Total No. of Questions : 10] [Total No. of Printed Pages : 4

Roll No. .....

BE–101(GS)

B. E. (First/Second Semester)
EXAMINATION, June, 2011
(Common for all Branches)
ENGINEERING CHEMISTRY

Time : Three Hours

Maximum Marks : 70

Minimum Pass Marks : 22 (D Grade)

Note : Attempt all questions. Parts of a question should be attempted together. Answers should be to the point. All questions carry equal marks.

Unit – I

1. (a) Draw a well labelled diagram of Ion-exchange resin method for softening of hard water. How the exhausted resin is regenerated ? 6

   (b) Write disadvantages of scale formation. 4

   (c) Explain why : 4

   (i) Hardness of water is expressed in terms of $CaCO_3$ equivalent.

   (ii) Hard water consumes a lot of soap.

Or

2. (a) Write the essential characteristics of municipal water. Write the names of steps involved in the water treatment. 6

   (b) How many grams of $CaSO_4$ dissolved per litre gives 272 ppm of hardness ? 4

   (c) Explain why : 4

   (i) Presence of silica is not desirable in high pressure boilers.

   (ii) Magnesium bicarbonate requires double amount of lime for softening.

Unit – II

3. (a) Discuss the determination of calorific value by Bomb Calorimeter. 6

   (b) Calculate the weight and volume of air needed for the combustion of 1 kg of carbon. 4

   (c) Explain why ? 4

   (i) Gaseous fuels are more advantageous than solid fuels.

   (ii) Net calorific value is less than gross calorific value.

Or

4. (a) What is knocking ? How can the antiknocking characteristics of a fuel be improved ? 6

   (b) A liquid hydrocarbon contains Carbon and Hydrogen in a ratio of 4 : 1 respectively. Calculate the wt. of air required for complete combustion of 200 kg of this fuel. 4

   (c) Explain why : 4

   (i) A good fuel must have low ash content.

   (ii) Coke is preferred to coal is metallurgical processes.

Unit – III

5. (a) Define the term lubricant. Give classification of lubricant with examples. Write important functions of lubricant. 6

(b) Write the composition of cement. Give the equations of chemical reactions involved in manufacture of portland cement by rotary kiln technology. 4

(c) Explain why : 4

(i) Coefficient of thermal expansion of a refractory be least.

(ii) SEN of a lubricating oil should be low.

Or

6. (a) What are refractories ? Explain pyrometric cone test and RUL test for the determination of refractoriness and strength of a refractory sample. 6

(b) Write a note on extreme pressure lubrication. 4

(c) Explain why : 4

(i) Gypsum is added in cement.

(ii) Aniline point of a lubricant should be high.

Unit – IV

7. (a) Discuss mechanism of addition and condensation polymerisation. 6

(b) Write preparation and properties of : 4

(i) Polyacrylonitrile

(ii) Bakelite

(c) Explain why : 4

(i) Natural rubber is useless as pure gold.

(ii) Thermosetting plastics cannot be reused.

Or

8. (a) What is vulcanisation of rubber ? How is it carried out ? Give its uses. 6

(b) Write preparation and properties of : 4

(i) Terylene

(ii) Teflon

(c) Explain why : 4

(i) PVC is soft and flexible as compared to bakelite.

(ii) All organic molecules do not form polymers.

Unit – V

9. (a) Discuss principle and instrumentation of gas chromatography. 6

(b) Write the principle involved in chloride determination in water sample. 4

(c) 100 ml of a water sample on titration with N/50 H_2SO_4, gave a titre value of 8·5 ml to phenolphthalein end point and 17·0 ml to methyl orange end point. Calculate alkalinity of water sample. 4

Or

10. (a) Discuss instrumentation and applications of IR spectroscopy. 6

(b) 100 ml of standard hard water containing 1 mg of pure $CaCO_3$ per ml, consumed 25 ml EDTA. 50 ml of water sample consumed 25 ml of same EDTA solution in another titration. Calculate total hardness. 4

(c) 100 ml of water sample contains 230 ppm of dissolved oxygen. After five days the dissolved oxygen becomes 30 ppm after the sample was diluted to 500 ml. Find the BOD of the sample. 4