(b) Write short notes on the following (any ***two***) :

(i) Cement moduli

(ii) Cement additives

(iii) Fly ash as a cementing material. 6

OR

6. (a) Draw a labelled diagram of rotary kiln. Describe the process of manufacture of portland cement by wet process. State the various thermochemical changes occur during the process. 6

(b) Attempt any ***two*** of the following :

(i) Rapid hardening cement

(ii) High alumina cement

(iii) Soundness of cement

(iv) Ready mix concrete. 4

7. (a) Give the significance of green chemistry. State the basic principles of green chemistry. 3

(b) Discuss super critical CO_2 as a green solvent. 3

(c) Define energy density and power density. 2

OR

8. (a) Discuss construction, working and application of Ni-Cd battery. 4

(b) Write notes on (any ***two***) :

(i) Carbon credit

(ii) Biocatalysis

(iii) Primary battery. 4

NTK/KW/15/7286

Faculty of Engineering & Technology

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

ENGINEERING CHEMISTRY

Time : Two Hours] [Maximum Marks : 40

INSTRUCTIONS TO CANDIDATES

(1) All questions carry marks as indicated.

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

Question No. **1 OR** Question No. **2**

Question No. **3 OR** Question No. **4**

Question No. **5 OR** Question No. **6**

Question No. **7 OR** Question No. **8**

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

(4) Assume suitable data wherever necessary.

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

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

(7) Discuss the reaction, mechanism wherever necessary.

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

1. (a) Water contains following impurities in ppm :

$Ca(HCO_3)_2$ = 75 , $MgSO_4$ = 30, $CaCl_2$ = 95,

$Mg(HCO_3)_2$ = 73, Dissolved CO_2 = 20.

Calculate the amount of lime (85% pure) and soda (95% pure) require for the softening of 2,50,000 litres of water using sodium aluminate as a coagulant at the rate of 16.4 ppm. 8

(b) Explain desalination by Electro-dialysis process. 4

OR

2. (a) A zeolite softener was completely exhausted by passing 20,000 litres of water sample through it. If the zeolite requires 150 litres of 5.5% NaCl solution for complete regeneration, calculate the hardness of the water sample. 3

(b) Write notes on (any ***three***) :

(i) Break point chlorination and its significance.

(ii) Tertiary treatment of waste water to reduce water pollution.

(iii) Causes and disadvantages of scale formation in boiler.

(iv) Carbonate and phosphate conditioning. 9

3. (a) How corrosion can be prevented with proper material selection and design ? 4

(b) Explain the following (any ***two***) :

(i) Cathodic protection by impressed current method.

(ii) How rate of corrosion is depend upon nature of environment ?

(iii) Pilling-Bedworth Rule. 6

OR

4. (a) Discuss the mechanism of electrochemical corrosion by O_2 absorption and H_2 liberation. 4

(b) Explain why (any ***three***) :

(i) Anodic area should be larger than cathodic area.

(ii) Copper equipment should not possess a small steel bolt.

(iii) Pitting corrosion is auto-catalytic and self stimulating.

(iv) A pure metal rod, half immersed vertically in water starts corroding at the bottom. 6

5. (a) How does ordinary portland cement set-in and harden on mixing with water ? Justify the answer with chemical equations. 4