COURSE OUTCOMES (COS)

Course Name: C211 Mathematics- III (PDE & PS) (U21MA302) Year: II-I Sem A.Y: 2022-23

C211.1	Introduce PDE and solution of first order PDE.
C211.2	Introduce the solution methodologies for second order Partial Differential Equations with applications in engineering
C211.3	Provide an overview of probability and statistics to engineers
C211.4	Obtain the concepts of curve fitting, correlation and test of significance.
C211.5	Acquire the knowledge of Test of Hypothesis pertaining to small and large samples, chi-square for goodness of fit.

Course Name: C212 Engineering Mechanics (U21ME301) Year: II-I Sem A.Y: 2022-23

C212.1	Draw the free body diagram of system of forces by the different methods of resolution of forces to determine resultant and equilibrant.
C212.2	Find the determinate and indeterminate structure.
C212.3	Determine the forces induced in different members of truss by the method ofjoints and section.
C212.4	Determine the centroid, Area moment of inertia, product of inertia and mass moment of inertia of different geometric cross sections.
C212.5	Explain kinematics & kinetics of particles, projectiles, curvilinear motion, centroidal motion and plane motion of rigid bodies.
C212.6	Apply the knowledge of Principle of virtual work to extract the information regarding hidden and unknown variables in a system.

Course Name: C213 English for Technical Communication (U21EN301) Year: II-I Sem A.Y: 2022-23

C213.1	Apply technical communication skills effectively.
C213.2	Adapt different types of official correspondence.
C213.3	Construct report writing using various techniques.
C213.4	Develop adequate skills of manual writing.
C213.5	Interpret the information transfer from verbal to non-verbal data and vice-versa.

Course Name: C214 Manufacturing Processes (U21ME302) Year: II-I Sem A.Y: 2022-23

C214.1	Differentiate the selection materials for patterns, types and allowances ofpatterns used in casting and analyze the components of moulds with defects that are produced during casting process.
C214.2	Design core, core print and gating system in special metal casting processes, to a variety of manufacturing processes including their typical use and capabilities.
C214.3	Categorize the different welding procedure specification execution, implementation and riveting, traditional processes and process used in Manufacturing Industries.
C214.4	Perform Solid-state welding theory that emphasizes the driving force ofmetals that spontaneously weld to each other. Approaches include Resistance, Friction, Diffusion, Explosion, and Ultrasonic Welding.
C214.5	Become familiar with some of the basic metal forming processes like extrusion, rolling, forging, wire drawing and sheet metal working process and able to understand the concepts of powder metallurgy and its process.
C214.6	Recommend the appropriate design of gating systems, forming processes, welding process and NDT techniques by selecting suitable manufacturing processes to manufacture the products optimally.

Course Name: C215 Thermodynamics (U21ME303) Year: II-I Sem A.Y: 2022-23

C215.1	Explain the basic concepts of thermodynamic system, properties, equilibrium, pressure, specific volume, temperature, zeroth law of thermodynamics, temperature measurement and temperature scales, and apply them for solving problems of thermodynamic systems.
C215.2	State and apply the first law of thermodynamics for closed and open systems undergoing different thermodynamic processes and its applications.
C215.3	Prove the equivalence of two statements of second law of thermodynamics and apply them to refrigerators, heat engines, heat pumps or compressors and nozzles etc.
C215.4	Describe the properties of pure substances, gases and their mixtures, and apply the property relations to thermodynamic problems.
C215.5	Compare and Analyze the Power Cycle, Vapour Cycles and Refrigeration Cycle.

Course Name: C216 Advanced Communication Skills Lab (U21EN3L1)Year: II-I Sem A.Y: 2022-23

C216.1	Organize ideas relevantly and coherently in their communication
C216.2	Analyze and comprehend the text inferentially
C216.3	Write Resume/CV and Cover letter effectively
C216.4	Practice oral presentation confidently
C216.5	Participate in group discussions dynamically and face interviews optimistically
C216.6	Organize ideas relevantly and coherently in their communication

Course Name: C217 Manufacturing Processes Lab (U21ME3L1) Year: II-I Sem A.Y: 2022-23

C217.1	Understand & recognize the principle of casting, and various casting methods used and melting practices followed.
C217.2	Find the strengths of various types of sand & their properties.
C217.3	Identify the basic principle of welding and distinguish between various welding types and their applications.
C217.4	Determine the principles of metal working, various types of metal working technique
C217.5	Recognize the bulk deformation processes of rolling, extrusion & making piercing and blanking operation by using hydraulic press
C217.6	Identify the various types of plastics and their processing techniques

Course Name: C218 Machine Drawing and Modeling Lab (U21ME3L2) Year: II-I Sem A.Y: 2022-23

C218.1	Understanding and suitable application of dimensioning, drawing sheet format, angle of projection, type of projection such as orthogonal, isometric, etc., & sectional views.
C218.2	Make free hand sketches of various mechanical components
C218.3	Obtain the knowledge of conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribsetc.
C218.4	Understand and evaluate different types of joints such as cotter joints, rivetedjoints, welded joints & couplings and make their drawings.
C218.5	Extract data from the drawing such as type of projection (first angle / second angle, etc.,), type of view (front / top / side), dimensions, etc., and utilize themfor conversion from isometric to orthographic & amp; vice versa and frompart drawing to assembly drawing & amp; vice versa.
C218.6	Evaluate and develop assembly drawings using part drawings and to analyze the functions of different parts in assembly, in future machine drawing standards can be used for safe design of assemblies.

Course Name: C219 Programming Lab-I (U21CS3L1) Year: II-I Sem A.Y: 2022-23

C219.1	Write, test, and debug simple Python Programs
C219.2	Implement Python Programs with Conditionals and loops
C219.3	Develop the ability to formulate Regular Expressions and use them for Pattern Matching.
C219.4	Develop Python Programs step wise by defining functions and calling them
C219.5	Read and Write data from/to files in Python
C219.6	Implement database and GUI applications.

COURSE OUTCOMES (COS)

Course Name: C311 Hydraulic Machines (PC408ME) Year: III-I Sem A.Y: 2022-23

C311.1	Classify hydraulic machines based on direction of energy conversion and principle of operation.
C311.2	Explain the designing of reciprocating pump and centrifugal pump.
C311.3	Sketch the performance characteristics of a given Centrifugal and Reciprocating pumps.
C311.4	Demonstrate different types of turbines with their principles and practical applications.
C311.5	Evaluate the performance characteristics of hydraulic turbines.
C311.6	Design, Estimate the performance of various hydraulic equipment andsystems and design with Hydraulic power controls and fluidics.

Course Name: C312 Design of Machine Elements (PC409ME) Year: III-I Sem A.Y: 2022-23

C312.1	Apply the fundamentals of design of machine elements, and behavior of members subjected to various types of complex loads, and criteria of failure to satisfy the applications.
C312.2	Identify the principles involved in evaluating the shape and dimensions of a component, when subjected to various types of fatigue loading, and methods to reduce the stress concentration.
C312.3	Design the machine components joined by Riveted, Welded and bolted joints, and to analyse the different ways in which riveted and welded joints can fail.
C312.4	Illustrate the design, development and use of knuckle joint, spigot cotter joint, gib and cotter joint, strap end of a connecting rod and use of different keyways in engineering applications.
C312.5	Design the shafts composed of gears and belt pulley.
C312.6	Map out and design the different Couplings used in different industrial applications.

Course Name: C313 Dynamics of Machines (PC410ME) Year: III-I Sem A.Y: 2022-23

C313.1	Analyze the forces statistically & dynamically for slider crank mechanism and determine the gyroscopic effect on aero-plane, ships, two-wheeler vehicles & four-wheeler vehicles.
C313.2	Design a flywheel considering speed and energy fluctuation and construct theturning moment diagram for IC engines.
C313.3	Analyze the sensitiveness, stability, Controlling Force, Isochronism, etc. of the governor.
C313.4	Analyze balancing of rotating & reciprocating masses statistically anddynamically.
C313.5	Evaluate the frequency of vibration of single degree freedom system, and determine the critical speed of shaft.
C313.6	Determine the natural frequencies and mode shapes of two degree of freedom systems, using Dunkerley, Raleigh and Holzer methods.

Course Name: C314 Metrology and Instrumentation (PC411ME) Year: III-I Sem A.Y: 2022-23

C314.1	Understand limits, fits and tolerances and their applications. Linear and angular measurements and design measuring instruments.
C314.2	Understand the principles of comparators and apply and Measurement ofStraightness and Flatness Roundness.
C314.3	Evaluate roughness and its measurement of gears, thread profiles.
C314.4	Build basic measuring system, static and dynamic characteristics ofinstruments and their application.
C314.5	Analyze basic principles to measure pressure, temperature, displacement.
C314.6	Examine the principles to measure force, torque and vibrations.

Course Name: C315 – Heat Transfer (PC412ME) Year: III-I Sem A.Y: 2022-23

C315.1	Analyze the different modes of HT, derivations related to cylindrical,spherical and Cartesian coordinates.
C315.2	Evaluate the 1-D steady state conduction, overall heat transfer coefficient andcritical radius of insulation.
C315.3	Analyze the differences between forced convection and natural convection.
C315.4	Evaluate the different classifications of boiling and condensation and also of radiation heat transfer, heat exchangers and its classification.
C315.5	Analyze practical applications of heat transfer and its importance in the field of mechanical engineering in practical life.

Course Name: C316 Automobile Engineering (PE51ME) Year: III-I Sem A.Y: 2022-23

C316.1	Generalize the different types of automobiles, list the engine components, and describe the functioning of IC and SI engines.
C316.2	Differentiate the types of Lubrication system; identify different lubrication and colling systems used in vehicles.
C316.3	List the features of different steering mechanisms, describe the importance ofwheel alignment and different suspension systems.
C316.4	Identify different components in power transmission system design a system, components.
C316.5	Adapt techniques, skills and modern engineering tools necessary to control the pollution.
C316.6	Gain knowledge on overall working system in light, medium and heavy vehicles.

Course Name: C317 Thermal Engineering Lab-2 (PC455ME) Year: III-I Sem A.Y: 2022-23

C317.1	Calculate thermal conductivity of solids, heat transfer coefficient subjected to natural and forced convection environment, emissivity and Stefan Boltzmann constant value of thermal radiation.
C317.2	Predicting efficiency of Pin-fin subject to natural and forced convection and LMTD and effectiveness of parallel and counter flow heat exchangers.
C317.3	Interpret the link between refrigeration effects, work done and COP of thesystem Refrigeration and Air conditioning systems.
C317.4	Identify the different Psychometric processes on Psychometric chart and describe how those processes can be maintained.
C317.5	Determine overall efficiency of Centrifugal blower and Axial fan.
C317.6	Measurement of pressure distribution, lift and drag force on specimen inWind Tunnel.

Course Name: C318 Dynamics of Machines Lab (PC456ME) Year: III-I Sem A.Y: 2022-23

C318.1	Explain the working of governors and can be able to perform experiment on Performance Characteristic Curves.
C318.2	Test for gyroscopic effect, and can be able to analyze the effect of gyroscopic couple for different motions.
C318.3	Test for balance masses Statically and Dynamically.
C318.4	Predict the motion of the follower for given profile of cam.
C318.5	Determine the time period, amplitude and natural frequency of vibrating system.
C318.6	Determine the critical speed of shaft for different n-conditions.

Course Name: C319 Fluid Mechanics and Hydraulics Machinery Lab (PC457ME) Year: III-I Sem A.Y: 2022-23

C319.1	Investigate through experimentation different types of pump models and estimate their performance under different working conditions.
C319.2	Determine the coefficient of impact of jet on vanes at different flow rates.
C319.3	Estimate the performance of hydraulic turbines at constant speed and constanthead.
C319.4	Calibrate flow measuring devices such as venturi meter and orifice meter.
C319.5	Develop the hydraulic circuits to cater the needs of the industry.

COURSE OUTCOMES (COS)

Course Name: C411 Operation Research **Year: IV-I Sem A.Y: 2022-23**

C411.1	Interpret the concepts, scope and phases of operations research. Apply the L.P.P and derive optimal solutions to linear programming problems bygraphical method, simplex method, and Big-M method.
C411.2	Construct Dual problems and apply the dual Simplex Method
C411.3	Construct the Transportation and Assignment problems and determine optimum solutions for transportation, Assignment and travelling salesman problems.
C411.4	Assess a game theory for pure and mixed strategy under competitive environment. Estimate the replacement time for deteriorate items when value of money is counted & not counted.
C411.5	Determine the minimum processing times for sequencing of n-jobs-2/3/m & 2-jobs-n machines.
C411.6	Evaluate the waiting line problems for M/M/1 and M/M/K queuing models and illustrate various optimization techniques

Course Name: C412 Refrigeration & Air Conditioning **Year: IV-I Sem A.Y: 2022-23**

C412.1	Acquire knowledge and analyze various Air Refrigeration systems and understand desirable properties of refrigerants
C412.2	Analysis of the VCR cycle and its components compressor, condenser, evaporator and expansion devices.
C412.3	Gain knowledge about Vapour absorption refrigeration systems, Steam Jet Refrigeration System and its analysis. Study about Non-conventional Refrigeration systems like Thermoelectric refrigerator, Pulse tube refrigerationsystem.
C412.4	Understand Psychometric properties, Psychometrics chart and representation of processes on the chart, know thermodynamics of human body and ASHRE comfort chart
C412.5	Perform Air conditioning cooling load calculations and design of airconditioning systems and components of air conditioning equipment's.

Course Name: C413 Industrial Engineering **Year: IV-I Sem A.Y: 2022-23**

C413.1	Adapt a variety of management tactics to the financial world and extract management principles in the area of human resource management.
C413.2	Apply the theory of production planning and management into industry andmaintain control over the processes involved in order fulfillment.
C413.3	Explain Importance of inventory control system.
C413.4	Develop different techniques to ensure that the products or processes meet the necessary quality standards.
C413.5	Explain the role of Decision theory under uncertainty.
C413.6	Recommend various approaches under Uncertainty and Risk conditions.

Course Name: C414 Additive Manufacturing Technology Year: IV-I Sem A.Y: 2022-23

C414.1	Interpret the prototyping fundamentals and RP Processes.
C414.2	Recognize liquid-based RP Systems
C414.3	Recognize different types of Powder based RP System and Rapid Tooling.
C414.4	Identify STL formats, STL files and its problem
C414.5	Describe the differences and application of AMT.

Course Name: C415 Non-Conventional Energy Sources Year: IV-I Sem A.Y: 2022-23

C415.1	Acquire knowledge of renewable and non-renewable sources of energy and operation of different types of Fuel Cell systems.
C415.2	Gain knowledge about solar energy collectors, solar energy storage systems, solar pond and its application
C415.3	Compare the application of wind energy and wind energy conversion system
C415.4	Classify the applications of different renewable energy sources like ocean thermal, hydro, geo-thermal energy etc.
C415.5	Develop capability to do basic design of bio gas plant.

Course Name:C416 Project-I Year: IV-I Sem A.Y: 2022-23

C416.1	Identify a topic in advanced areas of Mechanical Engineering.
C416.2	Analyze and discuss the results to draw valid conclusions.
C416.3	Review literature to identify gaps and define objectives & scope of the work.
C416.4	Generate and implement innovative ideas for social benefit.
C416.5	Discuss complete process of a project – designing, programming, module development.

Course Name: C417 Summer Internship Seminar Year: IV-I Sem A.Y: 2022-23

C417.1	Engaged in the integral activities of reading, discussion and composition around a particular topic.
C417.2	Develop presentation skills.
C417.3	Apply confidence to face the interviews.
C417.4	Investigate the advancements in the particular topic.
C417.5	Distinguish opinions from researched claims.