S.E - III sem - Chem - 20/12/15

Engineering Chemistry - I

(27)

SE/CHEM/CBGS/EC-I.

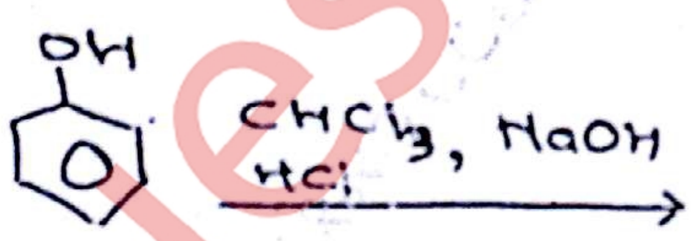
QP Code : **5082**

(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 :–
   (a) Explain the structure of SF_4 molecule on the basis of VSEPR Theory. 5
   (b) Write IUPAC names of the following co-ordination compounds– 5
      (i) $[Zn(NCS)_4)^{2-}$
      (ii) $Na[Mn(CO)_5]$
   (c) Explain preparation, properties and bonding involved in $Fe(CO)_5$. 5
   (d) Explain Thermodynamically and Kinetically controlled reactions. Hence, explain methylation of toluene by Friedal-Craft's reaction. 5
   (e) Compare the stability of tertiary, secondary, primary and methyl carbocation. Justify your answer using inductive effect and hypercojugation. 5
   (f) What is an elimination reaction? Explain E1 reaction with mechanism. 5

2. (a) Explain electrophilic substitution in case of anilinium ion. 5
   (b) Write the chemical formula of the following co-ordination compounds– 5
      (i) Diamine silver (I) chloride
      (ii) Tetracyanonickelate (II) ion
   (c) Complete the reaction. State the name of the reaction and explain the mechanism of the same. 5



   (d) Explain biochemistry of enzyme containing copper. 5

3. (a) Draw molecular orbital diagram for CO molecute and comment on its bond order and magnetic properties. 5
   (b) What is EAN? Calculate EAN for $[Cu(CN)_4)^{3-}$ 5
   (c) Explain structure of carbon free radicals. 5
   (d) Explain eletrophilic substitution in case of chlorobenzene. 5

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4. (a) Discuss the formation of carbocations. 5
(b) Compare MOT and VBT. 5
(c) What is CFSE? Calculate CFSE for d^5 and d^9 configuration for high spin and low spin complexes. 5
(d) What is nucleophilic substitution reaction? Explain the mechanism of SN^2 reaction with suitable example. 5

5. (a) Discuss the mechanism of Pinacol-Pinacolone rearrangement with respect to symmetrical pinacol. 5
(b) Explain oxygen actom transfer biomolecular reaction containing iron. 5
(c) Compare Bonding and Antibonding molecular orbitals. 5
(d) Define the terms :–
(i) Complex ion
(ii) Co-ordination number
(iii) Co-ordination sphere
(iv) Ligand
(v) Chelating ligand 5

6. (a) On the basis of MOT, explain energy level diagram of O_2 molecule. Calculate bond order and comment on its magnetic properties. 5
(b) Give mechanism and applications of Michael reaction. 5
(c) What is geometrical isomerism? Explain geometrical isomerism in Pt (II) complexes with co-ordination number 6. 5
(d) Explain Friedal-Craft alkylation reaction.