CBCS Scheme

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

17CHE12/22

First/Second Semester B.E. Degree Examination, June/July 2018
Engineering Chemistry

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Define single electrode potential. Derive Nernst equation. **(07 Marks)**

b. Describe the construction and working of zinc-air battery. Mention any two applications. **(07 Marks)**

c. Define concentration cells. The cell potential of Ag concentration cell is $Ag/AgNO_3(0.002M)/(AgNO_3(XM)/Ag$ is 0.0751V at 25°C. Write the cell reactions and calculate the value of X. **(06 Marks)**

OR

2 a. What are reference electrodes? How will you determine the electrode potential of unknown electrode using calomel as reference electrode? **(07 Marks)**

b. Explain the construction and working of Lithium ion battery. Mention its application. **(07 Marks)**

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

Module-2

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

b. What is galvanizing? Explain the various steps involved in it. **(07 Marks)**

c. Explain electroplating of Nickel by Watts Bath and mention its uses. **(06 Marks)**

OR

4 a. Explain stress corrosion and water line. **(07 Marks)**

b. Explain the following: i) polarization ii) over voltage. **(06 Marks)**

c. What is electro less plating? Explain the electro less plating of copper. **(07 Marks)**

Module-3

5 a. A coal sample contains 5.8% H_2 is subjected to combustion in a bomb calorimeter. Calculate the gross and net calorific values. Given that mass of coal sample is 0.78×10^{-3} kg, mass of water in copper calorimeter is 2.5 kg, water equivalent of calorimeter is 0.83 kg rise in temperature is 3.2°C, latent heat of steam is 2454 kJ/kg and specific heat 4.187 kJ/kg/°C. **(07 Marks)**

b. Define knocking. Explain the mechanism of knocking and mention its ill effects. **(07 Marks)**

c. Define photovoltaic cell. Describe the construction and working of photo-voltaic cell with a neat diagram. **(06 Marks)**

OR

6 a. Define cracking. Explain fluidized catalytic cracking with a neat diagram. **(07 Marks)**

b. Explain the Fischer-Tropsch process of synthesis of petrol. **(07 Marks)**

c. Describe the method of purification of silicon by zone refining. **(06 Marks)**

Module-4

7 a. Distinguish between addition and condensation polymerization reactions with suitable examples. **(06 Marks)**

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

c. A polymer sample containing 100, 150 and 200 molecules having molar mass 3000 g/mol, 3500 g/mol and 4000 g/mol respectively. Calculate the number average and weight average molecular mass of the polymer. **(07 Marks)**

OR

8 a. Define T_g. Explain any three factors affecting T_g. **(07 Marks)**

b. Describe the synthesis of (i) Polyurethane (ii) Silicone rubber. Mention the application. **(07 Marks)**

c. What are adhesives? Explain the synthesis and application of epoxy resins. **(06 Marks)**

Module-5

9 a. What is boiler feed water? Explain priming and foaming in boilers. **(06 Marks)**

b. Define COD. In a COD tests 32.7 cm^3 and 23.5 cm^3 of 0.02N FAS solution are required for blank and sample titration respectively. The volume of test sample is 25 cm^3. Calculate the COD of solution. **(07 Marks)**

c. Explain the synthesis of nanomaterial by sol-gel process. **(07 Marks)**

OR

10 a. Define BOD. Explain the determination of BOD. **(07 Marks)**

b. What is desalination? Explain the desalination of seawater by electro dialysis. **(07 Marks)**

c. Write a note on nano composites and fullerenes. **(06 Marks)**

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