CBCS SCHEME

USN | 4 | V | P | 2 | 0 | E | C | 0 | 1 | 1

18ME15/25

Time: 3 hrs.

Max. Marks: 100

Note: 1. *Answer any FIVE full questions, choosing ONE full question from each module.*
2. *Assume missing data (if any)*
3. *Use of steam tables is permitted.*

Module-1

1 a. Distinguish between renewable and non-renewable sources of energy with suitable examples. **(08 Marks)**
   b. With a neat sketch, explain the working principle of solar flat plate collector and indicate its merits and demerits. **(08 Marks)**
   c. Find the enthalpy of 1kg of steam at 12 bar when
      i)   Steam is dry saturated
      ii) Steam is 22% wet. **(04 Marks)**

OR

2 a. Explain the formation of steam with the Temperature – Enthalpy diagram. **(08 Marks)**
   b. Steam which is initially at a pressure of 9 bar and dryness fraction of 0.98 is subjected to the following operations.
      i) Steam loses 50kJ/kg at constant pressure
      ii) Steam receives 150kJ/kg at constant pressure.
      Find the final quality and temperature of steam under each of the above condition **(08 Marks)**
   c. State the Zeroth law and First law of thermodynamics. **(04 Marks)**

Module-2

3 a. Explain the working of a Babcock and Wilcox boiler with a neat sketch. **(08 Marks)**
   b. With a neat labeled sketch, explain the working of a Francis turbine. **(08 Marks)**
   c. List the important mountings on a boiler. **(04 Marks)**

OR

4 a. Discuss the construction and working of a Lancashire boiler with a neat sketch. **(08 Marks)**
   b. Explain the working of a Pelton turbine with a neat sketch. **(08 Marks)**
   c. With a neat labeled sketch, explain the working of a centrifugal pump. **(04 Marks)**

Module-3

5 a. Explain the working of a 4 stroke petrol engine with neat sketches. Indicate the 4 stroke and the pressure – volume changes on a P-V diagram. **(10 Marks)**
   b. A two stroke engine has a piston diameter of 200mm and stroke length of 300mm. The engine has a mean effective pressure of 3.6 bar and speed of 400rpm. The effective diameter of brake drum is 1m and the load on the brake drum is 81 kg. Determine the indicated power, brake power and mechanical efficiency of the engine. **(10 Marks)**

OR

6 a. Explain the principle of working of a room air conditioner with a neat sketch.   (10 Marks)
   b. A single cylinder 4 stroke engine has a swept volume of 6 litres and a rated speed of 300 rpm. At full load, the torque developed was measured with a dynamometer whose pulley diameter is 1m. The tension in the tight side is 700N and on the slack side is 300N, 4kg of fuel was consumed to run the engine for 1 hour. The indicated mean effective pressure is 6 bar and calorific value of the fuel is 42,000 kJ/kg. Calculate the indicated power, brake power, mechanical efficiency and indicated thermal efficiency.   (10 Marks)

Module-4

7 a. Explain the principle of arc welding with a neat sketch.   (08 Marks)
   b. Discuss the applications of ferrous and non-ferrous metals.   (06 Marks)
   c. In a crossed belt drive system, the tension on the tight side of a belt is 3000N and the angle of lap is 160°. If the coefficient of friction is 0.3, find the tension on the slack side of the belt and initial tension.   (06 Marks)

OR

8 a. What are the shape memory alloys? Discuss the applications of these alloys.   (08 Marks)
   b. List different types of gears and mention their applications.   (06 Marks)
   c. Discuss the applications of composite materials in aerospace industry, automobile industry and recreation.   (06 Marks)

Module-5

9 a. Explain the different operations carried out on a lathe [any 4].   (08 Marks)
   b. Mention the applications of robots in material handling, assembly and inspection.   (08 Marks)
   c. What are the advantages of CNC machines?   (04 Marks)

OR

10 a. With a neat sketch, explain the process of taper turning on a lathe using compound slide method.   (08 Marks)
    b. Explain the following operations on milling, straddle milling, slab milling and slot milling.   (08 Marks)
    c. Name the common configurations used in a robot and explain their working.   (04 Marks)

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