of standard functions using the properties of
MEC301.3	Students will be able to use Cauchy – Riemann equations to verify if a function is analytic, Obtain complex form Fourier series of functions, Apply L
MEC301.4	Students will be able to identify Harmonic functions; Check if a given sequence of functions is orthogonal/orthonormal; obtain Half Range and com
MEC301.5	Students will be able to obtain an analytic function given a linear combination of its real and imaginary parts; Understand and analyze the complex
MEC301.6	Students will be able to Solve Partial Differential equations (heat equation) using Fourier Series; Use Bender-Schmidt and Crank-Nicholson metho

<b>Course Name:</b>	Strength of Materials		
<b>Course Code</b>	MEC302		
<b>Faculty Name:</b>	Dr. Padiya		
<b>Year</b>	2	<b>Sem</b>	3

CO Number	Course Outcome
MEC302.1	Recall fundamental concepts of various stresses and strains induced in materials when subjected to different types of loading.
MEC302.2	Illustrate the Shear force and Bending Moment in the beams subjected to different types of loading with various supports.
MEC302.3	Solve for the magnitude and nature of the stresses induced in beams, shafts, shells when subjected to different kinds of loads
MEC302.4	Analyze the strain energy in mechanical element subjected to gradual, sudden and Impact loading.
MEC302.5	Analyze the deflection and slope in beams when subjected to different loads with various supports.
MEC302.6	Analyze buckling phenomenon in columns, struts.

<b>Course Name:</b>	Production Process I		
<b>Course Code</b>	MEC303		
<b>Faculty Name:</b>	Sudhakar A		
<b>Year</b>	2	<b>Sem</b>	3

CO Number	Course Outcome
MEC303.1	Identify different primary forming, joining and chip removal processes like casting, forging, Rolling, plastic moulding, machining and welding.
MEC303.2	Describe different casting process, forming process, welding operations and machining operations
MEC303.3	Solve numerical on casting and forming process based on the given parameters.
MEC303.4	Analyse the effect of change in parameters for any manufacturing process like casting, forming process, etc.
MEC303.5	Interpret suitable manufacturing process for a given component.
MEC303.6	Develop a process plan for a given component.

<b>Course Name:</b>	Materials and Metallurgy		
<b>Course Code</b>	MEC304		
<b>Faculty Name:</b>	Rajwade		
<b>Year</b>	2	<b>Sem</b>	3

CO Number	Course Outcome
MEC304.1	Define the terms which are related to properties of materials.
MEC304.2	Classify different materials and get an outline of new materials like composites, nano-materials and polymers in terms of their types, properties,
MEC304.3	Relate mechanical behaviour of materials subjected to deformation under different loading conditions to identify different processing conditions
MEC304.4	Select the appropriate heat treatment processes for ferrous alloys which are suitable for the different applications.
MEC304.5	Interpret the iron - iron carbide equilibrium diagram and TTT diagram for selecting proper heat treatment process depending on alloying elements,
MEC304.6	Summarise the percentage composition of different phases in different alloys.

<b>Course Name:</b>	Thermodynamics		
<b>Course Code</b>	MEC305		
<b>Faculty Name:</b>	S. Sabnis		
<b>Year</b>	2	<b>Sem</b>	3

CO Number	Course Outcome
MEC305.1	Memorize the laws, theorems and relations of thermodynamics.
MEC305.2	Describe the heat and work interactions in thermodynamics systems.
MEC305.3	Solve the real life examples using thermodynamic relations.
MEC305.4	Calculate the Heat and Work transfer for thermodynamic systems
MEC305.5	Evaluate the performance and efficiencies of heat engines and power cycles.
MEC305.6	Formulate work transfer for a system taking into account exergy balance.

<b>Course Name:</b>	Material testing		
<b>Course Code</b>	MEL301		
<b>Faculty Name:</b>	Dr. Padiya		
<b>Year</b>	2	<b>Sem</b>	3

CO Number	Course Outcome
MEL301.1	Recall the stress - strain behavior of materials
MEL301.2	Explain mechanical properties of materials subjected to tensile loading.
MEL301.3	Experiment the torsional loading on shaft to find torsional strength of materials.
MEL301.4	Take part in impact test using Izod and Charpy method
MEL301.5	Measure the hardness of materials
MEL301.6	Build flexural test with central and three point loading conditions

<b>Course Name:</b>	Computer Aided Drawing Modelling		
<b>Course Code</b>	MESBL301		
<b>Faculty Name:</b>	Pavan K / Nilesh G		
<b>Year</b>	2	<b>Sem</b>	3

CO Number	Course Outcome
MESBL301.1	Define curves of intersection for different solids and draw true shape and size of inclined surface on the Auxiliary plane.
MESBL301.2	Understand the different types of threads and joints which are used in industries.
MESBL301.3	Apply the limits and tolerance on component dimensions along with GD&T and surface finish symbols representation.
MESBL301.4	Analyze the conversion of pictorial views into orthographic projections.
MESBL301.5	Evaluate type of joint between two mating components.
MESBL301.6	Creation of mechanical systems in 3D environment.

<b>Course Name:</b>	Mini Project – 1A		
<b>Course Code</b>	MEPBL301		
<b>Faculty Name:</b>	Johnson/ Sachin		
<b>Year</b>	2	<b>Sem</b>	3

CO Number	Course Outcome
MEPBL301.1	Identify problems based on societal /research needs.
MEPBL301.2	Apply Knowledge and skill to solve societal problems in a group
MEPBL301.3	Develop interpersonal skills to work as member of a group or leader
MEPBL301.4	Draw the proper inferences from available results through theoretical/ experimental/simulations
MEPBL301.5	Development Soft Skills and/or core Skills
MEPBL301.6	Learn project management principles during project work.

<b>Course Name:</b>	Mechanical Measurements and Control		
<b>Course Code</b>	MEC501		
<b>Faculty Name:</b>	Mahesh R		
<b>Year</b>	3	<b>Sem</b>	5

CO Number	Course Outcome
MEC501.1	Recall the basic concepts learnt in Industrial electronics, applied mechanics and math's as applicable to transistors, diodes, microcontrollers, mass, work energy principles, velocity, accelerations, levers and Laplace transform along with differential equations.
MEC501.2	Distinguish the basic methodologies to measure Displacement motion due to (linear, rotary, turbulence, thermal and as feedback to control the output etc) and classification of these transducers based on various parameters and systems.
MEC501.3	Choose the appropriate transducer to measure the required system parameters like (displacement, speed, acceleration, force, flow, temperatures etc) validating the specifications and handshaking between the interfacing components.
MEC501.4	Examine the fundamental laws, governing equations and working principles to deduce the equations for (Displacement sensed by Transducers, input to output stability relation between intermediate elements, feedback errors, work, power, etc) for analysis of the given system.
MEC501.5	Judge between different criteria's in a given system to help map a suitable component to get expected results by solving for various parameter's like (analog output setting, fluctuating resistance current and voltages to represent Displacement in a transduced form etc) in the analysis of transfer function numerically.
MEC501.6	Build new updated and comparative data between various measuring elements to derive a better control incorporating feedback so as to easily correlate different criteria's and parameters to provide a stable system (using Transfer function, performance curves, S-plots, stability criteria's, Specifications from manufacturer etc) to predict/obtain system performance.

<b>Course Name:</b>	Thermal Engineering		
<b>Course Code</b>	MEC502		
<b>Faculty Name:</b>	Pawan K		
<b>Year</b>	3	<b>Sem</b>	5

CO Number	Course Outcome
MEC502.1	Learner is able to define various terms in thermal engineering
MEC502.2	Learner is able to describe the concepts of thermal engineering
MEC502.3	Learner is able to apply learnt equations to solve numerical on conduction, convection, radiation, heat exchangers and internal combustion engines
MEC502.4	Learner is able to frame and solve differential equations in heat transfer
MEC502.5	Learner is able to compare engines/heat exchangers and conclude
MEC502.6	Learner is able to determine various design related parameters in heat transfer and internal combustion engines

<b>Course Name:</b>	Dynamics of Machinery		
<b>Course Code</b>	MEC503		
<b>Faculty Name:</b>	Swapnil Gujarathi		
<b>Year</b>	3	<b>Sem</b>	5

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MEC503.1	State Basic Concepts of Dynamics of Machinery.
MEC503.2	Convert the physical mechanical system into mathematical model to represent dynamic system and derive its governing equation of motion.
MEC503.3	Apply methods to solve differential equations and determine natural frequency of mechanical systems.
MEC503.4	Investigate the Static and Dynamic forces in mechanical systems.
MEC503.5	Evaluate vibration transmissibility and measure motion parameters using vibration measuring instruments.
MEC503.6	Develop a program in GNU-OCTAVE to plot the response of free vibration of a mechanical system.

<b>Course Name:</b>	Finite Element Analysis		
<b>Course Code</b>	MEC504		
<b>Faculty Name:</b>	Shreeprasad M		
<b>Year</b>	3	<b>Sem</b>	5

CO Number	Course Outcome
MEC504.1	Solve differential equations using weighted residual methods
MEC504.2	Develop the finite element equations to model engineering problems governed by second order differential equations
MEC504.3	Apply the basic finite element formulation techniques to solve engineering problems by using one dimensional elements
MEC504.4	Apply the basic finite element formulation techniques to solve engineering problems by using two dimensional elements
MEC504.5	Apply the basic finite element formulation techniques to find natural frequency of single degree of vibration system
MEC504.6	Use commercial FEA software ANSYS Mechanical APDL, to solve problems related to mechanical engineering

<b>Course Name:</b>	Computational Methods		
<b>Course Code</b>	MEDLO5013		
<b>Faculty Name:</b>	Dr. Pawar		
<b>Year</b>	3	<b>Sem</b>	5

CO Number	Course Outcome
MEDLO5013.1	Identify an appropriate mathematical formulation to linear algebraic equations.
MEDLO5013.2	Understand and develop mathematical models of physical systems.
MEDLO5013.3	Build an appropriate mathematical formulation to non-linear algebraic equations.
MEDLO5013.4	Evaluate and interpret the data regression, curve fitting and statistics.
MEDLO5013.5	Apply the numerical techniques and numerical schemes.
MEDLO5013.6	Formulate the concept of numerical methods in realistic applications.

<b>Course Name:</b>	Thermal Engineering		
<b>Course Code</b>	MEL501		
<b>Faculty Name:</b>	Pawan K		
<b>Year</b>	3	<b>Sem</b>	5

CO Number	Course Outcome
MEL501.1	Learner is able to identify various components of experimental set up
MEL501.2	Learner is able to describe the procedure for experiments
MEL501.3	Learner is able to apply learnt equations to do the calculations
MEL501.4	Learner is able to plot curves from the data gathered
MEL501.5	Learner is able conclude on the data obtained
MEL501.6	Learner is able to determine various design related parameters

<b>Course Name:</b>	Dynamics of Machinery		
<b>Course Code</b>	MEL502		
<b>Faculty Name:</b>	Swapnil G		
<b>Year</b>	3	<b>Sem</b>	5

CO Number	Course Outcome
MEL502.1	Estimate natural frequency of spring-mass-damper system.
MEL502.2	Determine the damping coefficient of the oil
MEL502.3	Plot and analyse governor characteristic
MEL502.4	Analyse gyroscopic effect on laboratory model.
MEL502.5	Balance the rotating mass.
MEL502.6	Analyse vibration response plotted through a program written in GNU-OCTAVE.

<b>Course Name:</b>	Finite Element Analysis		
<b>Course Code</b>	MEL503		
<b>Faculty Name:</b>	Shreprasad M		
<b>Year</b>	3	<b>Sem</b>	5

CO Number	Course Outcome
MEL503.1	Solve differential equations using weighted residual methods
MEL503.2	Develop the finite element equations to model engineering problems governed by second order differential equations
MEL503.3	Apply the basic finite element formulation techniques to solve engineering problems by using one dimensional elements
MEL503.4	Apply the basic finite element formulation techniques to solve engineering problems by using two dimensional elements
MEL503.5	Apply the basic finite element formulation techniques to find natural frequency of single degree of vibration system
MEL503.6	Use commercial FEA software ANSYS Mechanical APDL, to solve problems related to mechanical engineering

<b>Course Name:</b>	Professional communication and ethics		
<b>Course Code</b>	MESBL501		
<b>Faculty Name:</b>	Sachin sugave		
<b>Year</b>	3	<b>Sem</b>	5
<b>CO Number</b>	<b>Course Outcome</b>		
MESBL501.1	Students will be able to relate to techniques of formal and technical writing and to principles of corporate ethics which includes knowledge of Intellectual		
MESBL501.2	Students will be able to explain the objectives, format and style of technical report, technical proposal and the importance of interpersonal skills and paraphrase a technical paper		
MESBL501.3	Students will be able to describe strategies for effective meetings and group discussions and techniques for effective preparation for different types of interview which includes		
MESBL501.4	Students will be able to apply conceptual awareness of interpersonal skills, strategies for effective meetings which includes documentation, and		
MESBL501.5	Students will be able to make use of the given format while drafting a technical report and technical proposal and the techniques of effective preparation for		
MESBL501.6	Students will be able to evaluate technical reports and technical proposals using the given rubric		

<b>Course Name:</b>	Mini Project – 2 A		
<b>Course Code</b>	MEPBL501		
<b>Faculty Name:</b>	Johnson/ Sachin		
<b>Year</b>	3	<b>Sem</b>	5
<b>CO Number</b>	<b>Course Outcome</b>		
MEPBL501.1	Identify problems based on societal /research needs.		
MEPBL501.2	Apply Knowledge and skill to solve societal problems in a group.		
MEPBL501.3	Develop interpersonal skills to work as member of a group or leader.		
MEPBL501.4	Draw the proper inferences from available results through theoretical/experimental/simulations.		
MEPBL501.5	Analyse the impact of solutions in societal and environmental context for sustainable development.		
MEPBL501.6	Use standard norms of engineering practices		

<b>Course Name:</b>	Machine Design -II		
<b>Course Code</b>	MEC701		
<b>Faculty Name:</b>	Dr Suryawanshi & Johnson Varghese		
<b>Year</b>	4	<b>Sem</b>	7
<b>CO Number</b>	<b>Course Outcome</b>		
MEC701.1	The learner will be able to describe the basic working of gears, rolling and sliding contact bearings, clutches, belts and chains, cam and follower		
MEC701.2	The learner will be able to identify and model a machine element and analyse the stresses induced using application software		
MEC701.3	The learner will be able to perform design calculations based on strength and wear concepts referring design data books and choose the standard dimension		
MEC701.4	The learner will be able to identify and model a machine element and analyse the stresses induced using application software		
MEC701.5	The learner will be able to select and Synthesize machine elements and evaluate the strength oriented design.		
MEC701.6	The learner will be able to design a new machine elements from given known data		

<b>Course Name:</b>	Production Planning and Control		
<b>Course Code</b>	MEC703		
<b>Faculty Name:</b>	Sandeep Dasgupta & Juned A		
<b>Year</b>	4	<b>Sem</b>	7
<b>CO Number</b>	<b>Course Outcome</b>		
MEC703.1	Students will be able to describe PPC, its function (planning, forecasting, scheduling, routing, inventory control, sequencing) and its relationship with other dept		
MEC703.2	Students will be able to compare types of production, qualitative and quantitative forecasting, aggregate and capacity planning, probabilistic and deterministic models, manual process planning and CAPP, MRP I and MRP II.		
MEC703.3	Students will be able to use forecasting techniques, deterministic inventory control models, line balancing techniques and optimally schedule n-jobs in m-machines		
MEC703.4	Students will be able to illustrate ABC inventory classification with diagram, network diagram, techniques of line balancing and benefits and limitations of MRP II.		
MEC703.5	Students will be able to develop process sheet and resource levelling by crashing of critical path.		
MEC703.6	Students will be able to justify project scheduling by network analysis and cost allocation in critical path method		

<b>Course Name:</b>	CAD/CAM/CAE		
<b>Course Code</b>	MEC702		
<b>Faculty Name:</b>	Shreeprasad S Manohar & Sudhakar A		
<b>Year</b>	4	<b>Sem</b>	7
<b>CO Number</b>	<b>Course Outcome</b>		
MEC702.1	Identify proper computer graphics techniques for geometric modelling, CNC terminology and RP techniques for Machining operations		
MEC702.2	Differentiate computer graphics techniques for geometric modelling, CNC machining centers and RP techniques for Machining operations		
MEC702.3	Manipulate graphical data and CNC machine tool to transform or machine objects		
MEC702.4	Categorize the graphical data for geometric modeling, CNC machining and Rapid Prototyping		
MEC702.5	Recommend the suitable technique for geometric modeling, CNC machining and Rapid Prototyping		
MEC702.6	Design an optimized a tool path for a given model		

<b>Course Name:</b>	Mechanical Vibration		
<b>Course Code</b>	MEDLO7031		
<b>Faculty Name:</b>	Sachin S		
<b>Year</b>	4	<b>Sem</b>	7
<b>CO Number</b>	<b>Course Outcome</b>		
MEDLO7031.1	Students will be able to relate elements of a vibratory system to a physical system.		
MEDLO7031.2	Students will be able to explain basic concepts of Mechanical Vibrations.		
MEDLO7031.3	Students will be able to develop mathematical model to represent a dynamic system.		
MEDLO7031.4	Students will be able to analyze response of mechanical systems subjected to vibrations.		
MEDLO7031.5	Students will be able to determine natural frequency of mechanical systems		

MEDLO7031.6	Students will be able to design vibration isolation and vibration measuring systems.
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<b>Course Name:</b>	Automobile Engineering		
<b>Course Code</b>	MEDLO7032		
<b>Faculty Name:</b>	Nilesh G		
<b>Year</b>	4	<b>Sem</b>	7

CO Number	Course Outcome
MEDLO7032.1	Explain the types and working of clutch and transmission system.
MEDLO7032.2	Demonstrate the working of different types of final drives, steering gears and braking systems.
MEDLO7032.3	Illustrate the constructional features of wheels, tyres and suspension systems.
MEDLO7032.4	Illustrate the storage, charging and starting systems.
MEDLO7032.5	Describe the type of body and chassis of an automobile.
MEDLO7032.6	Explain the different technological advances in automobile.

<b>Course Name:</b>	Pumps, Compressors and Fans		
<b>Course Code</b>	MEDLO7033		
<b>Faculty Name:</b>	Cleta P		
<b>Year</b>	4	<b>Sem</b>	7

CO Number	Course Outcome
MEDLO7033.1	Recall the basic concepts learnt in fluid mechanics and thermodynamics as applicable to pumps, compressors and fans.
MEDLO7033.2	Explain the basic terminologies and classification of these fluid machines based on various criteria.
MEDLO7033.3	Illustrate the working and concepts related to the functioning and description of pumps, compressors & fans.
MEDLO7033.4	Employing the fundamental laws, deduce the equations for analysis of these fluid machines.
MEDLO7033.5	Apply the fundamentals to solve for various parameters in the analysis of these fluid machines.
MEDLO7033.6	Analyze the fluid machines quantitatively to predict/obtain their performance.

<b>Course Name:</b>	Computational Fluid Dynamics		
<b>Course Code</b>	MEDLO7034		
<b>Faculty Name:</b>	Dr.S. Pawar		
<b>Year</b>	4	<b>Sem</b>	7

CO Number	Course Outcome
MEDLO7034.1	State advantages and limitations of CFD as compared to experimental and theoretical methods and show working of typical commercial software.
MEDLO7034.2	Derive the governing equations, relate mathematical expressions with physical boundary conditions and explain their numerical implementation.
MEDLO7034.3	Do classification of differential equations, explain different types of grids (structured and unstructured) and discretization methods (FDM, FVM and FEM).
MEDLO7034.4	Derive the stream function-vorticity formulation (pressure-velocity decoupling), RANS equations and compare different turbulence models.
MEDLO7034.5	Solve steady and unsteady, one, two and three dimensional, diffusion and convection-diffusion problems using FVM.
MEDLO7034.6	Analyze different fluid flow and heat transfer problems computationally, using commercial CFD software and writing code (in any programming language e.g.

<b>Course Name:</b>	Energy Audit and Management		
<b>Course Code</b>	ILO 7018		
<b>Faculty Name:</b>	Dr Y S Padiya		
<b>Year</b>	4	<b>Sem</b>	7

CO Number	Course Outcome
ILO 7018.1	Remembers various Energy Conservation Act and related standards
ILO 7018.2	Understand the importance of Energy Audit, its norms, Procedure and techniques for EC
ILO 7018.3	Carry out an Energy Audit and prepare report
ILO 7018.4	Evaluate the performance of Energy consuming equipments
ILO 7018.5	Estimate the energy Saving potential and related costing

<b>Course Name:</b>	Machine Design -II LAB		
<b>Course Code</b>	MEL701		
<b>Faculty Name:</b>	Johnson Varghese / Dr Suryawanshi		
<b>Year</b>	4	<b>Sem</b>	7

CO Number	Course Outcome
MEL701.1	Select SC bearings for a given applications from the manufacturers catalogue
MEL701.2	Illustrate and Select bearings for a given applications from the manufacturers catalogue
MEL701.3	Construct and calculate the V-belt drive and flat drive on the given conditions.
MEL701.4	Compare and design, the chain drive based on the given conditions
MEL701.5	Decide and design clutch dimensions for a given application.
MEL701.6	Design the gearbox for a given application

<b>Course Name:</b>	CAD/CAM/CAE LAB		
<b>Course Code</b>	MEL702		
<b>Faculty Name:</b>	Shreeprasad S Manohar / B. Chavan		
<b>Year</b>	4	<b>Sem</b>	7

CO Number	Course Outcome
MEL702.1	Identify proper computer graphics techniques for geometric modelling
MEL702.2	Transform graphical objects and store and manage graphical data
MEL702.3	Prepare CAM Toolpath and prepare CNC code applicable to CNC machines using modern tools i.e. Solidworks and MasterCAM
MEL702.4	Analyze complex engineering components using FEA
MEL702.5	Compare the results of FEA of complex engineering components with existing model to optimize the design
MEL702.6	Create physical 3D mechanical structure using any one of the CNC/ RP techniques

