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VTU.REG.NO

B.E. Second Semester Examination – July 2024

Chemistry for Computer Science Stream

Time: 3 hrs] [Maximum Marks: 100

Note: Answer any FIVE full questions, selecting atleast ONE full question from each module.

Module – I

1. a) What is conductometric sensor? Interpret conductometric titration of strong acid with strong base. **(07 Marks)**
   b) Define battery. Explain classification of batteries with examples. **(06 Marks)**
   c) What is potentiometric type of electrochemical sensor? Outline about estimation of Fe by potentiometrically. **(07 Marks)**

2. a) Develop construction, working and applications of Na-ion battery. **(07 Marks)**
   b) Define Li-ion battery. Find the construction and working of Li-ion battery. **(06 Marks)**
   c) What are fuel cells? Organize construction, working and applications of CH_3OH-O_2 fuel cell. **(07 Marks)**

Module – II

3. a) What is e-waste? List the sources and composition of e-waste. **(06 Marks)**
   b) Interpret the toxic materials used in electronic and electrical products and their health hazards. **(07 Marks)**
   c) Discuss the characteristics and need of a e-waste management. **(07 Marks)**

4. a) Summarize separation and thermal treatment methods for recycling and recovery from e-waste. **(06 Marks)**
   b) Illustrate hydrometallurgical and pyrometallugical methods of extraction from e-waste. **(07 Marks)**
   c) What is the role of stake holders in environmental management of e-waste. **(07 Marks)**

Module – III

5. a) Define corrosion. Illustrate electrochemical theory of corrosion by taking iron as an example. **(06 Marks)**
   b) What is anodic coating? Explain control of corrosion by galvanization. **(05 Marks)**
   c) Outline about the following factors affecting the role of corrosion:
   i) Relative area of anode and cathode area ii) Temperature iii) pH **(09 Marks)**

6. a) What is concentration cell? A concentration cell is constructed by dipping copper rods in 0.001M and 0.1M $CuSO_4$ solutions. Calculate the emf of the cell at 298 K. **(06 Marks)**
   b) What are reference electrode? Summarize the construction, working of calomel electrode. **(07 Marks)**
   c) Illustrate the determination of pH using glass electrode. **(07 Marks)**

Module – IV

7. a) Define polymers. Outline free radical mechanism of addition polymerization taking ethylene as an example. **(06 Marks)**
   b) Organize synthesis, properties and applications polyvinylchloride (PVC). **(06 Marks)**
   c) What are conducting polymers? Explain conducting mechanism of polyacetylene. **(08 Marks)**

8. a) A polymer sample contains 1,2,3 and 4 molecules having molecular weights 10^5, 2×10^5, 3×10^5, 4×10^5 respectively. Calculate the number average and weight average molecular weight of the polymer. **(06 Marks)**
   b) What are fibers? Illustrate synthesis properties and applications of Kevlar. **(07 Marks)**
   c) What are plastics? Explain synthesis properties and applications of Teflon. **(07 Marks)**

Module – V

9. a) Illustrate about sources and nature of impurities of water. (08 Marks)
   b) Explain purification water by reverse osmosis with neat diagram. (06 Marks)
   c) Illustrate about the following: (06 Marks)
      i) Temporary hardness ii) Permanent hardness iii) Total hardness

10. a) Define COD. 20 ml of sewage sample for COD is reacted with 25 ml of $K_2Cr_2O_7$ solution and the unreacted $K_2Cr_2O_7$ requires 9.0 ml of N/4 FAS solution. Under similar conditions, in blank titration 15 ml of FAS is used up. Calculate the COD of the sample. (07 Marks)
    b) Organize the properties and engineering applications of carbon nanotubes. (06 Marks)
    c) Explain properties and engineering applications of graphene. (07 Marks)