

(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<sub>2</sub> 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

**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 :

$\text{Ca}(\text{HCO}_3)_2 = 75$  ,  $\text{MgSO}_4 = 30$ ,  $\text{CaCl}_2 = 95$ ,

$\text{Mg}(\text{HCO}_3)_2 = 73$ , Dissolved  $\text{CO}_2 = 20$ .

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  $\text{O}_2$  absorption and  $\text{H}_2$  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