

**2021-24**

*Time : 3 hours*

*Full Marks : 75*

*Pass Marks : 30*

*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**

**(Compulsary)**

1. Answer all questions of the following :  $1 \times 10 = 10$ 
  - (a) Write the statement of Zeroth law of Thermodynamics.
  - (b) Write the relation between CP and CV.
  - (c) What is the dimension of Thermal Conductivity ?
  - (d) What is the value of Solar Constant ?

- (e) Write the equation for an ideal gas for n-molecules.
- (f) Write expression for mean free path.
- (g) State the Wien's Displacement law.
- (h) Name the scientist who stated that good absorbers are good emitters.
- (i) The First law of Thermodynamics is a special case of \_\_\_\_\_.
- (ii) The internal energy of an ideal gas depends only on \_\_\_\_\_.

2. State the law of Equipartition of Energy. 5

### Group – B

Answer any four questions of the following :

$$15 \times 4 = 60$$

- 3. Define Entropy. Show that the entropy of a perfect gas remains constant in a reversible process and increases in irreversible process.
- 4. State Carnot's theorem and deduce it from the Second law of Thermodynamics.

5. Deduce Maxwell-Boltzmann distribution law of velocities.
6. What is Black body radiation ? State and prove Stefan's Law.
7. Discuss Fermi Dirac distribution law and show that  $n_i = \frac{g_i}{[e^{\alpha+\beta E_i}] + 1}$ .
8. Write short notes on any **two** of the following :
- (a) Mean Free Path
  - (b) Gibb's Function
  - (c) Electron Gas
  - (d) Plank's Law

