BE - 101

B.E. I & II Semester

Examination, December 2012

Engineering Chemistry

(Grading System)

Time : Three Hours

Maximum Marks : 70

Note : 1. *Attempt any one question from each unit.*
2. *Parts of the question should be attempted at one place.*
3. *All questions carry equal marks.*

Unit - I

1. a) Give the chemical reactions involved in lime-soda process of softening of water.

   b) Why is water soften before using in boiler?

   c) The hardness of 10000 litres of a sample of water was removed by passing it through a zeolite softener. The zeolite softener then required 200 litres of sodiumchloride solution containing 150 gm/litre of NaCl for regeneration. Find out the hardness of Water sample.

OR

2. a) Why hardness of water estimated equivalent of $CaCO_3$? What are the different units of hardness?

   b) How exhausted resins are regenerated in ion-exchange method of water softening.

   c) Is bleaching powder behaves as disinfectant, explain.

   d) A water sample containing 136 mg of $CaSO_4$ per litre calculate the hardness in terms of $CaCO_3$ equivalents.

Unit - II

3. a) Define gross and net calorific value of fuel.

   b) Discuss in brief the proximate analysis of coal and give its significance.

   c) The percentage composition by weight of a sample of coal was found to be as under-

   C = 81%, H = 5%, S = 1%, N = 1% and ash 3.5%.

   Calculate the minimum amount of oxygen and air required for complete combustion of 1 kg coal.

OR

4. a) Explain octane and cetane number of gasoline.

   b) Define chemical fuel. How they are classified, give suitable example of each type.

   c) A coal sample has the following percentage composition

   C = 82%, H = 3.1%, S = 1.1%, N = 0.8%, O = 3.9%, Ash = 9.1%.

   Calculate approximately gross calorific (GCV) and net calorific. Value (NCV) in cal/gm.

Unit - III

5. a) What do you mean by viscosity index?

   b) What are refractories, give their classification?

   c) Write a short note on portland cement.

OR

6. a) Define flash point and fire point.

b) What are the raw material of refractory?

c) An oil of unknown viscosity index has a saybolt universal viscosity of 58 seconds at 210°F and 580 seconds at 100°F.

The high viscosity index standard oil has saybolt viscosity of 58 seconds at 210°F and 430 seconds at 100°F. The low viscosity index standard has a saybolt universal viscosity of 58 seconds at 210°F and 780 seconds at 100°F. Determine V.I. of un known oil.

Unit - IV

7. a) Give the mechanism of addition polymerization.

b) Give preparation, properties and uses of Nylon 6:6, teflon.

OR

8. a) What is polymerization? Explain condensation polymerization with the help of two examples.

b) Give preparation properties and uses of PVC and silicone resin.

Unit - V

9. a) Write short note on UV spectroscopy.

b) Give reason:

i) Alkalinity due to OH^- and HCO_3^- ions can not be present simultaneously in water.

ii) If Na_2SO_4 dissolve in water. It will create the alkalinity in water.

solution was made to one litre by dilution. 50 ml of this solution required 40 ml of EDTA solution, while 50 ml of the sample of water required 20 ml of EDTA. Calculate total hardness of water sample.

OR

10. a) Write short notes on any two of the following:

i) DO

ii) BOD

iii) Lambert's and Beer's law

b) 100 ml of a water sample required 20 ml of $\frac{N}{50}$ H_2SO_4 for neutralization to phenolphthalein end point. After this methyl orange indicator was added to this and further acid required was 15 ml calculate the type and extent of alkalinity.