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10CHE12/22

First/Second Semester B.E. Degree Examination, June/July 2018
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 : (04 Marks)
- A redox reaction taking place in a galvanic cell is always.
A) Spontaneous B) Non spontaneous C) Irreversible D) None of these
 - When the concentration of chloride ions in calomel electrode decreases, the reduction potential of the electrode.
A) Increases B) Decreases C) Does not alter D) Becomes zero
 - An ion selective electrode used in the determination of pH is,
A) Calomel electrode B) Silver-Silver chloride electrode
C) Glass electrode D) None of these
 - The standard reduction potential of copper and silver electrodes are 0.34 and 0.80 V respectively. The emf of the cell formed is,
A) 1.14 V B) 0.46 V C) 1.26 V D) 1.94 V
- b. Give the differences between a galvanic cell and an electrolytic cell. (04 Marks)
- c. Explain the construction and working of the following: (06 Marks)
- Silver - Silver chloride electrode and
 - Glass electrode.
- d. Define single electrode potential. Calculate the potential of Ag-Zn cell at 298 K, if the concentrations of Ag^+ ions and Zn^{2+} ions are $5.2 \times 10^{-2} \text{ m}$ and $1.3 \times 10^{-2} \text{ m}$ respectively. Given $E_{\text{Ag}^+/\text{Ag}}^\circ = 0.80 \text{ V}$ and $E_{\text{Zn}^{2+}/\text{Zn}}^\circ = -0.76 \text{ V}$ (06 Marks)
- 2 a. Choose the correct answers for the following : (04 Marks)
- In a rechargeable battery the net cell reaction is,
A) Irreversible B) Reversible C) Non spontaneous D) None of these
 - The cathodic material of lead-acid battery is,
A) Pb_3O_4 B) PbO C) PbO_2 D) Pb
 - The electrolyte used in Zn-Air cell is,
A) H_2SO_4 B) HCl C) KCl D) KOH
 - Super capacitors are also referred to as,
A) Electrical layer capacitor B) Single layer capacitor
C) Electrical double layer capacitor D) None of these
- b. What are fuel cells? Distinguish between a fuel cell and a battery. (05 Marks)
- c. Describe the construction and the working of Ni-Cd storage battery. (06 Marks)
- d. Describe the construction and working of a Hydrogen-Oxygen fuel cell. (05 Marks)
- 3 a. Choose the correct answers for the following : (04 Marks)
- If Iron is coated with Zinc, which metal gets corroded in corrosive environment.
A) Iron B) Zinc C) Both Iron and Zinc D) None of these
 - A steel water tank is half filled with water for storage, which portion of the tank gets corroded in due course of time.
A) Below the water line B) Above the water line
C) Entire area of the tank D) No corrosion
 - The flux used in Galvanizing is,
A) NH_4Cl B) BaCl_2 C) NaCl D) Palm oil



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- iv) Caustic embrittlement is an example of,
A) Galvanic corrosion B) Water line corrosion
C) Stress corrosion D) None of these
- b. Discuss the influence of the following factors on the rate of corrosion:
(i) Nature of corrosion product and (04 Marks)
(ii) pH (06 Marks)
- c. Discuss : (i) Galvanic corrosion and (ii) Pitting corrosion (06 Marks)
- d. Explain the following methods of control of corrosion: (i) Phosphating and (ii) Tinning (06 Marks)
- 4 a. Choose the correct answers for the following : (04 Marks)
- i) For an electrolytic mixture containing Z_n^{2+} , C_u^{2+} , A_g^+ ions, which ion going to be discharged first is,
A) Z_n^{2+} B) C_u^{2+} C) A_g^+ D) Z_n^{2+} and C_u^{2+}
- ii) In electroplating the article to be plated is subjected to pickling. This is to,
A) Increase the rate of plating B) Get a bright deposit
C) Remove grease D) Remove oxide scaling
- iii) In an electrolytic cell, anode of the cell is,
A) -ve B) +ve C) No change D) \pm
- iv) The double sided printed circuit board is manufactured by using the process,
A) Electroforming B) Phosphating C) Electroplating D) Electroless plating
- b. What is electroplating? Give the differences between electroplating and electroless plating. (04 Marks)
- c. Give a brief account of the following plating processes:
(i) Electroplating of chromium and (06 Marks)
(ii) Electroless plating of Nickel.
- d. Explain the effect of following factors on the nature of electrodeposite:
(i) Complexing agent, (ii) Levellers and (iii) Brightners (06 Marks)

PART - B

- 5 a. Choose the correct answers for the following : (04 Marks)
- i) A reference mixture used to find the octane number of gasoline is,
A) Isooctane-Pentane B) Isooctane-Butane
C) Isooctane-Heptane D) Isooctane-Hexane
- ii) Power alcohol is a belnded mixture of gasoline and
A) Butanol B) Ethanol C) Propanol D) Methanol
- iii) A renewable fuel obtained from a variety of agricultural resources such as soy beans or rapeseeds is known as,
A) Biopetrol B) Diesel C) Biodiesel D) Biogas
- iv) Photovoltaic cell consists of,
A) P-n junction B) n-type junction C) P-junction D) None of these
- b. What is reforming? Explain the reactions occurring during reforming process. (04 Marks)
- c. What is a photovoltaic cell? Explain its construction and working. (05 Marks)
- d. Define the terms GCV and NCV. Calculate the gross and net calorific value of a coal sample from the following data:
(i) Weight of coal = 0.65 kg
(ii) Weight of water taken in calorimeter = 1200 kg
(iii) Water equivalent of calorimeter = 400 kg
(iv) Latent heat of steam = $587 \times 4.2 \text{ KJkg}^{-1}$
(v) Hydrogen in the coal sample = 2%
(vi) Rise in temperature = 1.8°C
(vii) Specific heat of water = $4.187 \text{ KJ/kg}^\circ\text{C}$ (07 Marks)

