CBCS Scheme

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

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.***

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

Module-1

1 a. What are reference electrodes? Describe the construction and working of Calomel electrode, mention the uses. **(07 Marks)**

b. Define Battery. Explain construction, working and uses of Ni-metal Hydride battery. **(07 Marks)**

c. What are fuel cells? Explain the construction and working of Methanol oxygen cell. **(06 Marks)**

OR

2 a. Define single Electrode Potential? Derive Nernst equation for single electrode. **(07 Marks)**

b. What are concentration cells? The cell potential of Ag concentration cell,

$\frac{Ag_{(s)}}{AgNO_3}(0.001M)(AgNO_3(XM)/Ag_{(s)}$ is 0.0659 V at 25°C. Write the cell reactions and calculate the value of X. **(07 Marks)**

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

Module-2

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

b. What is Anodizing? Explain anodizing of aluminium, mention uses. **(07 Marks)**

c. Define Electroless plating. What are the differences between electro plating and electroless plating? **(06 Marks)**

OR

4 a. What is differential aeration corrosion? Explain pitting corrosion with anode and cathode reactions. **(07 Marks)**

b. Define metal finishing? Explain electroplating of Nickel by Watt's bath, mention the uses. **(07 Marks)**

c. What is cathodic protection? Explain the sacrificial anode method and impressed current method. **(06 Marks)**

Module-3

5 a. Define GCV and NCV? How calorific value of a solid/liquid fuel is determined using bomb colorimeter. **(07 Marks)**

b. Define octane and cetane number? What is the objective of reforming of petrol and discuss the various methods of reforming. **(07 Marks)**

c. What are solar cells? Describe the method of purification of silicon by zone refining. **(06 Marks)**

OR

6 a. A coal sample containing 92% C, 7% H_2 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 0.85×10^{-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) PMM A (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 Tg. **(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^3 and 12.5 cm^3 of 0.05 N FAS solution are required for blank and sample titration respectively. The volume of the test sample used is 26 cm^3. 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)**

* * * * *