FE1905

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F.E. Semester – I (Revised Course 2019-20)
EXAMINATION FEBRUARY 2022
Chemistry

[Duration : Three Hours] **[Total Marks : 100]**

Instructions:
1) Attempt **any two** questions each form **PART-A** and **PART-B** and any one question from **PART-C**.
2) Draw diagrams wherever required.
3) Assume additional data if required.

PART-A

(Answer Any **Two** Questions)

Q.1 **A)** Calculate the cell potential of the cell consisting of Aluminium electrodes, one immersed in a solution of 0.625M and other immersed in a solution of 0.25M of its ions. Explain the working principle of the cell with the cell reactions. Given E^0_{Al} =-1.66V **5**

B) A cadmium rod is placed in 0.5M $CdSO_4$ solution at 298K.Write the electrode reaction and Nernst equation. Also calculate the standard electrode potential. Given E^0_{Cd}=0.40V **5**

C) A metallic structure was exposed in an environment was found to have undergone corrosion. Explain the different types of corrosion that the structure could have undergone. Assuming that the environmental conditions favored acid rain. **5**

D) With the help of a neat labeled diagram, explain the construction and working of Zn-air Battery. **5**

Q.2 A) A galvanic cell to be operated at 25^0C is set up using the metals Mg and Cu, write the cell representation and cell reactions. Also find the E.M.F. of the cell assuming that $MgSO_4$(0.08M) and $CuSO_4$ (0.04M) were used as electrolytes, Given E^0_{Mg}= -2.37V and E^0_{Cu} = 0.34V **5**

B) Sketch the Saturated Calomel electrode. Write the electrode reaction and explain how it works. **5**

C) A steel boiler in the hospital containing three fourths full of water was found to have undergone corrosion. Name and explain the type of corrosion that the boiler underwent. **5**

D) With the help of a neat labeled diagram, explain the construction and working of Li-ion polymer Battery **5**

Q.3 A) Describe in detail the characteristics with reference to i. Shelf life ii. Cycle life iii. Discharge curve iv. Types v. Geometry of a battery **8**

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B) Explain the basic set up of an electroplating bath and the process for Chromium plating. 5

C) The following cell $Ag/Ag^{+}(0.007M)//(0.07M)\ Ag^{+}/Ag$ was used to obtain electrical energy. State the working principle with equations and calculate its Cell potential.(Given $E^{0}Ag = 0.80V$) 5

D) Explain in brief how you would protect the underground iron pipe from corrosion. 5

PART-B

(Answer Any **Two** Questions)

Q.4 A) Explain the Structure and Property Relationship in Polymers based on its Chemical property 5

B) Draw the neat labeled block diagram of Gas Chromatography and give its any three applications. 5

C) Define the following terms 5
- i) Polymer
- ii) Octane number
- iii) Degree of polymerization
- iv) Cetane number
- v) Functionality.

D) Explain how the mining of Petroleum is carried out with help of neat labeled diagram. 5

Q.5 A) Give the classification of Polymers based on i) Structure ii) Type of Polymerization 5

B) Write any five points to differentiate between Enantiomers and Diastereomers. 5

C) State the basic principle involved in the working of UV-visible Spectrophotoscopy and draw the block diagram of the spectrophotometer. 5

D) Explain how you will prepare PVC using the Bulk polymerization method. 5

Q.6 A) What is Crystallinity in Polymers. Explain the factors which affect crystallinity in Polymers. 5

B) Name the different fractions of Petroleum and the temperature zones at which they are obtained from crude oil 5

C) Write the mechanism of Reimer - Tiemann's reaction and give its applications. 5

D) How are fuels classified based on occurrence and give an example of each based on their state of aggregation 5

PART-C

(Answer Any **One** Question)

Q.7

A) The following cell $Fe/Fe^{2+}(0.008M)//(0.08M)\ Fe^{2+}/Fe$ 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 $E^0Fe = 0.44V$) **5**

B) Explain how the nature of the chloride film formed on the metal affects the rate of corrosion. Give suitable examples. **5**

C) With the help of a block diagram, explain the working of FTIR. **5**

D) Define polymerization and explain Suspension polymerization in detail **5**

Q.8

A) What is an ion selective electrode Give an example and explain how it work. **5**

B) Explain how anodization of Aluminium is carried out with an appropriate diagram. **5**

C) What is electroless plating. Explain how a PCB is prepared for electroless plating. **5**

D) Explain the classification of Polymers based on Number of monomers and their arrangements with suitable example. **5**

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