Mechanical Engineering Program Course outcomes:

Quality improvement in education encompasses the all-round development of learners. This requires a multi-pronged approach aiming at quality curriculum and its effective transaction in an enabling environment. Learning outcomes specify what learners' new behaviors will be after a learning experience. They state the knowledge, skills, and attitudes that the students will gain through your course. Since we are affiliated with University of Mumbai, in addition to university curriculum, course outcomes for Mechanical graduate program were finalized in a brain storming sessions by senior faculty. The course outcomes for the graduate program in Mechanical Engineering are listed below;

Semester III

Course Name: MEC301 Applied Mathematics III	
MEC 301.1	Student will gain basic knowledge of Laplace Transform & demonstrate an ability to identify , formulate & solve engineering problems
MEC 301.2	Students will understand methods in the theory of analytic functions of several complex variables, and applications of these to approximation and mapping problems.
MEC 301.3	Student will be Capable to identify & classify zeros , singular points , residues & their applications. Also participate & succeed in competitive exams.
MEC 301.4	Students will calculate both real and complex forms of the Fourier series for standard periodic waveforms and convert from real form Fourier series to complex form and vice-versa
MEC 301.5	Student will become familiar with Partial Differential equations & demonstrate an ability to identify , formulate & Solve engineering problems.
MEC 301.6	Students will acquire problem-solving skills in a broad range of significant mathematics.

Course Name: MEC302 Thermodynamics	
MEC302.1	Apply various thermodynamics laws to the real life systems.
MEC302.2	Evaluate the role of entropy in a thermal equilibrium system.
MEC302.3	Estimate the properties of steam at different states.
MEC302.4	Define and understand natural and ideal processes and its application .
MEC302.5	Assess the basic difference between the gas PSOwer cycle and vaPSOur cycle.
MEC302.6	Understand the basic property relation and combustion process.
Course Name: MEC303 Strength of Materials	
MEC 303.1	Understand the concept of stress and strain for homogeneous, isotropic material.
MEC 303.2	Use of physics concept to solve variety of applied real world problems using the appropriate tools backed by mathematical to solve structural problem involving strength.
MEC 303.3.	Determine the stress and strain in members subjected to combined loading and apply the theories of failure and static loading.
MEC 303.4	Determine and analyse principal stress, maximum shearing and the stress acting on structural member.

MEC 303.5	Determine the deflection and rotation produced by axial, torsional and flexural load.
MEC 303.6	Design simple bars, beams and circular shafts for allowable stresses and loads.

Course Name: MEC304 Production Process- I	
MEC304.1	understand the basic concepts of Casting process their operations and applications
MEC304.2	understand the concept of forming processes such as rolling, extrusion, forging their applications and process working.
MEC304.3	understand different metal joining processes such as welding, soldering, brazing also their process operations & applications
MEC304.4	understand powder metallurgy process, sintering metal injection & applications.
MEC304.5	understand different molding process, application of plastics and their use, also molding with ceramics.
MEC304.6	understand different non-destructive testing techniques.
Course Name:MEL305 Computer Aided M/c Drawing	
SEC305.1	Should be able to understand solid geometry, intersection of surfaces of various geometry
SEC305.2	Should be able to understand design various 2D Drawing of standard machine elements

SEC305.3	Should be able analyze various assembly and details
SEC305.4	Should be able synthesis of various bearings, joints, ICE engine parts, Jig & fixture
SEC305.5	Should be able evolution of 2D & 3D drawing by using SOLID WORKS design software
SEC305.6	Should be able visualize & prepare detail drawing on sketch book for manufacturing purpose
Course Name: MEL306 Data Base &Information Retrieval System	
MEL306.1	To understand the needs of database management system and information retrieval system (DBMS and IR)
MEL306.2	To conceptualize and analyse different data models and schemas in DBMS
MEL306.3	To understand needs of database processing and learn technoques for controlling the consequences of concurrent data access
MEL306.4	To apply and design graphical user interface techniques for retrieve the information from the database
MEL306.5	To apply and synthesis the complex queries of SQL on DBMS
MEL306.6	To understand the functional dependies and design the database using different data models (ER Model, Relational Model)
Course Name: MEL307 Machine Shop Practice-I	

MEL 303.1	Students will acquire operating skills of various machines like lathe, shaper, milling etc
MEC 303.2	Students will Perform and conversant of operational function of plain turning, taper turning and screw cutting etc. on lathe machine
MEC 303.3.	Students will perform machining operations on lathe, shaper and milling machine
MEC 303.4	Students will able to plan the process requirements of engineering products, machines, materials requirements, Tools required in the process
MEC 303.5	Students will able to optimize the machining process operating parameters of speed, feed and depth of cut to produce customers desired output.
MEC 303.6	Students will able to identify the job and list out the operations required to produce the engineering products

Semester IV

Course name: MEC401 Applied Mathematics IV	
MEC 401.1	Student will find the characteristic equation, eigenvalues and corresponding eigenvectors of a given matrix and are able to solve problems on functions of matrices.
MEC 401.2	Student will become familiar with the Green's, Stoke's and Gauss-divergence theorem to give a physical interpretation of the vector field & its applications.
MEC 401.3	Student will understand the importance of nonlinear optimization and are able to optimise (max / min) problems of Non Linear Programming.
MEC 401.4	Student will gain basic knowledge of probability distributions & demonstrate an ability to identify, formulate & solve problems

MEC 401.5	For Sampling Theory student will choose the appropriate test and determine whether a given hypothesis is accepted or not.
MEC 401.6	Student will understand application of statistical concepts and linear algebra for solving different engineering problems.
Course Name: MEC402 Fluid Mechanics	
MEC404.1	Understand different properties of fluid, various type of fluid ,their flows and principles of fluid flow.
MEC404.2	Solve fluid flow problem using Lagrangian and Euler approach.
MEC404.3	Analyze the types of flows and feasibility of flow using fundamental of fluid kinematic.
MEC404.4	Design and develop various pipe system as per requirements.
MEC404.5	Understand the various fundamental of flow over bodies and apply them to solve the problem on the marine system and aeronautical system.
MEC404.6	Fabricate fluid system for various application or analyze fluid system using modelling and analyzing tools through mini project.
Course Name: MEC403 Theory of Machines- I	
MEC 403.1	Understand and explain various components of mechanisms.
MEC 403.2	Construct and apply mechanisms to provide specific motion.
MEC 403.3	Draw using various methods velocity and acceleration diagrams of mechanisms.

MEC 403.4	Construct CAM profile illustrating displacement, velocity, acceleration and jerk for the specific follower motion.
MEC 403.5	Define and apply different Flexible connectors.
MEC 403.6	Define different Terms used in gears and application of different Gears in power Transmission.
Course Name: MEC404 Production Process- II	
MEC404.1	To have good knowledge of how to perform different metal removal process on different machines.
MEC404.2	Develop and execute CNC machining programs to cut parts on a milling machine.
MEC404.3	Compute force components of interest that are associated with processes that are performed by mechanical means & stresses and strains, both in-process and residual, for mechanical, thermal and thermo-mechanical processes.
MEC404.4	Design a single, multiple point cutting and press tool and study the effect of coolants in it.
MEC404.5	Evaluate the aspects of cutting Tools and Economics of machining.
MEC404.6	To have a knowledge on surface finish, cutting tool materials, coolants.
Course Name: MEC405 Material Technology	
MEC 405.1	Understand and classify basic engineering materials.

MEC 405.2	Differentiate various imperfections, deformations and failure mechanism.
MEC 405.3	Interpret SN – curve and phase diagrams to understand theory of alloys.
MEC 405.4	Test and analysis failure mechanisms
MEC 405.5	Choose the appropriate heat treatment process for specific requirement
MEC 405.6	Understand the significance of different alloying elements

Course Name: MEC406 Industrial Electronics	
MEC406.1	Understand the working of semiconductor devices.
MEC406.2	Understand the applications of power electronic converters
MEC406.3	Understand concept of OPAMP and 555 Timer
MEC406.4	Demonstrate the knowledge of basic functioning of digital circuits
MEC406.5	Demonstrate the knowledge of basic functioning of microcontroller based system
MEC406.6	Understand speed-torque characteristics of electrical machines

Semester V

Course Name: MEC501 I C Engines	
MEC501.1	Understanding difference between SI & CI engine
MEC501.2	Understanding the working of engine & its Components
MEC501.3	Analyze engine performance characteristics
MEC501.4	Perform exhaust gas analysis & its effect on environment
MEC501.5	Identify alternative fuel & its effect
MEC501.6	To Understand & analyze recent development in IC Engine
Course Name: MEC502 Mechanical Measurements and Control	
MEC502.1	Student should be able to understand different measurement system and common types of errors
MEC502.2	Student should be able to get knowledge of different types of sensors ,transducers and strain gauges used for measurement.
MEC502.3	Student should be able to understand the fundamental concepts of control system and mathematical modelling of system.

MEC502.4	Student should be able to apply the concept of time response and frequency response of the system
MEC502.5	Student should be able to understand the basics of stability analysis of the system
MEC502.6	Student should be able to analyse the response of different order system for various step inputs
Course Name: MEC503 Production Process-Ill	
MEC503.1	Apply the working principles and processing characteristics of ultra-precision machining,
MEC503.2	Identify various stresses involved in sheet metal forming process.
MEC503.3	Achieve thorough knowledge of designing the jigs & fixture.
MEC503.4	Learn how products are made using non-traditional machining processes.
MEC503.5	Achieve fair knowledge of the plastic injection moulding process.
MEC503.6	Study the different types of production systems like agile manufacturing, Flexible
Course Name: MEC504 Theory of Machines- II	
MEC 504.1	To understand working principle of clutches and its construction details.

MEC 504.2	To study working and types of brakes and dynamometers.
MEC 504.3	To analyse working principle/s and applications of Gyroscope and Governors.
MEC 504.4	To demonstrate different types of gear trains and its applications.
MEC 504.5	To understand the principle of Flywheel, the concept of balancing of rotating and reciprocating mass.
MEC 504.6	To develop models to understand machine kinematics and solve them.
Course Name: MEC505 Heat Transfer	
MEC505.1	Understand and differentiate between conduction, convection and radiation three modes of heat transfer.
MEC505.2	Apply various principles of heat transfer to solve problems on thermal systems using differential analysis or electrical analogy.
MEC505.3	Understand dimensional and graphing similarities in heat transfer analysis and its use to solve heat transfer systems.
MEC505.4	Distinguish and solve real time problems using steady state and transient heat transfer analysis.
MEC505.5	Differentiate between various types of heat exchangers and can evaluate, compare and improve effectiveness of heat exchangers.
MEC505.6	Understand mechanism of boiling and condensation.

Course Name: MEL501 Business Communication and Ethics	
MEL501.1	To understand the business communication process, ethics and its effective application.
MEL501.2	Synthesize and apply report writing, proposalwrting and the project management skills .
MEL501.3	Apply appropriate analytical skills in project report presentations, group discussions and to communicate effectively in various formal settings.
MEL501.4	To undersatnd and learn various roles in group and organization understanding the interpersonal skills like emotional intelligence, leadership,negotiation, time management and team work.
MEL501.5	Participate and achieve success in competative exams and campus placements
MEL501.6	To enhance social skills, business perspectives and inculcate employment skills .

Semester VI

Course Name: MEC601 Metrology and Quality Engineering	
MEC601.1	Should be able to understand the basic concepts and principles of modem quality concepts and statistical techniques.
MEC601.2	Should be able to design tolerance and fits for selected product quality
MEC601.3	Should be able to identify different surface finish and measure the parts with various comparators
MEC602.4	Should be able to understand the fundamentals of modern quality concept and apply stastical techniques.
MEC602.5	Should be able to understand fundamental and importance of quality control
MEC602.6	Should be able to apply various samplining techniques for inspection and can read different tables for quality assurance.
Course Name:MEC602 Machine Design I	
FEC104.1	Should be able to Understand various design consideration.
FEC104.2	Should be able to Study and apply principles of machine design
FEC104.3.	Should be able to Design machine elements on the basis of strength, and economic criteria .

FEC104.4	Should be able to Check (Validate results) design with the help of design software
FEC104.5	Should be able to prepare production drawing
FEC104.6	Should be able toUse design data books and various standard codes of practices
Course Name: MEC603 Mechanical Vibrations	
MEC603.1	Understand the basic concepts and principles of vibration
MEC603.2	Develop and analyze the differential equation of motion for vibratory systems analytically and also using MAT LAB
MEC603.3	Estimate natural frequency of single degree and multi degree systems
MEC603.4	Design and evaluate suspension system using concepts of vibration isolation and transmissibility
MEC603.5	Understand the principles of vibration measuring instruments and use it to measure vibration using seismic equipments
MEC603.6	Solve the problems of rotor dynamics system and balancing of masses

Course Name: MEC604 Thermal and Fluid Power Engineering	
MEC 604.1	Students should be able to illustrate types , limitations , scenario's of various types of boilers , mountings , accessories.
MEC 604.2	Students should be able to understand different jet of fluid on various type of surfaces .
MEC 604.3	Student should be able to understanding the working of turbines & its Components .
MEC 604.4	Student should be able to identify utilities of thermal and hydraulic energy software.
MEC 604.5	Student should be able to analyze performance of turbines.
MEC 604.6	Student should be able to understand &analyze recent development in turbines , boilers.
Course Name: MEC605 Mechatronics	
MEC605.1	Understand different sensors and actuators
MEC605.2	Understand various electrical actuating systems
MEC605.3	Understand various pneumatic and hydrualic actuating systems
MEC605.4	Will able to develop circuits for industrial automation

MEC605.5	Will be able to design system interfacing and DAS
MEC605.6	Indigenously design and develop a mechatronic system
Course Name: MEC606 Finite Element Analysis	
MEC606.1	Students should be able to solve the complex field problems using various differential equation.
MEC606.2	Students should be able to formulate mathematical model as well as FEA model for the various engineering problems.
MEC606.3	Student should be able to understand the various aspects of FEA like elements, nodes, discretization variables boundary conditions, formulation and stiffness matrix.
MEC606.4	Student should be able to solve the various 1D engineering problems like structural analysis, heat transfer, fluid flow, trusses and beams by using FEA method and FEA software
MEC606.5	Student should be able to solve the 2D finite element problem using the concept like Jacobian matrix, CST elements and analysis by using FE software
MEC606.6	Student should be able to evaluate the various mechanical components and to check their feasibility analytically as well as using FEA software.

Semester VII

Course Name: MEC701 Machine Design II	
MEC701.1	Apply basic principles to design gears based on given conditions.
MEC701.2	Select appropriate gear for Power transmission.
MEC701.3	Select appropriate bearing for given application with the help of manufacturing catalogue.
MEC701.4	Analyse different Failures in gears ,cam & follower & Bearing.
MEC701.5	Design cam & follower for different applications.
MEC701.6	Able to validate design with the help of design softwares.
Course Name: MEC702 CAD-CAM CAE	
MEC702.1	Use techniques of computer graphics for geometric modelling and write equations for curves also solve problems based upon it.
MEC702.2	Develop mathematical representation and object oriented programs for 2D and 3D transformations.
MEC702.3	Create part programs for NC, CNC machines and use it.
MEC702.4	Model and analyze real life applications using CAE tools.

MEC702.5	Apply rapid prototyping and tooling concepts in product design and manufacturing
MEC702.6	Understand and apply concepts of CIM.

Course Name: MEC703 Mechanical Utility Systems	
MEC703.1	understand the basic concepts and principles of vibration
MEC703.2	Develop and analyze the differential equation of motion for vibratory systems analytically and also using MAT LAB
MEC703.3	Estimate natural frequency of single degree and multi degree systems
MEC703.4	Design and evaluate suspension system using concepts of vibration isolation and transmissibility
MEC703.5	Understand the principles of vibration measuring instruments and use it to measure vibration using seismic equipments
MEC703.6	Solve the problems of rotor dynamics system and balancing of masses

Course Name: MEC704 Production Planning and Control	
MEC704.1	Understand the importance & activities of Production Planning & Control in Industries.
MEC704.2	Understand the importance of inventories & control functions.
MEC704.3	Able to make various documents like purchase orders, store receipt used in Industries.
MEC704.4	Understand importance of product & process planning and forecasting models.
MEC704.5	Able to convert the problems into mathematical models and evaluate optimum solutions.
MEC704.6	Understand scheduling & sequencing techniques and able to draw Gantt, CPM & PERT charts used in industries.

Course Name: MEE 7012 Power Plant Engineering	
MEE 7012.1	Illustrate types limitations, scenarios, crises & need of power Plants
MEE 7012.2	Design power plant economy
MEE 7012.3	Analyse &apply their theoretical knowledge in various power plant on the basis of energy resources available

MEE 7012.4	Design combination power plant working on various combine cycles
MEE 7012.5	Analyze working of nuclear power plant & study of waste disposal as for hazardous free environment
MEE 7012.6	Function individually as a Power plant manager & also function as team leader to run various activity in power plant

Course Name: MEE 7019 Operations Research	
MEE7019.1	Identify and develop operational research models from the verbal description of the real system.
MEE7019.2	Understand the mathematical tools that are needed to solve optimisation problems.
MEE7019.3	Use mathematical software to solve the proposed models
MEE7019.4	Develop a report that describes the model and the solving technique, analyse the results and propose
MEE7019.5	Recommendations in language understandable to the decision-making processes in Management Engineering
MEE7019.6	Experiences with identifying, accessing, evaluating, and interpreting information and data in support of assignments, projects, or research.

Course Name: MEP701 Project I	
MEP701.1	Able to identify the conceptual problems factors and their levels in industries.
MEP701.2	Able to formulate the real life problems factors and theirs levels in the form of mathematical model.
MEP701.3	Able to plan and establish real life problems in the form of experimental setup.
MEP701.4	Able to simulate and analyse the real life problems using the mathematical model and software
MEP701.5	Able to prepare the report contents of conceptual problems factors, factor levels, academic literature, problem formulation, problem statement, factor analysis and coclusion & suggestion
MEP701.6	Able to prepare the presentation of project contents details in brief using MS-office Power point

Semester VIII

Course Name: MEC801 Design of Mechanical System	
MEC801.1	Should be able to understand the basic concepts and principles of statics and Dynamics.
MEC801.2	Should be able to build Free Body diagram and equilibrium conditions for equilibrate systems.
MEC801.3	Should be able to evaluate geometric parameters of generalized shapes.

MEC801.4	Should be able to understand equations of motions from kinematics point of view.
MEC801.5	Should be able to understand equations of motions from Dynamics point of view.
MEC801.6	Should be able to understand Kinematics and Kinetics of rigid bodies.
Course Name: MEC 802 Industrial Engineering and Management	
MEC802.1	Design a system component of a process to meet desired needs within realistic constraints.
MEC802.2	Develop capability in integrating knowledge of design along with other aspects of value addition in the conceptualization and manufacturing stage of various products.
MEC802.3	Manage and implement different concepts involved in methods study and understanding of work content in different situations
MEC802.4	Identify appropriate process analysis method to understand analyze & explain & industrial engineering problem.
MEC802.5	Describe the profession & technical area of industrial engineering & manufacturing engineering
MEC802.6	Identify various cost accounting and financial management practices widely applied in industries.

Course Name: MEC803 Refrigeration and Air Conditioning	
MEC803.1	Illustrate and discuss fundamental principles and various types of refrigeration and air conditioning systems.
MEC803.2	Obtain cooling capacity and coefficient of performance by conducting test on vapour compression refrigeration systems, also Identify and locate various important components.
MEC803.3	Present the properties, applications and environmental issues of different refrigerants.
MEC803.4	Illustrate various refrigeration and air conditioning processes using psychometric chart.
MEC803.5	Design and analyse complete air conditioning system and calculate cooling load for air conditioning systems used for various applications.
MEC803.6	Design distribution system for air conditioning setup and discuss applications of Refrigeration & A/C.

Course Name: MEE8022 Renewable Energy sourses	
MEE8022.1	Illustrate, types, limitations, scenario, crises & need of Non conventional energy sources
MEE8022.2	Design various system for use of Non conventional energy sources

MEE8022.3	Understand the combination of energy sources use and get hybrid
MEE8022.4	Find exact how to use of energy sources by giving the demo like power plant visit.
MEE8022.5	find out how to reduce the pollution by using Non conventional energy sources.
MEE8022.6	Understand how to use waste material as energy source to reduce the cost of conventional energy sources.

Course Name: MEE8026 Automobile Engineering	
MEE8026.1	Describe different Automotive systems
MEE8026.2	Demonstrate working principle and their requirements of different automotive systems like power train system, tyres etc
MEE8026.3	Explain the working and importance of electrical system like charging ,staring system etc
MEE8026.4	Indentify different body structure and their layouts and choose appropriate layout depending on the their use analyze it from aerodynamic point of view
MEE8026.5	Demonstrate and explain requirement and classification of brakes, steering system and various term related to steering geometry
MEE8026.6	Understand and explain recent trends in automobile like ABS, ECM and working of various sensors and their construction

Course Name: MEP802 Project II	
MEP802.1	Able to identify the conceptual problems factors and their levels in industries.
MEP802.2	Able to formulate the real life problems factors and theirs levels in the form of mathematical model.
MEP802.3	Able to plan and establish real life problems in the form of experimental setup.
MEP802.4	Able to simulate and analyse the real life problems using the mathematical model and software
MEP802.5	Able to prepare the report contents of conceptual problems factors, factor levels, academic literature, problem formulation, problem statement, factor analysis and coclusion & suggestion
MEP802.6	Able to prepare the presentation of project contents details in brief using MS-office Power point