vtuplanet.com

USN | | | | | | | | | | |

10CHE12/22

First/Second Semester B.E. Degree Examination, December 2011
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.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

PART – A

1 a. Choose your answers for the following : **(04 Marks)**

i) The reference electrode used in measurement of standard reduction potential is
A) Standard calomel electrode B) Hydrogen electrode
C) Ag-Agcl electrode D) Standard hydrogen electrode

ii) When the concentration of chloride ions in Ag-Agcl electrode increases, the potential of the electrode
A) Increases B) Decreases
C) Does not change D) None of these

iii) Nernsts equation is based on
A) Thermodynamic principle
B) An equation for redox potential
C) Increase in the free energy of the system
D) None of the above

iv) In a Galvanic cell oxidation takes place at
A) Electrolyte B) Cathode C) Anode D) Salt bridge

b. What are concentration cells? Derive an expression for the EMF of a concentration cell. **(05 Marks)**

c. Define standard electrode potential. Explain the origin of electrode potential. **(06 Marks)**

d. An electro chemical cell is formed from nickel and lead electrodes having 0.01m $NiSO_4$ and 0.5m $PbSO_4$ Electrolytes. The standard electrode potentials of Ni and Pb electrodes are – 0.24V and – 0.13V respectively. Write the cell scheme, cell reaction and calculate EMF of the cell at 298 K. **(05 Marks)**

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

i) Cycle life is applicable only to
A) Primary batteries B) Secondary batteries
C) Reserve batteries D) All the above

ii) The electrolyte used in Z_n – air battery is
A) aq H_2SO_4 B) Conc.KCl
C) Aq.KOH D) Aq.Hcl

iii) EMF of a battery depends on
A) Standard electrode potential B) Temperature
C) Reaction quotient D) All the above

iv) The fuel cells are more superior than the batteries as
A) They are light in weight B) They are eco friendly
C) They produce current at low cost D) All the above

WWW.VTUPLANET.COM

vtuplanet.com

b. Discuss construction and working of load-acid storage battery. **(06 Marks)**

c. Explain construction and working of Ni-MH battery. **(04 Marks)**

d. What are fuel cells? Describe the construction and working of $CH_3OH - O_2$ fuel cell. **(06 Marks)**

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

i) At high hydrogen over voltage, the rate of corrosion
A) Increases B) Decreases
C) Increases initially and then decreases D) Remains un changed

ii) Metal iron is coated with zinc metal to prevent corrosion. The process is
A) Anodic coating B) Cathodic coating
C) Inorganic coating D) Painting

iii) In corrosion, the gas which is produced in acidic medium is
A) Hydrogen B) Oxygen
C) Nitrogen D) Carbon dioxide

iv) The type of corrosion occuring in wire fence is
A) Galvanic corrosion B) Inter – granular corrosion
C) Differential aeration corrosion D) Water – line corrosion

b. Discuss :
i) Stress corrosion
ii) Water line corrosion. **(06 Marks)**

c. Explain the influence of following factors on the rate of corrosion :
i) Nature of corrosion product ; ii) Anodic and cathodic area. **(04 Marks)**

d. Describe the following process : i) Galvanising ; ii) Tinning. **(06 Marks)**

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

i) In electroplating, the article to be plated is subjected to pickling. This is to
A) Remove grease B) Increase rate of plating
C) Remove oxide scale D) Get a bright deposit

ii) The decomposition potential is equal to
A) Back EMF B) Cell voltage
C) Current density D) None of the above

iii) Brightners are added to plating bath in order to
A) To get uniform deposit
B) Make grain size of the deposit smaller than λ of light
C) To get thick deposit
D) Remove colour

iv) Which of the following is essential in electroless plating
A) Oxidising agent B) Reducing agent
C) Anode D) Electrical energy

b. What is meant by metal finishing? Explain the process of electroplating of gold. **(06 Marks)**

c. Discuss the influence of the following in electroplating bath solution. **(04 Marks)**

d. What is electroless plating? Explain electroless plating of nickel, with relavent reactions. **(06 Marks)**

WWW.VTUPLANET.COM

vtuplanet.com

PART – B

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

i) The process of breaking down hydrocarbons of higher molecular weight into lighter hydrocarbons is known as
A) Refining B) Reforming
C) Isomerization D) Cracking

ii) The octane number of a fuel is a measure of
A) Its ability to resist anti knocking
B) Inability to offer resistance for knocking
C) Its ability to resist knocking
D) None of the above.

iii) The addition of TEL to gasoline is
A) Decreases the octane number
B) Increases the octane number
C) Decreases the cetane number
D) Increases the cetane number

iv) Photovoltaic cell consists of
A) p – n junction B) n – type junction
C) p – type junction D) None of the above

b. What is reforming of petroleum? Give any four reactions involved in reforming. **(06 Marks)**

c. Discuss the following : i) Power alcohol ; ii) Biodiesl. **(06 Marks)**

d. On burning 0.85×10^{-3} kg of a solid fuel in a bomb calorimeter, the temperature of 2.1 kg water is raised from 24°C to 27.6°C. The water equivalent of calorimeter and latent heat of steam are 1.1 kg and 2454 kJ/kg respectively. Specific heat of water is 4.187 kJ/kg. If the fuel contains 2% hydrogen, calculate its gross and net calorific values. **(04 Marks)**

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

i) Flame photometer is based on
A) Atomic absorption B) Molecular absorption
C) Atomic emission D) All the above

ii) Condensed phase rule for a two component system is
A) P + F = C + 3 B) P + F = C – 2
C) P + C = F + 1 D) P + F = C + 1

iii) At eutectic point the composition of lead and silver has
A) Lowest melting point B) Highest melting point
C) Lowest boiling point D) Highest boiling point

iv) The filter used in copper colorimetry is
A) 420 nm B) 520 nm
C) 620 nm D) 320 nm

b. State phase rule. Give phase diagram of water system and explain application of phase rule to water system. **(06 Marks)**

c. Explain the application of phase-rule to lead silver system. **(06 Marks)**

d. Give the components of the instruments required for potentiometry. Explain an application of potentiometry. **(04 Marks)**

www.VTUPLANET.com

vtuplanet.com

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

i) Kevlar is a
A) Polyurethane B) Polycarbonate C) Polystyrene D) Polyamide

ii) Which one is a conducting polymer?
A) Aniline B) Pyrrole C) Poly acetylene D) Acetylene

iii) Very high molecular weight polymers will have
A) Low Tg B) High Tg C) Moderate Tg D) No Tg

iv) The polymer widely used in making inner tubes of tyre is
A) Neoprene rubber B) Butyl rubber
C) Styru – butadiene rubber D) Natural rubber

b. What are polymers? Discuss the free radical mechanism of polymerization of ethylene. **(05 Marks)**

c. Give the synthesis and an application of i) Silicone rubber ; ii) Teflon. **(06 Marks)**

d. What are the deficiencies of natural rubber? Explain vulcanization of rubber. **(05 Marks)**

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

i) Chloride content of water sample is determined by
A) Colorimetric method B) Argentometric method
C) SPADNS method D) Gravimetric method

ii) As the temperature increases, the amount of dissolved oxygen of water sample
A) Increases B) Decreases
C) Has no effect D) None of the above

iii) Reverse osmosis is a method of getting pure water from
A) Sewage water B) Industrial waste water
C) Sea water D) River water

iv) Estimation of total hardness of water using EDTA titrant involves
A) Neutralisation reaction B) Redox reaction
C) Precipitation reaction D) Complexometric reaction

b. How is alkalinity of water caused? Explain the method of determination of alkalinity. **(06 Marks)**

c. Describe electrodialysis method of desalination of water. **(06 Marks)**

d. 25 CC of waste water was mixed with 25 CC of $K_2Cr_2O_7$, acidified and refluxed. The unreacted $K_2Cr_2O_7$ required 8.2 CC of 0.2N FAS. In a blank titration 25 CC of $K_2Cr_2O_7$ acidified required 16.4 CC of same FAS. Calculate COD of waste water. **(04 Marks)**

*****

vtuplanet.com

WWW.VTUPLANET.COM