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CBCS SCHEME

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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.

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.

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°K. Assume T_S = 170.4 °C, V_S = 0.2403 m^3/kg, V_f = 0.001115 m^3/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)**

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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