

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

Paper ID : 199122

Roll No. 

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**B.TECH**

**(SEM.I) THEORY EXAMINATION, 2015-16**

**Engineering Chemistry-I**

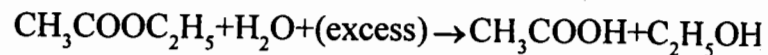
*Time: 3 hours*

*[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).

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



- (h) Explain why hardness of water is expressed in terms of terms of  $\text{CaCO}_3$  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)

- On the basis of molecular orbital theory explain why  $\text{F}_2$  is diamagnetic while  $\text{O}_2$  is paramagnetic.
- Write the mechanism of  $\text{SN}^1$  &  $\text{SN}^2$  reaction.
- Describe the different conformation of n-butane with potential energy diagram.
- 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  $6 \text{ min}^{-1}$ . If we start with  $[\text{A}] = 5.0 \text{ mol L}^{-1}$  when would  $[\text{A}]$  reach the value of  $0.05 \text{ mol L}^{-1}$ ?
- Write the mechanism of any two of the following:

(2)

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

- Aldol condensation.
- Beckman rearrangement.
- Cannizaro's reaction.

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

- $\text{CH}_3\text{COCH}_3$
- $\text{C}_2\text{H}_5\text{OH}$

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.

- Nylon-6,6
- PMMA
- Bakelite.

### Section-C

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

- (a) Differentiate between temporary and permanent hardness of water.

(3)

- (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 combustion for 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  $10^{\circ}$  C rise in temperature in the vicinity of  $27^{\circ}$  C.
- (c) Define bond order. Calculate the bond order and predict the magnetic behavior of  $\text{CO}$ ,  $\text{CO}^+$ ,  $\text{CO}^-$ .