Total No. of Questions :5]

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Roll No

BE - 101

B.E. I & II Semester Examination, June 2015

Engineering Chemistry

Time : Three Hours

Maximum Marks : 70

Note: i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.
ii) All parts of each questions are to be attempted at one place.
iii) All questions carry equal marks, out of which part A and B (Max.50 words) carry 2 marks, part C (Max.100 words) carry 3 marks, part D (Max.400 words) carry 7 marks.
iv) Except numericals, Derivation, Design and Drawing etc.

Unit - I

1. a) Explain why hard water does not give lather with the soap.
   b) Caustic embrittlement is a type of boiler corrosion, explain.
   c) Describe the role of Co-agulants in water treatment, giving chemical reactions involved.
   d) What troubles in boiler may arise due to use of untreated water? Describe any two boiler troubles with respect to causes, ill-effects and remedies.

OR

A water sample on analysis gave the following data: $MgCl_2$ = 95; $CaSO_4$ = 272; $MgSO_4$ = 120; H_2SO_4 = 49; SiO_2 = 4.0 (all in ppm)
Calculate the amount of lime (95% pure) and soda (97% pure) needed for treating 1.5 million litres of water. If the costs of lime and soda are Rs. 50 and Rs.1500 per 100 kg each respectively. Calculate the total cost of chemicals used for treating 1.5 million litres of the water.

Unit - II

2. a) Define Calorific Value, Higher Calorific Value, Lower Calorific Value, (CV, HCV and LCV). Explain the differences between HCV and LCV.
   b) Presence of Sulphur in a fuel adds to its heating value, but still its presence is not desirable in a good quality fuel, explain.
   c) A sample of coal was found to have the following percentage composition : C = 75% H = 5.2%; O = 12.1%; N = 3.2% and ash = 4.5%.
   Calculate the minimum air required for complete combustion of 1 kg of coal.
   d) Write brief notes on :
      i) Knocking and anti knocking of I.C. engine fuels
      ii) Diesel engine fuels

OR

What is Carbonization? With a neat and labelled diagram describe manufacture of coke recovery of by products.

Unit - III

3. a) Why lubrication is required between two moving surfaces even if they are very smooth?
   b) Define aniline point and write its significance.
   c) Write the importance of refractoriness and conductivity for a good refractory.
   d) Discuss various mechanisms of lubrications.

OR

With a neat and labelled diagram describe the manufacture of cement by wet process.

Unit - IV

4. a) Define terms : Monomers, Polymers, Polymerization and degree of polymerization.
   b) Explain two types of polymerization with example.
   c) What is natural rubber? Write the structure of its monomer. Compare characteristics of natural rubber and synthetic rubber.
   d) i) Write the mechanism of free radical polymerization or Co-ordination polymerization
      ii) Write preparation, properties and uses of (any one)
         a) Nylon 6:6
         b) Urea-Formaldehyde resin

OR

What is compounding of rubber? Name the ingredients used in compounding also give their functions?

Unit - V

5. a) Explain terms BOD and COD.
   b) What is alkalinity in water? How does its presence affect the industrial water?
   c) With an schematic representation explain the instrumentation of I.R. technique.
   d) Write principle, instrumentation and applications of gas chromatography.

OR

0.28 g of $CaCO_3$ was dissolved in HCl and the solution made upto one litre with distilled water, 100 ml of above solution required 28 ml of EDTA solution on titration. 100 ml of hard water sample required 33 ml of same EDTA solution on titration. On boiling 100 ml of this water, cooling, filtering and then titration required 10 ml of EDTA solution. Calculate the temporary and permanent hardness of water.

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