CBCS SCHEME

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

15CHE12/22

First/Second Semester B.E. Degree Examination, Dec.2018/Jan.2019
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. Derive Nernst equation for single electrode potential. **(05 Marks)**

b. Define electrolyte concentration cell. The e.m.f of cell $Ag|AgNO_3$ (0.001M)|| Ag NO_3(XM)| Ag is 0.0591 V at 25°C. Find the value of X. **(05 Marks)**

c. Explain the following battery characteristics:
   i) Cell potential
   ii) Capacity
   iii) Cycle life. **(06 Marks)**

OR

2 a. Define reference electrode. Discuss the construction and working of Ag-Agcl electrode. **(05 Marks)**

b. Describe the construction and working of Lithium – ion battery. Mention its application. **(05 Marks)**

c. Describe construction, working and application of methanol O_2 fuel cell using H_2SO_4 as electrolyte. **(06 Marks)**

Module-2

3 a. Explain electrochemical theory of corrosion taking Iron as an example. **(05 Marks)**

b. Explain the following factors affecting corrosion
   (i) Nature of corrosion product
   (ii) Ratio of Anodic to cathodic Area
   (iii) p^H of the medium. **(05 Marks)**

c. Describe electroplating of chromium (decorative and Hard). Mention the reasons for not using chromium Anode in electroplating of chromium. **(06 Marks)**

OR

4 a. Explain waterline and pitting corrosion. **(06 Marks)**

b. What is metal finishing? Mention technological importance of metal finishing. **(05 Marks)**

c. Describe electro-less plating of copper with plating reactions. **(05 Marks)**

Module-3

5 a. Define Cracking. Explain fluidized bed catalytic cracking method with a neat diagram. **(05 Marks)**

b. What is Reforming of petroleum? Give any three reactions involved in reforming. **(05 Marks)**

c. What is photovoltaic cell? Explain the construction and working of photovoltaic cell. Mention any two advantages. **(06 Marks)**

OR

6 a. Calculate the Gross or Net calorific value of a coal sample from the following data obtained from Bomb calorimetric experiment. **(05 Marks)**

i) Weight of coal = 0.65×10^{-3}kg
ii) Weight water in colorimeter = 1200g
iii) Water equivalent of calorimeter = 400g
iv) Latent heat of steam = 587×4.2kJ/kg
v) Rise in temperature = 1.8°C
vi) Sp-heat of water = 4.187kJ/kg % of H = 5

b. Explain the modules, panels and arrays of the design of PV cell. **(06 Marks)**

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

Module-4

7 a. Explain free radical mechanism for addition polymerization taking vinyl chloride as an example. **(06 Marks)**

b. Describe the synthesis and applications of the following polymer.
i) Plexiglass (PMMA)
ii) Polyurethane **(06 Marks)**

c. What is glass transition temperature? Discuss how flexibility of polymer chain affects glass transition temperature. **(04 Marks)**

OR

8 a. Calculate number average and weight average of a polymer in which 200 molecules of 1000 g/mole, 300 molecules of 2000g/mole and 500 molecules of 3000 g/mole are present respectively. **(06 Marks)**

b. Explain the synthesis, properties and application of silicon rubber. **(05 Marks)**

c. What is polymer composite? Describe the synthesis an application of Kevlar fibre. **(05 Marks)**

Module-5

9 a. Explain Scale and Sludge formation in the boiler. **(05 Marks)**

b. Explain determination of DO (Dissolved O_2) by Winkler's method. **(06 Marks)**

c. Write a note on fullerene. **(05 Marks)**

OR

10 a. Explain desalination of sea water by ion selective electrodialysis method. **(05 Marks)**

b. Explain the synthesis of nanomaterial by chemical vapour condensation method. Mention advantages of this method. **(05 Marks)**

c. Write short notes on Carbon nanotubes and Dendrimers. **(06 Marks)**

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