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21EME15/25

First/Second Semester B.E. Degree Examination, July/August 2022 Elements of Mechanical Engineering

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of steam tables is permitted.

Module-1

- Discuss the various emerging trends and technologies in different sectors and their contribution to GDP. (06 Marks)
 - Draw T-h diagram of steam formation and label the various properties of steam on it. (06 Marks)
 - Describe the energy conversion from hydel energy into electrical energy with the aid of suitable sketch. (08 Marks)

OR

- Explain the working of centrifugal pump with a sketch. (08 Marks)
 - Find the enthalpy of one kg of steam at 12 bar when
 - Steam is 22% wet
 - Steam is dry saturated
 - Superheated to 250°CAssume specific heat of super heated steam as 2.25 kJ/kg K. the values of steam properties at 12 bar are $t_s = 188^\circ\text{C}$, $h_f = 798.43$ kJ/kg, $h_{fg} = 1984.3$ kJ/kg. (06 Marks)
 - Briefly explain the working of tidal power plant and mention its limitations. (06 Marks)

Module-2

- Explain the non ferrous metals with their applications. (06 Marks)
 - Distinguish between Soldering, Brazing and Welding. (06 Marks)
 - Compare TIG and MIG welding with sketches. (08 Marks)

OR

- Why is cooling necessary for electronic devices? Discuss Active, Passive and Hybrid cooling. (06 Marks)
 - How are composites classified? Mention their applications. (06 Marks)
 - What are smart materials and shape memory alloys? Explain. (08 Marks)

Module-3

- Draw a neat sketch of internal combustion engine and label the components. (06 Marks)
 - Explain the concept of electric vehicle with components. (08 Marks)
 - List the desirable properties of good refrigerant. (06 Marks)

OR

- Explain the working of window type air conditioning system with neat sketch. (10 Marks)
 - The following observations were made during a test on a two stroke cycle oil engine. Bore = 200mm, stroke = 250mm, Speed = 350 rpm, Brake drum diameter = 1200mm, Net brake load = 450N, mean effective pressure = 2.8bar, oil consumption = 3.6 kg/hr, calorific value of oil = 41868 kJ/kg. Determine IP, BP mechanical efficiency, indicated thermal efficiency and brake thermal efficiency. (10 Marks)

Module-4

- 7 a. Illustrate with sketches differences between simple and compound gear train. (08 Marks)
b. Find the length of an open belt driving two parallel shafts 2m apart, connected by two pulleys of 0.1m and 0.8m diameter. Also determine the additional length of belt required if cross belt drive is used. (08 Marks)
c. Define the terms :
i) Machine
ii) Mechanism. (04 Marks)

OR

- 8 a. Classify and explain the types of robots configuration. (10 Marks)
b. List and explain the types of Gears. (05 Marks)
c. Mention the applications of Chains and Ropes. (05 Marks)

Module-5

- 9 a. Explain the following lathe operations with sketches.
i) Facing
ii) Taper turning
iii) Knurling. (10 Marks)
b. Describe the working of CNC system and mention its applications. (10 Marks)

OR

- 10 a. Define milling. Explain the working of horizontal spindle milling machine. (10 Marks)
b. Explain the concept of open loop and closed loop system in mechatronics. (05 Marks)
c. Discuss the concept of smart manufacturing. (05 Marks)
