Quantum University, Roorkee

Course Outcomes for the Syallbus 2022-26 Batch

Program Nam **Bachelor of Technology in Mechanical Engineering**

Course Name   **Mathematics I**

Course Code   **MA3102**

Unit-wise	Descriptions	BL	Employability
CO1	Students should be able to learn the basic principles of	2	Em
CO2	Students should be able to understand and learn how to	2	S
CO3	Students should be able to understand theorems related to	3	S
CO4	Students should be able to know basic application	3	En
CO5	Students should be able to solve the linear equations using	3	None

Course Name   **Human Values and Ethics**

Course Code   **PS3101**

Unit-wise	Descriptions	BL	Employability
CO1	Students should be able to understand the significance of	2	Em
CO2	Students should be able to distinguish between the Self	2	S
CO3	Students should be able to understand the value of	2	S
CO4	Students should be able to understand the harmony in	2	En
CO5	Students should be able to distinguish between ethical and	3	None

Course Name   **Basics of Computer and C Programming**

Course Code   **CS3103**

Unit-wise	Descriptions	BL	Employability
CO1	Students should be able to understand Computer and its	2	Em
CO2	Students should be able to use the C programming	2	S
CO3	Students should be able to understand arrays, their functions that will help them to design new problem solving approach in 'C'.	2	S
CO4	Students should be able to understand pointers, recursion, and macros for solving complex problems in 'C'.	2	En
CO5	Students should be able to gain a broad perspective about the uses of computers in engineering industry.	2	None

Course Name   **Basic Electrical and Electronics Engineering**

Course Code   **EC3101**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Students should be able to understand the basic theorms used in simplifying the electrical circuits.	3	Em
CO2	Students should be able to Know about the generation and utilization of three phase alternating quantities.	3	S

CO3	Students should be able to Know about single phase transformer and its various parameters.	2	S
CO4	Students should be able to understand the various components used in electronics like P-N junction and Zener dioide.	2	En
CO5	Students should be able to understand basics of digital electronics and various electrical measurement devices.	3	None

Course Name   **Basics of Computer and C Programming Lab**
Course Code   **CS3140**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Students should be able to approach the programming tasks using techniques learned in Theory and write pseudo-codes based on the requirements of the problem.	3	Em
CO2	Students should be able to use the comparisons and limitations of the various programming constructs and choose the right one for the task in hand.	3	S
CO3	Students should be able to write the program based on numerical techniques learned and able to edit, compile, debug, correct, recompile and run it.	3	S

Course Name   **Basic Electrical and Electronics Engineering Lab**
Course Code   **EC3140**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Students should be able to know about the basic concepts of the Kirchhoff's current and voltage laws and perform Thevenin's, Norton's, superposition and maximum power transfer theorems.	3	Em
CO2	Students should be able to analyze and understand the characteristics of transistors and semiconductor diodes and analyze the half-wave and full-wave rectifier using silicon diode.	4	S
CO3	Students should be able to Learn the basic concepts of various logic gates.	2	S

Course Name   **Engineering Graphics and Design**

Course Code   **ME3145**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Students should be able to know about the basic concepts of the Kirchhoff's current and voltage laws and perform Thevenin's, Norton's, superposition and maximum power transfer theorems.	3	Em
CO2	Students should be able to analyze and understand the characteristics of transistors and semiconductor diodes and analyze the half-wave and full-wave rectifier using silicon diode.	4	S
CO3	Students should be able to Learn the basic concepts of various logic gates.	2	S

Course Name   **Mathematics II**

Course Code   **MA3202**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Students should be able to understand ordinary differential equations, with their solutions through constant coefficients. They will also learn about Euler- Cauchy equations, Solution of second order differential equations by changing dependent and independent variables.	3	Em
CO2	Students should be able to understand the properties of Fourier series. and the relationship between Fourier series and linear time invariant system.	2	S
CO3	Students should be able to learn the basics of the theory of error and the approximation theory; the fundamental principles of mathematical modeling; the numerical methods for solving problems of algebra; and the methods of numerical integration and differentiation.	2	S
CO4	Students should be able to learn about Interpolation which is a useful mathematical and statistical tool used to estimate values between two points.	2	En

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO5	Students should be able to formulate and solve problems involving random variables and apply statistical methods for analysing experimental data. They will also learn to analyse the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems. Taylor's and Laurent's series expansions of complex function will be also explored at the end of Unit.	1	None

Course Name **Engineering Physics**
Course Code **PH3101**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Students should be able to understand special theory of realtivity (STR), concepts linked with STR and radiationlaws. extract information from partial derivative models in order to interpret reality.	3	Em
CO2	Students should be able to understand interference, diffraction and abletoconnectittoafewengineering applications.	3	S
CO3	Students should be able to explain the phenomena of polarization in electromagnetic waves and their production, Detection and analysis. They will also understand the operation and working principle of laser.	3	S
CO4	Students should be able to understand electromagnetic theory using maxwells equations, and its uses in various engineering application. They will also understand the difference between dia,para and ferromagnetic materials.	3	En
CO5	Students should be able to explain fundamentals of quantum mechanics and apply it to problems on bound states.	3	None

Course Name **Environmental Studies**
Course Code **CY3205**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Students should be able to correlate the human population growth and its trend to the environmental degradation and develop the awareness about his/her role towards environmental protection and preventions.	2	Em
CO2	Students should be able to understand the solutions related to environmental problems related with the renewable& non-renewable resources.	2	S
CO3	Students should be able to understand the importance of ecosystem and biodiversity and the method of conservation of biological diversity.	2	S
CO4	Students should be able to understand different components of the environment and their function and the effects pollution on environment and should be able to understand the concept of sustainable development.	3	En
CO5	Students should be able to correlate the human population growth and its trend to the environmental degradation and develop the awareness about his/her role towards environmental protection and preventions.	3	None

Course Name **Fundamentals of Mechanical and Mechatronics Engineering**

Course Code **ME3103**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Students should be able to understand application of the laws of thermodynamics to wide range of systems and aware about the basics of thermal engineering applications in IC engines and its working.	2	Em
CO2	Students should be able to know and apply the types of forces and concepts used to analyze force mechanisms	2	S
CO3	Students should be able to analyze and understand the Stress-strain diagrams and use of material.	2	S
CO4	Students should be able to understand the various machining processes	2	En

CO5	Students should be able to gain knowledge on the various engineering materials and their properties.	1	None

Course Name **Advance Computer Programming & Software**

Course Code **CS3207**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Students will be able to understand about pointers and their usage in programming	3	Em
CO2	Student will be able to understand the usage of arrays in programming	2	S
CO3	Student will be able to use arrays,function pointer for programming	3	S
CO4	Student will be able to program using various C libraries	3	Em
CO5	Student will be able to know the various software tools	2	Em

Course Name **Engineering Physics Lab**

Course Code **PH3140**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Students should be able to understand the processof performing the experiments on wavelength andfocal length practically.	3	Em
CO2	Students should be able to verify the theortical calculations with observed results in practical experiments.	3	S
CO3	Students should be able to Enhance the skills of using appratus for verification of different laws.	3	S

Course Name **Advance Computer Programming & Software Lab**

Course Code **CS3245**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Students should be able to develop Pointer, recursion, functions and array based programs in C.	2	Em
CO2	Students should be able to develop Dynamic memory allocation technique based programs and execute Command line Arguments in C.	2	S
CO3	Students should be able to execute C programs and Shell Commands in Unix Environment.	2	S

Course Name **Workshop Practice**
Course Code **ME3140**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Students will be able to develop the ability to perform the various operations with the help of lathe machine and its tools	3	Em
CO2	Students will be able to develop the ability to perform the various operations using welding	3	S
CO3	Students will be able to develop the ability to perform the various operations using fitting tools	3	S
CO4	Students will be able to develop the ability to perform the various operations on wood using carpenty tools	3	s
CO5	Students will be able to develop the ability to perform the various operations using Sheet metal and blacksmithy tools	3	s

Course Name **Disaster Preparedness and Management**
Course Code **CE3102**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)

CO1	Students will be able to develop the ability to perform the various operations with the help of lathe machine and its tools	3	Em
CO2	Students will be able to develop the ability to perform the various operations using welding	3	S
CO3	Students will be able to develop the ability to perform the various operations using fitting tools	3	S
CO4	Students will be able to develop the ability to perform the various operations on wood using carpenty tools	3	s
CO5	Students will be able to develop the ability to perform the various operations using Sheet metal and blacksmithy tools	3	s

Course Name **Strength of Materials**

Course Code **ME3308**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Students should be able to know and understand various mechanical properties of materials for real time applications.	2	Em
CO2	Students should be able to understand the behaviour of trusses under loads and beams under the application of shear force and bending moment.	3	S
CO3	Students should be able to understand the behaviour of shafts under torsion and behavior of cylinder and springs under various loads.	3	S
CO4	Students should be able to understand the behaviour of beams under stresses and apply the knowledge through numerical problems.	3	En
CO5	Students should be able to understand the behaviour of columns and struts and estimate effective length under different conditions.	3	None

Course Name **Materials Science**

Course Code **ME3302**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)

CO1	Student should be able to understand the fundamental knowledge about engineering materials, its modern and atomic concepts, properties, imperfections and applications.	2	Em
CO2	Student should be able to learn about the magnetic and electric properties and diffusion of solids.	2	S
CO3	Student should be able to learn the fundamental knowledge about Iron-Carbon Equilibrium Phase Diagram and alloys.	2	S
CO4	Student should be able to learn the different heat treatment processes and corrosion, its causes, effects and prevention.	2	En
CO5	Student should be able to learn the fundamental knowledge about powder metallurgy, composites, ceramics and plastics.	2	None

Course Name   **Thermal Engineering**
Course Code   **ME3306**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student should be able to understand the basic concepts of thermodynamics and know the thermodynamic relations	2	Em
CO2	Student should be able to understand the formation of steam and calculate the efficiency of different power cycles.	3	S
CO3	Student should be able to understand the functioning of steam power plant, gas power plant and their major components.	3	S
CO4	Student should be able to analyze the performance of boilers and flow through nozzles used in existing thermal system.	3	S
CO5	Student should be able to know concepts of compressor and its working	3	S

Course Name   **Fluid Mechanics and Machines**
Course Code   **ME3304**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)

CO1	Students should be able to understand about basics of fluid mechanics and concepts related to fluid statics.	2	Em
CO2	Students should be able to clear concepts related to fluid kinematics and fluid dynamics and clear concepts related to basic equations used in fluid dynamics also student able to solve application problems of fluid dynamics.	2	S
CO3	Students should be able to understand the mechanics of fluid and to study and their applications in flow through pipes and External Flows.	2	S
CO4	Students should be able to understand the properties and characteristics of basics of turbomachinery and Hydraulic turbines. Also able to solve application problems.	2	En
CO5	Students should be able to understand the properties and characteristics of a fluid and also analyze the performance of pumps and Compressors.	2	None

Course Name **Computer Aided Machine Drawing**

Course Code **ME3307**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student should be able to know about various Conventions and symbols and study limits, fits and Tolerances he should be able to Draw different types of screw threads, threaded fasteners, riveted joints and welded joints.	3	Em
CO2	Student should be able to understand and draw the part and assembly drawing of Machine Components.	4	S
CO3	Student should be able to understand the basic commands of AutoCAD software and draw 2D and 3D drawing on this software.	4	S,Em

Course Name **Strength of Materials Lab**

Course Code **ME3344**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)

CO1	Students should be able to calculate the hardness of different materials used in mechanical engineering	3	Em
CO2	Students should be able to perform different tests like impact test, torsion test, tensile and compressive tests to check the mechanical properties of materials	3	S
CO3	Students should be able to check the deflection in beams and perform different tests like creep test and buckling of column	3	S

Course Name **Thermal Engineering Lab**

Course Code **ME3343**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student should understand the working and determine the performance parameters of IC engines.	3	Em
CO2	Student should understand the construction and working of different boilers	2	S
CO3	Student should able to analyse the performance parameters of reciprocating compressor.	3	S

Course Name **Material Science Lab**

Course Code **ME3341**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student should be able to learn and identify the different properties possessed by the engineering materials.	3	Em
CO2	Student should be able to learn and perform the microscopic examination using metallurgical microscope and specimen polishing machine.	3	S
CO3	Student should be able to learn and perform the different heat treatment processes and calculate thedifference in hardness before and after heat treatment.	3	S

Course Name **Fluid Mechanics and Machines Lab**

Course Code   **ME3342**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Students should be able to learn practical espects of fluid Mechanics like pressure measurement, losses in fluid flow or due to shape change and apply them in designing and problem solving	3	Em
CO2	Students should be able to know the practical aspects of various turbines such as kaplan, francis and apply in designing process	3	S
CO3	Students should be able to know the practical aspects of various pumps such as reciprocating pump and apply in designing process	3	S

Course Name   **Heat Transfer**

Course Code   **ME3404**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student should be able to Understand the modes of heat transfer and its governing laws and also acquire skills to calculate heat transfer in steady state conditions	2	Em
CO2	Student should be able to calculate the heat transfer in transient conditions and understand the importance of extended surface.	2	S
CO3	Student should be able to understand convective heat transfer and find the heat transfer coefficient in varying conditions.	2	S
CO4	Student should be able to analyse heat exchangers and understand the phase change heat transfer.	2	S
CO5	Student should be able to understand the various principles involved in the radiation heat transfer and find the heat transfer rate	2	S

Course Name   **Theory of Machines**

Course Code   **ME3402**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student should be able to understand the basic components used in the making of machines and mechanism along with the exploration of their interrelation to give them motion	2	Em
CO2	Student should be able to understand the use of clutches, brakes and dynamometers in vehicles and applying the knowledge gained through numerical problems	3	S
CO3	Student should be able to understand the application of flywheel in machines and applying the knowledge gained through numerical problems	3	S
CO4	Student should be able to understand the application of governors in machines and applying the knowledge gained through numerical problems	3	S
CO5	Student should be able to understand the concept of gyroscope and cams in machines & aircrafts and applying the knowledge gained through numerical problems	3	S

Course Name **Manufacturing Science I**
Course Code **ME3410**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student will be able to understand the various considerations in Pattern making &Moulds preparation	2	s
CO2	Student will be able to understand about the Casting Processes and melting furnaces	2	S
CO3	Student will be able to know about the welding process	2	S
CO4	Student will be able to know about the special welding processes	2	S
CO5	Student will know about the weldments design and its testing methods	2	S

Course Name **Measurement and Metrology**
Course Code **ME3603**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Students should be able to develop the inspection of engineering parts with various precision instruments.	2	Em
CO2	Students should be able to the basic use Principles of measuring instruments and gauges and their uses.	2	S
CO3	Students should be able to the significance of measurement system, errors, transducers, intermediate modifying and terminating devices.	2	S
CO4	Students should be able to the advances in Metrology such as use of CMM, Laser, Machine Vision System for Metrology etc.	2	S
CO5	Students should be able to the Inspection of spur gear, thread elements and Evaluation and inspection of surface roughness.	2	S

Course Name **Manufacturing Science I Lab**
Course Code **ME3445**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student will be able to gain the practical knowledge in material casting processes	3	s
CO2	Student will be able to gain practical knowledge of arc and gas welding and cutting processes	3	S
CO3	Student will be able to understand about weld and casting defects	3	S

Course Name **Heat Transfer lab**
Course Code **ME3443**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)

CO1	Student should be able to understand the conduction heat transfer in steady conditions	2	Em
CO2	Student should be able to understand and analysis of heat exchanger	3	S
CO3	Student should be able to analyze the convection heat transfer	3	S

Course Name **Theory of Machines lab**

Course Code **ME3441**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student should be able to understand the principles of working of various links, mechanisms and dynamometers.	2	Em
CO2	Student should be able to determine performance parameters of gyroscope,governors.	4	S
CO3	Student should be know the concept of balancing of masses and determine the critical speed of shafts in loading conditions	3	S

Course Name **Measurement and Metrology Lab**

Course Code **ME3641**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Students should be able to develop the theoreticalconcepts taught inMechanicalMeasurements& Metrologythrough experiments.	3	Em
CO2	Studentsshouldbe abletodescribe the basic useof Variousmeasuring toolsmeasuring techniques.	3	S
CO3	Studentsshouldbe abletothecalibrationtechniques Ofvariousmeasuringdevices.	3	S

Course Name **Machine Design I**

Course Code **ME3501**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student should be able to gain basic concept of machine design and find out the machine component life under the application of various types of load conditions.	3	Em
CO2	Student should be able to design the Shaft, key and coupling under different type of Stress conditions.	2	S
CO3	Student should be able to know the basics of Lever and different types of joints used in mechanical engineering and study how to design them for practical application.	2	S
CO4	Student should be able to Understand the various parts and types of screw jack and design their components according to load value given.	2	S
CO5	Student should be able to understand about different types of spring used in machines and the design procedure adopted for different types of spring.	3	S

Course Name **Manufacturing Science-2**
Course Code **ME3510**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Students will be able to acquire a fundamental knowledge on metal forming technology	2	s
CO2	Students will be able to understand the rolling and forging metal forming processes used in manufacturing industry.	2	S
CO3	Students will be able to understand the extrusion and drawing metal forming processes used in manufacturing industry.	2	S
CO4	Students will be able to understand the sheet metal forming processes used in manufacturing industry.	2	S
CO5	Students will be able to understand the powder metallurgy techniques adopted in manufacturing	2	S

Course Name **Industrial Engineering and Management**
Course Code **ME3715**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student should be able to understand the management principles.	2	Em
CO2	Student should be able to know the organizational structure and approaches for decision making process.	3	S
CO3	Student should be able to understand the layout of a manufacturing plan	3	S
CO4	Student should be able to apply the method study and perform work measurement techniques for productivity.	2	S
CO5	Student should be able to understand methods to improve productivity and importance of value engineering.	2	S

Course Name   **Vehicle Technology**
Course Code   **ME3504**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student should be able to understand the Vehicle's Fundamentals	2	Em
CO2	Student should be able to learn about the applications of various IC Engine Power System	2	S
CO3	Student should be able to understand the working principles of Transmission and understanding of Control System	2	S
CO4	Student should be able to know about the various concept of Suspension and Electrical System	2	S
CO5	Student should be able to get understanding of various Electric Vehicle	2	S

Course Name   Vehicle Technology Lab
Course Code   ME3541

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student should be able to understand the working of various systems in a vehicle	2	Em
CO2	Student should be able to Know about the types of tyres and tread patterns	3	S
CO3	Student should be able Learn about the fuel standards and emission norms	2	S

Course Name   **Manufacturing Science II Lab**
Course Code   **ME 3544**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student will be able to understand and perform the rolling, forging and sheet metal operations used in forming process	2	s
CO2	Student will be able to understand the methods to perform extrusion, wire drawing process	2	S
CO3	Student will be able to understand about powder metallurgy techniques	2	S

Course Name   **Machine Design II**
Course Code   **ME3601**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student should be able to understand about spur gear and design procedure adopted for spur gear under various load conditions.	2	Em
CO2	Student should be able to understand about Helical and Bevel gear and design the helical and bevel gear under various load conditions.	2	S

CO3	Student should be able to know about Rolling contact bearing and design various types of rolling contact bearing for industrial applications.	2	S
CO4	Student should be able to understand about sliding contact bearing and design various types of sliding contact bearing for industrial applications.	2	S
CO5	Student should be able to know about the general design considerations and selection of Type of IC Engine and Design IC engine Components.	3	S

Course Name **Entrepreneurship and Startup**
Course Code **ME3610**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student will be able to understand the nature and basics of entrepreneurship.	2	Ent
CO2	Student will be able to understand the identification of project and describe the role of agencies in entrepreneurship promotion	4	Ent
CO3	Student will be able to understand and Build an entrepreneurial business idea and identify funding oppurtunies	3	Ent
CO4	Student will be able to understand assess opportunities and constraints for new business ideas	2	Ent
CO5	Student will be able to understand design strategies for successful implementation of ideas by knowing regulatory frameworks	2	Ent

Course Name **Mechatronics and Automation**
Course Code **MT3607**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Students should be able to understand basic fundamentals of automation in terms of mechatronics as an interdisciplinary system	2	Em
CO2	Students should be able to understand the fundamentals of sensors and transducers used in automating the industrial environment	2	S

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None
CO3	Students should be able to understand the fundamentals of actuators and drives used in automating the industrial environment	2	S
CO4	Students should be able to understand the fundamentals of PLC used for automating the systems	2	Em
CO5	Students should be able to understand the fundamentals of micro mechatronic systems used in automating the process	2	Em

Course Name   **Industrial Automation Lab**
Course Code   **MT3643**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student will be able to understand the various valves used for control operations in automating systems	2	Em
CO2	Student will be able to understand the operation of PLC and implementation of logic in PLC	2	S
CO3	Student will be able to implement the instructions in PLC	2	S

Course Name   **Mechatronics Lab**
Course Code   **MT3641**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Students should be able to get knowledge about the different types of sensors and their use in automating the machines	2	Em
CO2	Students should be able to get knowledge about the working of microprocessors in automating the machines	2	S
CO3	Students should be able to get knowledge about the working of various automated systems such as pick & place robot, windscreen wiper motion etc.	2	S

Course Name   **Technical VAP I**
Course Code   **ME3646**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student should be able to apply the engineering knowledge to attain the problem solving skills required during the placement drives.	3	Em
CO2	Student should be able to develop ability to face technical interviews.	3	Em
CO3	Student should be able to know the types of technical questions asked by the companies in the placement drives.	2	Em

Course Name **CAD/CAM**
Course Code **ME 3701**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Students should be able to develop an understanding of the basics of CAD/CAM, exchange formats, transformation techniques, Basic of FEM and wireframe modeling.	2	Em
CO2	Students should be able to attain a theoretical understanding of surface modeling and solid modeling.	4	S
CO3	Students should be able to understand about NC machine, Part programming by using G and M Code, CNC and DNC machine.	3	S
CO4	Students should be able to attain a theoretical understanding of System devices and method to control NC system.	2	S
CO5	Students should be able to theoretically analyze about advance tool which is used in CAM systems.	2	S

Course Name **Engineering Economics and Project Management**
Course Code **ME3716**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student will be able to understand the fundamentals of economics in operation of an engineering industry	2	Em
CO2	Student will be able to know about break even analysis for economic efficiency of the industry	3	S
CO3	Student will be able to understand the basics of managing a project with feasibility analysis	3	S
CO4	Student will be able to know the methods to monitor the project progress	2	Em
CO5	Student will be able to know the techniques of project appraisal and estimating the project.	3	Em

Course Name   **CAD/CAM Lab**
Course Code   **ME3740**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Students should be able to develop an understanding about CAD package and working in sketch mode and understand part features and draw Part modeling of various machine components.	4	Em
CO2	Students should be able to know about CNC Lathe Machine (MTab FANUC controller – standard feature & machine specification)	2	S
CO3	Students should be able to write a part program and simulate the tool part for the given model using FANUC controller for facing, step turning, taper turningand thread cutting.	4	S

Course Name   **Quality Engineering Lab**
Course Code   **ME3748**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student will be able to get knowledge about the working of softwares and their application in quality analysis	3	S
CO2	Student should be able to get knowledge about performing various tools and techniques of quality analysis such as measurement charts, cause and effect analysis and control charts	3	S
CO3	Student should be able to get knowledge about performing various tools and techniques of quality analysis such as process capability, hypothesis testing and Multi-Vari analysis	3	S

Course Name   **Technical VAP II**

Course Code   **ME3746**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student should be able to apply the engineering knowledge to attain the problem solving skills required during the placement drives.	3	Em
CO2	Student should be able to develop ability to face technical interviews.	3	S
CO3	Student should be able to know the types of technical questions asked by the companies in the placement drives.	2	S

Course Name   **Refrigeration and Air Conditioning**

Course Code   **ME3505/ME3602**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)

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Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Students should be able to develop understanding about basics of Refrigeration and clear concepts related to ideal parameters of refrigeration.	3	Em
CO2	Students should be able to clear concepts related to vapor compression refrigeration system.	3	S
CO3	Students should be able to understand the basics of vapor absorption system and its application	2	S
CO4	Students should be able to understand the properties and characteristics of basics of air conditioning.	3	S
CO5	Students should be able to solve cooling load calculations and also able to design of air conditioning system by solving practical problems	3	S

Course Name **Mechanical Vibrations**
Course Code **ME3708**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Students should be able to develop an understanding of different types of motions and effect of damping.	3	Em
CO2	Students should be able to develop an understanding of single degree of freedom and vibration measuring instruments.		S
CO3	Students should be able to attain a theoretical understanding of Two Degree Freedom System and undamped dynamic.	3	S
CO4	Students should be able to develop an understanding of exact analysis undamped free and forced vibrations of multidegree system.	3	S
CO5	Students should be able to numerical analyze the Rayleigh's, Dunkerley's, Holzer's and Stodola's methods and Critical speed of shafts.	3	S

Course Name **Industrial Inspection and Quality Control**
Course Code **ME3612**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student will be able to understand the principles of measurement and instruments used for measurement	3	Em

CO2	Student will be able to understand the principles of measurement and inspection using gauges		S
CO3	Student will be able to understand the fundamentals of quality control	3	S
CO4	Student will be able to understand the quality control techniques adopted in industry	3	S
CO5	Student will be able to understand the fundamentals of sampling techniqus	3	S

Course Name   **Power Plant Engineering**
Course Code   **ME3611**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student will be able to understand about coal based power plants and its systems	2	Em
CO2	Student will be able to about gas based power plants and its systems	2	Em
CO3	Student will be able to about nuclear power plants and its systems	2	Em
CO4	Student will be able to about hydel based power plants and its systems	2	Em
CO5	Student will be able to know the economics,environment and safety issues and standards related to power plants	2	Em

Course Name   **Alternative Fuels and Energy Systems**
Course Code   **ME3703**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Students should be able to understand the need of alternative fuels.	2	Em
CO2	Students should be able to compare different types of alcohols and vegetable oils.	2	S
CO3	Students will aware about the production of natural gas, LPG, Hydrogen and Biogas.	2	S
CO4	Students should be able to understand the need of electric and solar power.	2	S
CO5	Students should be able to understand different emission control techniques.	2	S

Course Name **Finite Element Method**

Course Code **ME3707**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Students should understand the concepts behind formulation methods in FEM.	2	Em
CO2	Students should be able to Identify the application and characteristics of FEA elements in truss and frames.	3	S
CO3	Students should develop element characteristic equation.	3	S
CO4	Students should be able to apply the FEM 2D concept on steady state heat transfer analysis.	3	S
CO5	Students should be able to understand dynamic analysis in different stepped bar and a beam, time dependent field problems.	2	S

Course Name **Operation Research**

Course Code **ME3503**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student should be able to understand the principles of decision making through linear programming and applying the learnings though numerical problems	3	S
CO2	Student should be able to understand the principles of decision making through transportation & assignment models and applying the learnings though numerical problems.	2	S
CO3	Student should be able to understand the principles of decision making through queuing theory & waiting line models and applying the learnings though numerical problems.	2	S
CO4	Student should be able to understand the principles of decision making through network diagrams such as PERT & CPM and applying the learnings though numerical problems.	2	S
CO5	Student should be able to understand the principles of decision making through Game Strategy and applying the learnings though numerical problems.	2	S

Course Name **Robotics and Automation**
Course Code **MT3803**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student should be able to understand the basic concepts of Definitions,	2	Em
CO2	Student should be able to understand the types of robots	2	S
CO3	Student should be able to understand the Trajectories Motion and Automation, Robot Navigation and Automation	2	S
CO4	Student should be able to analyze Robot Arm Kinematics	2	S
CO5	Student should be able to know and apply concepts of ROS	2	S

Course Name **Microprocessors in Automation**
Course Code **MT3819**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student will be able to understand fundamentals of number systems,logic gates and 8085 microprocessor	2	Em
CO2	Student will be able to understand fundamentals of machine cycles	2	S
CO3	Student will be able to understand fundamentals of Assembly language programming	2	S
CO4	Student will be able to understand fundamentals of convertor and timers	2	S
CO5	Student will be able to understand fundamentals of digital control	2	S

Course Name **Unconventional Manufacturing Processes**
Course Code **ME3713**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Students should be able to understand the need of non traditional machining processes and able to classify various processes.	2	Em
CO2	Students should be able to recognize the role of mechanical energy in non-traditional machining processes.	2	S
CO3	Students should be able to various on machining electrically conductive material through electrical energy in non- traditional machining processes.	2	S
CO4	Students should be able to perform process analysis considering the various responses considered in a process.	2	S
CO5	Students should be able to the use of controlled explosive and spark energy in deformation process.	2	S

Course Name **Plastic Processing and Techniques**
Course Code **ME3714**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Students should be able to Understand the various types of PPEs and their usage in Plastic industry and non-conventional blow molding process.	2	Em
CO2	Students should be able to Co-extrusion blow molding displacement processes, blow molding of irregular shaped parts.	2	S
CO3	Students should be able to various screw designs used in extrusion plants, specialized extrusion processes for non-conventional extrusion product.	2	S
CO4	Students should be able to the Reaction injection molding (rim)and features of rim process and, characteristic of rim parts.	2	S
CO5	Students should be able to the use non-conventional injection molding techniques and injection molding of reinforced thermoplastics.	2	S

Course Name **Rapid Prototyping**

Course Code   **ME3806**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student should be able to understand about development of RP systems	2	Em
CO2	Student should be able to understand about Reverse Engineering and New Technologies	2	S
CO3	Student should be able to know about Materials for Rapid Prototyping Systems	2	S
CO4	Student should be able to understand about Liquid and Solid Based Rapid Prototyping Systems	2	S
CO5	Student should be able to know about the Powder Based Rapid Prototyping Systems	2	S

Course Name   **Non-Conventional Energy Resources**

Course Code   **ME3815**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Students should be able to Identify the renewable energy sources,their utilization and types of solar energy	2	Em
CO2	. Students should be able to understand various concepts related to solar radiation and its measurement	2	S
CO3	Students should be able to understand various concepts related to solar thermal electricity generation	2	S
CO4	Students should be able to Understand the principle of working of nuclear power plants	2	S
CO5	Students should be able to Understand the safety features adopted in nuclear reactors	2	S

Course Name   **Supply Chain Management**

Course Code   **ME3803**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student should be able to Know about the objective and importance of supply chain	2	Em
CO2	Student should be able to Know about thePlanning Demand and Supply in a Supply Chain	2	S
CO3	Student should be able to Know about the Planning and Managing inventories in a Supply Chain	2	S
CO4	Student should be able to Know about the Transportation, Network Design and Information Technology	2	S
CO5	Student should be able to learn about the Coordination in Supply Chain and effect of E-Business	2	S

Course Name **Industrial Hazard and Safety**
Course Code **ME3817**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student will be able to understand about physical occupational hazards and standards	2	Em
CO2	Student will be able to understand about chemical and nuclear occupational hazards	2	S
CO3	Student will be able to understand about biological and ergonomical occupational hazards	2	S
CO4	Student will be able to understand about occupational health and toxicology	2	S
CO5	Student will be able to understand about occupational physiology	2	S

Course Name **Energy Storage System**
Course Code **ME3808**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student should be able to understand the basic concepts of Electrical Energy Storage Technologies	2	Em
CO2	Student should be able to understand the Emerging needs for ees	2	S
CO3	Student should be able to understand the Classification of EES systems	2	S
CO4	Student should be able to analyze the Renewable Energy Systems Simulation of energy storage systems and its management	2	S
CO5	Student should be able to know smart park, electric vehicle charging facility, HESS in microgrid and smart grid, microbial fuel cell, hydrogen fuel cell.	2	S

Course Name   **Energy Conservation and Audit**
Course Code   **ME3807**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student should be able to understand about Energy conservation	2	Em
CO2	Student should be able to understand about Energy Audit	2	S
CO3	Student should be able to know about Demand Side Management	2	S
CO4	Student should be able to understand about Voltage and Reactive power in Distribution Systems	2	S
CO5	Student should be able to know about the Efficiency in Motors and Lighting system	2	S

Course Name   **Lean Manufacturing**
Course Code   **ME3810**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student will be able to understand principles about lean manufacturing and importance	2	Em
CO2	Student will be able to know about JIT and TPM principles and implementation technques	2	S
CO3	Student will be able to know about TQM,5S and VSM procedure and principles	2	S
CO4	Student will be able to know implementation technique of Lean manufacturing	2	s
CO5	Student will be able to know about significance of six sigma	2	s

Course Name   **Hybrid Vehicle Propulsion**

Course Code   **ME3818**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Student will be able to understand about hybrid and electric vehicle fundamentals	2	Em
CO2	Student will be able to understand about drive train used in hybrid vehicles	2	S
CO3	Student will be able to understand about electric propulsion unit used in hybrid vehicles	2	S
CO4	Student will be able to understand about energy storage systems	2	s
CO5	Student will be able to understand about energy management techniques	2	s

Course Name   **Facility Planning and Design**

Course Code   **ME3816**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)

CO1	Student will be able to understand about facilities planning	2	Em
CO2	Student will be able to understand about plant layout	2	S
CO3	Student will be able to understand about group technology	2	S
CO4	Student will be able to understand about line balancing	2	S
CO5	Student will be able to understand about effective material handling	2	S

Course Name   **Indian Knowledge System**
Course Code   **HU3201**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	The students will be able to understand the Indian Knowledge System such as historical development, sources and scope.	2	S
CO2	The students will be able to understand the vocabulary system of Indian knowledge system.	2	S
CO3	The students will be able to understand and apply the philosophical foundations and methods of IKS.	3	N
CO4	The students will be able to execute the case studies based on the Indian knowledge system.	3	N
CO5	The students will be able to understand the influence of Indian Knowledge System on world.	2	S

Course Name   **United Nations Development Programme**
Course Code   HU3202

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Emt)/ None (Use , for more than One)
CO1	Students will learn about the Structure, Mission, Vision and Goals of UNDP	2	S
CO2	Equip the students with the knowledge of sustainable livelihoods for inclusive economic growth.	2	S
CO3	Students will learn and explore about the Human Development index to promote well being at all ages.	2	S

CO4	To impart better education on SDGs goals focusing on Gender Equality and Provide Access to Justice to All and Build Effective.	3	N
CO5	Students will develop knowledge regarding environment sustainability.	3	N