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10CHE12/22

First/Second Semester B.E. Degree Examination, June/July 2017
Engineering ~~Physics~~ 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 :

i) Calomel electrode produces a potential of ± 0.2422 Volt where filled with
A) Sat.ku B) 1N ku C) 1 M ku D) 0.1N ku

ii) Voltameter in an electrochemical cell is used to measure
A) Concentration B) Voltage C) Current D) None of these.

iii) Glass electrode cannot be used in the presence of fluoride ions because
A) Alkaline error B) Loss its activity
C) Glass membrane dissolves D) None of these

iv) The potential of the standard hydrogen electrode is taken as
A) 1 Volt B) 0 Volt C) 10 Volt D) None of these **(04 Marks)**

b. Define single electrode potential. Derive Nerst's equation for single electrode potential **(06 Marks)**

c. Define the terms : i) Galvanic cell ii) Concentration cell iii) Reference electrode. Give an example each. **(06 Marks)**

d. Calculate the emf of Li-Aℓ cell

$\underset{(s)}{Li}\left|Li^{+}(0.12M)\right|\left|A\ell^{3+}(0.15M)\right|\underset{(s)}{A\ell}$ at 298K if the standard reduction potential of lithium electron is $-3.05V$ and aluminium electrode is $-1.66V$. **(04 Marks)**

2 a. Choose the correct answers for the following :

i) The electrolyte used in Li-MnO_2 battery is
A) 30y. H_2SO_4 B) 60M KOH
C) Li – halide and organic solvents D) $NH_4u + Z_nu_2$

ii) Which of the following is used in cellular phones?
A) Zn – MnO_2 B) Zn – Air C) Pb – acid D) Ni – MH

iii) The electrolyte used in Zn – Air battery
A) aq.H_2SO_4 B) aq. KOH C) Con Ku D) None of these

iv) Which of the following is a reserve battery?
A) Zn – Air battery B) Ni – MH battery C) Zn – Ag_2O D) Li – MnO_2 **(04 Marks)**

b. Describe the construction and working of lead acid battery. **(06 Marks)**

c. What are fuel cells? Describe the construction and working of a $H_2 – O_2$ fuel cell. **(06 Marks)**

d. Discuss the battery characteristics: i) Capacity ii) Cycle life. **(04 Marks)**

3 a. Choose the correct answers for the following :

i) Impressed current method of preventing corrosion is
A) Anodic protection B) Cathodic Protection
C) Both (A) and (B) D) None of these.

ii) Galvanized nuts and bolts is an example of
A) Cathodic coating B) Impressed current method
C) Corrosion inhibition D) Anodic coating.

iii) When the ratio of anodic area to the cathodic area increases, the rate of corrosion.
A) Decreases B) Increases C) attains constancy D) None of these.

iv) Caustic embrittlment is a classic example of
A) Differential aeration corrosion B) Stress corrosion
C) Differential metal corrosion D) None of these. **(04 Marks)**

b. Define the term corrosion. Explain the electron chemical theory with reference of iron. **(06 Marks)**

c. Explain the following types of corrosion i) Pitting corrosion ii) Water line corrosion. **(06 Marks)**

d. Explain the following factors influence on the rate of corrosion
i) Nature of the corrosion product ii) Hydrogen overvoltage. **(04 Marks)**

4 a. Choose the correct answers for the following :

i) Throwing power is higher in the case of
A) Electroplating process B) Electro less plating process
C) Both (A) and (B) D) None of these.

ii) Reducing agent used in electro-less plating of copper is
A) EDTA B) Formaldehyde C) Sodium Hypophosphite D) None of these.

iii) Gold plating in printed circuit boards is done using
A) Neural cyanide bath B) Alkaline cyanide bath
C) Acid cyanide bath D) None of these.

iv) IN electroplating of chromium the anode used is
A) Chromium B) Pb-Sb alloy C) Nickel D) Copper. **(04 Marks)**

b. Explain the following factors influencing the rate of electro-deposit
i) Temperature ii) Current density iii) Wetting agent. **(06 Marks)**

c. Discuss the process of electroless plating of nickel. Mention its applications **(06 Marks)**

d. What is electroplating? Mention any three advantages of electroless plating over electroplating. **(04 Marks)**

PART – B

5 a. Choose the correct answers for the following :

i) The chemical name of biodiesel is
A) Monoalkyl fatty ester B) Fatty acids
C) Triglycerides D) None of these.

ii) Catalyst used in catalytic converter are
A) Pt, Pd and Rh B) Ni, ℓo and Cr C) Al_2O_3 and SiO_2 D) None of these.

iii) If the percentage of hydrogen in a fuel is, low its net calorific value is
A) High B) Low C) Constant D) None of these.

iv) Which of the following is not a secondary fuel
A) Natural gas B) Coal gas C) Water gas D) Producer gas **(04 Marks)**

b. What is meant by cracking? Describe the fluidized bed catalytic cracking process. **(06 Marks)**

c. What is PV-cell? Explain the construction and working of PV-Cell. Mention its advantages. **(06 Marks)**

d. How much rise in temperature of water occurs when 0.75g of a fuel is burnt a bomb calorimeter containing 2.5kg of water. If the gross calorific values of the fuel is 4500kJ/kg and water equivalent of calorimeter is 0.65kg. Given S = 4.187 kJ/kg/°C. **(04 Marks)**

6 a. Choose the correct answers for the following :

i) In a filtration of strong acid verses strong base conductivity
A) Increases B) Decreases
C) Increases and then decreases D) Decreases and then increases.

ii) Lambert's law states that intensity of monochromatic light decrease exponentially
A) Concentration B) Path length C) Time D) Density.

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

iv) Gibb's phase rule is applicable to
A) Heterogeneous systems B) Heterogeneous system in equilibrium
C) Homogeneous system D) All the above **(04 Marks)**

b. Draw the phase diagram for water system, explain and calcualte the number of degree of freedom on a line, in a area and at triple point. **(06 Marks)**

c. What are potentiometric filtrations? Discus the application of potentiometry on the estimation of FAS using std $K_2Cr_2O_7$ solution. **(06 Marks)**

d. Mention the advantages of conductometric filtration. **(04 Marks)**

7 a. Choose the correct answers for the following :

i) Which of the following is an adhesive
A) Neoprene B) Bakelite C) Plexiglass D) Araldite

ii) The monomer for neoprene is
A) Isoprene B) Chloroprene C) Epichlorophydrin D) Bisphenol – A.

iii) Kelvar is a
A) Polyurethanes B) Polycarbonates C) Polystyrene D) Polyamide.

iv) Benzoyl peroxide is used as
A) Inhibitor B) Terminator
C) Propagator D) Chain transfer agent **(04 Marks)**

b. Define glass transition temperature. Explain the following factors affecting Tg. Value.
i) Flexibility ii) Molecular weight. **(06 Marks)**

c. What are conducting polymers? Explain the mechanism of conduction poly acetylene by oxidative doping (P-type). **(06 Marks)**

d. How are the following polymers synthesized i) Teflow ii) PMMA. **(04 Marks)**

8 a. Choose the correct answers for the following :

i) Complexing agent for spectrochemical analysis of nitrates
A) SPADNA B) Ammonia
C) Phenol sulphonic acid D) Phenol disulphonic acid

ii) A treatment involving the removal of phosphate is
A) Primary B) Secondary C) Tertiary D) None of these.

iii) The indicator used in the determination of chloride content of water sample by Mohr's method.
A) Phenolphthalein B) Potassium chromatic C) Starch D) Ferroiw

iv) Permanent hardness of water is caused due to the presence of
A) Calcium carbonate B) Calcium chloride
C) Calcium bicarbonate D) All the above. **(04 Marks)**

b. Explain the gravimetric method of determination of suphate content in water. **(06 Marks)**

c. What is desalination? Explain the desalination of water by reverse osmosis. **(06 Marks)**

d. Explain the activated sludge process. **(04 Marks)**

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