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B.TECH.

THEORY EXAMINATION (SEM-II) 2016-17

ENGINEERING CHEMISTRY

Time : 3 Hours

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

SECTION – A

1. **Explain the following:**

- What do you understand by temporary and permanent hardness of water. (a)
- Why β carotene absorbs light in visible region? **(b)**
- Explain why the value of NCV is greater than GCV. (c)
- Explain the bonding and antibonding molecular orbitals. (**d**)
- **(e)** Define polymer and polymerization.
- **(f)** What is unit cell? What are its types?
- What is meant by elastomers? **(g)**
- Calculate the bond order of O_2 ? **(h)**
- (i) Predict the number of signals in CH₃CH₂OH.
- Explain Priming and Foaming. (j)

SECTION - B

2. Attempt any five of the following questions:

- What is metallic bond? Explain it on the basis of Molecular Orbital theory. (a) (i)
 - (ii) With the help of MO diagram, calculate the bond order, nature of the following: N₂ & O₂
- Differentiate between addition and condensation polymerization with suitable **(b)** (i) examples?
 - Write the method of preparation for the following polymers: (ii)
 - **PMMA** (ii) Orlon (iii) Polystyrene (i)
- Discuss the Zeolite method for water softening. (c) (i)
 - The hardness of 1000 liters of a water sample was completely removed by (ii) 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**) Write possible optical isomers in tartaric acid. (i)
 - What is the difference between enantionmers and diastereoisomers? (ii)
- Define the terms chromophore and auxochrome in UV spectroscopy. **(e)** (i)
 - A compound having concentration 10^{-3} g/l resulted absorbance value 0.20 at λ_{max} (ii) 510 nm using 1.0 cell. Calculate it absorptivity and molar absorptivity values. Molecular weight of compound is 400.
- What is electrochemical corrosion? Write down the mechanism involved in **(f)** electrochemical corrosion. Calculate the amount of rust (Fe₂O₃.3H₂O) formed by complete rusting of 1 kg of iron.
- Describe the structure of graphite. How it acts as conductor of electricity. Show, how **(g)** does the S_N^2 reaction give rise to inverted product while S_N^1 reaction gives a racemic mixture.
- Show, how does the S_N^2 reaction give rise to inverted product while S_N^1 reaction gives **(h)** a racemic mixture.

Max. Marks: 100

 $10 \ge 2 = 20$

 $5 \ge 10 = 50$



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Attempt any two of the following questions:

- **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 $(HCO_3)_2=17.4 \text{ mg/lit}, Mg (HCO_3)_2=9.3 \text{mg/lit}, CaSO_4=12.6 \text{ mg/lit} and MgCl_2 = 8.7 \text{ mg/lit}.$

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