Roll No .....

BE - 101

B.E. I & II Semester Examination, December 2013

Engineering Chemistry

Time : Three Hours

Maximum Marks : 70

Note: Total number of question 10. Attempt one question (including all parts) from each unit. Assume missing data if any suitably.

Unit - I

1. a) Define softening of water. Describe the Zeolite method of softening of hard water with the help of neat and labelled diagram. 6
   b) What is boiler corrosion. Discuss its causes? 4
   c) Write short note on any two- 4
      i) Caustic embrittlement
      ii) Chlorination
      iii) $CaCO_3$ equivalent

OR

2. a) Define hardness of water. Discuss the internal treatment method of water softening. 6
   b) What is Boiler Trouble? Explain the causes of scale formation. 4
   c) A sample of water on analysis was found to contain the following $Ca(HCO_3)_2$ = 4 mg/l, $Mg(HCO_3)_2$ = 6 mg/l, $CaSO_4$ = 8 mg/l, $MgSO_4$ = 10 mg/l. Calculate the temporary, permanent and total hardness of water in ppm, °Cl and °Fr. 4

Unit - II

3. a) Define calorific value. How it is determine by bomb calorimeter? 6
   b) Discuss the parameters of ultimate analysis of coal? 4
   c) Write short note on any two. 4
      i) Anti knock compound
      ii) Octane No
      iii) Carbanization

OR

4. a) Describe the Otto-Hoffmann's method for the manufacture of coke. Write the recovery of by products. 7
   b) On burning 0.83 g of a solid fuel in a bomb calorimeter, the temperature of 3500g of water increases from 26.5° C to 29.2° C. Water equivalent of calorimeter and latent heat of steam are 385g and 587 cal/g respectively. If the fuel contains 0.7% hydrogen, calculate its gross and net calorific value? 7

Unit - III

5. a) Define lubricant. Discuss the classification of lubricants. 6

b) Write short note on any two: 4
   i) Saponification value
   ii) Thermal spalling
   iii) Blended oil

c) Explain cement manufacture by wet process. 4

OR

6. a) Define lubrication. Describe hydrodynamic mechanism of lubrication. 6

b) What are refractories. Describe the properties of refractories. 4

c) An oil sample under test has a Saybolt universal viscosity same as that of Standard Gulf oil (low viscosity standard) and Pennsylvanian oil (high viscosity index standard) at 100°F are 61758 and 420 respectively. Calculate viscosity index of the sample oil. 4

Unit - IV

7. a) Define polymerisation. Explain free radicals mechanism of polymerisation. 6

b) Write preparation, properties and uses of buna-N. 4

c) Explain condensation polymerisation with two examples. 4

OR

8. a) Discuss the classification of polymers on the basis of molecular forces. 6

b) Explain polyvinyl chloride is stronger and tougher than polyethylene. 4

c) Write short note on any two- 4
   i) Vulcanisation
   ii) Phenolic Resin
   iii) Nylon-6,6

Unit - V

9. a) Discuss in brief the type of molecular vibrations. 6

b) Explain Gas Liquid Chromatography. 4

c) Write short note on any two- 4
   i) Lambert Beer law
   ii) Chemical shift
   iii) Partition chromatography

OR

10. a) Define spectroscopy discuss the principle and working of NMR spectroscopy. 6

b) Write short note on application of UV spectroscopy. 4

c) Write short note on any two- 4
   i) Stretching and Bending vibrations
   ii) Chromophores
   iii) Significance of IR spectroscopy.

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