

**2024(Backlog)**

*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**

1. Answer all questions of the following :

1×10 = 10

- (a) What is an adiabatic process ?
- (b) State Carnot's Theorem.
- (c) Write down classical entropy expression and state its unit.
- (d) Write two differences between reversible and irreversible processes.

- (e) What is molar specific heat ?  
 (f) What are thermodynamical variables.  
 (g) Can temperature of a system can be increased without heating it ?  
 (h) How does the coefficient of viscosity of a gas vary with size of a gas molecule ?  
 (i) What is thermal radiation ?  
 (j) What is Fermi gas?
2. Compare the basic differences of M-B, B-E and F-D statistics. 5

**Group – B**

Answer any four questions of the following :

15×4 = 60

3. Define entropy. Show that the entropy of a perfect gas remains constant in a reversible process and increases in irreversible process.  
 4. Deduce Maxwell's distribution law of velocities of molecules for an ideal gas.

MO – 97/3

( 2 )

Contd.

5. Explain Black Body Radiation. State and deduce Stefan-Boltzmann law using Planck's Law.  
 6. Derive Fermi-Dirac distribution law. Under what condition it becomes Maxwell-Boltzmann distribution law ?  
 7. Prove the following thermodynamic relation  $\left(\frac{\partial S}{\partial V}\right)_T = \left(\frac{\partial P}{\partial T}\right)_V$  and hence using it derive Clausius-Clapeyron equation.  
 8. Deduce differential form of Gibb's function, Helmholtz function and free energy function.



MO – 97/3 (150)

( 3 )

UESE(III)—Phy  
(DSC – C)