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06CHE12/22

First/Second Semester B.E. Degree Examination, June/July 08
Engineering Chemistry

Time: 3 hrs.

Max. Marks:100

Note : Answer any FIVE full questions, choosing at least two questions from each part.

Part - A

- 1
 - a. Describe the experimental determination of calorific value of a solid fuel using Bomb calorimeter. (06 Marks)
 - b. What is synthetic petrol? Describe the Bergius method of synthesis of petrol. (05 Marks)
 - c. Write a note on reforming of petrol. (04 Marks)
 - d. Explain construction and working of silicon photovoltaic cell. (05 Marks)
- 2
 - a. What are reference electrodes? Explain the construction and working of calomel electrode. (05 Marks)
 - b. Calculate the standard electrode potential of $Cu^{2+} | Cu$ if its electrode potential at 25° C is 0.296V when $[Cu^{2+}]$ is 0.015 M. (03 Marks)
 - c. What are ion-selective electrodes? Explain the measurement of pH of a solution using glass electrode. (07 Marks)
 - d. Derive Nernst's equation on electrode potential. (05 Marks)
- 3
 - a. Explain the following battery characteristics:
 - i) Energy efficiency
 - ii) Current capacity
 - iii) Cycle life. (06 Marks)
 - b. Describe the construction and working of Lead – acid battery. (08 Marks)
 - c. Describe the construction and working of $H_2 - O_2$ fuel cell. (06 Marks)
- 4
 - a. Discuss the effect of following on the rate of corrosion.
 - i) Nature of the metal ; ii) Nature of the corrosion product ; iii) pH ; iv) area effect. (08 Marks)
 - b. Explain differential aeration corrosion with suitable example. (06 Marks)
 - c. What is cathodic protection? How a metal is cathodically protected by sacrificial anode method. (06 Marks)

Part - B

- 5
 - a. Define polarization, decomposition potential and over voltage. Mention their significance with reference to electrode position. (08 Marks)
 - b. How do the following affect the nature of electroplating?
 - i) Current density
 - ii) temperature
 - iii) pH
 - iv) Organic additives. (08 Marks)
 - c. What is electroless plating? Mention any two advantages. (04 Marks)
- 6
 - a. What are liquid crystals? Distinguish between thermotropic and lyotropic liquid crystals with examples. (06 Marks)
 - b. Explain the working of liquid crystals in display systems. (06 Marks)
 - c. What are the advantages of conductometric titrations over conventional titrations? (03 Marks)
 - d. Explain the determination of concentration of an unknown solution by colorimetric method. (05 Marks)
- 7
 - a. Define polymerization. Explain different types of polymerization processes with suitable examples. (05 Marks)
 - b. Give synthesis and uses of the following polymers i) Teflon ii) Neoprene (06 Marks)
 - c. Write a note on compounding of resins. (04 Marks)
 - d. Write preparation, properties and uses of epoxy resins. (05 Marks)
- 8
 - a. Explain temporary and permanent hardness of water. (04 Marks)
 - b. Define B.O.D and C.O.D and mention various steps involved in sewage treatment. (04 Marks)
 - c. Describe the argentometric method of estimation of chloride content of a water sample. (04 Marks)
 - d. What is potable water? Describe the electro dialysis process of desalination of water. (08 Marks)