

Time: 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 M
- Explain the structure of SF_4 on the basis of VSEPR Theory.
 - Write IUPAC names of the following co-ordination compounds-
 - $Na[Mn(CO)_5]$
 - $[Ag(NH_3)_2]Cl$
 - Explain preparation, properties and bonding involved in $Fe(CO)_5$
 - Explain Thermodynamically and Kinetically controlled reactions. Hence, explain sulphonation of naphthalene.
 - Compare the stability of tertiary, secondary and primary carbocation. Justify your answer using inductive effect and hyperconjugation.
 - What is photolysis? Explain Norrish type-I and Norrish type-II with mechanism.
2. (a) Define Quantum yield. Explain the reasons for high quantum yield. 5 M
- (b) Write the chemical formula of the following co-ordination compounds- 5 M
- Tetracyanonickelate (II) ion
 - Dichloro diammine platinum (II)
- (c) Explain mechanism and applications of Wohl-Ziegler bromination reaction. 5 M
- (d) Explain biochemistry of enzyme containing Zn. 5 M
3. (a) Draw molecular orbital diagram for F_2 molecule and comment on its bond order and magnetic properties. 5 M
- (b) What is EAN? Calculate EAN of $[Ni(CO)_4]$ 5 M
- (c) Explain the structure of carbenes. 5M
- (d) Draw Jablonski diagram to explain various modes by which an excited molecule gives out extra energy and comes to the ground state. 5M
4. (a) Discuss the formation of carbanion. 5M
- (b) What are the drawbacks of VBT? 5 M
- (c) What is CFSE? Calculate CFSE for high and low spin octahedral complexes. 5 M
- (d) Differentiate between Photochemical and Thermochemical reactions. 5 M
5. (a) Explain the mechanism of Pinacol-Pinacolone rearrangement reaction. 5 M
- (b) Explain oxygen atom transfer biomolecular reactions containing iron. 5 M
- (c) Compare Bonding and Antibonding molecular orbitals. 5 M
- (d) What are the drawbacks of CFT? 5 M
6. (a) On the basis of MOT, explain energy level diagram of NO molecule. 5 M
- (b) Give mechanism and applications of Reimer-Tiemann reaction. 5 M
- (c) Write a note on ionization isomerism and linkage isomerism. 5 M
- (d) Explain transition state and intermediate. 5 M