2024(Backlog)

Time : 3 hours

Full Marks : 60

Pass Marks : 24

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Answer from both the Groups as directed.

Group – A

(Compulsory)

1. Answer the following questions : 1×10 = 10

   (a) State first law of thermodynamics.

   (b) Define Adiabatic process.

   (c) What is coefficient of performance of a refrigerator ?

   (d) Define third law of thermodynamics.

(e) Define enthalpy.

(f) What is adiabatic throttling ?

(g) Define viscosity.

(h) What do you mean by degrees of freedom ?

(i) Write van der Waals equation of state of a gas.

(j) What is an ideal gas ?

2. What is the law of equipartition of energy ? 5

Group – B

Answer any **three** questions of the following : 15×3 = 45

3. Starting from four thermodynamical potentials, derive Maxwell's thermodynamical relations. Use one of these to obtain Clausius-Clapeyron's latent heat equation.

4. Explain what you understand by absolute or thermodynamic scale of temperature. Show that this scale is identical to the ideal gas temperature scale. Explain why negative temperature on this scale is not possible.

5. What do you mean by Entropy ? Show that entropy remains constant in reversible process but increases in irreversible process.

6. Using Maxwell's law of distribution of speeds of molecules in a gas obtain expressions for most probable speed, average speed and root-mean square speed.

7. Write short notes on any **two** of the following :

(a) Carnot's theorem

(b) Carnot's cycle

(c) TdS equations

(d) Mean free path