

# CBCS SCHEME

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## First/Second Semester B.E. Degree Examination, Engineering Chemistry

Time: 3 hrs.

Max. Marks: 100

**Note:** Answer any FIVE full questions, choosing ONE full question from each module.

### Module-1

- 1 a. What are ion selective electrodes? Describe the construction of glass electrode with diagram. (07 Marks)
- b. Define Single Electrode Potential. Derive the Nernst equation for single electrode potential. (07 Marks)
- c. What are Fuel Cells? Give the differences between fuel cell and conventional cell. (06 Marks)

OR

- 2 a. EXplain the following battery characteristics
  - i) Energy efficiency ii) Cycle life iii) Self life. (06 Marks)
- b. Describe the construction and working of Zn — Air cell. Mention its applications. (07 Marks)
- c. What are concentration cells? Calculate the cell potential of the following cell at 298K.  
 $\text{C}_6\text{H}_5\text{I} \text{C}^+ (0.001 \text{ M}) \parallel \text{I} \text{C}^+ (0.1 \text{ M}) \mid \text{Cu}$ . Write the cell reactions. (07 Marks)

### Module-2

- 3 a. Explain the following factors affecting the rate of corrosion :
  - i) Ratio of anodic to cathodic area ii) pH iii) Temperature. (06 Marks)
- b. What is Tinning? Explain the process of tinning by hot dipping process. (07 Marks)
- c. What is Electroless Plating? Explain electroless plating of copper with suitable reactions. (07 Marks)

OR

- 4 a. Define Corrosion. Explain Electrochemical theory of corrosion by taking iron as an example. (07 Marks)
- b. What is Metal finishing? What are the technological importance of metal finishing. (06 Marks)
- c. Explain Electroplating of chromium for decorative and hard deposit. (07 Marks)

### Module-3

- 5 a. What is Cracking? Explain fluidized bed catalytic cracking. (07 Marks)
- b. Explain the synthesis of petrol by Fischer Tropsch process. (06 Marks)
- c. What are Photovoltaic cells? Explain construction and working of a photovoltaic Cell. (07 Marks)

OR

- 6 a. Define GCV and NCV. Calculate the gross and net calorific value of a sample of coal from the following data :  
 Weight of coal = 0.80 g ; Weight of water = 2000 g ; Water equivalent of calorimeter = 500g ; Rise in temperature =  $2.5^\circ\text{C}$  ; Specific heat of water =  $4.187 \text{ kJ/kg/}^\circ\text{C}$   
 % of hydrogen = 5% ; Latent heat of steam =  $2457 \text{ kJ/kg}$ . (08 Marks)
- b. Explain Modules , Panels and Arrays of Photovoltaic cells. (06 Marks)
- c. Explain purification of silicon by zone refining process. (06 Marks)

17CHE12/22

#### Module-4

- 7 a. What is Polymerization? Explain addition and condensation polymerization with example. (07 Marks)
- b. Explain the synthesis and applications of the following polymers : (06 Marks)
- i) Polyurethane ii) Silicone rubber.
- c. What are Polymer composites? Give the synthesis and applications of Kevlar. (07 Marks)

#### **OR**

- 8 a. In a polymer sample, 25% of molecules have molecular mass 1000 g/mol, 35% molecules have molecular mass 2000 g/mol and remaining molecules have molecular mass 3000 g/mol. Calculate the number average and weight average molecular mass of the polymer. (06 Marks)
- b. What is Glass transition temperature? Explain any THREE factors affecting the glass transition temperature. (07 Marks)
- c. Explain free radical mechanism of addition polymerization of vinyl chloride. (07 Marks)

#### Module-5

- 9 a. Explain the Activated Sludge method of treatment of sewage water. (06 Marks)
- b. Define BOD and COD. In a COD test 26.5 cm<sup>3</sup> and 15.0 cm<sup>3</sup> of 0.05N FAS solutions were required for blank and sample titrations respectively. The volume of the test sample used was 25 cm<sup>3</sup>. Calculate the COD of the test sample. (07 Marks)
- c. What are Nano materials? Describe the synthesis of nano material by Sol gel method. (07 Marks)

#### **OR**

- 10 a. What is Desalination? Explain the desalination of sea water by reverse osmosis. (06 Marks)
- b. Explain synthesis of nano materials by chemical vapour condensation process. (06 Marks)
- c. Write a note on the following : (08 Marks)
- i) Carbon nano tubes and ii) Fullerenes.