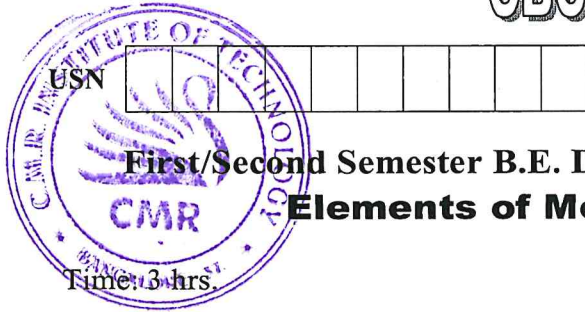


CBCS SCHEME



18ME15/25

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

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain renewable and non-renewable energy sources with suitable examples. (06 Marks)
- b. Sketch and explain the working principle of flat-plate collector. (10 Marks)
- c. What are the differences between fossil fuels and bio-fuels? (04 Marks)

OR

- 2 a. Define Zeroth law, First law and Second law of thermodynamics. (06 Marks)
- b. With a neat sketch, explain the process of formation of steam. (06 Marks)
- c. Find the enthalpy and specific volume of 1 kg of steam at 8 bar. The dryness fraction is 0.9, superheated steam temperature is 300°C and the specific heat of the steam is 2.25 kJ/kg°C. Assume $T_s = 170.4$ °C, $V_s = 0.2403$ m³/kg, $V_f = 0.001115$ m³/kg, $h_f = 720.94$ kJ/kg, $h_{fg} = 2046.5$ kJ/kg, $h_g = 2767.5$ kJ/kg. (08 Marks)

Module-2

- 3 a. With a neat sketch, explain the construction and working of Babcock and Wilcox boiler. (12 Marks)
- b. List the boiler mountings and accessories by mentioning their functions. (08 Marks)

OR

- 4 a. Sketch and explain the working principle of Pelton wheel turbine. (08 Marks)
- b. Explain the working principle of centrifugal pump. (08 Marks)
- c. What is cavitation? Briefly explain. (04 Marks)

Module-3

- 5 a. Give the broad classification of I.C. engines and with a neat sketch, explain the various parts of an I.C. engine. (12 Marks)
- b. 4-stroke diesel engine has a Piston diameter of 250 mm, stroke length of 400 mm, mean effective pressure is 4 bar, dia of brake drum is 1m and speed is 500 rpm. Calculate the IP, BP and FP by assuming an effective brake load of 400 N. (08 Marks)

OR

- 6 a. List the important properties of a good refrigerant. (04 Marks)
- b. Sketch and explain the working principle of vapour compression refrigeration system. (10 Marks)
- c. Explain the working principle of air-conditioner. (06 Marks)

Module-4

- 7 a. Classify ferrous and non-ferrous materials and list the application of it. (05 Marks)
- b. What is a composite material and classify the various composite materials? (05 Marks)
- c. Explain TIG and MIG welding. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

OR

- 8 a. Derive the expression for a length of a belt for a open belt drive. (10 Marks)
b. List the advantages of gear drives over belt drives. (04 Marks)
c. A gear wheel of 20 teeth drives another gear having 36 teeth running at 200 rpm. Calculate the speed of driving wheel and velocity ratio. (06 Marks)

Module-5

- 9 a. Explain any three lathe operations with simple sketch. (06 Marks)
b. Sketch and explain taper turning by Tailstock offset method. (06 Marks)
c. Explain the construction and working of vertical milling machine. (08 Marks)

OR

- 10 a. Sketch and explain the components of a CNC machine. (08 Marks)
b. List the advantages of CNC machines over conventional machines. (04 Marks)
c. List and explain any one type of robot configuration system. (08 Marks)

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