



First/Second Semester B.E. Degree Examination, June/July 2025

Elements of Mechanical Engineering

Max. Marks: 100

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

Module-1

- 1 a. With a neat sketch, explain the principle of conversion of solar energy into electrical energy in a PV cell. (10 Marks)
- b. With a neat sketch, explain the working principle of a wind mill. (10 Marks)

OR

- 2 a. Define the following terms :
i) Dryness fraction
ii) Latent heat
iii) Enthalpy
iv) Entropy
v) Internal energy. (10 Marks)
- b. Find the specific volume and enthalpy of 1 kg of steam at 0.8 MPa.
i) When the dryness fraction is 0.9
ii) When the steam is super heated to a temperature of 300°C. The specific heat of superheated steam is 2.25 kJ/kg k. (10 Marks)

Module-2

- 3 a. With neat sketch, explain the working of fire tube boiler. (10 Marks)
- b. Explain the different boiler mountings and accessories. (10 Marks)

OR

- 4 a. Classify hydraulic turbines and with a neat sketch explain the working of a typical impulse turbine. (10 Marks)
- b. What are hydraulic pumps? Explain centrifugal pump with a neat sketch. (10 Marks)

Module-3

- 5 a. Explain with a neat sketch, the working of 4-S petrol engine with P-V diagram. (10 Marks)
- b. A single cylinder four – stroke engine runs at 1000 rpm and has a bore of 115 mm and has a stroke of 140 mm. The brake load is 6 kg at 600 mm radius and the mechanical efficiency is 80 percent. Calculate brake power and mean effective pressure. (10 Marks)

OR

- 6 a. List the commonly used refrigerants. Explain the ideal properties of a refrigerant. (10 Marks)
- b. Explain with a neat sketch, the working of vapor compression refrigeration cycle. (10 Marks)

Module-4

- 7 a. Describe a composite material. Classify the types of composite material based on reinforcing material and matrix material. (10 Marks)
- b. With a neat sketch explain the TIG welding technique. (10 Marks)

OR

- 8 a. Derive an expression for length of belt in open belt drive. (10 Marks)
- b. Classify gear drives. explain with sketch :
i) Helical gears
ii) Worm and worm wheel. (10 Marks)

Module-5

- 9 a. Explain the following machining operation on lathe machine with suitable sketches.
i) Turning
ii) Facing
iii) Thread cutting
iv) Knurling. (10 Marks)
- b. With a neat sketch, explain the working of vertical milling machine. (10 Marks)

OR

- 10 a. Discuss briefly the components of a CNC system with a neat block diagram. (10 Marks)
- b. Explain the advantages, limitation and application of robots in industries. (10 Marks)

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