Printed Pages : 4

NAG-102

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

PAPER ID : **180120**

Roll No.

B. Tech.

(SEM. I) (ODD SEM.) THEORY EXAMINATION, 2014-15

ENGINEERING CHEMISTRY

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

Note : Attempt questions from all sections as per the instructions.

SECTION – A

1 Attempt all parts. Each part carries equal marks : **2×10=20**

(a) Define polymers with example.

(b) What is pitting corrosion?

(c) What is viscosity? How it can be measured ?

(d) Which of the following metals could provide cathodic protection to iron : Al, Zn, Cu and Ni ?

(e) What is Energy of activation?

(f) What is meant by elastomers ?

(g) What is hardness ?

(h) Define proteins.

(i) Write the Arrhenius rate equation.

(j) What is the minimum energy requirement of human body per day ?

SECTION – B

2 Attempt any three parts of this question : **10×3=30**

(a) (i) Define chemical kinetics. Derive the equation for a first order reaction.

(ii) Discuss the cloud and Pour Point.

(b) (i) What is meant by calorific value of a fuel? What is the difference between gross calorific value and net calorific value?

(ii) Describe the role of calgon in descaling of the boiler.

(c) Explain the Lime soda process for the softening of water.

The hardness of 1,000 litres of a water sample was completely removed by passing it through a zeolite softner. The softner then required 30 litres of NaCl solution containing 1.5 mg/l of NaCl solution. Calculate the hardness of the sample of water.

(d) Define the voltage and EMF. Explain various methods for measurement of EMF.

(e) (i) If three polymers of molecular weight 40000, 60000 and 80000 are mixed together in equal parts by weight. Calculate its $\bar{M}_n, \bar{M}_w$.

(ii) What are vitamins? Explain the water soluble and insoluble vitamins.

SECTION – C

Attempt all five questions. Each question carries equal marks : **5×10=50**

3 Attempt any one part of the following :

(a) Derive the kinetic equation for reaction of zero order reaction. A first order of reaction is 40% completed in 30 seconds. Calculate (i) rate constant (ii) Half life time and (iii) time required for 80% completion of the reaction.

(b) Describe zeolite process for making soft water from hard water. Calculate temporary, permanent and total hardness of a sample of water containing $Mg(HCO_3)_2$ =14..6 mg/L; $Ca(HCO_3)_2$ =16.2 mg/L ; $MgCl_2$ =9.2 mg/L ; $CaSO_4$ = 13.6 mg/ L.

4 Attempt any one part of the following :

(a) Classify the various types of fuels. What are the properties of good fuel? Write the advantages of the biogas and fossil fuels.

(b) What are lubricants? Explain the following properties of lubricants and discuss their significance: viscosity, viscosity index and neutralization number.

5 Attempt any one part of the following :

(a) Write the principles of food chemistry. What are carbohydrates ? Classify them with examples.

(b) What are alpha amino acids ? How are they classified ? Give methods for the synthesis of alpha amino acids.

6 Attempt any one part of the following :

(a) Distinguish the following (any two)

(i) Addition polymerization and condensation polymerization

(ii) Order of reaction and molecularity of reaction

(iii) Flash and fire point

(b) Write the various properties of polymers. Give the various methods for the determination of molecular weight of polymer.

7 Attempt any one part of the following :

(a) Give a brief account of corrosion and its mechanism. Explain the reason: The rusting of iron is quicker in saline water than in ordinary water.

(b) What is conductivity? Differentiate among the specific conductivity, molecular conductivity and equivalent conductivity. Prove that for a second order reaction, the half life period is inversely proportional to its initial concentration.