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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 enantionmers and diastereoisomers?

(e) (i) Define the terms chromophore and auxochrome in UV spectroscopy.

(ii) A compound havingconcentration10^{-3}g/l resulted absorbance value 0.20 at λ_{max} 510 nm using 1.0 cell. Calculate it 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 ($Fe_2O_3.3H_2O$) 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.

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SECTION – C

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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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