Roll No. | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(CE,CSE,EEE,EE,ECE,ME) (Sem–1,2)

ELEMENTS OF MECHANICAL ENGINEERING

Subject Code : BTME-101

M.Code : 54101

Date of Examination : 19-06-23

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION - B & C have FOUR questions each.**
3. **Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.**
4. **Select atleast TWO questions from SECTION - B & C.**

SECTION–A

1. Answer briefly :

a) On a hot summer day, a student turns his fan on when he leaves his room in the morning. When he returns in the evening, will the room be warmer or cooler than the neighbouring rooms? Why? Assume all the door and windows are kept closed.

b) Name and state the property introduced by the first law of thermodynamics.

c) Distinguish between quasi static process and actual process.

d) What is a steady flow process?

e) What are the main conclusions that can be drawn from the efficiency of Carnot cycle?

f) Write an expression for the air standard thermal efficiency of Otto cycle.

g) Define polar moment of inertia.

h) What is the purpose of providing spark plug in S. I. engine?

i) What are technological properties of materials?

j) What is the difference between thermoplastic and thermosetting materials?

SECTION–B

2. What is the essence of first law of thermodynamics? Write down expression for the first law applied to

   a) cycle.

   b) process.

3. A certain volume of gas at 47°C and 6.5 bar is expanded to four times its original volume according to pV1.25=Constant. Determine the final temperature of the gas and change in entropy per kg gas, assume C_p =0.996 KJ/kg K and C_v = 0.707 kJ/kg K.

4. An engine working on the Otto cycle is supplied with air at 1.1 MPa, 35°C. The compression ratio is 8. Heat supplied is 2100 kJ/kg. Calculate the maximum pressure and temperature of the cycle, the cycle efficiency and the mean effective pressure.

   (For air, cp = 1.005, cv = 0.718 and R = 0.287 kJ/kg K).

5. Explain classification of Engineering materials and characteristics of key engineering materials used in manufacturing.

SECTION–C

6. Derive steady flow energy equation for a single stream of fluid entering and leaving the control volume.

7. a) **Differentiate between the following :**

      i) Creep and fatigue

      ii) Yield stress and proof stress

      iii) Ductile and brittle fracture

   b) What are the commercial alloys of aluminum? Briefly describe their composition and uses.

8. List the major factors affecting the selection of materials.

9. Find the centroid of an unequal angle section 100 mm × 80 mm × 20 mm.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.