GSE/D-21 **792**

CHEMISTRY

Paper II

Physical Chemistry

Time : Three Hours]   [Maximum Marks : 32

Note : Attempt *Five* questions in all, selecting at least *two* questions from each Section. Q. No. **1** is compulsory.

(Compulsory Question)

1. (a) Explain pressure correction for real gases. **2**

   (b) What is the basic principle of Claude's process for liquefaction of gases ? **2**

   (c) What changes in vapour pressure, if some solute is added to solvent ? **2**

   (d) Draw the structure of any *three* crystal systems. **2**

Section A

2. (a) Draw the graph which shows the Root mean square of velocity, Average velocity and Most Probable velocity in Maxwell distribution Curve. **3**

   (b) At what temperature will the root mean square velocity of sulphur dioxide be same as that of methane at 27ºC ? **3**

3. Write van der Waals equation and derive relationship between van der Waals constant and Critical constants. **6**

4. (a) Calculate the Boyle temperature for oxygen molecule assuming that it is a van der Waals gas. Given $a = 1.36$ dm^6 atm mol^{-2}, $b = 1.082$ dm^3 atm K^{-1} mol^{-1}. **3**

(b) Write the limitations of van der Waals equation. **3**

5. (a) Derive van der Waals reduced equation of State and the law of corresponding states. **4**

(b) Write uses of liquefied gases. **2**

Section B

6. (a) Explain the theories of structural determination of liquid state. **3**

(b) Explain the effect of temperature on the surface tension of liquid. **3**

7. (a) In an experiment with Ostwald's Viscometer, the times of flow of water and ethanol are 80 sec and 175 sec at 20ºC. The density of water is 0.998 g/cm^3 and that of ethanol is 0.79 g/cm^3. The viscosity of water at 20ºC is 0.01008 poise. Calculate the viscosity of ethanol. **3**

(b) Explain additive and constitutive properties with suitable example. **3**

8. (a) Write a note on Miller indices. **3**

   (b) Define isomorphism and polymorphism with suitable example. **3**

9. (a) Calculate the angle at which first order diffraction will occur when X-rays of wavelength 1.84 Å are diffracted by the atoms of crystal, given that the interplanar distance is 5.04 Å. **3**

   (b) Explain Cholesteric liquid crystals with suitable example. **3**