

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 β 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 λ_{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.

SECTION – C

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.