Departments of Mechanical Engineering

Class: S.E

Program Outcome (PO's)

At the end of the program, the graduates of S.E. Mechanical engineering department students have got following knowledge.

1. **Engineering Knowledge:** Utilized the principles of mathematics, science, and engineering fundamentals, along with specialized knowledge in a mechanical engineering field, to address intricate mechanical engineering challenges and devise effective solutions.
2. **Problem analysis:** Employed the skills to identify, formulate, review research literature, and analyze intricate engineering problems, resulting in substantiated conclusions drawn from the foundational principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Crafted solutions for intricate engineering problems and designed system components or processes that fulfilled specified requirements, all while giving due consideration to public health and safety, as well as cultural, societal, and environmental factors
4. **Conduct investigations of complex problems**: Applied research-based knowledge and methodologies, including the design of experiments, analysis and interpretation of data, and synthesis of information, to derive valid conclusions.
5. **Modern tool usage**: Utilized and applied appropriate techniques, resources, as well as modern engineering and IT tools, including prediction and modeling, to conduct complex engineering activities, acknowledging and understanding their limitations.
6. **The engineer and society**: Applied reasoning informed by contextual knowledge to assess societal, health, safety, legal, and cultural issues, recognizing the associated responsibilities relevant to professional engineering practice.
7. **Environment and sustainability**: Demonstrated an understanding of the impact of professional engineering solutions in societal and environmental contexts, and exhibited knowledge of the necessity for sustainable development.
8. **Ethics**: Applied ethical principles, committed to professional ethics and responsibilities, and adhered to norms of engineering practice.
9. **Individual and team work**: Functioned effectively as an individual and as a member or leader in diverse teams, as well as in multidisciplinary settings.
10. **Communication**: Effectively communicated on complex engineering activities with the engineering community and society at large, including the ability to comprehend and produce effective reports and design documentation, deliver compelling presentations, and provide and receive clear instructions.
11. **Project management and finance**: Displayed knowledge and understanding of engineering and management principles, applying them to one's own work as a team member or leader to manage projects and contribute to multidisciplinary environments.
12. **Life-long learning**: Acknowledged the need for and demonstrated the preparation and ability to engage in independent and life-long learning within the broad context of technological change in the past.

Subject : Thermodynamics-I
Subject Code : MED202

Course Outcome (CO's)

1. Students abled to analyze the work and heat interactions associated with a prescribed process path, and to perform a first law analysis of a flow system.
2. Students abled to apply Second Law of Thermodynamics and entropy concepts in analyzing the thermal efficiencies of heat engines such as Carnot and Rankine cycles and the coefficients of performance for refrigerators.
3. The students understood the concept of entropy.
4. At the end of this course, the students could apply knowledge of basic thermodynamic concepts for analysis of vapour power cycles
5. Students got familiar with the construction and principles governing the form of simple and complex one-component pressure-temperature diagrams and the use of volume-temperature and pressure-volume phase diagrams and the steam tables in the analysis of engineering devices and systems.
6. Students understood the different types of fuels and combustion reaction

Subject : Thermodynamics-I
Subject Code : MED202

Program Specific Outcome (PSO's)

1. Students understood Concept of flow work, control volume and steady flow process, Assumptions.
2. Students understood Steady flow energy equation on time and mass basis.
3. Students understood Difference between steady flow and non-flow process
4. Students understood application of SFEE to some steady flow devices via nozzle diffuse
5. Students understood SFEE & applied of SFEE to some steady flow devices via throttling valve, turbine, and compressor.
6. Students understood Limitations of first law of thermodynamics, concept of PMM-I
7. Students understood various statements, Heat engine, Refrigerator and Heat pump.
8. Students understood COP of heat pump and refrigerator, Reversed heat engine.
9. Students understood Equivalence of kelvin-plank and clausius statements.
10. Students understood PMM-II, Carnot theorem, Thermodynamics temperature scale
11. Students understood Concept of entropy, clausius theorem, clausius inequality.
12. Students understood T-S diagrams, Entropy change for ideal gas during Reversible process
13. Students understood Entropy of isolated system in real process. Principle of increase of entropy, Available and unavailable energy
14. Students understood Concept of air standard cycle, assumptions, Carnot, otto cycles with representation on P-V & T-S planes
15. Students understood Students understood Mathematical analysis for efficiency, Mean effective pressure and power.
16. Students understood Diesel and Dual air standard cycles with representation on P-V, T-S planes
17. Students understood Bryton cycles, Atkinson cycle, Ericson cycle
18. Students understood pure substance, phase, phase transformation of water at constant pressure
19. Students understood Critical point triple point, different stages, entropy of steam.
20. Students understood steam table, process of steam, Enthalpy-Entropy diagram
21. Students understood Definition of fuel calorific value, combustion, mass fraction etc.
22. Students understood Combustion equation, stoichiometric air, excess air and deficient air
23. Students understood Analysis of product of combustion, gravimetric and volumetric analysis
24. Students understood Determination of actual and excess air quantity analysis for combustion

Subject : Machine Drawing (MD)
Subject Code : MED203

Course Outcome (CO's)

1. Students enhanced with imagination, interpretation skills and to draw correct product drawing.
2. Students visualized and understood the interaction of different solids.
3. Students interpreted conventional symbols and understood methods of representing different types of joints.
4. Students illustrated various machine components through assembly and detail part drawing.
5. Students were capable to represent various machine components conventionally on engineering drawing, read and interpret various symbols and conventions placed on machine drawing.
6. Students understood construction of simple assembly drawings and prepare detailed part drawings.

Subject : Machine Drawing (MD)
Subject Code : MED203

Program Specific Outcome (PSO's)

1. Students understood the Methods of Development, Parallel line development for Right and oblique prisms.
2. Students understood methods of Development Cylinders.
3. Students understood Radial line development for Right pyramids.
4. Students understood Development of oblique pyramid by Triangulation.
5. Students understood Oblique cones and Development of Elbows,
6. Students understood development of Right cones.
7. Students understood Study of auxiliary planes projection of objects on auxiliary planes.
8. Students understood completing the regular views with the help of given auxiliary views.
9. Students understood Intersection of solids- prism to prism.
10. Students understood Intersection of solids- cylinder to cylinder
11. Students understood Intersection of solids- cone to cylinder, cone to prism.
12. Students understood Intersection of solids- curves on forged parts, prism to prism.
13. Students understood Conventional Representation -: Conventions used to represent materials in section and machine elements in machine drawings
14. Students understood Screwed fastening: Thread profiles, Locking arrangement of nuts, Foundation bolts, Pipe Joints: Flanged, socket and spigot joints, hydraulic, Union joints, expansion joints.
15. Students understood Riveted Joints: Single and Double Riveted Butt and Lap Joints, Welding joints: Weld joints and symbols, Conventional signs.
16. Students understood position and dimensioning of weld symbol in drawing, Machining Symbols: surface roughness, indication of surface roughness on production drawing, indication of machining allowances.
17. Students understood Drawings assembled views for the part drawings of following assemblies, Importance of BOM, Preparation of BOM.
18. Students understood Drawings assembled views for the part drawings of following assemblies - Engine parts – stuffing box, cross heads, Eccentrics,
19. Students understood Drawings assembled views for the part drawings of following assemblies - Petrol Engine connecting rod, piston assembly.
20. Students understood Drawings assembled views for the part drawings of following assemblies - Machine parts - Screws jacks, Machine Vices, Plummer block, Tool Post, Tailstock.
21. Students understood Drawing of parts details given assembled views - connecting rod ends.
22. Students understood Drawing of parts details given assembled views - Jigs and fixtures.
23. Students understood Drawing of parts details given assembled views - press tools.
24. Students understood Drawing of parts details given assembled views – gauges, Valves: Steam stop valve.
25. Students understood Drawing of parts details given assembled views – spring loaded safety valve, feed check valve and air cock.

Subject: STRENGTH OF MATERIALS
Class: S.E.
Subject Code: MED 204

CO's:

1. Students understood the concepts of stress and strain at a point as well as the stress-strain relationships for homogenous, isotropic materials.
2. Students Calculate the Shear force and Bending Moment and draw the SFD, BMD for given problem.
3. Students determined and illustrate the principal stresses in Beams, maximum shearing stress, and the stresses acting on a structural member.
4. Students Calculate the stresses and strains in axially-loaded members, circular torsion members, and members subject to flexural loadings.
5. Students Calculate the principal plane and stress. Calculate the stresses and strains associated with thin-wall spherical and cylindrical pressure vessels and Strain energy.
6. Students Determined the Slope and Deflection of Statically determinate beams subjected to different load.

Subject: STRENGTH OF MATERIALS
Subject Code: MED 204

Program Specific Outcome (PSO's)

1. Students were able to Define Stress and strain, (tensile, compressive & shear) Hooke's Law, Modulus of elasticity.
2. Students were able to explain Modulus of rigidity Stress-strain diagram for ductile and brittle material Principle of superposition, Stresses in composite bars.
3. Students were able to Find out Thermal stresses and strains in simple and composite members Define and derive relation between Linear and Lateral strains, Poisson's ratio Derive relation between volumetric strains, Bulk modulus.
4. Students were able to Calculate Shear force and bending moment in determinate beams due to concentrated loads
5. Students were able to Explain U.D.L., U.V.L. and couples
6. Students Determined of position of point of contra flexure and maximum bending moment Solve problem on given condition.
7. Students Understood Theory of simple bending, Assumptions Evaluate Flexural formula, Moment of resistance and Section modulus.
8. Students Determined of bending stresses Draw bending stress distribution diagram for the beams with commonly used sections like rectangular, square, circular.
9. Students Derived Shear stress distribution formula, Maximum and average shear stress Determination of shear stresses.
10. Students were able to Calculate Bending stresses in column due to eccentric loading problem on Shafts in series and parallel.
11. Students were able to explain eccentricity about one axis and two axis & Discuss about Condition for no tension, Core or Kernel of sections.
12. Students Determined Theory of torsion of circular shafts, Assumptions and Derive Torsion formula and Calculate problem on angular twist for solid hollow and composite circular shafts.
13. Students understood the Define Principal planes and principal stresses and Maximum shear stress
14. Students able to Determination of positions of principal planes and Find out planes of maximum shear.
15. Students able to explain Graphical method: Mohr's circle of stresses and Derive equation Circumferential (Hoop) stress and longitudinal stress
16. Students able to explain Relation between bending moment and slope and determination of slope and deflection of statically determinate beams
17. Students able to Calculate problems on (simply supported, cantilever and overhanging beams) subjected to point loads
18. Students able to Derive equation on moments by double integration method, McCauley's method

Subject: PRODUCTION PROCESSES
Subject Code: MED205

Course Outcome (CO's)

1. Students abled to illustrate the basic principles of foundry practices and special casting processes, their Advantages, Limitations and Applications.
2. Students abled to Explain and relate the basics of hot and cold working process, their advantages, Limitations and Applications.
3. The students understood the various types of joining processes and select the appropriate one according to the application.
4. Students got familiar with basic principles of working of sheet metal.
5. Students understood the different types of plastic processing methods.
6. Students understood the different surface treatment methods.

Subject : PRODUCTION PROCESSES
Subject Code : MED205

Program Specific Outcome (PSO's)

1. Students understood study of Pattern making.
2. Students understood study Pattern making.
3. Students understood the steps involved in making a general sand mould., core making.
4. Students understood study the Melting Furnaces.
5. Students understood study the gas fired furnace, cupola study the electric furnaces.
6. Students understood study the electric furnaces.
7. Students understood study the Casting methods.
8. Students understood study the Die casting methods.
9. Students understood understand the Classification of cold and hot working methods.
10. Students understood study the Machine forging.
11. Students understood the Inspection methods and Defects.
12. Students understood study the Cold working processes.
13. Students understood study the Sheet metals & Operation.
14. Students understood study the Types of sheet metal joints.
15. Students understood the Manual, mechanical, hydraulic power presses.
16. Students understood the Press brake, roll bending.
17. Students understood Press tools and die.
18. Students understood Types of plastics, polymers, additives.
19. Students understood Classifications of plastics forming and fabrication processes.
20. Students understood stea casting, Compression moulding, transfer moulding.
21. Students understood Injection moulding, Extrusion moulding, calendaring.
22. Students understood the Rotational moulding, blow moulding.
23. Students understood the laminating plastics.
24. Students understood the Classification of joining processes.
25. Students understood the the Arc welding.
26. Students understood the wire feed mechanism and its control systems, filler metals, fluxes, safety equipment.
27. Students understood the MIG, TIG, carbon arc, electro slag, electro gas and plasma arc welding.
28. Students understood the Welding defects, Testing and Inspection of welds.
29. Students understood the Purpose of surface treatment.
30. Students understood the types of coatings, powder coating.
31. Students understood the study the metal spraying, anodizing, polishing.

Subject : Thermodynamics-II
Subject Code : MED252

Course Outcome (CO's)

1. Students understood & evaluated performance of Boiler,
2. Students understood & evaluated performance of boiler Draught
3. Students evaluated performance of Nozzle.
4. Students Understood basic function of condenser & types of condenser.
5. Students determined efficiency and output of various steam power cycle
6. Evaluate performance of Air compressor

Subject : Thermodynamics-II
Subject Code : MED252

Program Specific Outcomes (PSO's)

1. Students got to know Classification of boilers which is suitable for condition Calorific value heat supplied and the steam output enthalpy to be calculated
2. Students understood that the IBR is a construction code including requirements for design, material and fabrication for equipment used in the manufacture of boiler and boiler parts for use in India.
3. Students understood Equivalent evaporation, energy balance
4. Students got to know Forced draught and induced draught.
5. Students understood Height of chimney to calculate for the proper exhaust of flue gases & At what height and outside air temperature the flue gases discharge is maximum. Maximum discharge of flue gases.
6. Students understood Adiabatic nozzle or isentropic nozzle. Output of nozzle i.e velocity
7. Students understood Effect of friction, mass of steam discharged
8. Students understood Is nozzle is efficient or not and for what area the discharge is maximum.
9. Students understood Supersaturated flow through the nozzle, effect of back pressure on nozzle characteristics
10. Students understood Types of condensers Partial pressure of gases what happen when two gases are allowed to mixed etc
11. Students understood Mass flow rate of condenser. Vacuum pump calculation, cooling tower in refrigeration plant.
12. Students understood Difference between ideal and real power generation cycle.
13. Students understood Enhancements in rankine cycle for better efficiency
14. Students understood Thermal efficiency, work ratio, specific steam consumption, power output.
15. Students understood More enthalpy more work done at the inlet of the turbine
16. Students understood Classification of compressor.
17. Students understood Indicated diagram and clearance volume of compressor
18. Students understood multistage compression.
19. Students understood Rotary compressors, working principle of centrifugal compressor axial flow compressors.
20. Students understood Difference and varieties of compressor

Subject : Theory of Machine- I (TOM-I)
Subject Code : MED253

Course Outcome (CO's)

1. Student understood the concepts of machines, mechanisms and related terminologies.
2. Student was capable to describe and analyze planar mechanism for displacement, velocity.
3. Student understood the process analyze planar mechanism for displacement, velocity and acceleration graphically.
4. Student analyzed motion of transmission element like cams, and the braking system.
5. Student understood and utilized analytical, mathematical and aspects of kinematics of machines for balancing of masses.

Subject : Theory of Machine- I (TOM-I)
Subject Code : MED253

Program Specific Outcome (PSO's)

1. Students understood the Scope of the subject, kinematics and dynamics. Statics and kinetics.
2. Basic Kinematic chains: single slider crank chain, Double slider crank chain and four bar chains of class I & class II type. Mechanisms, Inversions of Basic Kinematic chains, & their applications, variants, structures, machines.
3. Students understood the Definitions of Kinematic link or element; Kinematic pair; Classification of Kinematic Pairs and their types; Kinematic chain; degree of freedom, relation between no. of links & joints.
4. Students understood Velocity analysis of mechanisms (having maximum six links) using Relative velocity method.
5. Students understood Instantaneous center method and relative center method (using Kennedy's theorem), Determination of linear and angular velocities and their directions
6. Students understood the acceleration analysis of mechanisms (having maximum six links) using relative acceleration method. Problems involving Coriolis component of acceleration.
7. Student capabled to determination of linear and angular acceleration for mechanisms having maximum four links. Ritterhaus construction method and Klein's construction method for simple engine mechanisms and offset engine mechanisms.
8. Student understood the Modified Klein's construction method for four bar mechanisms. Analytical method for acceleration analysis for engine mechanisms
9. Student understood to the Introduction, Materials for Brake Lining, Types of Brakes, Short shoe brakes, Band brakes and Band & block brakes, braking of a Vehicle,
10. Students understood the Dynamometer, Types of Dynamometers, Classification of Absorption, Dynamometers, Prony Brake Dynamometer, Rope Brake Dynamometers, Classification of Transmission Dynamometers
11. Students understood the Introduction, Classification of Followers, Classification of Cams, Terms used in Radial cams, Motion of the Follower.
12. Student understood the Displacement, Velocity and Acceleration Diagrams when the Follower Moves with Uniform Velocity, Simple Harmonic Motion
13. Student understood Uniform Acceleration and Cycloidal Motion, Construction of Cam Profiles.
14. Student understood the Introduction of Balancing of Rotating Masses, Balancing of a Single Rotating Mass by a Single Mass Rotating in the Same Plane
15. Student understood the Balancing of a Single Rotating Mass by Two Masses Rotating in Different Planes.
16. Balancing of Several Masses Rotating in the Same Plane, Balancing of Several Masses Rotating in Different Planes.
17. Student understood to the Introduction, Primary and Secondary Unbalanced Forces of Reciprocating Masses,
18. Student understood Partial Balancing of Unbalanced Primary Force in a Reciprocating Engine, Partial Balancing of Locomotives, Effect of Partial Balancing of Reciprocating Parts of Two Cylinder Locomotives,
19. Student understood Variation of Tractive Force, Swaying Couple, Hammer Blow, Balancing of Primary Forces of Multi-cylinder In-line Engines, Balancing of Secondary Forces of Multi-cylinder Inline Engines.

SUBJECT- ELECTRICAL MACHINES
SUBJECT CODE-(MED254)
II

Course Outcome (CO's)

1. Students understood the working of different types of DC machines also the load tests on DC machines. At the end students understood the construction, application, characteristics of DC generator & DC motor.

2. At the end of this chapter students understood the methods of starting and control of DC motor and also the tests and applications of DC motors.

3. Students understood different types of Special purpose machines along with their construction and operating principles of BLDC, PMDC and DC servomotor.

4. Students have understood various tests to be performed induction motors, also understood how to evaluate the performance of Induction motor.

5. Students gained the knowledge of Synchronous machines also understood the construction and working of Synchronous generator and synchronous motor.

6. At the end of this chapter students have understood construction and working of synchronous machines and special purpose AC machines.

SUBJECT- ELECTRICAL MACHINES
SUBJECT CODE-(MED254)
Programme Specific Outcome (PSO's)

1. Students Understood the working of different types of DC machines
2. Students are able to perform load tests on DC machines.
   Students got the concepts of main parts of DC machines.
3. Students got the concepts of typical flux, flux path, armature winding, simple lap and wave winding.
4. Students got the concepts of commutator and brush assembly.
5. Students understood the construction of DC generator & DC motor.
6. Also got the knowledge of application, characteristics of DC generator & DC motor.
7. At the end of this chapter students understood the methods of starting and control of DC motor
8. Students are able to perform the tests of DC motors.
9. Students got the information about the applications of DC motors.
10. Students understood different types of Special purpose DC machines along with their construction and operating principles of BLDC, PMDC and DC servomotor.
11. Students have Understood various tests to be performed induction motors
12. Students have understood how to evaluate the performance of Induction motor.
13. At the end of this chapter students have understood construction and working of synchronous machines
14. Students gained the knowledge of Synchronous machines also understood the construction and working of Synchronous generator and synchronous motor.
15. Students have understood construction and working of Special purpose AC machines
16. Students understood the concept of operating principles of AC Servomotor.
17. Students understood the concept of Repulsion motor.
18. Students understood the concept of operating principles of AC Servomotor.