When a few drops of methyl orange are added to the same solution and titration was further continued the yellow colour of the solution just turned pink after the addition of another 12ml of acid. Calculate the type and extent of alkalinity present in the water sample.

OR

Discuss briefly the chemical reactions and methods used for analysis of D.O. parameters in water.

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Total No. of Question: 5] *[Total No. of Pages:4*

Roll No.: ……

BE - 101

B.E. I and II Semester Examinations, December 2014

Engineering Chemistry

Time: Three Hours *Maximum Marks: 70*

Note: i) Answer five questions. In each question, part A, B, C are compulsory, and part D has internal choice.

ii) All parts of each question are to be attempted at one place.

iii) All questions carry equal marks, out of which part A and part B (Max. 50 words) carry 2 marks; part C (Max. 100 words) carry 3 marks; part D (Max. 400 words) carry 7 marks.

iv) Expect numerical, Derivation, Design and Drawing, etc.

Unit - I

1. a. Why does magnesium bicarbonate require double amount of lime for softening?

b. If silica is present in water, what harmful effects it can cause?

c. Explain the function of calgon and sodium aluminate in water treatment.

d. Discuss zeolite method of water softening with its limitation.

OR

A sample of water has been found to contain the following in ppm: $Ca(HCO_3)_2$=10.5, $Mg(HCO_3)_2$=12.5, $CaSO_4$=7.5, $CaCl_2$=8.2, $MgSO_4$=2.6. Calculate the temporary and permanent hardness in degree French. Calculate lime and soda for 1000 liters of water.

Unit - II

2. a. Differentiate coal from coke.

b. Give significance of ultimate analysis of coal.

c. What are octane number and cetane number?

d. The percentage composition by weight of a coal sample was found to be as under: C=81%, H=5%, O=8.5%, S=1%, N=1% and 3.5% ash.

i. Calculate the minimum amount of O_2 and air required for complete combustion of 1kg of this coal.

ii. Percentage composition by weight of the dry products of combustion.

OR

What is cracking? Discuss moving bed catalytic cracking with its advantages.

Unit - III

3. a. Give two examples of each, lubricating oils, greases and solid lubricants.

b. Why anti-oxidants are added to lubricants? Give examples of it also.

c. What are the constitutional compounds of Portland cement?

d. Discuss important properties of refractories.

OR

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 210°F. Their Saybolt universal viscosities at 100°F are 61, 758 and 420 seconds respectively. Calculate viscosity index of the sample oil.

Unit - IV

4. a. Why natural rubber needs vulcanization?

b. What are the monomer of butyl rubber? What would be its structure?

c. Differentiate thermoplastic resin from thermosetting resin.

d. Give preparation, properties and uses of any two of the following:

i. Orlon
ii. Dacron
iii. PMMA

OR

Give preparation, properties and uses of any two of the following:

i. Urea-Formaldehyde resin
ii. Melamine-Formaldehyde resin
iii. Epoxy resin

Unit - V

5. a. In which region of electromagnetic radiation, do we observe NMR and vibration spectroscopy?

b. Define chromophore and auxochrome.

c. Write a short note on gas chromatography.

d. A water sample is alkaline to both phenolphthalein and methyl orange. 200ml of water sample on titration with N/25 HCl required 5ml of the acid to phenolphthalein end point.