# 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.

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(Contd.)

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<sub>2</sub> 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.

#### OR

- (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.
  - (b) What are the causes of scale and sludge formation?Discuss its disadvantages.
  - (c) Explain Desalination of brackish water by Reverse Osmosis. State its limitations and advantages.

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- 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.

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(Contd.)

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(iii) Rusting of Iron is quicker in saline water than the ordinary water.			
Discuss the various factors which influence the			
corrosion process.			
OR			
Write short notes on [any Two] :-			
(i) Hot Dipping Process			
(ii) Anodic Protection			
(iii) Cathodic Protection by impressed current.			
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4. (a)

(b)

- How corrosion can be prevented with proper design (b) and material selection?
- For what purpose are the following types of cement 5. (a) used and why:
  - Rapid hardening cement
  - (ii) Water proof cement
  - (iii) High Alumina cement
  - (iv) Low Heat cement?

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

### OR

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

(Contd.)

	(b)	What is setting and hardening of cement? Discu with the help of reactions involved.	1SS 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 a	ınd
		explain any two principles with example.	4
		OR	
8.	(a)	Discuss supercritical fluid CO2 with the help	of
		its phase diagram.	4
	(b)	Explain the working of Ni-Cd batteries with	its 4

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