Department of Mechanical , CAY- (Odd semester, 2019-20)

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

Course Name:	Thermodynamics		
Course Code	MEC302		
Faculty Name:	Dr. Rao		
Year	2	**Sem**	3

CO Number	Course Outcome
MEC302.1	Memorize the laws, theorems and relations of thermodynamics.
MEC302.2	Describe the heat and work interactions in thermodynamics systems.
MEC302.3	Solve the real life examples using thermodynamic relations.
MEC302.4	Calculate the Heat and Work transfer for thermodynamic systems
MEC302.5	Evaluate the performance and efficiencies of heat engines and power cycles.
MEC302.6	Formulate work transfer for a system taking into account exergy balance.

Course Name:	Strength of Materials		
Course Code	MEC303		
Faculty Name:	Sachin Sheravi / Bajirao N.		
Year	2	**Sem**	3

CO Number	Course Outcome
MEC303.1	Recall fundamental concepts of variousstresses and strains induced in materials when subjected to different types of loading.
MEC303.2	Illustrate the Shear force and Bending Moment in the beams subjected to different types of loading with various supports.
MEC303.3	Solve for the magnitude and nature of the stresses induced in beams, shafts, shells when subjected to different kinds of loads
MEC303.4	Analyze the strain energy in mechanical element subjected to gradual, sudden and Imapct loading.
MEC303.5	Analyze the deflection and slope in beams when subjected to different loads with various supoorts.
MEC303.6	Analyze buckling phenomenon in columns, struts.

Course Name:	Production Process I		
Course Code	MEC304		
Faculty Name:	Deepika Gupta/ Hemant Hogade		
Year	2	**Sem**	3

CO Number	Course Outcome
MEC304.1	Identify different primary forming, joining and chip removal processes like casting, forging, Rolling, plastic moulding, machining and welding.
MEC304.2	Describe different casting process, forming process, welding operations and machining operations
MEC304.3	Solve numerical on casting and forming process based on the given parameters.
MEC304.4	Analyse the effect of change in parameters for any manufacturing process like casting, forming process, etc.
MEC304.5	Interpret suitable manufacturing process for a given component.
MEC304.6	Develop a process plan for a given component.

Course Name:	Material Technology		
Course Code	MEC305		
Faculty Name:	Madan/Jenifer		
Year	2	**Sem**	3

CO Number	Course Outcome
MEC305.1	Define the terms which are related to properties of materials.
MEC305.2	Classify different materials and get an outline of new materials like composites, nano-materials and polymers in terms of their types, properties, processing methods and applications.
MEC305.3	Relate mechanical behaviour of materials subjected to deformation under different loading conditions to identify different processing conditions and failure mechanisms.
MEC305.4	Select the appropriate heat treatment processes for ferrous alloys which are suitable for the different applications.
MEC305.5	Interpret the iron - iron carbide equilibrium diagram and TTT diagram for selecting proper heat treatment process depending on alloying elements, compositions and temperatures to study the evolved microstructure.
MEC305.6	Summarise the percentage composition of different phases in different alloys.

Course Name:	Computer Aided Machine Drawing		
Course Code	MEL301		
Faculty Name:	Hemant H / Juned A		
Year	2	**Sem**	3

CO Number	Course Outcome
MEL301.1	Define curves of intersection for different solids and draw true shape and size of inclined surface on the Auxiliary plane.
MEL301.2	Understand the different types of threads and joints which are used in industries.
MEL301.3	Apply the limits and tolerance on component dimensions along with GD&T and super finish symbols representation.
MEL301.4	Analyze the conversion of pictorial views into orthographic projections.
MEL301.5	Evaluate type of joint between two mating components.
MEL301.6	Creation of mechanical systems in 3D environment.

Course Name:	Strength of Materials		
Course Code	MEL302		
Faculty Name:	Sachin Sheravi / Bajirao N.		
Year	2	Sem	3

CO Number	Course Outcome
MEL302.1	Recall the stress - strain behavior of materials
MEL302.2	Explain mechanical properties of materials subjected t tensile loading.
MEL302.3	Experiment the torsional loading on shaft to find torsional strength of materials.
MEL302.4	Take part inimpact test using Izod and Charpy method
MEL302.5	Measure the hardness of materials
MEL302.6	Build flexural test with central and three point loading conditions

Course Name:	Material Technology		
Course Code	MEL303		
Faculty Name:	Madan/Jenifer		
Year	2	Sem	3

CO Number	Course Outcome
MEL303.1	Learner will be able to identify various parts of metallurgical microscope.
MEL303.2	Learners will be able to demonstrate the stages in metallography to characterize the material
MEL303.3	Learner will be able to Interpret the Iron-Iron carbide equilibrium diagram and TTT diagram for micro structure study and for selecting and designing of proper heat treatment
MEL303.4	Learner will be able to calculate the grain size for relating the mechanical behaviour of the materials.
MEL303.5	Learner will be able to evaluate the hardness and hardenability of the material.
MEL303.6	Generate a heat treated surface by various heat treatment process.

Course Name:	I C Engines		
Course Code	MEC501		
Faculty Name:	Nilesh Gaware / Sandeep Sabnis		
Year	3	Sem	5

CO Number	Course Outcome
MEC501.1	will be able to differentiate between SI and CI engines and give examples of the usage/applications of various types of engines. Student can identify, draw and explain basic components of various types of I C Engines
MEC501.2	Student will be able to explain working of various systems of I C Engines of SI Type (viz. Carburetion, Gasoline Injection, Spark ignition etc.) and CI Type (Viz. Fuel Injection) and common ones such as Supercharging, Lubrication, Engine cooling etc.
MEC501.3	Student will be able to apply the knowledge of mathematics, science, and engineering to Air standard cycles, Engine trials, and working various engine operating systems viz. Carburetion, fuel injection supercharging to solve problems.
MEC501.4	Student will be able to apply knowledge of chemistry, thermodynamics, heat transfer and fluid mechanics to combustion in SI and CI engines and explain the application of the same to design of combustion chambers and related hardware.
MEC501.5	Student will be able to to compare advancements in engine technology with conventional past designs and explain the advance features in light of present challenges like fuel economy, emissions and need for alternate fuels.
MEC501.6	Student will be able to to assess performance of engines based on experimental data (collected or given) and comment on the performance of engines

Course Name:	I C Engines		
Course Code	MEL 501		
Faculty Name:	Nilesh Gaware / Sandeep Sabnis		
Year	3	Sem	5

CO Number	Course Outcome
MEC501.1	Student will be able to list down describe and draw components of four stroke and Two stroke engines. Student will be able to differentiate between SI and CI engines and explain working of these engines on actual hardware
MEC501.2	Student will be able to explain working of various systems of I C Engines of SI Type (viz. Carburetion, Gasoline Injection, Spark ignition etc.) and CI Type (Viz. Fuel Injection) .
MEC501.3	Student will be able to safely operate I C engines in the lab and carry out experiments on the same
MEC501.4	Student will be able to apply knowledge of engine performance parameters from theory course to analyse the engine test data to predict engine efficiencies and draw performance curves.
MEC501.5	Student will be able to comment on the performance of engines and compare the same with different results obtained at various operating conditions by other students
MEC501.6	Student will be able to plan experiments / projects to address present day challenges like fuel economy, emissions and need for alternate fuels and will be able to present / implement such ideas

Course Name:	Mechanical Measurements and Control		
Course Code	MEC502		
Faculty Name:	B S Chavan / Mahesh R		
Year	3	Sem	5

CO Number	Course Outcome
MEC502.1	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.
MEC502.2	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.
MEC502.3	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.
MEC502.4	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.
MEC502.5	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.
MEC502.6	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.

Course Name:	Heat Transfer		
Course Code	MEC503		
Faculty Name:	Dr Pawar/ Pawan K		
Year	3	Sem	5

CO Number	Course Outcome
MEC505.1	Student explains the basic concepts in heat transfer
MEC505.2	Student derives and solves differential equations and works out on numerical examples on steady state conduction heat transfer
MEC505.3	Student derives and solves differential equations and works out on numerical examples on heat transfer through extended surfaces and unsteady state heat transfer. Student also explains numerical methods in heat transfer and solves numerical examples on 1D heat conduction
MEC505.4	Student derives and solves differential equations, equations related to dimensional analysis and works out on numerical examples on free and forced convection in internal and external flows
MEC505.5	Student derives equations on various laws and solves numerical examples on radiation
MEC505.6	Student explains basics of heat exchangers, boiling, condensation, heat pipe etc. Student also derives basic equations in thermal design of heat exchangers and works out on numerical examples on heat exchangers

Course Name:	Dynamics of Machinery		
Course Code	MEC504		
Faculty Name:	Swapnil Gujarathi / Georgena Kannukkadan		
Year	3	Sem	5

CO Number	Course Outcome
MEC504.1	State Basic Concepts of Dynamics of Machinery.
MEC504.2	Convert the physical mechanical system into mathematical model to represent dynamic system and derive its governing equation of motion.
MEC504.3	Apply methods to solve differential equations and determine natural frequency of mechanical systems.
MEC504.4	Investigate the Static and Dynamic forces in mechanical systems.
MEC504.5	Evaluate vibration transmissibility and measure motion parameters using vibration measuring instruments.
MEC504.6	Develop a program in SCILAB to plot the response of free vibration of a mechanical system.

Course Name:	Press tool Design		
Course Code	MEDLO5011		
Faculty Name:	Madan		
Year	3	Sem	5

CO Number	Course Outcome
MEDLO5011.1	Student will be able to define, list and state various press working operations for mass production of sheet metal components.
MEDLO5011.2	Student will be able to identify scrap minimization, safety aspects and automation in press working.
MEDLO5011.3	Student will be able to explain and describe principles and blank development in bent & drawn components, failure mechanisms of pressed components, safet
MEDLO5011.4	Student will be able to recognize and prepare working drawings and setup for economic production of sheet metal components
MEDLO5011.5	Student will be able to demonstrate various press working operations for mass production of sheet metal parts, press tool requirements to build concepts pertai
MEDLO5011.6	Student will be able to Design Piercing & Blanking Die, solve problems on Cutting force and Stripping Force, Economic Strip Layout, Centre of Pressure, ber

Course Name:	Machining Sciences and Tool Design		
Course Code	MEDLO5012		
Faculty Name:	Sudhakar Ambhore		
Year	3	Sem	5

CO Number	Course Outcome
MEDLO5012.1	Calculate the values of various forces involved in the machining operations
MEDLO5012.2	Design various single and multipoint cutting tools
MEDLO5012.3	Analyse heat generation in machining operation and coolant operations.
MEDLO5012.4	Illustrate the properties of various cutting tool materials and hence select an appropriate tool material for particular machining application.
MEDLO5012.5	Demonstrate the inter-relationship between cutting parameters and machining performance measures like power requirement, cutting time, tool life and surface finish
MEDLO5012.6	Analyse economics of machining operations

Course Name:	MANUFACTURING SCIENCES LAB		
Course Code	**MEL505**		
Faculty Name:	Shreeprasad S Manohar, Johnson Varghese, Bajirao Nangarepatil & Sachin Shervi		
Year	4	Sem	7

CO Number	Course Outcome
MEL501.1	Identify and select location and clamping faces/points on jobs.
MEL501.2	Design and develop simple productive and cost effective jigs and fixtures.
MEL501.3	Identify press tool requirements to build concepts pertaining to design of press tools.
MEL501.4	Design and develop simple productive and cost effective jigs and fixtures.
MEL501.5	Select a proper temperature measurement method for the required machining operation.
MEL501.5	Design multi point cutting tool.

Course Name:	Machine Design -II		
Course Code	MEC701		
Faculty Name:	Shreeprasad S Manohar & Johnson Varghese		
Year	4	Sem	7

CO Number	Course Outcome
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

Course Name:	Production Planning and Control		
Course Code	MEC703		
Faculty Name:	Sandeep Dasgupta & Cleta Pereira		
Year	4	Sem	7

CO Number	Course Outcome
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

Course Name:	CAD/CAM/CAE		
Course Code	MEC702		
Faculty Name:	Shreeprasad S Manohar & Deepika Gupta		
Year	4	Sem	7

CO Number	Course Outcome
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

Course Name:	**Mechanical Vibration**		
Course Code	**MEDLO7031**		
Faculty Name:	Pradeepkumar Suryawanshi		
Year	4	Sem	7

CO Number	Course Outcome
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.

Course Name:	**Automobile Engineering**		
Course Code	**MEDLO7032**		
Faculty Name:	Bajirao N.		
Year	4	Sem	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.

Course Name:	Pumps, Compressors and Fans		
Course Code	MEDLO7033		
Faculty Name:	Babitha Devdas		
Year	4	Sem	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 andclassificationof 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.

Course Name:	Computational Fluid Dynamics		
Course Code	MEDLO7034		
Faculty Name:	S.S. Pawar		
Year	4	**Sem**	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. C, C++, etc.) for simple geometries.

Course Name:	Energy Audit and Management		
Course Code	ILO 7018		
Faculty Name:	Dr Y S Padiya		
Year	4	**Sem**	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

Course Name:	Machine Design -II LAB		
Course Code	MEL701		
Faculty Name:	Shreeprasad S Manohar, Johnson Varghese, Bajirao Nangarepatil & Sachin Shervi		
Year	4	**Sem**	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 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

Course Name:	CAD/CAM/CAE LAB		
Course Code	MEL702		
Faculty Name:	Shreeprasad S Manohar, Deepika Gupta & Georgena Kannukadan		
Year	4	**Sem**	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