USN | | | | | | | | | | **18ME15/25**

First/Second Semester B.E. Degree Examination, June/July 2019
Elements of Mechanical Engineering

Time: 3 hrs.   Max. Marks: 100

Note: *I. Answer FIVE full questions, choosing one full question from each module.*
2. Use of Steam table is permitted.

Module-1

1 a. List and explain any one source of energy. **(06 Marks)**
   b. Explain briefly : (i) Global Warming (ii) Ozone depletion **(06 Marks)**
   c. Find the enthalpy of 1 kg of steam at 12 bar when,
   - (I)   Steam is dry saturated.
   - (ii) Steam is 22% wet and
   - (iii) Super heated to 250 $^\circ$C

   Assume the specific heat of the super heated steam as 2.25 KJ/kgK. **(08 Marks)**

OR

2 a. Explain briefly any two of the following:
   - (i)   Zeroth law of thermodynamics.
   - (ii) First law of thermodynamics.
   - (iii) Second law of thermodynamics. **(06 Marks)**
   b. Explain formation of steam with the help of Temperature-Enthalpy (T-h) diagram. **(08 Marks)**
   c. Find the specific volume and enthalpy of 1 kg of steam at 0.8 MPa.
   - (i)   When the dryness fraction is 0.9.
   - (ii) When the steam is super heated to a temperature of 300°C.

   The specific heat of the super heated steam is 2.25 KJ/kgK. **(06 Marks)**

Module-2

3 a. With a neat labeled diagram, explain working of Babcock and Wilcox boiler. **(08 Marks)**
   b. Define prime movers and explain working of Pelton wheel turbine with a neat sketch. **(12 Marks)**

OR

4 a. Define (i) Boiler Mountings. (ii) Boiler Accessories.
   Explain functions of any five mountings or accessories. **(12 Marks)**
   b. What are hydraulic pumps? Explain centrifugal pump with a neat sketch. **(08 Marks)**

Module-3

5 a. Explain 4-s petrol engines with P-V diagram. **(10 Marks)**
   b. Give comparisons between petrol and diesel engines. **(05 Marks)**
   c. A four stroke IC engine running at 450 rpm has a bore diameter of 100 mm and stroke
      length 120 mm. The indicated diagram details are,
      - (i) Area of the diagram 4 cm$^-$
      - (ii) Length of the indicated diagram 6.5 cm
      - (iii)Spring value of the spring used 10 bar/cm.

   Calculate the indicated power of the engine. **(05 Marks)**

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OR

6   a. Explain with a neat sketch working of vapour compression Refrigerator.   **(08** Marks)
    b. Define : (i) Ton of Refrigerator   (ii) COP   (iii) Ice making capacity   **(06** Marks)
    C. List commonly used refrigerants and mention the applications of air conditioners **. (06** Marks)

Module 4

7 a. Classify ferrous and non ferrous metals.   **(05 Marks)**
   b.   Define composites, explain any two of the following : (i) Piezoelectric materials
        (ii) Shape memory alloys   (iii) Optical fibre glass.   **(05 Marks)**
   c.   Classify metal joining processes, explain TIG (Tungsten Inert Gas) Welding with a neat
        sketch.   **(10 Marks)**

OR

8   a. Derive an expression for length of the belt in open belt drive.   **(10 Marks)**
    b. Mention advantages and disadvantages of V-Belt drive.   **(05 Marks)**
    C. List different types of gears and explain any one with its advantages.   **(05 Marks)**

Module 5

9   a. Explain briefly the following:
            (i)   Turning
            (ii)   Facing
            (iii)   Thread cutting   **(06 Marks)**
    b.   Explain the working of horizontal milling machine with a simple line diagram.   **(08 Marks)**
    c.   Explain briefly:
            (i)   Angular milling.
            (ii)   Gang milling.
            (iii)   Plane milling.   (06 Marks)

OR

10   a. Explain briefly the components of a CNC machine with a neat block diagram.   **(08 Marks)**
     b.   Define Robots and mention its general applications.   **(07 Marks)**
     c.   Write short note on:
          CNC Machining Center or Turning Center.   **(05 Marks)**

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