CBCS SCHEME

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17CHE12/22

First/Second Semester B.E. Degree Examination, Aug./Sept.2020
Engineering Chemistry

Time: 3 hrs. Max. Marks: 100

Note: Answer any 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. Define Single Electrode Potential. Derive the Nernst equation for single electrode. **(07 Marks)**

b. What are reference electrodes? Describe the construction and working of glass electrode. Mention the uses. **(07 Marks)**

c. Define fuel cells. Explain the difference between battery and fuel cell. **(06 Marks)**

OR

2 a. What are concentration cells? An electrolyte concentration cell consists of two magnesium electrodes immersed in magnesium nitrate solutions of 0.024 M and 0.064M concentration at 25°C. Give the cell representation, cell reaction and calculate the emf of the cell. **(07 Marks)**

b. Describe he construction and working of lithium ion battery. Mention the uses. **(07 Marks)**

c. Write a note on (i) Voltage (ii) Cycle life (iii) Shelf life. **(06 Marks)**

Module-2

3 a. What is galvanization? Explain galvanization process by hot dipping? Mention uses. **(07 Marks)**

b. Define Electroless Plating. Explain electroless plating of copper with relevant reactions. **(07 Marks)**

c. Explain the following factors affecting rate of corrosion :
(i) Nature of the metal (ii) Ratio of anodic and cathodic area (iii) pH **(06 Marks)**

OR

4 a. Define corrosion. Explain the electrochemical theory of corrosion by taking Iron as an example. **(07 Marks)**

b. Define electroplating? Explain the electroplating of chromium. Mention the uses. **(07 Marks)**

c. Define Metal Finishing? Give the technological importance of metal finishing. **(06 Marks)**

Module-3

5 a. What is cracking? Explain fluidized catalytic cracking process. **(07 Marks)**

b. 0.85g of coal sample (Carbon = 90%, H_2 = 5% and ash = 5%) was subjected to combustion in a bomb calorimeter. Mass of water taken in the calorimeter was 2000g and the water equivalent of the calorimeter was 600g. The rise in temperature was found to be 3.5°C. Calculate the gross and net calorific values of the sample.
(Latent heat of steam = 2454 kJ kg^{-1}, Specific heat of water = 4.2 kJ kg^{-1} $°C^{-1}$) **(07 Marks)**

c. Explain the purification of Silicon by zone refining process. **(06 Marks)**

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OR

6 a. Define calorific value of fuel? Explain the experimental determination of calorific value of a solid fuel using Bomb Calorimeter. **(07 Marks)**

b. Describe the synthesis of petrol by Fishcer – Tropsch process. **(07 Marks)**

c. Explain the construction and working of Photovoltaic Cell. **(06 Marks)**

Module-4

7 a. Define Polymers. Differentiate between Addition and Condensation polymerization. **(07 Marks)**

b. Explain the free radical mechanism of addition polymerization of by taking vinyl chloride as an example. **(07 Marks)**

c. Explain the synthesis and applications of (i) Polyurethanes (ii) Polycarbonates. **(06 Marks)**

OR

8 a. In a sample of a polymer, 100 molecules have molecular mass 10^3 g/mol, 250 molecules have molecular mass 10^4 g/mol and 300 molecules have molecular mass 10^5 g/mol. Calculate the number average and weight average molecular mass of the polymer. **(07 Marks)**

b. Define Glass transition temperature? Explain any three factors affecting glass transition temperature. **(07 Marks)**

c. Give the synthesis and applications of (i) Kevlar (ii) Epoxy resin. **(06 Marks)**

Module-5

9 a. What is boiler corrosion? Explain with reactions. **(07 Marks)**

b. What is desalination? Explain desalination of seawater by Reverse Osmosis process. **(07 Marks)**

c. What are nano materials? Explain the synthesis of nano materials by Sol-gel method. **(06 Marks)**

OR

10 a. Define COD and BOD. In a COD test 20.5 cm^3 and 10.5 cm^3 of 0.01 N FAS solution are required for blank and sample titration respectively. The volume of test sample used is 25 cm^3. Calculate the COD of the sample. **(07 Marks)**

b. Explain any three size dependent properties of nanomaterials. **(07 Marks)**

c. Write short notes on :
(i) Fullerenes
(ii) Carbon nano rods. **(06 Marks)**

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