

[Time: Three Hours]

[Marks:70]

Please check whether you have got the right question paper.

- N.B: 1. All questions are compulsory.
2. Draw neat labelled diagrams whenever necessary.

- Q.1**
- a) Give the structure, Properties and significance of liquid Crystals. (03)
- b) Define Specific rotation and give its application in pharmacy. (02)
- c) What is the freezing point of a solution containing 3.42gm of sucrose and 500gm of water? The molecular weight of sucrose is 342. In this relatively dilute solution, value of $K_f = 1.86$ (03)
- d) Define the following: (04)
- Isothermal process
 - Adiabatic Process
 - Isobaric Process
 - Isochoric Process
- e) Discuss the variation of equivalent conductance with dilution. (03)
- Q.2**
- a) Explain the principle and method of liquefaction of gases by Claude's method. (04)
- OR**
- Explain the Principle behind liquefaction of gases and write a note on aerosols.
- b) Define dipole moment. How can it be used in elucidation of molecular Structure? (03)
- c) i) State and explain Kirchoff's equation. (04)
ii) Write a short note on-Bond Energy.
- Q.3**
- a) Justify – 'Relative lowering of vapor pressure is a colligative property'. (04)
- b) Define entropy and write its significance. Calculate the increase in entropy when one gram molecular weight of ice at 0°C melts to form water. Latent heat of fusion of ice = 80 calories. (04)
- OR**
- Give the various statements of second law of thermodynamics and discuss efficiency of heat engine.
- c) What is the effect of dilution of a weak electrolyte on specific and equivalent conductance? (03)
- Q.4**
- a) Discuss critical Phenomenon and define various critical constants. (04)
- b) Define molar refraction. Discuss applications of Abbe's refractometer. (03)
- c) Describe any one method to determine depression in freezing point as a colligative property. (04)
- OR**
- Explain a method to determine the molecular weight of a solute by elevation in boiling point.

- Q.5**
- a) Write a short note on polymorphism. (04)
 - b) What is osmosis? Explain Berkley and Hartley's method for measurement of osmotic pressure. (04)
 - c) Define : Heat of fusion (03)
Heat of combustion
Heat of solution

OR

Explain Hess's law of constant heat summation.

- Q.6.**
- a) Calculate the pressure of 1 mole of CO₂ gas in a container of 2 liter capacity at 27°C using the ideal gas equation and Van der Waal's equation. (03)
a = 3.608 lit² atm/mole²
b = 0.0428 lit/mole
R = 0.0821 lit atm/K mole
 - b) Write a note on Azeotropic distillation. (03)
 - c) Write a note on Gibb's free energy (03)
 - d) State the postulates of Arrhenius theory of electrolytic dissociation. (02)