CBCS Scheme

USN 15CHE12/22

First/Second Semester B.E. Degree Examination, Dec.2016/Jan.2017
Engineering Chemistry

Time: 3 hrs. Max. Marks: 80

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

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.

Module-1

1 a. Describe the construction and working of Li-MnO_2 battery. **(05 Marks)**

b. Define battery. Explain the following battery characteristics:
(i) Electricity storage density.
(ii) Energy efficiency.
(iii) Cycle life.
(iv) Shelf life. **(05 Marks)**

c. Define reference electrode. Explain the construction and working of Calomel electrode. **(06 Marks)**

OR

2 a. A concentration cell was constructed by immersing two silver electrodes in 0.02 M and 2 M $AgNO_3$ solution. Write the cell representation, cell reactions and calculate the EMF of the cell at 25°C. **(05 Marks)**

b. Derive Nernst equation for single electrode potential. **(05 Marks)**

c. Explain the construction and working of methanol oxygen fuel cell. Mention its application. **(06 Marks)**

Module-2

3 a. What is cathodic protection? Explain how a metal article is protected by sacrificial anodic method. **(05 Marks)**

b. Explain the following factors affecting the rate of corrosion:
(i) Nature of the metal.
(ii) Ratio of anodic to cathodic areas.
(iii) pH. **(05 Marks)**

c. Explain electroless plating of copper with relevant reaction. **(06 Marks)**

OR

4 a. What is metal finishing? Give the technological importance of metal finishing. **(05 Marks)**

b. Explain the influence of the following factors on the nature of electrodeposit:
(i) pH.
(ii) Temperature.
(iii) Concentration of the metal ion. **(05 Marks)**

c. Explain stress and differential metal corrosion with example. **(06 Marks)**

Module-3

5 a. Define cracking. Describe fluidized bed catalytic cracking. **(05 Marks)**

b. What is biodiesel? Explain the synthesis and advantages of biodiesel. **(05 Marks)**

c. Explain the production of solar grade silicon by union-carbide process. **(06 Marks)**

OR

6 a. Define photo voltaic cell. Explain the construction and working of photo voltaic cell. **(06 Marks)**

b. Explain the purification of silicon by zone refining. **(04 Marks)**

c. A 0.6 g of coal sample (carbon 90%, H_2 3% and ash 7%) was subjected to combustion in a bomb calorimeter. Mass of water taken in the calorimeter was 2000 g and the water equivalent of calorimeter was 400 g. The rise in temperature was 3°C. Calculate the gross and net calorific value of the sample. Given, specific heat of water is 4.187 KJ/kg/°C and latent heat of steam is 2454 KJ/kg. **(06 Marks)**

Module-4

7 a. Explain the free radical mechanism for addition polymerization by taking vinyl chloride as an example. **(06 Marks)**

b. Explain the synthesis, properties and applications of epoxy resin. **(04 Marks)**

c. What is glass transition temperature? Explain the following factors affecting glass transition temperature.
(i) Chain flexibility and
(ii) Intermolecular forces. **(06 Marks)**

OR

8 a. Explain structure – property relationship of polymers with respect to,
(i) Crystallinity (ii) Tensile strength **(05 Marks)**

b. What is polymerization? Explain addition and condensation polymerization with example. **(05 Marks)**

c. What are polymer composite? Explain the synthesis, properties and application of Kevlar fibre. **(06 Marks)**

Module-5

9 a. Write a note on fullerenes. Mention its application. **(05 Marks)**

b. Discuss the synthesis of nanomaterials by gas condensation method and chemical vapour condensation processes. **(05 Marks)**

c. Discuss the experimental determination of Dissolved Oxygen (DO) of waste water. Mention the reactions involved in it. **(06 Marks)**

OR

10 a. What is desalination? Discuss the desalination of sea water by ion exchange process. **(05 Marks)**

b. What is boiler feed water? Explain the scale and sludge formation in boilers. **(05 Marks)**

c. Explain any three size dependent properties of nanomaterials. **(06 Marks)**

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