

- (c) What is flow and non-flow process ?
- (d) State Kelvin Plank's statement.
- (e) State the properties of ideal gas.
- (f) Distinguish heat transfer and work transfer.
- (g) Explain the use of sling psychomotor.
- (h) Name the improving methods for Rankine cycle.
- (i) Define Molar Mass.
- (j) What are the thermodynamics gradient ?

Roll No. ....

Total Pages : 04

**July-22-00230**

B.Tech. EXAMINATION, 2022

Semester III (CBCS)

ENGINEERING THERMODYNAMICS (ME, AE)

ME-303

Time : 3 Hours

Maximum Marks : 60

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*The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.*

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**Note** : Attempt *Five* questions in all, selecting *one* question from each Sections A, B, C and D. Q. No. 9 is compulsory.

**Section A**

1. Explain the Zeroth law of thermodynamics and indicate how it helps to introduce the concept of temperature and provides a method for its measurement. **10**

2. A room for four persons has two fans, each consuming 0.18 kW power, and three 100 W lamps. Ventilation air at the rate of 80 kg/h enters with an enthalpy of 84 kJ/kg and leaves with an enthalpy of 59 kJ/kg. If each person puts out heat at the rate of 630 kJ/h determine the rate at which heat is to be removed by a room cooler, so that a steady state is maintained in the room. **10**

### Section B

3. Prove that a system which satisfies Kelvin Planck statement cannot violate Clausius statement or *vice versa*. **10**
4. A refrigeration plant for a food store operates as a reversed Carnot heat engine cycle. The store is to be maintained at a temperature of  $-5^{\circ}\text{C}$  and the heat transfer from the store to the cycle is at the rate of 5 kW. If heat is transferred from the cycle to the atmosphere at a temperature of  $25^{\circ}\text{C}$ , calculate the power required to drive the plant. **10**

### Section C

5. Describe the construction of temperature-entropy and Mollier diagrams. Explain the use and importance of Mollier diagram in practice. **10**
6. A sample of steam from a boiler drum at 3 MPa is put through a throttling calorimeter in which the pressure and temperature are found to be 0.1 MPa,  $120^{\circ}\text{C}$ . Find the quality of the sample taken from the boiler. **10**

### Section D

7. Explain Otto cycle in detail. Derive the air standard efficiency of Otto cycle. **10**
8. An engine equipped with a cylinder having a bore of 15 cm and a stroke of 45 cm operates on an Otto cycle. If the clearance volume is  $2000\text{ cm}^3$ , compute the air standard efficiency. **10**

### (Compulsory Question)

9. Write short notes on the following : **2×10=20**
- (a) What is adiabatic evaporative cooling ?
- (b) Explain the entropy principle.