

**B.TECH.**

**THEORY EXAMINATION (SEM-II) 2016-17**

**ENGINEERING CHEMISTRY**

**Time : 3 Hours**

**Max. Marks : 100**

**Note : Be precise in your answer. In case of numerical problem assume data wherever not provided.**

**SECTION – A**

**1. Explain the following:**

**10 x 2 = 20**

- (a) What do you understand by temporary and permanent hardness of water.
- (b) Why  $\beta$  carotene absorbs light in visible region?
- (c) Explain why the value of NCV is greater than GCV.
- (d) Explain the bonding and antibonding molecular orbitals .
- (e) Define polymer and polymerization.
- (f) What is unit cell? What are its types?
- (g) What is meant by elastomers?
- (h) Calculate the bond order of  $O_2$ ?
- (i) Predict the number of signals in  $CH_3CH_2OH$ .
- (j) Explain Priming and Foaming.

**SECTION – B**

**2. Attempt any five of the following questions:**

**5 x 10 = 50**

- (a) (i) What is metallic bond? Explain it on the basis of Molecular Orbital theory.  
(ii) With the help of MO diagram, calculate the bond order, nature of the following:  
 $N_2$  &  $O_2$
- (b) (i) Differentiate between addition and condensation polymerization with suitable examples?  
(ii) Write the method of preparation for the following polymers:  
(i) PMMA (ii) Orlon (iii) Polystyrene
- (c) (i) Discuss the Zeolite method for water softening.  
(ii) The hardness of 1000 liters of a water sample was completely removed by passing it through a zeolite softener. The softener then required 30 liters of NaCl solution containing 1.5 g/l of NaCl for regeneration. Calculate the hardness of the sample of water.
- (d) (i) Write possible optical isomers in tartaric acid.  
(ii) What is the difference between enantiomers and diastereoisomers?
- (e) (i) Define the terms chromophore and auxochrome in UV spectroscopy.  
(ii) A compound having concentration  $10^{-3}$  g/l resulted absorbance value 0.20 at  $\lambda_{max}$  510 nm using 1.0 cell. Calculate its absorptivity and molar absorptivity values. Molecular weight of compound is 400.
- (f) What is electrochemical corrosion? Write down the mechanism involved in electrochemical corrosion. Calculate the amount of rust ( $Fe_2O_3 \cdot 3H_2O$ ) formed by complete rusting of 1 kg of iron.
- (g) Describe the structure of graphite. How it acts as conductor of electricity. Show, how does the  $S_N^2$  reaction give rise to inverted product while  $S_N^1$  reaction gives a racemic mixture.
- (h) Show, how does the  $S_N^2$  reaction give rise to inverted product while  $S_N^1$  reaction gives a racemic mixture.



Attempt any two of the following questions:

2 x 15 = 30

- 3 (i) What is biogas? How biogas is produced? With the help of diagram, explain Biogas Plant.
- (ii) What is potable water? What are its chemical requirements?
- 4 (i) What are bio degradable polymers? Discuss their applications?
- (ii) How do you prepare the following polymers? (a) Bakelite (b) Perspex (c) Cis-1,4-polyisoprene cross linked through non metal
- 5 (i) For a  $XY_2$  bent molecule show various types of stretching and bending vibrations in IR
- (ii) Calculate temporary and total hardness of a water sample containing: Ca  $(HCO_3)_2$  = 17.4 mg /lit, Mg  $(HCO_3)_2$  = 9.3mg/lit,  $CaSO_4$  = 12.6 mg/lit and  $MgCl_2$  = 8.7 mg /lit.

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