

S.E.(CHEMICAL)(Sem III) (Choice Based) / 50702 - ENGINEERING CHEMISTRY I

Q.P. Code :24013

[Time: Three Hours]

[Marks:80]

Please check whether you have got the right question paper.

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

Q.1 Answer any four of the following:-

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- Explain the structure of IF_7 molecule on the basis of VSEPR theory.
- Write IUPAC names of the following coordination compounds:
 - $K_3[Fe(CN)_5NO]$
 - $[Al(OH)_4(H_2O)_2]$
- Explain the role of zinc in human biochemical system.
- Explain the concept of equilibrium controlled and rate controlled reactions w.r.t. Nitration of chlorobenzene.
- Write any two reactions in which carbenes are generated. Differentiate between singlet and triplet carbenes.
- What is photolysis? Explain Norrish type I and Norrish type II cleavage with mechanism.

Q.2

- Differentiate between thermochemical and photochemical reactions. 05
 - What is CFSE? Calculate CFSE for d^3 and d^6 in octahedral complexes. 05
 - Arrange the following reactive intermediates in the order of increasing stability and justify your answer with proper reasoning 05
- $$Ph\overset{\ominus}{C}H_2, (Ph)_2\overset{\ominus}{C}H, (Ph)_3C^{\ominus}$$
- On sulphonation at different temperatures how many products are formed by naphthalene and why? Explain with reactions. 05

Q.3

- Explain bonding in M – CO bond. Draw and explain valid structure of $Fe(CO)_5$. 05
- Draw molecular orbital diagram for hydrogen fluoride molecule. 05

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- c) Write chemical formula of the following coordination compounds. **05**
 i) Aluminium tetrachloroaurate (III)
 ii) Bis (ethylenediamine) copper (II) ion

d) What are carbocations and carbanions? Compare the structure of carbocation and carbanion. **05**

Q.4 a) Differentiate between thermodynamically controlled and kinetically controlled reactions. **05**

b) Explain in detail the geometrical isomerism in coordination compounds with respect to coordination number 6. **05**

c) Explain fluorescence and phosphorescence with the help of diagram. **05**

d) Explain the role of iron in haemoglobin. **05**

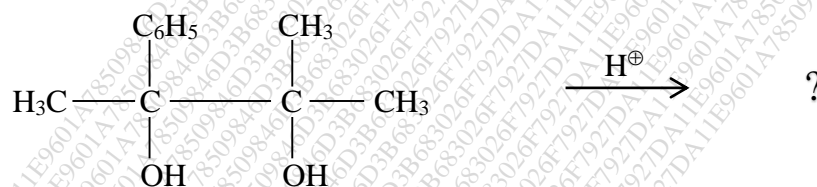
Q.5 a) What is EAN? Calculate EAN for $[Co(NO_2)_6]^{3-}$ **05**

b) With mechanism explain role of N – bromo succinimide in Allylic bromination reaction. **05**

c) Write a note on hydrogen bonding. **05**

d) Define quantum yield. Explain the reasons for high quantum yield. **05**

Q.6 a) Complete the following reaction. State the name of the reaction and write the mechanism of the same. **05**



b) What is VBT? Explain the drawbacks of VBT. **05**

c) Explain with example the difference between Intermediate and Transition state. **05**

d) Write a note on ionisation isomerism and linkage isomerism. **05**
