B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

May 2023 Semester End Main Examinations

Programme: B.E.   Semester: I / II

Branch: Common to all Branches   Duration: 3 hrs.

Course Code: 18CY1BSCHY/18CY2BSCHY   Max Marks: 100

Course: Engineering Chemistry   Date: 18.05.2023

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1 a) What is desalination? Describe desalination of salt water by Electrodialysis method. **05**

b) Describe activated sludge method for sewage treatment. **05**

c) In an experiment 25 cm^3 of sample hard water required 11.5 cm^3 0.02 M EDTA solution for titration using EBT as indicator. Under similar conditions another 25cm^3 of same sample water after boiling and cooling required 8.4 cm^3 of EDTA solution. Calculate temporary, permanent and total hardness of water sample. **05**

d) Justify the roles of Ag_2SO_4 and $HgSO_4$ in experimental determination of COD of waste water. What happens to estimation of COD in their absence? **05**

UNIT - II

2 a) Describe the construction and working of calomel electrode. **05**

b) What are concentration cells? EMF the concentration cell Cu|CuSO$_4$ (x) || CuSO$_4$ (0.02M) | Cu, at 29°C is 0.03 V. Find the concentration of CuSO$_4$ at anode. **05**

c) Justify the following statements: (i) Zinc in contact with silver undergoes corrosion faster than zinc in contact with copper. (ii) Mg blocks connected with buried Iron pipe. **05**

d) Appraise the process of Tinning. **05**

Or

3 a) Explain electrochemical theory of corrosion taking iron as example. **05**

b) With suitable example predict the effect of following factors on the rate of corrosion (i)Nature of corrosion product (ii) pH of medium. **05**

c) Explain differential aeration corrosion with an example. **05**

d) What is electroplating? Explain the electroplating of chromium with relevant reactions. **05**

UNIT - III

4 a) When 0.86 g of benzoic acid subjected to complete combustion in Bomb calorimeter, the temperature of surrounding water increased from 24°C to 27.4°C. The weight of water taken and water equivalent of bomb calorimeter were 1.5 Kg and 0.45 Kg respectively. Calculate GCV of benzoic acid. (Given: Specific heat of water = 4.186 KJ/Kg/°C.   **05**

   b) Explain the construction and working of Si based solar cell.   **05**

   c) Explain the construction and working of Li-CoO$_2$ battery. Write any two applications of Li-Ion battery.   **05**

   d) Describe the construction and working of Methanol -O$_2$ Fuel cell.   **05**

Or

5 a) Discuss on Fluidized bed catalytic cracking process with neat diagram.   **05**

   b) Describe the Zone refining method for solar grade silicon purification.   **05**

   c) What is biodiesel? Discuss its synthesis by transesterification process.   **05**

   d) Elaborate the construction and working of Zinc-Air battery   **05**

UNIT - IV

6 a) Explain bulk polymerization method with its merits and demerits.   **05**

   b) In a polymer sample, 25 molecules have molecular mass 12000g/mol, 40 molecules have molecular mass 24000g/mol and remaining molecules have molecular mass 18000. Calculate the number average and weight average molecular mass of the polymer.   **05**

   c) Write synthesis of: (i) PMMA and (ii) Nitrile rubber.   **05**

   d) Justify the following statements (i) Kevlar is much less flexible than nylons. (ii) Tg of nylon is greater than polyethylene.   **05**

UNIT - V

7 a) Describe the synthesis of nanomaterials by sol-gel method.   **05**

   b) State Lambert – Beer Law. Elaborate the principle involved in copper colorimetric estimation   **05**

   c) Justify the following statements (i) Bulk gold which is catalytically inactive became catalytically active in the Nano scale (ii) Graphene has superior mechanical and electrical properties.   **05**

   d) Elaborate on the estimation of the amount of sodium in water sample by Flame photometric method.   **05**

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