Time: 3 Hours **Marks: 80**

Please check whether you have got the right question paper.

N.B.: 1. Questions no. 1 is compulsory.

2. Attempt any three questions from remaining five questions.

Q.1 Attempt **any four** questions of the following: **[20]**

a) Explain Geometry & hybridization of BrF_3 molecule on the basis of VSEPR theory.

b) Discuss preparation, bonding, hybridization and geometry of $Fe_2(CO)_9$ molecule.

c) Differentiate between Kinetically controlled and thermodynamically controlled reaction.

d) Discuss structure and stability of carbanion.

e) Differentiate between Photochemical & Thermochemical reactions.

f) Give Nomenclature for following.

i) $Na_2[Zn(OH)_4]$ ii) $[Co(NH_3)_6]Cl_3$

Q.2 a) Write note on Effective atomic number (EAN). Explain with an example. **[05]**

b) Draw Molecular Orbital Diagram of F_2 molecule. Comment on Bond order and Magnetic character. **[05]**

c) Write note on Iron containing Protein. **[05]**

d) Explain Quantum yield. Give reasons for high Quantum yield. **[05]**

Q.3 a) Discuss Sulphonation of naphthalene as kinetically controlled and thermodynamically controlled reaction. **[05]**

b) Explain S-P and P-P orbitals overlapping for formation of σ & σ* by LCAO method. **[05]**

c) Discuss Reimer-Tiemann reaction with its applications. **[05]**

d) Discuss Biochemistry of Zinc containing metalloprotein. **[05]**

Q.4 a) Calculate CFSE for d^5 and d^7 system in strong field and weak field for octahedral complexes. **[05]**

b) Explain Wohl-Ziegler reaction. **[05]**

c) What is hydrogen bonding? Explain Intra molecular and inter molecular hydrogen bonding with an examples. **[05]**

d) Discuss Jablonski diagram. **[05]**

Q.5 a) Explain Pinacol - Pinacolone rearrangement reaction. **[05]**

b) Explain geometrical isomerism with example in co-ordination compounds with respect to CN-4. **[05]**

c) Define and explain Intermediate and Transition state with suitable example. **[05]**

d) Differentiate between Fluorescence & Phosphorescence. **[05]**

Q.6 a) Calculate EAN for following Compound

i) $[Pt(Cl)_4(H_2O)_2]$ ii) $K_4[Fe(CN)_6]$. **[05]**

b) Discuss the formation and structure of carbocation. **[05]**

c) Explain oxygen transportation in hemoglobin. **[05]**

d) Discuss the VBT and give the limitations of VBT. **[05]**

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