B.E. First Semester All Branches (C.B.S.) / B.E. First Semester (Fire Engineering)

Engineering Chemistry

P. Pages : 2 Time : Two Hours

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NKT/KS/17/7198

Max. Marks : 40

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Due credit will be given to neatness and adequate dimensions.
7. Diagrams and chemical equations should be given whenever necessary.
8. Use of non programmable calculator is permitted.

1. a) A water sample contains following imparities in ppm **8**

$Mg(HCO_3)_2 = 36.5$, $CaSO_4 = 54.4$

$CaCl_2 = 55.5$, $MgCl_2 = 57$

$MgSO_4 = 90$, $NaHCO_3 = 58.5$

$NaCl = 25.5$

Calculate the quantities of lime (90% pure) and soda (85% pure) required for softening of 75,000 litres of water using $NaAlO_2$ as a coagulant @ 16.4 ppm.

b) What is chlorination? Discuss Break point chlorination and its significance. **4**

OR

2. a) A Zeolite softener was exhausted by passing 20,000 litres of hard water through it. If the zeolite requires 300 litres of 2.5% NaCl solution for regeneration. Calculate the hardness of water. **3**

b) Discuss the formation and disadvantages of scale in boiler. **4**

c) Write a note on Desalination of sea water using - Electrodialysis and Reverse osmosis process. **5**

3. a) Explain the mechanism of electrochemical corrosion with respect to H_2 liberation. **3**

b) How design and material selection helps to control metallic corrosion? **3**

c) Write notes on **4**
i) Galvanic series.
ii) Pitting corrosion.

OR

4. a) What is cathodic protection? How it is achieved by impressed current method. **4**

b) Write short note on following. **6**

i) Pilling – Bedworth rule.
ii) Water line corrosion.
iii) Stress corrosion.

5. a) How portland cement is manufactured by wet process? Explain with well cabled diagram and various reaction. **6**

b) What are cement additives? Discuss any two of them. **4**

OR

6. a) Explain the setting and hardening of cement. **4**

b) Write short note on **6**

i) Microscopic constituents of cement.
ii) Fly ash as a cementing material.

7. a) State the basic principles of Green chemistry and explain any two of them. **4**

b) Discuss the following. **4**

i) Carbon credit concept.
ii) Power density and Energy density.

OR

8. a) What is super critical fluid? State properties and uses of SCF CO_2. **4**

b) Explain construction and working of $H_2 - O_2$ alkaline fuel cell. **4**

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