

# CBCS Scheme

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17CHE12/22

## First/Second Semester B.E. Degree Examination, June/July 2018 Engineering Chemistry

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- Define single electrode potential. Derive Nernst equation. (07 Marks)
  - Describe the construction and working of zinc-air battery. Mention any two applications. (07 Marks)
  - Define concentration cells. The cell potential of Ag concentration cell is  $\text{Ag}/\text{AgNO}_3(0.002\text{M})/(\text{AgNO}_3(\text{XM})/\text{Ag}$  is 0.0751V at 25°C. Write the cell reactions and calculate the value of X. (06 Marks)

OR

- What are reference electrodes? How will you determine the electrode potential of unknown electrode using calomel as reference electrode? (07 Marks)
  - Explain the construction and working of Lithium ion battery. Mention its application. (07 Marks)
  - What are fuel cells? Explain the construction and working of methanol-oxygen fuel cell. (06 Marks)

### Module-2

- Define corrosion. Explain electrochemical theory of corrosion by taking iron as example. (07 Marks)
  - What is galvanizing? Explain the various steps involved in it. (07 Marks)
  - Explain electroplating of Nickel by Watts Bath and mention its uses. (06 Marks)

OR

- Explain stress corrosion and water line. (07 Marks)
  - Explain the following: i) polarization ii) over voltage. (06 Marks)
  - What is electroless plating? Explain the electroless plating of copper. (07 Marks)

### Module-3

- A coal sample contains 5.8%  $\text{H}_2$  is subjected to combustion in a bomb calorimeter. Calculate the gross and net calorific values. Given that mass of coal sample is  $0.78 \times 10^{-3}$  kg, mass of water in copper calorimeter is 2.5 kg, water equivalent of calorimeter is 0.83 kg rise in temperature is 3.2°C, latent heat of steam is 2454 kJ/kg and specific heat 4.187 kJ/kg/°C. (07 Marks)
  - Define knocking. Explain the mechanism of knocking and mention its ill effects. (07 Marks)
  - Define photovoltaic cell. Describe the construction and working of photo-voltaic cell with a neat diagram. (06 Marks)

OR

- Define cracking. Explain fluidized catalytic cracking with a neat diagram. (07 Marks)
  - Explain the Fischer-Tropsch process of synthesis of petrol. (07 Marks)
  - Describe the method of purification of silicon by zone refining. (06 Marks)

**Module-4**

- 7 a. Distinguish between addition and condensation polymerization reactions with suitable examples. (06 Marks)
- b. Explain the mechanism of addition polymerization by taking vinyl chloride as example. (07 Marks)
- c. A polymer sample containing 100, 150 and 200 molecules having molar mass 3000 g/mol, 3500 g/mol and 4000 g/mol respectively. Calculate the number average and weight average molecular mass of the polymer. (07 Marks)

**OR**

- 8 a. Define  $T_g$ . Explain any three factors affecting  $T_g$ . (07 Marks)
- b. Describe the synthesis of (i) Polyurethane (ii) Silicone rubber. Mention the application. (07 Marks)
- c. What are adhesives? Explain the synthesis and application of epoxy resins. (06 Marks)

**Module-5**

- 9 a. What is boiler feed water? Explain priming and foaming in boilers. (06 Marks)
- b. Define COD. In a COD tests  $32.7 \text{ cm}^3$  and  $23.5 \text{ cm}^3$  of 0.02N FAS solution are required for blank and sample titration respectively. The volume of test sample is  $25 \text{ cm}^3$ . Calculate the COD of solution. (07 Marks)
- c. Explain the synthesis of nanomaterial by sol-gel process. (07 Marks)

**OR**

- 10 a. Define BOD. Explain the determination of BOD. (07 Marks)
- b. What is desalination? Explain the desalination of seawater by electro dialysis. (07 Marks)
- c. Write a note on nano composites and fullerenes. (06 Marks)

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