CBCS SCHEME

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

18CHE12/22

First/Second Semester B.E. Degree Examination, Aug./Sept.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 Standard reduction potential and derive Nernst equation for single electrode potential. **(06 Marks)**

b. What is a Reference electrode? Explain the construction and working of a Calomel electrode. **(07 Marks)**

c. Define Cell Potential. Give the cell representation , cell reactions and calculate the potential of the cell consists of Li and Cu electrodes dipped in 0.1 M Li Cℓ and 0.5M $CuSO_4$ solutions at 25^0C. Given $E^0Li = -3.05V$ and $E^0Cu = 0.34V$. **(07 Marks)**

OR

2 a. Define Ion selective electrode. Explain the determination of pH using glass electrode. **(06 Marks)**

b. Derive an equation for potential of a concentration cell and calculate the potential of following cell at 25^0C. Ag/Ag NO_3 (0.005m) // Ag NO_3(0.5m)/Ag. **(07 Marks)**

c. Explain the construction and working of Li - ion cells. Mention its applications. **(07 Marks)**

Module-2

3 a. Briefly explain the effect of following factors on rate of corrosion :
i) The ratio of Anodic and Cathodic areas ii) Nature of corrosion product.
iii) pH of the medium. **(06 Marks)**

b. Define Corrosion of metals. Describe the electrochemical theory of rusting of iron. **(07 Marks)**

c. Define Electroless plating and explain electroless plating of copper. **(07 Marks)**

OR

4 a. Explain Electroplating of hard chromium and mention its applications. **(06 Marks)**

b. Discuss the following : i) Differential metal corrosion ii) Anodization of aluminum. **(07 Marks)**

c. Explain in brief : i) Sacrificial anode method ii) Decomposition potential. **(07 Marks)**

Module-3

5 a. Define Calorific value of a fuel and calculate the gross and net calorific value of a coal from the following data :
i) Mass of coal burnt = 0.85 gms.
ii) Water equivalent mass of copper calorimeter = 0.65kg.
iii) Mass of water taken in the copper calorimeter = 2.2kg.
iv) Rise in temperature of water = 3.0^0C.
v) Percentage of H_2 in the coal = 3.2.
vi) Latent heat of steam = 2457.76 kJ/kg. **(06 Marks)**

b. Define Fuel cell and explain the construction and working $CH_3OH - O_2$ fuel cell. **(07 Marks)**

c. Describe the preparation of solar grade silicon by Union carbide process. **(07 Marks)**