Printed Pages: 4 | 331/332 | AS-103

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

Paper ID : 199113 | Roll No. | | | | | | | | | | |

**B.Tech**

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

**ENGINEERING CHEMISTRY-I**

**[Time:3 hours]** **[Total Marks:100**

**SECTION-A**

Attempt **all** parts. All parts carry equal marks. Write answer of each part in short. (10×2=20)

(a) Explain why Teflon is highly chemical resistant.

(b) Low density and high density polythene differ in density why?

(c) 3.25 g coal was kjeldahlized and $NH_3$gas thus evolved was absorbed in 45 ml of 0.1 N $H_2SO_4$. To neutralize excess of acid, 11.5 ml of 0.1 N NaOH was required. Calculate the % of N in the coal sample.

(d) Giving examples differentiate between intra and inter molecular hydrogen bonding.

(e) Calculate density of a BCC crystal. Side of cube is 4A° and M=60

(f) Explain why Toluene undergoes electrophilic substitution reaction more easily than nitrobenzene.

(g) Calculate the number of atoms per unit cell in SCC, BCC and FCC.

(h) Write down the chemical unit of Nylon and Polystyrene.

(i) Explain why methyl amine is a stronger base than ammonia.

(j) Why is TMS used as a standard reference in NMR spectroscopy?

## SECTION-B

Attempt any **five** questions from this sections

(5×10=50)

2. What are liquid crystals? Write the classification and applications of liquid crystal.

3. Explain why $N_2$ is diamagnetic while $O_2$ is paramagnetic with the help of molecular orbital diagram.

4. Explain classification of conducting polymers with their applications.



5. Explain Zeolite process of water softening. 100 ml of water sample has a hardness equivalent of 12.5 ml of 0.08 N $MgSO_4$. What is its hardness in ppm?

6. Explain the construction and working of a galvanic cell.

7. What is biogas? How biogas is produced? With the help of diagram, explain Biogasification.

8. What is electrochemical corrosion? Write down the mechanism involved in electrochemical corrosion. How much rust ($Fe_2O_3.3H_2O$) will be formed when 100 kg of iron have completely rusted.

9. What is chemical shift? Two Isomers I and II of the molecular formula $C_3H_6O$ give I.R. absorption band near 3550 $cm^{-1}$ and 1717 $cm^{-1}$ respectively. Assign structural formula to I and II consistent with their IR absorption bands.

## SECTION-C

Attempt any **two** questions from this section.

(2×15=30)

10. (a) For an $XY_2$ bent molecule, show various types of stretching and bending in IR spectroscopy?

(b) What is hardness of water? The hardnass of 10,000 litres of a sample of water was removed by passing it through a zerlite softener. The zeolite softener then required 200 litres of sodium chloride solution containing 150 gm/litre of NaCI for regeneration. Find the hardness of water sample.

(c) Describe the possible optical isomerism in tartaric acid.

11. Attempt **all** parts of the following:

(a) Define Gross Calorific Value(GCV) and Net Calorific Value(NCV) of a Fuel.

(b) Write mechanism of Hoffmann rearrangement.

(c) With the help of Data given show that decomposition of $H_2O_2$ in aqueous solution is first order

| Time(min): | 0 | 10 | 20 | 30 |
|---|---|---|---|---|
| Volume of $KMnO_4$ required- | | | | |
| To decompose $H_2O_2$(ml) | 12.5 | 25.0 | 20.0 | 15.7 |

12. Attempt all parts of the following:

(a) Show, how $SN^2$ reaction gives rise to inverted product.

(b) What are organometallic compounds? Give their classification & two applications.

(c) Draw the potential energy diagram for the various conformations of n-butane.

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