

PMM/KS/15/6916

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) Answer **FOUR** questions as follows : Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6, Q. 7 or Q. 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) Use of non programmable calculator is permitted.
 - (8) Discuss the reaction, mechanism wherever necessary.
1. (a) Calculate the amount of lime (85% pure) and soda (90% pure) required to soften 5,00,000 liters of water using $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ as a coagulant at the

rate of 69.5 ppm, with the following impurities (in ppm) :

$\text{Ca}(\text{HCO}_3)_2 = 81$; $\text{CaCl}_2 = 111$; $\text{Mg}(\text{HCO}_3)_2 = 73$;
 $\text{MgSO}_4 = 90$; $\text{NaCl} = 72$

Also calculate the carbonate and non-carbonate hardness. 8

- (b) What are boiler scales ? How they are formed ?
 Discuss disadvantages of scales. 4

OR

2. (a) A zeolite softener was exhausted on passing hard water containing 450 ppm of hardness. The exhausted zeolite bed was regenerated completely on passing 290 liters of NaCl solution containing 6% NaCl. Calculate the quantity of hard water that was softened using this softener. 3

- (b) Write short notes on :—

- (i) Caustic embrittlement
- (ii) Phosphate conditioning
- (iii) Chlorination of water. 9

3. (a) What is cathodic protection ? How it is done using sacrificial anode method ? 4

- (b) Attempt any *two* :—

- (i) Atmospheric corrosion
- (ii) Galvanization
- (iii) Effect of Environment on Corrosion. 6

OR

4. (a) Discuss the importance of design and material selection in controlling corrosion. 4
- (b) Give reasons (any *three*) :—
- (i) Rusting of Iron is quicker in saline water than ordinary water.
 - (ii) Corrosion is reverse of extraction metallurgy.
 - (iii) Corrosion occurs in steel pipe connected to copper plumbing.
 - (iv) Corrosion of water filled tanks occurs below the water line. 6
5. (a) Explain the Wet process of cement manufacturing, with a neat and well labelled diagram. 6
- (b) For what purpose following types of cement is used and why ?
- (i) White cement
 - (ii) Low heat cement
 - (iii) High alumina cement
 - (iv) Rapid hardening cement. 4

OR

6. (a) Explain the process of setting and hardening of cement. 5
- (b) What are the important process parameters for manufacturing of good cement clinker. 3
- (c) What do you mean by soundness of cement ? 2

7. (a) Explain construction and working of Ni-Cd battery with its applications. 4
- (b) Write short notes on :—
- (i) Biocatalysis
- (ii) Carbon credit. 4

OR

8. (a) What is Green Chemistry ? Discuss its significance. 3
- (b) What is supercritical fluid ? State properties and advantages of SCF CO_2 . 3
- (c) Discuss the applications of fuel cell. 2