B. Sc. (Part - I)

Physics Paper II
(Kinetic Theory and Thermodynamics)

P. Pages : 4

Time : Three Hours | Max. Marks : 40

Note : 1. All questions are compulsory.
2. Draw neat diagrams wherever necessary.

Eitfter

1. a) State the thermodynamics equation of state for a perfect gas. 1

b) Derive Vander Waal's equation of state for real gas. 5

c) State any four assumptions of kinetic theory of gases. 2

OR

2. p) Assuming the expression for pressure exerted by a gas on the basis of kinetic theory of gases, deduce' Boyle's law. 2

q) Define two specific heats of a gas and show that for a diatomic gas the ratio of two specific heats is 1.4. **3**

r) Give the kinetic interpretation of temperature. **3**

Either

3. a) Show that mean free path of a molecule is inversely proportional of the density of gas. **3**

b) Explain the effect of pressure and temperature an mean free path. **2**

c) Explain the transport phenomena in gases. **3**

OR

4. p) Obtain expression for viscosity of a gas on the basis of transport phenomena. **4**

q) Describe with a neat diagram method for liquefaction of hydrogen gas. **4**

Either

5. a) State and explain first law of thermodynamics. **2**

b) Explain reversible and irreversible processes. **3**

c) Explain Kelvin's thermodynamic scale of temperature. **3**

OR

6. p) Describe carnot's reversible cycle and obtain an expression for its efficiency for a prefect gas. **5**

q) Find the efficiency of a carnot's engine working between 127°C and 27°C. **2**

r) State zeroth law of thermodynamics. **1**

Either

7. a) Define

i) Intensive variables.

ii) Extensive variables. **2**

b) Explain the enthalpy function (H). **2**

c) Obtain Maxwell's thermodynamical relation

$$\left(\frac{\partial T}{\partial V}\right)_S = -\left(\frac{\partial P}{\partial S}\right)_V$$ **4**

OR

8. p) Obtain the Joule - Kelvin coefficient $\left(\frac{\partial T}{\partial P}\right)_H$ using Maxwell's thermodynamical relation. 3

q) Derive Maxwell's thermodynamical relation. $\left(\frac{\partial P}{\partial T}\right)_V = \left(\frac{\partial S}{\partial V}\right)_T$ 4

r) Define Internal energy function (U). 1

Either

9. a) Describe a perfectly black body. 2

b) Explain Rayleigh - Jean's law of energy distribution. 2

c) Derive an expression for pressure of a black body radiation 4

OR

10. p) Explain black body radiation spectrum. 3

q) Explain Stefan Boltzman law. 3

r) State the Planck's quantum postulates. 2

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