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(Following Paper ID and Roll No. to be filled in your Answer Book)

Paper ID : 199122   Roll No. [ ][ ][ ][ ][ ][ ][ ][ ][ ]

B.TECH

(SEM.I) THEORY EXAMINATION, 2015-16

Engineering Chemistry-I

Time: 3 hours]   *[Total Marks:100*

1. Attempt , all parts. All parts carry equal marks. Write answer of each part in short.   (10×2=20)

    (a) Give any two examples of optically active compounds without chiral centre.

    (b) What is metallic bonding.

    (c) Explain functionality of a polymer.

    (d) Explain why p-nitrophenol is more soluble than o-nitrophenol in water.

    (e) Arrange in increasing order of stability
         $C_2H_5, C_6H_5CH_2^+, (CH_3)_2CH^+$

    (f) Why is the value of Gross Calorific Value (GCV) greater than Net Calorific Value (NCV).

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(g) Calculate the order and molecularity of the following reactions:

$$CH_3COOC_2H_5 + H_2O + (excess) \rightarrow CH_3COOH + C_2H_5OH$$

(h) Explain why hardness of water is expressed in terms of terms of $CaCO_3$ equivalents.

(i) Write any two examples of acid-base titration.

(j) Write down the structure of Zeigler-Natta catalyst.

Section-B

Note: Attempt any **five** questions from this section. **(5×10=50)**

2. On the basis of molecular orbital theory explain why F_2 is diamagnetic while O_2 is paramagnetic.

3. Write the mechanism of SN^1 & SN^2 reaction.

4. Describe the different conformation of n-butane with potential energy diagram.

5. Derive the equation for half life of first order reaction. A reaction that is of first order with respect to reactant A has a rate constant 6 min⁻¹. If we start with $[A]=5.0$ mol L⁻¹ when would $[A]$ reach the value of 0.05 mol L⁻¹?

6. Write the mechanism of any two of the following:

(2)

6. Write the mechanism of any two of the following:

(a) Aldol condensation.

(b) Beckman rearrangement.

(c) Cannizaro's reaction.

7. What is shielding and deshielding. Calculate the number of signal for following molecules:

(a) CH_3COCH_3

(b) C_2H_5OH

8. What is hydrogen bonding? Differentiate between intra and intermolecular hydrogen bonding with suitable examples.

9. Describe the preparation, properties and application of any two of the following polymers.

(a) Nylon-6,6

(b) PMMA

(c) Bakelite.

Section-C

Note: Attempt any two questions from this section. (15×2=30)

10. (a) Differentiate between temporary and permnent hardness of water.

(b) Define Chemical shift. What is its significance in the determination of the structure of molecules.

(c) What are biodegradable polymers? Discuss their application.

11. (a) Define the terms: Phase, Component and Degree of freedom.

(b) Calculate the weight and volume of air required for combusion fo 3 Kg of carbon.

(c) Calculate the density of silver which crystallizes in a face center cubic lattice with unit cell length of 0.4086 nm (Atomic wt of Ag=107.88)

12. (a) Explain why a pure metal rod half immersed vertically in water starts corroding at the bottom.

(b) Calculate the energy of activation whose rate constant is tripled by 10^0 C rise in temperator in the vicinity of 27^0 C.

(c) Define bond order. Calculate the bond order and predict the magnetic behavior of CO, CO^+, CO^-.

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