CBCS SCHEME

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18CHE12/22

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. Define Free Energy. Derive Nernst equation for single electrode potential. **(07 Marks)**

b. What are Reference Electrodes? Describe the construction and working of Calomel electrode. **(06 Marks)**

c. Explain the construction and working of Ni – Metal Hydride battery. Give the reaction during charging and discharging mode. Give any two applications. **(07 Marks)**

OR

2 a. Describe the construction and working of Lithium – ion battery. Give its applications. **(07 Marks)**

b. Write a note on Primary , Secondary and Reserve batteries. **(06 Marks)**

c. What are Concentration Cells? EMF of the cell $Ag/AgNO_3(C_1)$ // $AgNO_3$ (C_2 = 0.2m) / Ag is 0.8V. Calculate C_1 of the cell. **(07 Marks)**

Module-2

3 a. What is Corrosion? Explain the Electrochemical theory of corrosion by taking iron as an example. **(07 Marks)**

b. Explain i) Differential Metal Corrosion ii) Pitting Corrosion. **(07 Marks)**

c. What do you mean by metal finishing? Mention any five technological importances. **(06 Marks)**

OR

4 a. Define and explain any two terms :
i) Polarisation ii) Decomposition potential iii) Over voltage. **(06 Marks)**

b. What is Electroless Plating? Explain the Electroless plating of copper. **(07 Marks)**

c. Explain the process of Galvanization. **(07 Marks)**

Module-3

5 a. What is Knocking? Explain the mechanism. **(07 Marks)**

b. On burning 0.96 grams of solid fuel in bomb calorimeter the temperature of 3500 grams of water increased by 2.7^0C water equivalent of calorimeter and latent heat of steam are 385 grams and 587 cal/gram respectively. If the fuel contains 5% H_2 , calculate its gross and net calorific value. Specific heat of water = 4.187 kJ/kg K. **(06 Marks)**

c. What are Fuel Cells? Describe the construction and working of $CH_3OH – O_2$ fuel cell. **(07 Marks)**

OR

6 a. What are Solar Cells? Explain the construction and working of a typical P.V. Cell. **(07 Marks)**

b. Explain the production of solar grade Si by Union Carbide Process. **(07 Marks)**

c. Write a note on : i) Power alcohol ii) Unleaded petrol. **(06 Marks)**

Module-4

7 a. What are the main sources, effects and control of lead pollution? (07 Marks)
b. Mention the various causes, effects and disposal methods of e – waste. (07 Marks)
c. 50 mℓ of an industrial sewage has consumed 11.5 mℓ of 0.4N $K_2Cr_2O_7$ solution for complete oxidation. Calculate C.O.D of industrial sewage. (06 Marks)

OR

8 a. Explain the activated sludge treatment of sewage water. (07 Marks)
b. What is Desalination? Describe the desalination of seawater by reverse Osmosis process. (07 Marks)
c. Write a note on Ozone depletion. (06 Marks)

Module-5

9 a. Explain the theory, Instrumentation and Application of Calorimetry. (06 Marks)
b. What is Potentiometric titration? Explain the principle involved in Potentiometric titration. (07 Marks)
c. Write a note on Fullerene. Mention its application. (07 Marks)

OR

10 a. What are Nano – materials? Give their synthesis by Sol – gel techniques. (07 Marks)
b. Write a note on Graphenes. Mention their applications. (07 Marks)
c. Explain the theory and applications of Atomic Absorption Spectroscopy. (06 Marks)

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