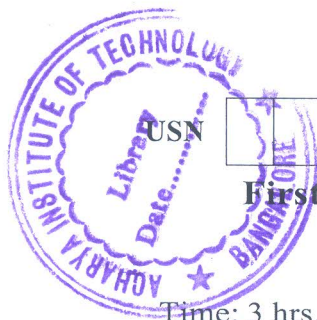


CBCS SCHEME



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17CHE12/22

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

- Define Single Electrode Potential. Derive the Nernst equation for single electrode. (07 Marks)
 - What are reference electrodes? Describe the construction and working of glass electrode. Mention the uses. (07 Marks)
 - Define fuel cells. Explain the difference between battery and fuel cell. (06 Marks)

OR

- What are concentration cells? An electrolyte concentration cell consists of two magnesium electrodes immersed in magnesium nitrate solutions of 0.024 M and 0.064M concentration at 25°C. Give the cell representation, cell reaction and calculate the emf of the cell. (07 Marks)
 - Describe the construction and working of lithium ion battery. Mention the uses. (07 Marks)
 - Write a note on (i) Voltage (ii) Cycle life (iii) Shelf life. (06 Marks)

Module-2

- What is galvanization? Explain galvanization process by hot dipping? Mention uses. (07 Marks)
 - Define Electroless Plating. Explain electroless plating of copper with relevant reactions. (07 Marks)
 - Explain the following factors affecting rate of corrosion : (i) Nature of the metal (ii) Ratio of anodic and cathodic area (iii) pH (06 Marks)

OR

- Define corrosion. Explain the electrochemical theory of corrosion by taking Iron as an example. (07 Marks)
 - Define electroplating? Explain the electroplating of chromium. Mention the uses. (07 Marks)
 - Define Metal Finishing? Give the technological importance of metal finishing. (06 Marks)

Module-3

- What is cracking? Explain fluidized catalytic cracking process. (07 Marks)
 - 0.85g of coal sample (Carbon = 90%, H₂ = 5% and ash = 5%) was subjected to combustion in a bomb calorimeter. Mass of water taken in the calorimeter was 2000g and the water equivalent of the calorimeter was 600g. The rise in temperature was found to be 3.5°C. Calculate the gross and net calorific values of the sample. (Latent heat of steam = 2454 kJ kg⁻¹, Specific heat of water = 4.2 kJ kg⁻¹ °C⁻¹) (07 Marks)
 - Explain the purification of Silicon by zone refining process. (06 Marks)

OR

- Define calorific value of fuel? Explain the experimental determination of calorific value of a solid fuel using Bomb Calorimeter. (07 Marks)
 - Describe the synthesis of petrol by Fischer – Tropsch process. (07 Marks)
 - Explain the construction and working of Photovoltaic Cell. (06 Marks)

Module-4

- 7 a. Define Polymers. Differentiate between Addition and Condensation polymerization. (07 Marks)
- b. Explain the free radical mechanism of addition polymerization of by taking vinyl chloride as an example. (07 Marks)
- c. Explain the synthesis and applications of (i) Polyurethanes (ii) Polycarbonates. (06 Marks)

OR

- 8 a. In a sample of a polymer, 100 molecules have molecular mass 10^3 g/mol, 250 molecules have molecular mass 10^4 g/mol and 300 molecules have molecular mass 10^5 g/mol. Calculate the number average and weight average molecular mass of the polymer. (07 Marks)
- b. Define Glass transition temperature? Explain any three factors affecting glass transition temperature. (07 Marks)
- c. Give the synthesis and applications of (i) Kevlar (ii) Epoxy resin. (06 Marks)

Module-5

- 9 a. What is boiler corrosion? Explain with reactions. (07 Marks)
- b. What is desalination? Explain desalination of seawater by Reverse Osmosis process. (07 Marks)
- c. What are nano materials? Explain the synthesis of nano materials by Sol-gel method. (06 Marks)

OR

- 10 a. Define COD and BOD. In a COD test 20.5 cm^3 and 10.5 cm^3 of 0.01 N FAS solution are required for blank and sample titration respectively. The volume of test sample used is 25 cm^3 . Calculate the COD of the sample. (07 Marks)
- b. Explain any three size dependent properties of nanomaterials. (07 Marks)
- c. Write short notes on :
(i) Fullerenes
(ii) Carbon nano rods. (06 Marks)

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