CBCS SCHEME

17CHE12/22

First/Second Semester B.E. Degree Examination, Dec.2019/Jan.2020
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. What are ion selective electrodes? Describe the construction of glass electrode with diagram. **(07 Marks)**
   b. Define Single Electrode Potential. Derive the Nernst equation for single electrode potential. **(07 Marks)**
   c. What are Fuel Cells? Give the differences between fuel cell and conventional cell. **(06 Marks)**

OR

2 a. Explain the following battery characteristics :
      i) Energy efficiency   ii) Cycle life   iii) Self life. **(06 Marks)**
   b. Describe the construction and working of Zn – Air cell. Mention its applications. **(07 Marks)**
   c. What are concentration cells? Calculate the cell potential of the following cell at 298K.
      $C_u | C_u^{2+} (0.001M) || C_u^{2+} (0.1M) | C_u$. Write the cell reactions. **(07 Marks)**

Module-2

3 a. Explain the following factors affecting the rate of corrosion :
      i) Ratio of anodic to cathodic area   ii) pH   iii) Temperature. **(06 Marks)**
   b. What is Tinning? Explain the process of tinning by hot dipping process. **(07 Marks)**
   c. What is Electroless Plating? Explain electroless plating of copper with suitable reactions. **(07 Marks)**

OR

4 a. Define Corrosion. Explain Electrochemical theory of corrosion by taking iron as an example. **(07 Marks)**
   b. What is Metal finishing? What are the technological importance of metal finishing. **(06 Marks)**
   c. Explain Electroplating of chromium for decorative and hard deposit. **(07 Marks)**

Module-3

5 a. What is Cracking? Explain fluidized bed catalytic cracking. **(07 Marks)**
   b. Explain the synthesis of petrol by Fishcher Tropsch process. **(06 Marks)**
   c. What are Photovoltaic cells? Explain construction and working of a photovoltaic cell. **(07 Marks)**

OR

6 a. Define GCV and NCV. Calculate the gross and net calorific value of a sample of coal from the following data :
      Weight of coal = 0.80 g ; Weight of water = 2000 g ; Water equivalent of calorimeter = 500g ; Rise in temperature = 2.5^0C ; Specific heat of water = 4.187kJ/kg/^{0}C
      % of hydrogen = 5% ; Latent heat of steam = 2457 kJ/kg. **(08 Marks)**
   b. Explain Modules , Panels and Arrays of Photovoltaic cells. **(06 Marks)**
   c. Explain purification of silicon by zone refining process. **(06 Marks)**

1 of 2

Module-4

7 a. What is Polymerization? Explain addition and condensation polymerization with example.
   (07 Marks)
   b. Explain the synthesis and applications of the following polymers :
      i) Polyurethane   ii) Silicone rubber. (06 Marks)
   c. What are Polymer composites? Give the synthesis and applications of Kevlar. (07 Marks)

OR

8 a. In a polymer sample, 25% of molecules have molecular mass 1000 g/mol , 35% molecules have molecular mass 2000 g/mol and remaining molecules have molecular mass 3000 g/mol. Calculate the number average and weight average molecular mass of the polymer. (06 Marks)
   b. What is Glass transition temperature? Explain any THREE factors affecting the glass transition temperature. (07 Marks)
   c. Explain free radical mechanism of addition polymerization of vinyl chloride. (07 Marks)

Module-5

9 a. Explain the Activated Sludge method of treatment of sewage water. (06 Marks)
   b. Define BOD and COD. In a COD test 26.5 cm^3 and 15.0 cm^3 of 0.05N FAS solutions were required for blank and sample titrations respectively. The volume of the test sample used was 25 cm^3. Calculate the COD of the test sample. (07 Marks)
   c. What are Nano materials? Describe the synthesis of nano material by Sol – gel method.
   (07 Marks)

OR

10 a. What is Desalination? Explain the desalination of sea water by reverse osmosis. (06 Marks)
   b. Explain synthesis of nano materials by chemical vapour condensation process. (06 Marks)
   c. Write a note on the following :
      i) Carbon nano tubes and   ii) Fullerenes. (08 Marks)

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