

Q.P. Code : 536504

(3 Hours)

[Total Marks : 80

- N.B. :** (1) Question No.1 is **compulsory**.
(2) Attempt **any three** questions from remaining **five** questions.

1. Answer **any four** of the following : **20**
- (a) Discuss the effect of lone pairs on the geometry of NH_3 .
 - (b) Explain method of preparation, properties and structure of $\text{Fe}_2(\text{CO})_9$.
 - (c) During sulphonation of naphthalene at 160°C , which product will predominate? Justify your answer.
 - (d) Write IUPAC names of the following co-ordination compounds:
 - (i) $[\text{Pt}(\text{NH}_3)_4(\text{en})]\text{Cl}_4$
 - (ii) $\text{Na}[\text{Mn}(\text{CO})_5]$
 - (e) Write the reaction and mechanism of Reimer-Tiemann reaction.
 - (f) Explain the mechanism of Nucleophilic substitution reaction, that involves the racemisation of product.
2. (a) Write the chemical formula of the following co-ordination compounds: **5**
- (i) Potassium tetracyano nickelate (II)
 - (ii) Tetra hydroxo zincate (III) ion
- (b) What is an Elimination reaction? Compare between E_1 and E_2 reactions. **5**
- (c) Explain the role of zinc metal in biological reaction. **5**
- (d) Draw Molecular Orbital diagram for CO molecule. Calculate its bond order and comment on its magnetic behaviour. **5**
3. (a) What is EAN? Calculate EAN of $[\text{Cu}(\text{CN})_4]^{3-}$. **5**
- (b) Differentiate between Bonding and Antibonding Molecular Orbitals. **5**
- (c) Explain stability of carbanion with respect to inductive effect and resonance. **5**
- (d) Differentiate between transition state and intermediate. **5**
4. (a) What is CFSE? Calculate CFSE of d^5 and d^9 in tetrahedral complexes. **5**
- (b) With the help of labelled Molecular Orbital, explain why $[\text{Fe}(\text{CN})_6]^{3-}$ is paramagnetic and $[\text{Fe}(\text{CN})_6]^{4-}$ is diamagnetic. **5**
- (c) Explain the role of Fe in Haemoglobin. **5**
- (d) What is Nucleophilic substitution reaction? Explain the mechanism of SN^2 reaction. **5**

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5. (a) Write pinacol- pinacolone reaction w.r.t. unsymmetrical diol. 5
(b) Draw Molecular Orbital diagram for N_2 molecule. Calculate its bond order and comment on its magnetic behaviour. 5
(c) Write note on Werner's theory. 5
(d) Explain biochemistry of enzyme containing copper. 5
6. (a) Explain the electrophilic substitution in case of aniline in acidic medium. 5
(b) What is Geometrical Isomerism? Draw Geometrical Isomers of $[Co(en)_2Cl_2]^+$. 5
(c) Write note on Hydrogen bonding. 5
(d) What are free radicals? Compare the stability of tertiary, secondary, primary and methyl free radicals. Justify your answer. 5