

**Engineering Chemistry**

P. Pages : 2

Time : Two Hours



**NJR/KS/18/4338**

Max. Marks : 40

- Notes :
1. All questions carry marks as indicated.
  2. Solve Question 1 OR Questions No. 2.
  3. Solve Question 3 OR Questions No. 4.
  4. Solve Question 5 OR Questions No. 6.
  5. Solve Question 7 OR Questions No. 8.
  6. Diagrams and chemical equations should be given whenever necessary.
  7. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) Calculate the quantities of lime (80%) and soda (85%) required for treatment of 75,000 L of water with following salts using  $Al_2(SO_4)_3$  as a coagulant at the rate of 40 ppm. **8**
- $Ca(HCO_3)_2 = 42\text{ppm}$ ,       $Mg(HCO_3)_2 = 20\text{ppm}$   
 $CaSO_4 = 68\text{ppm}$ ,       $CaCl_2 = 11.1\text{ppm}$   
 $MgSO_4 = 50\text{ppm}$

- b) Discuss boiler corrosion. **4**

**OR**

2. a) A zeolite bed was completely exhausted by passing 15,000 L of water sample through it. If the zeolite requires 180 L of 2.5% NaCl solution for complete regeneration then calculate the hardness of water sample. **3**

- b) Write short note on **any three**. **9**

- i) Break point chlorination.
- ii) Causes and disadvantages of scale formation.
- iii) Tertiary treatment of wastewater.
- iv) Caustic embrittlement.

3. a) Discuss the importance of design and material selection in controlling the corrosion. **4**

- b) Write brief note on **any three**. **6**

- i) Pitting Corrosion
- ii) Differential Aeration Theory
- iii) Intergranular corrosion
- iv) Electroplating

**OR**

4. a) What is electrochemical corrosion? Describe it by absorption of Oxygen & Liberation of  $H_2$ . 4
- b) Write short notes on **any two**. 6
- i) Pilling Bedworth rule.
- ii) Factors influencing corrosion.
- iii) Cathodic protection by sacrificial anode.
5. a) Describe with well labelled diagram manufacturing of cement by wet process. 6
- b) Explain the following **any two**. 4
- i) Heat of hydration & soundness of cement.
- ii) Ready mix concrete.
- iii) Rapid hardening cement.

**OR**

6. a) What are the important process parameters for manufacturing of good cement clinkers. 3
- b) Explain the properties of microscopic constituents of cement. 4
- c) Write properties and application of flu ash as cementing material. 3
7. a) Write 12 principles of green chemistry. Explain any 2 principles. 4
- b) Write short note on **any two**. 4
- i) Applications of Lithium Battery.
- ii) Primary Batteries.
- iii) Biocatalysis.

**OR**

8. a) Discuss construction, working and applications of  $H_2O_2$  alkaline fuel cell. 4
- b) Write short notes on **any two**. 4
- i) Energy density and power density.
- ii) Advantages and applications of  $CO_2$  as super critical fluid.
- iii) Significance of green chemistry.

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