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10CHE12/22

First/Second Semester B.E. Degree Examination, June / July 2014
Engineering Chemistry

Time: 3 hrs. **Max. Marks:100**

Note: *1. Answer any FIVE full questions, choosing at least two from each part.*
2. Answer all objective type questions only on OMR sheet page 5 of the answer booklet.
3. Answer to objective type questions on sheets other than OMR will not be valued.

PART — A

I a. 'Choose the correct answers for the following : (04 Marks)

i) Calomel electrode is reversible with respect to,
A)' ion B) Ag^+ ion C) Hę+ ion ID) None of these

ii) A galvanic cell converts:
A) Electrical energy in to chemical energy
B) Chemical energy in to electrical energy
C) Elect ical'pnergy in to heat energy
D) None of these

iii) The E°value of the c#J1.Zn/Z_a^+‖Fe^{2}+ IFe is if = —0.44 and E°; > —0.76
A) +0.32 V B)+1.2 V C) — 0.32V D) —1.2V

iv) Example of an ion selectiVe electrode is/
A) Calomel electrode B) Hydrogen electrode
C) Platinum electrode D) Glass electrode

b. What is single electrode potential? Obtain an expression for the same. (05 Marks)

c. What are reference electrodes? Explain the construction and working of Calomel electrode. (05 Marks)

d. An electrochemical cell is'cOnstructed by immersing a silver wire m AgNO3 solution of 0.5 M and a Cadmium mire in CdSO4 solution of 025 M at 25°C. Write the cell diagram, cell reaction and calCitlate emf of the cell and change in free energy. Given E'Ag^+ = +0.80 and E°cd^{2}+ = 0.40 F = 96.5 KJ/kgN (06 Marks)

2 a. Choose the.correct answers for the following : (04 Marks)

i) *The* density of H2SO4 to be maintained in the lead-acid storage cell is,
A) 0.5 B) 1.2 C) 2.4 D) None of these

ii) In which battery, a key component is separated from rest of the battery prior to activation.
A) Primay B) Secondary C) Reserve D) None of these

iii) The reaction taking place at anode of a battery,
A) Reduction B) Addition C) Neutralization D) Oxidation

iv) The electrolyte used in H2 — 02 fuel cell is,
A) KOH B) Nacl C) NH4OH D) Kcl

b. Explain the following battery characteristics:
i) Voltage ii) Energy storage density iii) Cycle life (06 Marks)

c. Explain the construction and working of Ni — Cd battery. (06 Marks)

d. Explain the construction and working of 112 — 02 fuel cell and mention its applications. (04 Marks)

3 a. Choose the correct answers for the following : **(04 Marks)**

i) Development of non porous and uniform oxide film over a metal surface due to corrosion,
A) Decreases the corrosion rate B) Increases the corrosion rate
C) Does not have any effect D) None of these

ii) Galvanizing is the process of coating of iron,
A) With Au B) With Zn C) With Cu D) None of these

iii) Which of the following is an example of cathodic coating,
A) Galvanizing B) tinning C) painting D) None of these

iv) Evolution of hydrogen type of corrosion occurs in,
A) Acedic medium B) Basic medium C) Both a and b D) None of these

b. 'What is metalic corrosion? Explain the electro chemical theory of corrosion, **(05 Marks)**

c. Disttissthe effect of the following factors on corrosion rate:
i) Nat re oxide film ii) Anodic to cathodic area iii) POlaiization **(06 Marks)**

d. Explain' the; corrosion control methods:
i) Use of inhibitor ii) Galvanisation **(05 Marks)**

4 a. Choose the correct answers for the following **(04 Marks)**

i) Technologicalimportance of metal finishing is to impart,
A) Corrosion resistance B),SOIderability
C) Thermal resistance;;, D) All of these

ii) Use of complexing agent during electrode-deposition is to,
A) Obtain shining deposit B) To check the metal ion concentration
C) Increase current density' D) None of these

iii) The proess used to manufacture P;C.B is,
A) Electoplating B) El6Ctrolessplating C) Phosphating D) None of these

iv) Electroless plating procesi Is Possible only on,
A) Catalytically active'eurface Inactive surface
C) Any surface D) Only on plastic surface

IC I' What is metal finishing ''Mention any 3 technological importance of metal finishing. **(04 Marks)**

c. Explain the factors that influence the nature of electrodeposit,
i) pH of electolytic bath; ii) temperature iii) current density **(06 Marks)**

d. What is electroless plating? Explain the process of electroless plating of copper. **(06 Marks)**

PART — B

5 a. Choose the correct answers for the following : **(04 Marks)**

i) Methyl tertiary butyl ether is added to gasoline to,
A) To increase the cetane number B) Minimize the knocking
C) To increase the efficiency of diesel D) All of these

ii) Which of the following posses zero octane number,
A) Iso Octane B) a-Methyl naphthalene
C) n — heptane D) Cyclohexane

iii) Photovoltaic cell is a,
A) Storage cell B) Rechargeable cell
C) Fuel cell D) Energy conversion device

iv) Knocking is due to,
A) Slow combustion B) Incomplete combustion
C) Instantaneous explosive combustion D) All of these

b. What is calorific value of a fuel? Explain the bomb calorimeter method to determine calorific value of a solid fuel. **(06 Marks)**

5 c. Calculate the gross and net calorific value of a coal sample from the following data:
i) Weight of coal — 0.73 g ii) Weight of water taken in calorimeter 1500 g iii) Water equivalent of calori meter = 470 g iv) Rise in temperature 2.3°C v) Percentage of hydrogen in coal sample 2.5% vi) Latent heat of steam is 587 calg ^{i}. **(05 Marks)**

d. Explain the methods of doping of silicon to get solar grade silicon. **(05 Marks)**

6 a. Choose the correct answers for the following : **(04 Marks)**

i) Gibbs phase rule for general system:
A) P + I = C — 2 B) P + F C — 1 C)P+F=C+ 1 D)P+F—C+2

ii) Which of the following is a one component system,
A) Water system B) Lead — Silver system
C) Iron — Carbon system D) None of these

iii,) Absorbance of light by a solution of a substance depends on,
A) Path length B) Concentration of solUtion
C;) Wavelength of incident light D) All of these

iv) ElaineThotometry is suitable for the detection of,
A) 11:6 B) Cu C) Fe D) Zn

b. State phase rule. Discuss the application of phase rule to water system. **(05 Marks)**

c. Explain the principle and application of potentio metric fitration with respect to redox titration. **(06 Marks)**

d. Discuss the conductoinetric titration and mention the advantages. **(05 Marks)**

7 a. Choose the correct answers for the following : **(04 Marks)**

i) Which of the following44,,co polymer?
A) Polythene B) Nitrile, rubber, C) PVC D) Plexi glass

ii) Requirement for conductivitki0olymer is,
A) Linear structure B) Presence of oxidising or reducing agents
C) Conjugation D) All of these

iii) Natural rubber is polymeriZe,e1 form of,
A) Chloroperene ,Ii),Isoperene Propene D) None of these

iv) Benzoyl peroxide isused as,
A) Initiator B) Terminator C) Propogator D) None of these

b. What is polymerization? Explain the addition polymerization's mechanism by taking poly ethylene as example. **(05 Marks)**

c. Explain the mechanism of conduction in poly acetylene. **(05 Marks)**

d. Explain thp, manufacture of following polymers and mention the uses:
i) PolyMe(hyl methacrylate. ii) Neoperene. **(06 Marks)**

8 a. Choose the correct answers for the following : **(04 Marks)**

i) Alkalinity in water is not due to,
A) H^{+} B) OH - C) CO;$^{-}$ D) HCO3

ii) The titrant used in estimation of total hardness of water is,
A) EDTA B) E.B.T C) NaCI D) KOH

iii) The reagent used in the estimation of sulphate ion in water is,
A) Phenoldisufonic acid B) SPANDS
C) Alumonia D) Barium Chloride

iv) Temporary hardness of water is due to,
A) Ca(HCO3)2 B) CaC12 C) CaSO4 D) MgSO4

b. What is desalination of water? Explain electrodialysis method. **(05 Marks)**

c. Explain the experimental method of determination of total hardness of water. **(06 Marks)**

d. 50 ml of sample of water consumed 15 ml of 0.01 MEDTA, before boiling and 5 ml of the same EDTA, after boiling. Calculate the total hardness, permanent hardness and temporary hardness. **(05 Marks)**

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