

S.E-III sem Chem
Engineering Chemistry - I

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CHEM. / EC-I
SE/III/CAGS/
Q.P. Code : 536500

(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 :-

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- (a) Explain the preparation and structure of $\text{Fe}(\text{CO})_5$.
 - (b) Explain the structure of PCl_5 on the basis of VSEPR theory.
 - (c) Write the chemical formula of the following co-ordination compounds.
 - (i) Tetra ammine copper (II) ion
 - (ii) Sodium hexanitro cobaltate (III)
 - (d) Explain thermodynamically & kinetically controlled reactions. Hence, explain sulphonation of naphthalene.
 - (e) What is SN^1 reaction ? Explain with mechanism.
 - (f) Discuss inductive effect and resonance effect with suitable example to explain stability of carbanion.
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2. (a) Explain the role of Fe in Haemoglobin. 5
 - (b) Write IUPAC names of the following co-ordination compounds. 5
 - (i) $[\text{Pt}(\text{Cl})_2(\text{NH}_3)_2]$
 - (ii) $[\text{Zn}(\text{NCS})_4]^{2-}$
 - (c) Differentiate between Bonding and Antibonding Molecular orbitals. 5
 - (d) What is Elimination reaction ? Discuss E_1 reaction with mechanism. 5
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3. (a) Draw Molecular orbital diagram for CO molecule and comment on its bond order and magnetic properties. 5
 - (b) Explain the applications of cytochromes. 5
 - (c) What is EAN ? Calculate EAN of $[\text{Ni}(\text{NH}_3)_6]^{2+}$ 5
 - (d) Write Pinacol-Pinacolone reaction with mechanism. 5
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4. (a) What is CFSE ? Calculate CFSE for d^3 & d^7 in octahedral complexes. 5
 - (b) Write a note on hydrogen bonding. 5
 - (c) Distinguish between transition state and intermediate. 5
 - (d) Explain electrophilic substitution in case of chlorobenzene. 5

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| 5. | (a) | Draw molecular orbital diagram for N_2 molecule and comment on its bond order and magnetic properties. | 5 |
| | (b) | Discuss Werner's theory. | 5 |
| | (c) | Explain the structure of free radicals. | 5 |
| | (d) | Explain biochemistry of enzyme containing copper. | 5 |
| 6. | (a) | Explain the following terms with suitable example.
(i) Chelates (ii) Ligands | 5 |
| | (b) | Explain methylation of toluene by Friedel craft reaction. | 5 |
| | (c) | Write the reaction and mechanism of Michael reaction. | 5 |
| | (d) | Give the drawbacks of VBT. | 5 |

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