CBCS Scheme

USN | | | | | | | | | | |

15CHE12/22

First/Second Semester B.E. Degree Examination, June/July 2016
Engineering Chemistry

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Explain the construction and working of silver-silver chloride electrode. **(05 Marks)**

b. What are ion selective electrodes? Discuss the construction and working of a glass electrode. **(06 Marks)**

c. Explain the construction and working of Zinc-Air cell. **(05 Marks)**

OR

2 a. Derive Nerst expression for single electrode potential. **(05 Marks)**

b. Explain the following battery characteristics ;
   i) Energy efficiency
   ii) Shelf life
   iii) Cycle life **(06 Marks)**

c. Explain the construction and working of Methanol - Oxygen fuel cell with H_2SO_4 electrolyte. **(05 Marks)**

Module-2

3 a. Explain electrochemical theory of corrosion with an example. **(05 Marks)**

b. Discuss the differential metal corrosion with an example. **(05 Marks)**

c. What is electroless plating? Mention the differences between electoplating and electroless plating. **(06 Marks)**

OR

4 a. Discuss the following factors influencing nature of electrodeposit. **(06 Marks)**
   i) Brighteners
   ii) Levellers and
   iii) pH

b. Explain electroplating of Decorative chromium. **(05 Marks)**

c. Discuss the process of Galvanization of Iron sheet. **(05 Marks)**

Module-3

5 a. How Calorific value of a solid fuel is determined using bomb calorimeter? **(05 Marks)**

b. What is meant by cracking? Describe with a neat diagram, fluidized bed cracking method. **(06 Marks)**

c. Explain the construction and working of a photovoltaic cell. **(05 Marks)**

OR

6 a. 0.75g of coal containing 2% hydrogen, when burnt in a bomb calorimeter, increased the temperature of 2.7kg water from 27.2°C to 29.7°C. If the water equivalent of calorimeter is 1.2kg. Calculate gross and net calorific value (specific heat of water 4.187kJ/kg/°C, latent heat of steam 2457 kJ/kg). **(06 Marks)**

b. Explain production of solar grade silicon by union carbide process. **(05 Marks)**

c. Discuss the zone refining process of purification of silicon. **(05 Marks)**

Module-4

7 a. Explain free radical mechanism of addition polymerization of vinyl chloride. **(05 Marks)**

b. Give the synthesis and applications of the following polymers ;

i) PMMA

ii) Polycarbonate. **(06 Marks)**

c. What are polymer composites? Explain synthesis, properties and applications of Kevlar. **(05 Marks)**

OR

8 a. A polymer sample contains 200 molecules of molecular mass 2000, 300 molecules of molecular mass 3000 and 500 molecules of molecular mass 5000. Calculate number average and weight average molecular masses of the polymer. **(06 Marks)**

b. What is glass transition temperature? Explain any THREE factors that influence the glass transition temperature. **(05 Marks)**

c. What are conducting polymers? Give the mechanism of conduction in polyaniline and two applications. **(05 Marks)**

Module-5

9 a. Explain the scale and sludge formation in boiler. **(06 Marks)**

b. What is desalination? Explain reverse osmosis process of desalination of sea water. **(05 Marks)**

c. Explain synthesis of nano-material by sol-gel process. **(05 Marks)**

OR

10 a. Define COD. Calculate COD of 25CC of an effluent sample which requires 8.3CC of 0.001M $K_2Cr_2O_7$ for its complete oxidation. **(05 Marks)**

b. Explain treatment of sewage by activated sludge process. **(06 Marks)**

c. Explain synthesis of nano materials by precipitation method. **(05 Marks)**

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