

# CBCS Scheme

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17CHE12

## First Semester B.E. Degree Examination, Dec.2017/Jan.2018 Engineering Chemistry

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- What are reference electrodes? Describe the construction and working of Calomel electrode, mention the uses. (07 Marks)
  - Define Battery. Explain construction, working and uses of Ni-metal Hydride battery. (07 Marks)
  - What are fuel cells? Explain the construction and working of Methanol oxygen cell. (06 Marks)

OR

- Define single Electrode Potential? Derive Nernst equation for single electrode. (07 Marks)
  - What are concentration cells? The cell potential of Ag concentration cell,  $\frac{\text{Ag}_{(s)}}{\text{AgNO}_3} (0.001\text{M})(\text{AgNO}_3(\text{XM})/\text{Ag}_{(s)})$  is 0.0659 V at 25°C. Write the cell reactions and calculate the value of X. (07 Marks)
  - Write a note on: (i) Capacity (ii) Cycle life (iii) Voltage (06 Marks)

### Module-2

- Define corrosion. Explain electrochemical theory of corrosion by taking Iron as an example. (07 Marks)
  - What is Anodizing? Explain anodizing of aluminium, mention uses. (07 Marks)
  - Define Electroless plating. What are the differences between electro plating and electroless plating? (06 Marks)

OR

- What is differential aeration corrosion? Explain pitting corrosion with anode and cathode reactions. (07 Marks)
  - Define metal finishing? Explain electroplating of Nickel by Watt's bath, mention the uses. (07 Marks)
  - What is cathodic protection? Explain the sacrificial anode method and impressed current method. (06 Marks)

### Module-3

- Define GCV and NCV? How calorific value of a solid/liquid fuel is determined using bomb calorimeter. (07 Marks)
  - Define octane and cetane number? What is the objective of reforming of petrol and discuss the various methods of reforming. (07 Marks)
  - What are solar cells? Describe the method of purification of silicon by zone refining. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 6 a. A coal sample containing 92% C, 7% H<sub>2</sub> and 3% Ash is subjected to combustion in a bomb calorimeter. Calculate the Gross and Net calorific values. Given that mass of coal sample is  $0.85 \times 10^{-3}$  kg, mass of water in copper calorimeter is 2 kg, water equivalent of calorimeter is 0.75 kg, rise in temperature of water is 2.5°C, latent heat of steam is 2454 kJ/kg and specific heat of water is 4.187 kJ/kg°C. (07 Marks)
- b. Describe the production of solar grade Si by union carbide process. (07 Marks)
- c. Explain the construction and working of a PV cell. (06 Marks)

Module-4

- 7 a. What are polymers? Illustrate the mechanism of addition polymerization by taking vinyl chloride as an example. (07 Marks)
- b. Describe the manufacture of, (i) PMMA (ii) Kevlar. Mention the uses. (07 Marks)
- c. Define addition and condensation polymerization process with one example each. (06 Marks)

OR

- 8 a. Define Glass Transition Temperature. Explain any three factors affecting T<sub>g</sub>. (07 Marks)
- b. What are Elastomers? Give the synthesis and applications of, (i) Silicone rubber (ii) Epoxy resin. (07 Marks)
- c. A polymer sample containing 50, 100 and 150 molecules having molar mass 2000 g/mol, 2500 g/mol and 3000 g/mol respectively. Calculate the number average and weight average molecular mass of polymer. (06 Marks)

Module-5

- 9 a. What is Boiler Feed Water? Explain the differences between scale and sludge formation in boiler. (07 Marks)
- b. What is desalination? Explain the desalination of sea water by electrodialysis. (07 Marks)
- c. What are nano materials? Explain the synthesis of nano material by Sol.gel method. (06 Marks)

OR

- 10 a. Define COD and BOD. In COD test 25.5 cm<sup>3</sup> and 12.5 cm<sup>3</sup> of 0.05 N FAS solution are required for blank and sample titration respectively. The volume of the test sample used is 26 cm<sup>3</sup>. Calculate the COD of the sample solution. (08 Marks)
- b. Describe the synthesis of nano materials by chemical vapor condensation process. (06 Marks)
- c. Write a note on CNT and Dendrimers. (06 Marks)

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