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**18ME15/25**

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

Time: 3 hrs.                                                                 Max. Marks: 100

**Note:** *1. 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°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$^2$
        (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)**

**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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