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F. E. Semester – I (Revised Course 2019-20)
EXAMINATION OCTOBER 2020
Chemistry

[Duration : Two Hours]

[Total Marks :60]

Instructions:

1. Answer THREE FULL QUESTIONS with ONE QUESTION FROM EACH PART.
2. Draw diagrams wherever required.
3. Assume additional data, if required.

PART-A

1. A. i) Calculate the E.M.F. of a cell consisting of Aluminum electrodes, one immersed in a solution of 0.003M and other immersed in a solution of 0.03M of its ions. Explain the working principle of the cell. 8
 ii) A zinc rod is placed in 0.5M ZnSO₄ solution at 298K. Write the electrode reaction and Nernst equation. Also calculate the standard electrode potential. Given $E^0_{Zn} = -0.76V$.
 B. An article made up of iron was exposed in the environment was found to have undergone corrosion. Explain any two mechanisms involved in the process of corrosion. Consider the above example and explain electrochemical theory of corrosion. All possible type of environmental conditions can be assumed. 7
 C. With the help of a neat diagram, explain the construction and working of Zn –air Battery. 5
2. A. i.) A galvanic cell to be operated at 25⁰C is set up using the elements Mg and Cu, write the cell representation and cell reactions. Also find the E.M.F. of the cell assuming that MgSO₄ (0.01 M) and CuSO₄ (0.05M) were used as electrolytes. Given $E^0_{Mg} = -2.37V$. and $E^0_{cu} = 0.34V$. 8
 ii) Sketch the silver/silver chloride electrode. Write the electrode reaction and explain how it Works.
 B. What is differential aeration corrosion? Explain with the help of neat labeled diagrams
 a) Pitting corrosion b) Waterline corrosion 7
 C. With the help of a neat labeled diagram, explain the construction and working of Li-ion polymer Battery. 5

3. A. Describe in detail the characteristics of a Battery. 8
 B. Explain the basic set up of an electroplating bath and the process for chromium plating. 7
 C. The following cell $\text{Mg}/\text{Mg}^{2+}(0.001\text{M})//(\text{0.01M})\text{Mg}^{2+}$ was used to obtain electrical energy. 5
 State the working principle with equations and calculate its E.M.F. (Given $E^0\text{Mg} = -2.37\text{V}$)

PART-B

4. A. Explain the structure and Property Relationship in Polymers based on i) Chemical and ii) Electrical Properties. 8
 B. Draw the block diagram of FTIR; give its instrumentation and any two applications. 7
 C. Define the following terms 5
 i. Polymer
 ii. Octane number
 iii. Degree of polymerization
 iv. Cetane number
 v. Functionality
5. A. Give the classification of Polymers based on i) Source ii) Structure iii) Type of polymerization v) Thermal Response 8
 B. Explain Geometrical isomerism and differentiate between Enantiomers and Diastereomers. 7
 C. State the basic principle involved in the working of UV-visible Spectrophotometry and draw the block diagram of the spectrophotometer. 5
6. A. What is Polymer Degradation? Explain the various ways by which a polymer undergoes degradation. 8
 B. Explain the different stages involved in the purification of crude oil and name the different fractions obtained from crude oil along with their carbon content. 7
 C. Write the mechanism of Reimer-Thiemann's reaction and given its applications. 5

PART-C

7. A. The following cell $\text{Cu}/\text{Cu}^{2+}(0.005\text{M})//(\text{0.05M})\text{Cu}^{2+}$ was used to obtain electrical energy. State the principle and explain the working with the help of a neat labeled diagram. also find its E.M.F (Given $E^0\text{Cu}=0.34\text{ V}$) 5
 B. Explain how the nature of the oxide film formed on the metal affects the rate of corrosion. Given examples. 5
 C. With the help of a block diagram, explain the working of Gas chromatography. 5
 D. Define polymerization and explain Bulk polymerization in detail. 5

8. A. Calculate E.M.F. of the cell $\text{Al} / \text{Al}^{3+} (0.01\text{M}) // \text{Ag} / \text{Ag}^+ (0.1\text{M})$. Also write cell reactions. 5
 Given. $E^0_{\text{Al}/\text{Al}^{3+}} = -1.66 \text{ V}$, $E^0_{\text{Ag}/\text{Ag}^+} = +0.80 \text{ V}$.
- B. What is anodization. Explain how it protects the metal from corrosion? 5
- C. What is a fuel? Give the classification of chemical fuels. 5
- D. Explain the classification of polymers based on Number of monomers and their arrangements with suitable example. 5

