USN | | | | | | | | | | | 21EME15/25
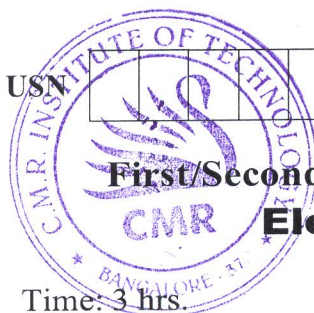
First/Second Semester B.E. Degree Examination, June/July 2023
Elements of Mechanical Engineering

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 250ºC
    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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