Faculty of Engineering & Technology

First Semester B.E. (C.B.S.) Examination

ENGINEERING CHEMISTRY

Paper—III

Time : Two Hours] [Maximum Marks : 40

INSTRUCTIONS TO CANDIDATES

(1) All questions carry marks as indicated.

(2) Answer **FOUR** questions as follows :

(i) Q. No. **1** OR Q. No. **2**

(ii) Q. No. **3** OR Q. No. **4**

(iii) Q. No. **5** OR Q. No. **6**

(iv) Q. No. **7** OR Q. No. **8**

(3) Due credit will be given to neatness and adequate dimensions.

(4) Diagrams and chemical equations should be given wherever necessary.

(5) Illustrate your answers wherever necessary with the help of neat sketches.

(6) Discuss the reaction, mechanism wherever necessary.

(7) Use of non-programmable calculator is permitted.

1. (a) Calculate temporary and permanent hardness along with the amount of Lime (90%) and Soda (95%) required for softening of 80,000 L of water using $NaAlO_2$ at the rate of 16.4 mg/L, with the following impurities (all are in ppm) :

$Ca(HCO_3)_2 = 81$; $Mg(HCO_3)_2 = 73$

$NaCl = 59.5$; $Mg(NO_3)_2 = 74$

$CaCl_2 = 45$ 1+7

(b) Define sterilization. Explain sterilization by using Ozone and UV radiations. 4

OR

2. (a) The total hardness of 10,000 Lts of water was completely removed by Zeolite softener. It required 30 Lts of NaCl solution containing 8.5% NaCl for regeneration. Calculate the hardness of the water sample. 4

(b) What are the causes of scale and sludge formation ? Discuss its disadvantages. 4

(c) Explain Desalination of brackish water by Reverse Osmosis. State its limitations and advantages. 4

3. (a) Give reason :

(i) Silver and copper metal do not undergo much corrosion like Iron in moist atmosphere.

(ii) Wire mesh corrodes faster at the joints.

(iii) Rusting of Iron is quicker in saline water than the ordinary water. 6

(b) Discuss the various factors which influence the corrosion process. 4

OR

4. (a) Write short notes on [any **Two**] :—

(i) Hot Dipping Process

(ii) Anodic Protection

(iii) Cathodic Protection by impressed current. 6

(b) How corrosion can be prevented with proper design and material selection ? 4

5. (a) For what purpose are the following types of cement used and why :

(i) Rapid hardening cement

(ii) Water proof cement

(iii) High Alumina cement

(iv) Low Heat cement ? 4

(b) How is ordinary Portland Cement manufactured by wet process ? Give the various reactions taking place in the Rotary Kiln. Also state the significance of rate of cooling of clinkers. 6

OR

6. (a) What are the important process parameter for manufacturing of good cement clinkers ? 3

(Contd.)

(b) What is setting and hardening of cement ? Discuss with the help of reactions involved. 4

(c) Write informative notes on cement additives. 3

7. (a) Write notes on :—

(i) Carbon Credits

(ii) Biocatalysis. 4

(b) Define Green Chemistry. State its principles and explain any two principles with example. 4

OR

8. (a) Discuss supercritical fluid CO_2 with the help of its phase diagram. 4

(b) Explain the working of Ni-Cd batteries with its advantages, limitations and applications. 4