

**B. Tech. Ist Semester (Main) Examination Feb.-2010****Engineering Chemistry - I****(Common to all Branches of Engineering)****1E1026****Time : 3 Hours****Maximum Marks : 80****Min. Passing Marks : 24****Instructions to Candidates:**

Attempt overall **Five** questions selecting **one** question from each unit. All questions carry **equal** marks.

**Unit - I**

1. a) What is hardness of water? What do you understand by temporary and permanent hardness? (6)
- b) Give the chemical reactions involved in determination of hardness of water by EDTA titration. (5)
- c) A water sample contains 204 mg of  $\text{CaSO}_4$  per litre. Calculate the hardness in terms of  $\text{CaCO}_3$  equivalent. (5)

**OR**

2. a) What do you mean by degree of hardness? Discuss the Clark's test for the determination of hardness of water. (7)
- b) Write informative notes on the followings :-
  - i) Sedimentation. (3)
  - ii) Break point chlorination (3)
  - iii) Structure of EDTA and EBT. (3)

## Unit - II

3. a) State the Zeolite process for the removal of hardness of water. Discuss its merits over lime-soda process. (6)
- b) What are boiler troubles? Discuss their consequences? (5)
- c) A water sample has the analytical report as under :
- $\text{MgCo}_3$  - 84 mg/l  
 $\text{CaCo}_3$  - 40 mg/l  
 $\text{CaCl}_2$  - 55.5 mg/l  
 $\text{Mg}(\text{NO}_3)_2$  - 37 mg/l  
Kcl - 20 mg/l
- Calculate the amount of lime (86% pure) and soda (83% pure) needed for the treatment of 80,000 litres of water. (5)

OR

4. a) Write short note on
- i) Demineralization process of water softening (3)
- ii) Caustic embrittlement. (3)
- iii) Carry over in steam boiler. (3)
- b) A water sample on analysis gives the following data :  $\text{Ca}^{2+}$  = 20 ppm,  $\text{Mg}^{2+}$  = 25 ppm,  $\text{Co}_2$  = 30 ppm,  $\text{HCO}_3^-$  = 150 ppm,  $\text{K}^+$  = 10 ppm. Calculate the lime (87% pure) and soda (91% pure) required to soften 1 million litres of water sample. (7)

## Unit - III

5. a) Discuss the classification of polymers. (4)
- b) Differentiate the thermoplasts and thermosets. (4)
- c) Explain the reactions involved in vulcanisation. (4)
- d) Anionic addition polymerisation. (4)

OR

6. Write short note on the following : (02 marks each)
- a) Bakelite
- b) Nylon 6,6
- c) BUNA Rubber
- d) Neoprene
- e) Natural rubber
- f) Terylene.
- g) Polythene
- h) Butyl rubber.



**Unit - IV**

7. a) Draw a labelled diagram of rotary kiln. Write chemical reactions taking place in the various zones of rotary kiln. (8)
- b) Discuss the manufacture of glass. (4)
- c) Give the composition, properties and uses of borosilicate glass. (4)

**OR**

8. a) Describe the process of 'setting' and 'hardening' of cement concrete, giving the reactions involved in such processes. What is the difference, if any, between 'setting' and 'hardening'? (8)
- b) Write brief note on types of glass. (4)
- c) Write an account of soda lime glass and safety glass. (4)

**Unit - V**

9. a) What are the requisites of a good refractory? (4)
- b) Discuss the seger's (Pyrometric) cone test. (4)
- c) Write brief note on flash and fire point. (4)
- d) Discuss the various types of lubrication. (4)

**OR**

10. a) What are refractories? Write briefly on silica refractory. (6)
- b) Write short note on RUL test. (5)
- c) What do you mean by cloud and pour point. (5)

**OR**

What do you mean by degree of hardness? Discuss the Clark's test for the determination of hardness of water. (7)

Write informative notes on the followings :-

i) Sedimentation. (3)

ii) Break point determination. (3)

iii) Uses of EDTA and EBT. (3)