

Engineering Chemistry Paper - III

P. Pages : 2

Time : Two Hours

**KNT/KW/16/7198**

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 wherever necessary.
 8. Use of non programmable calculator is permitted.

1. a) Calculate the quantities of Lime (85 % pure) and soda (90 % pure) required for the treatment of 1.2 Millions Litre of water containing following salts: 8
- $\text{Ca}(\text{HCO}_3)_2 = 81 \text{ ppm.}$
 $\text{Mg}(\text{HCO}_3)_2 = 73 \text{ ppm}$
 $\text{CaCl}_2 = 27.75 \text{ ppm.}$
 $\text{CaSO}_4 = 68. \text{ ppm.}$
 $\text{NaHCO}_3 = 42 \text{ ppm}$
 $\text{MgCl}_2 = 37.5 \text{ ppm.}$
 Coagulant used is $\text{Al}_2(\text{SO}_4)_3$ at the rate of 11.4 ppm.

- b) What is the purpose of internal treatment of boiler water? Discuss phosphate conditioning and explain why it is preferred over carbonate conditioning in high pressure boiler? 4

OR

2. a) A zeolite was completely exhausted by passing 20,000 litres of water through it. If the zeolite requires 150 litres of 3.5 % NaCl solution for complete regeneration. Calculate the hardness of the water sample. 3

- b) Write a short note on **any three**. 9
- i) Chlorination of water.
 - ii) Caustic embrittlement.
 - iii) Tertiary Treatment.
 - iv) Desalination of sea water by Electro-dialysis process.

3. a) Explain the mechanism of electrochemical corrosion by oxygen absorption. 4

- b) Explain why? **any three**. 6
- i) A copper equipment should not possess a small steel bolt.
 - ii) Rusting of iron is quicker in saline water than in ordinary water.
 - iii) Wire mesh corrodes faster at the joints.

- iv) Iron corrodes faster than Aluminium even though it is placed below Aluminium in electro chemical series.

OR

4. a) Discuss the various factors which influence the rate of corrosion, with respect to nature of metal and environment. 4
- b) Write a short note on **any two**. 6
- i) Pilling-Bed worth rule.
ii) Galvanization.
iii) Electroplating.
5. a) Explain in detail the manufacturing of cement by wet process. 6
- b) Write note on **any two**. 4
- i) Rapid hardening cement.
ii) High Alumina cement.
iii) Ready mix concrete.

OR

6. a) What do you mean by setting and hardening of cement?
b) Discuss the following **any two**.
i) Cement additives.
ii) Microscopic constituent of cement.
iii) Process parameter for manufacturing good cement.
7. a) What are the principles of Green chemistry? Explain any two principles.
b) Explain the construction and working of Ni-Cd battery.

OR

8. a) What is super critical CO_2 ? States it's properties and uses. 4
- b) Write short note on the following **any two**. 4
- i) Bio catalysis.
ii) Energy density & power density.
iii) Carbon Credits.
