14/11/2024 CHEMICAL SEM-III C SCHEME IEC-I QP CODE: 10065378

**Time: 3 Hours** **Marks:80**

N.B.: 1. Questions no. 1 is compulsory.
2. Attempt any three questions from remaining five questions
3. Figures to the right indicates full marks.

Q1. **Attempt any four questions of the following.** **[20]**

a. Why conductometric titrations superior over volumetric titrations? Give at least one limitation of conductometric titration.

b. Give preparation of $Fe(CO)_5$ molecule. Express their bonding, hybridization and Structure.

c. Justify concept of chirality with necessary conditions for a molecule to be chiral.

d. Distinguish between thermodynamically and kinetically controlled reactions.

e. Give chemical composition of Ammonium sulphate. Illustrate any four qualities of ideal fertilizer.

f. A 200 $cm^3$ of organic solution containing 0.35 g of certain solute. The solute is extracted three times with 20 $cm^3$ of ether. Find amount of solute remaining in aqueous solution and % extraction. If distribution ratio is 16.

**Q2.** a. Discuss effect of dilution & temperature on equivalent conductance. [5]

b. Summarize isomerism in CN-4 coordination compounds with suitable example. [5]

c. Give synthesis of Congo red dye with reaction. Give two applications. [5]

d. State Nernst distribution law and explain batch extraction process in brief. [5]

**Q3.** a. DiscussMichael addition reaction with mechanism. [5]

b. Write a note on Carbonic anhydrase. Give any two functions. [5]

c. Give synthesis of Methyl orange dye with reaction. Write two properties & applications. [5]

d. A solute is extracted from its aqueous solution on treatment with carbon tetra chloride. A 100 $cm^3$ of aqueous solution containing 0.5 g of solute extracted with 20 $cm^3$ of carbon tetrachloride. Calculate (i) the amount of solute remaining unextracted (ii) the percentage extraction. (Given D= 410) [5]

**Q4.** a. Discuss carbene & its types. Comment on structure and stability. [5]

b. Why Anti conformation of n-butane is more stable than Gauche & Eclipsed? Justify with help of Newman representation formula. [5]

c. Give synthesis of Alizarin dye with reaction. Write two properties &applications. [5]

d. Give nomenclature for $Na_2[Fe(CN)_4(H_2O)_2]$ and $[Ni(CO)_4]$. [5]

**Q5.** a. Calculate CFSE for $d^4$ and $d^6$ system in the strong filed and weak filed of octahedral complexes. [5]

b. Explain oxygen transportation reaction in haemoglobin. [5]

c. Discuss both Norrish type-I & Norrish type-II reactions with an example. [5]

d. Describe lanthanide separation by ion exchange method. [5]

**Q6.** a. Define Transport number. Explain w.r.t Moving boundary method. [5]

b. Explain pinacol pinacolone reaction with mechanism and one application. [5]

c. Name three main macro nutrient types of fertilizers. Discuss role of primary nutrients (N,P,K) and deficiency symptoms caused due to these. [5]

d. What is EAN? Calculate EAN for [5]
(i) $[V(CO)_6]$ (ii) $[Fe(H_2O)_6]^{2+}$.

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