USN ☐☐☐☐☐☐☐☐☐☐

21EME15/25

First/Second Semester B.E. Degree Examination, June/July 2023
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 table is permitted*

Module-1

1 a. Enumerate the roles of mechanical engineering in industries and society. **(04 Marks)**
   b. Define : i) Sensible heat ii) latent heat   iii) Dry steam   v) Wet steam   vi) Dryness fraction. **(10 Marks)**
   c. Find the enthalpy of 1kg of steam at 12 bar when,
      i) Steam is dry saturated
      ii) Steam is 22% wet
      iii) Super heated to 250°C
      Assume the specific heat of the super heated steam as 2.25 kJ/KgK. **(06 Marks)**

OR

2 a. Differentiate between Renewable and Non-renewable energy sources. **(04 Marks)**
   b. With a neat sketch, explain the working principle of Hydel power plant. **(08 Marks)**
   c. Explain with neat sketch Pelton Wheel. **(08 Marks)**

Module-2

3 a. Write a note on smart materials and shape memory alloys. **(06 Marks)**
   b. Differentiate between ferrous and Non ferrous metals. **(06 Marks)**
   c. What is Composite? List the applications of composite materials. **(08 Marks)**

OR

4 a. With a neat sketch, explain Arc Welding. **(08 Marks)**
   b. Differentiate between soldering and brazing. **(06 Marks)**
   c. Define three modes of heat transfer. **(06 Marks)**

Module-3

5 a. Differentiate between 2-stroke and 4-stroke engine. **(06 Marks)**
   b. With neat sketch, explain working principle of 4-stroke Diesel engine. **(08 Marks)**
   c. What are the advantages and disadvantages of electric vehicles? **(06 Marks)**

OR

6 a. Define the following :
      i) Refrigeration effect
      ii) Ton of Refrigeration
      iii) Unit of Refrigeration
      iv) Coefficient of Performance (COP)
      v) Ice making capacity. **(10 Marks)**
   b. With neat sketch, explain the working of vapour compression refrigeration spectrum. **(10 Marks)**

Module-4

7 a. Explain with neat sketches,
      i) Spur gear
      ii) Helical gear
      iii) Bevel gear   **(08 Marks)**
  b. Derive the length of the belt in open drive.   **(08 Marks)**
  c. What are the advantages and disadvantages of gear drive?   **(04 Marks)**

OR

8 a. Explain with neat sketch loading and unloading mechanism.   **(10 Marks)**
  b. Explain with neat sketch Robot configurations.   **(10 Marks)**

Module-5

9 a. Explain with neat sketches, the following operations
      i) Plain Turning
      ii) Facing
      iii) Taper-Turning
      iv) Knurling   **(10 Marks)**
  b. With neat sketch, explain working of Horizontal Milling Machine.   **(10 Marks)**

OR

10 a. Explain the components of CNC with neat block diagram.   **(08 Marks)**
   b. What are the Advantages and Disadvantages of CNC?   **(08 Marks)**
   c. Differentiate between open loop and closed loop control system.   **(04 Marks)**

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