

**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<sup>2</sup>  
(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. (05 Marks)  
(ii) Shape memory alloys (iii) Optical fibre glass.  
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)