

QP Code : 13457

(3 Hours)

[Total Marks : 70

- N. B. :** (1) All questions are compulsory.
(2) Draw neat labelled diagrams wherever necessary

1. (a) Write a note on super critical fluid state and give its applications. 3
- (b) What is optical activity? Draw schematic diagram of polarimeter. 3
- (c) An aqueous solution containing 10% w/v of a compound has a boiling point of 100.149° C. What is its molecular weight? 3
(K_b for water = 0.51)
- (d) Differentiate between :- 4
 - (i) Open system and closed system
 - (ii) Reversible process and Irreversible process
- (e) Define the following :- 3
 - (i) Faraday's first law of electrolysis
 - (ii) Specific conductance
 - (iii) Transport number
2. (a) Explain the principle behind liquefaction of gases and write a note on aerosols 4
OR
Explain the principle and method of liquefaction of gases by Linde's process.
- (b) Describe the concept of dielectric constant. 3
- (c) Derive the equation of $C_p - C_v = R$. 4
3. (a) Give the difference between positive and negative deviations from Raoult's law. 4
- (b) Give the various statements of second law of thermodynamics and discuss efficiency of heat engine. 4
OR
- (b) An engine operating between 200° C and 75° C takes 500J heat from a high temperature reservoir. Assuming that there are no frictional losses, calculate the work that can be done by this engine.
- (c) The resistance of a 0.2N solution of a salt is found to be 1.5×10^3 ohm s. Calculate the equivalent conductance of a solution. Cell constant = 1.15 cm^{-1} 3
4. (a) Derive the equation for deviation of real gases from ideal gas. 4
- (b) Explain principle and working of Abbe's refractometer. 3
- (c) Justify 'Depression in freezing point' is a colligative property. 4
OR
- (c) Explain a method to determine the molecular weight of a solute by elevation in boiling point.

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5. (a) Write a short note on polymorphism. 4
(b) What is osmosis? Explain Berkeley and Hartley's method for measurement of osmotic pressure. 4
(c) Explain Hess's law of constant heat summation. 3

OR

- (c) Define following :-
(i) Heat of formation
(ii) Heat of combustion
(iii) Heat of solution
6. (a) Calculate the pressure of 0.5 mole of CO_2 gas in a container of 1 liter capacity at 27°C using the ideal gas equation and the van der waals equation.
 $a = 3.608 \text{ liter}^2 \text{ atm/mole}^2$
 $b = 0.0428 \text{ liter / mole}$
 $R = 0.0821 \text{ liter atm / K mole}$ 3
(b) Explain principle of fractional distillation. 3
(c) Write a note on Gibb's free energy. 3
(d) Discuss Arrhenius theory of electrolytic dissociation in brief. 2