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10CHE12/22

First/Second Semester B.E. Degree Examination, Aug./Sept.2020
Engineering Chemistry

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1 a. Choose the correct answers for the following :
- The E° value of metal electrodes ABC and D are $-3.0V$, $-0.77V$, $+0.33V$ and $+0.80V$ respectively which of the following combination produce highest emf?
A) AB B) BC C) CD D) AD
 - When the concentration of the chloride ion $Ag/AgCl$ electrode increases, the reduction potential of the electrode.
A) Increases B) Remains same C) Decreases D) None of these
 - Electrode potential of a metal dipped in same electrolyte of some ionic concentration is calculated by:
A) Nernst equation B) Henderson's equation
C) Kirchoff equation D) None of these
 - Glass electrode can be considered for an example of
A) Primary reference electrode B) Ion selective electrode
C) Secondary reference electrode D) None of these (04 Marks)
- b. Define single electrode potential. Derive an expression for single electrode potential. (06 Marks)
- c. Write the half cell and net cell reaction of the following cell and calculate the emf of the cell at 298K. (Given E° of Fe and Ag are $-0.44V$ and $+0.8V$) $Fe/Fe^{2+}(0.02m)//Ag^+(0.15m)/Ag$. (06 Marks)
- d. A concentration cell is constructed by dipping copper electrodes in 0.025M and 0.35M $CuSO_4$ solution. The emf of the cell is 0.0338V at 298K. Calculate the valency of copper. (04 Marks)
- 2 a. Choose the correct answers for the following :
- In Pb/PbO_2 battery the product formed on both the electrodes during discharge.
A) $PbCl_2$ B) $PbSO_4$ C) PbO_2 D) None of these
 - Which among the following battery is non-rechargeable?
A) $Zn - MnO_2$ B) $Pb - PbO_2$ C) $Ni - MH$ D) $Ni - Cd$
 - The fuel cells are more superior than that the conventional batteries because.
A) They are light in weight B) They produce D.C. current at low cost
C) They are eco-friendly D) They are easily fabricated
 - In which battery a key component is separated from the rest of the battery
A) Primary battery B) Secondary battery C) Reserve battery D) None of these (04 Marks)
- b. What are primary battery? Describe the construction and working of Zin-air battery. (06 Marks)
- c. Write any four difference between battery and fuel cell. Explain the construction and working of H_2/O_2 fuel cell. (06 Marks)
- d. Explain the following characteristics of battery: i) Energy efficiency ii) Capacity. (04 Marks)



- 3 a. Choose the correct answers for the following :
- The flux used in Galvanization is:
A) NH_4Cl B) BaCl_2 C) NaCl D) MgCl_2
 - Sacrificial anode method of protecting a metal is an example of
A) Anodic protection B) Anodizing
C) Cathodic protection D) Organic coating
 - Pitting corrosion can be explained on the basis of
A) Crevice corrosion B) Differential aeration
C) Stress corrosion D) Bimetallic corrosion
 - Polarization of anode results in
A) Increase in rate of corrosion B) Decrease in rate of corrosion
C) Corrosion remains same D) None of these **(04 Marks)**
- b. What is corrosion? Explain electrochemical theory of corrosion. **(06 Marks)**
- c. Explain the following types of corrosion: i) Pitting corrosion ii) Bimetallic corrosion **(06 Marks)**
- d. Explain how the following factors affect the rate of corrosion: i) Anodic and cathodic area
ii) Nature of corrosion product. **(04 Marks)**
- 4 a. Choose the correct answers for the following :
- The function of complexing agent in the electrolytic bath is to
A) Increase conductivity B) Maintain metal ion concentration
C) Increase in the metal ion concentration D) None of these
 - The practical decomposition potential is greater than the theoretical decomposition potential because of
A) Ionisation B) Dissociation C) Polarization D) None of these
 - In electroplating the article to be plated is subjected to pickling. This is to
A) Remove oxide scale B) Remove grease and oil
C) Increase the rate of plating D) None of these
 - At very high current density the nature of the electrodeposit is
A) Fine grained B) Burnt deposit C) Irregular D) None of these **(04 Marks)**
- b. What is metal finishing? Write the technological importance of metal finishing. **(03 Marks)**
- c. What is electroless plating? What are its advantages? Explain electroless plating of nickel. **(07 Marks)**
- d. Explain how the following factors affect the nature of electro deposit :
i) Current density ii) pH iii) Throwing power. **(06 Marks)**

PART - B

- 5 a. Choose the correct answers for the following :
- The bomb calorimeter experiment is carried out to determine the calorific value of
A) Solid fuel B) Liquid fuel C) Gaseous fuel D) Both A and B
 - Which of the following is not a secondary fuel
A) Coal gas B) Producer gas C) Water gas D) Natural gas
 - Quality of diesel fuel is expressed in
A) Octane Number B) Butane Number C) Cetane Number D) Decane number
 - Photovoltaic cell consists of
A) N-P junction B) P-N-P junction C) N-P-N junction D) None of these **(04 Marks)**
- b. What is petroleum cracking? With a neat sketch explain fluidised catalytic cracking process. **(06 Marks)**
- c. What is meant by knocking? Explain the mechanism of knocking. **(06 Marks)**
- d. Write a note on power alcohol. **(04 Marks)**



- 6 a. Choose the correct answers for the following :
- Eutectic and Eutectoid point is observed in _____ system
A) Water system B) P_b -Ag system C) Fe-C system D) None of these
 - In one component system, if the degrees of freedom is zero, then the maximum number of phase is
A) 0 B) 2 C) 1 D) 3
 - Which among the following is an example for two phase two component system?
A) Water and Kerosene B) Water and Ethanol
C) Water and ether D) Water and salt solution
 - Conductometric titration is an example for _____ titration
A) Iodometric B) Red-ox C) acid-base D) Complexometric
(04 Marks)
- b. With neat sketch, explain the phase diagram of water system. **(08 Marks)**
- c. Write a note on lever rule with respect to P_b -Ag system. **(03 Marks)**
- d. Explain the theory and instrumentation of conductometric titration. **(05 Marks)**
- 7 a. Choose correct answers for the following :
- Which of the following polymer can be vulcanized?
A) Polyethylene B) Teflon C) Neoprene D) Epoxy
 - The monomer used in the synthesis of epoxy resin is
A) Bisphenol A and epichloro hydrin B) Bisphenol and Fermaldehyde
C) Epichlorohydrin and Fermaldehyde D) Bisphenol and alkyl isocyanate
 - Conducting form of polyaniline is
A) Nigraniline B) Leucoemeraldine C) Emeraldine D) Pernigraniline
 - The commercial name of polytetra-fluoro ethylene is
A) Teflon B) Fetcon C) Bakelity D) Plexi glass
(04 Marks)
- b. What are polymers? Explain addition and condensation polymerization with examples. **(05 Marks)**
- c. Explain the manufacture of plastic by the following method:
i) Injection moulding ii) Extrusion. **(08 Marks)**
- d. Write the synthesis and application of epoxy resin. **(03 Marks)**
- 8 a. Choose the correct answers for the following :
- Surphate content in water is determined by _____ method.
A) Gravimetric B) Iodometric C) Colorimetric D) Winkler
 - Desalination of water can be carried out by _____ process
A) Reverse osmosis B) Electrolysis C) Both A and B D) Lime-Soda
 - Indicator used in the determination of chloride, content in water is
A) $K_2Cr_2O_7$ B) K_2CrO_4 C) $(NH)_2S_2O_3$ D) Starch
 - Which among the following causes temporary hardness in water:
A) $CaSO_4$ B) $CaCl_2$ C) $MgSO_4$ D) $Ca(HCO_3)_2$
(04 Marks)
- b. What is meant by hard water? Explain the determination of total hardness of water by EDTA method. **(06 Marks)**
- c. 100ml of sample of H_2O consumed 18.3ml of 0.01MEDTA for titration. In another experiment 100ml of water sample was gently boiled and filtered. The filtrate consumers 9.7ml of 0.01MEDTA. Calculate total hardness, temporary hardness and permanent hardness. **(06 Marks)**
- d. Explain the determination COD of the given waste water sample. **(04 Marks)**

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