

Time: 3 Hours

Marks: 80

N.B.: 1. Question 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 from the following: [20]

- State the principle of conductometry and explain the conductometric titration curves of mixture of strong acid and a weak acid vs a strong base and weak base.
- Define EAN and Calculate EAN for -
(i) $[\text{Ni}(\text{NH}_3)_6]^{2+}$ (ii) $[\text{Pd}(\text{NH}_3)_6]^{4+}$
- Explain the formation of carbocation intermediate in Pinacol-Pinacolone rearrangement reaction.
- Give the synthesis of Methyl orange from sulphanilic acid. Give any two applications.
- Differentiate between Enantiomers and Diastereomers of Lactic acid and Tartaric acid.
- A 200 cm^3 of an aqueous solution containing 0.05 moles of a certain solute extracted twice with 25 cm^3 of ether. Calculate (i) the amount of solute remaining unextracted (ii) the percentage extraction. (Given $D= 12.0$)

Q2.

- Define following terms with units- [5]
(i) Equivalent conductance. (ii) Molar conductance.
- Give preparation of $\text{Fe}_2(\text{CO})_9$ molecule. Express their bonding and hybridization. [5]
- Explain deficiency symptoms of following nutrients in plants- N, P, Potash and Ca. [5]
- Write short note on- continuous and counter current extraction. [5]

Q3.

- Explain the role of Hb in the transport and storage of oxygen [5]
- Explain the formation of carbene as intermediate in Reimer-Tieman reaction. [5]
- Explain the industrial manufacture of Ammonium sulphate [5]
- Explain in detail the separation of lanthanides by ion exchange method. [5]

Q4.

- a. Discuss the application of crystal field theory to octahedral complexes with its drawbacks? [5]
- b. Related with chirality explain the following terms with examples-
 - i) plane of symmetry
 - ii) Centre of symmetry [5]
- c. Define Carbanion. Comment on its structure and stability. [5]
- d. Define fertilizers and explain organic nitrogenous fertilizers. [5]

Q5

- a. Define and explain the terms- ligand and coordination number with examples. [5]
- b. Assign the R-S configuration of 1-fluoro-1-methoxyethane [5]
- c. Explain the Nitration of chlorobenzene w.r.t. thermodynamically and kinetically controlled reaction. [5]
- d. What are basic methods used in liquid-liquid extraction? Describe batch extraction process in detail. [5]

Q6.

- a. Explain the moving boundary method for determination of transport number. [5]
- b. Define carbocation and explain the stability of carbocation. [5]
- c. Give Synthesis of Congo red dye. Give any two applications. [5]
- d. Give nomenclature of following. [5]
 - (i) $[(\text{NH}_3)_3\text{Co}(\text{OH})_3\text{Co}(\text{NH}_3)_3]$
 - (ii) $[\text{Co}(\text{en})_2\text{Cl}(\text{ONO})]^+$
