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| **USN** |  |  |  |  |  |  |  |  | |  |  | **10CH12** | | |
| **B. E. Degree First Semester End Examination (SEE), December 2010** | | | | | | | | | | | | | | |
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| **ENGINEERING CHEMISTRY** | | | | | | | | | | | | | | |
| **(Model Question Paper – 2)** | | | | | | | | | | | | | | |
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| **Time: 3 Hours ]** | | | | | | | | |  | | | | **[ Maximum Marks: 100** | |
| **Note:** | | | | | | 1. **Answer FIVE FULL questions.** 2. **Question No. 1, 2 and 3 are COMPULSORY** 3. **Answer ANY ONE from Question No. 4 and 5** 4. **Answer ANY ONE from Question No. 6 and 7** | | | | | | | |  |
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| **1.** | **Choose the correct answer (20 x 1 Mark Each)** | |
|  | **i)** | Calomel electrode is reversible with respect to,   1. Mercuric ion (B) Mercury   (C) Chloride ion (D) Platinum Loose electrons |
|  | **ii)** | In a galvanic cell, the oxidation takes place at  (A) Cathode (B) Anode (C) Electrolyte (D) Salt bridge |
|  | **iii)** | Which of the following constitutes Daniel cell?  (A) Zn – Ag cell (B) Cu – Ag cell (C) Zn – Cu cell (D) None of these |
|  | **iv)** | Which of the following is a reserve battery?  (A) Zn – air (B) Ni – metal hydride (C) Zn – Ag2O (D) Li – MnO2 |
|  | **v)** | The fuel cells are more superior than the conventional batteries because  (A) They are light in weight (B) They are eco friendly  (C) They produce direct current at low cost (D) They are easily fabricated |
|  | **vi)** | Water line corrosion in steel tank is an example a.  (A) Differential metal corrosion (B) Pitting corrosion  (C) Differential aeration corrosion (D) Stress corrosion |
|  | **vii)** | Rusting of iron is an example for  (A) Dry corrosion (B) Electrochemical corrosion  (C) Acid corrosion (D) None of these |
|  | **viii)** | Caustic embrittlement in the boiler is an example of  (A) Stress corrosion (B) Pitting corrosion  (C) Water line corrosion (D) Differential metal corrosion |

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|  | **ix)** | In chromium plating, anode is  (A) Soluble chromium anodes (B) Insoluble anodes  (C) Inert anodes (D) Both B and C |
|  | **x)** | The phenomenon in which the back emf produced due to the products of electrolysis is  (A) Electroplating (B) Electroless plating (C) Polarization (D) None of these |
|  | **xi)** | The process by which the higher hydrocarbons are broken into lower hydrocarbons by the application of  heat by (A) Combustion (B) Cracking (C) Sparking (D) Pyrolysis |
|  | **xii)** | Knocking is due to  (A) Slow combustion (B) Instantaneous explosive combustion  (C) Incomplete combustion (D) All of these |
|  | **xiii)** | Which of the following is primary fuel?  (A) Producer gas (B) Coal gas(C) Petroleum (D) Water gas |
|  | **xiv)** | Instrumental methods of analysis are widely adopted when compared to classical methods of analysis because  (A) The methods are much faster (B) Applicable at low concentration  (C) The analytical process can be automated (D) All of these |
|  | **xv)** | A device in which electricity is produced using solar energy is called  (A) Fuel cell (B) Voltaic cell (C) Photovoltaic cell (D) Concentration cell |
|  | **xvi)** | Natural rubber is a polymer of  (A) Isoprene (B) Nitrocellulose (C) Polyethylene (D) Bakelite |
|  | **xvii)** | The repeating unit of PVC is  (A) Ethylene (B) Tetra chloroethylene (C) Acrylonitrile (D) Vinyl chloride |
|  | **xviii)** | Nylon is a  (A) Vinyl polymer (B) Polymide (C) Polyester (D) Chloroprene |
|  | **xix)** | Winkler’s method is used to determine  (A) COD (B) BOD (C) Dissolved oxygen (D) Both B and C |
|  | **xx)** | The indicator used for the estimation of total hardness of a given water sample by EDTA method  (A) Starch (B) Erichrome black – T (C) Ferroin (D) Methyl orange |
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| **2.** | **(a)** | Explain the method of determining the PH of a solution using glass electrode. **(5 Marks)** |
|  | **(b)** | A galvanic cell is constructed by coupling Ag and Cd electrodes dipped in 0.5 M AgNO3 and 0.25 M CdSO4 respectively at 250 C. Write the cell notation, cell reaction and calculate EMF of the cell. Given: SRPs of Ag and Cd are +0.80V and – 0.4V respectively. **(5 Marks)** |
|  | **(c)** | Explain the construction and working of Pb – acid battery. **(5 Marks)** |
|  | **(d)** | Explain the construction and working of H2 – O2 fuel cell. **(5 Marks)** |
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| **3.** | **(a)** | Explain Differential aeration corrosion with examples. **(5 Marks)** |
|  | **(b)** | What are corrosion inhibitors? Explain corrosion inhibition by cathodic inhibitors  **(5 Marks)** |
|  | **(c)** | What you meant by electroplating? Explain the effect of following factors on nature of electrodeposits: (i) Current density (ii) Throwing power **(5 Marks)** |
|  | **(d)** | Explain the process of electroplating of chromium. **(5 Marks)** |
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| **4.** | **(a)** | Explain the determination of calorific value of a solid fuel using Bomb calorimeter.  **(5 Marks)** |
|  | **(b)** | What is reformation? Explain with reactions. **(5 Marks)** |
|  | **(c)** | State phase rule and explain the term phase, component and degree of freedom.**(5 Marks)** |
|  | **(d)** | Calculate the G.C.V and N.C.V from the following data, weight of coal sample = 0.85×10-3 kg, weight of water in copper calorimeter = 2.35 kg, water equivalent of calorimeter = 0.45 kg, specific heat of water = 4.187 kJ/kg/K, increase in temperature = 3.20 C, latent heat of condensation of steam = 2457 kJ/kg  percentage of hydrogen = 2.5  **(5 Marks)** |
|  |  | **OR** |
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| **5.** | **(a)** | Explain the determination of calorific value using Buoy’s calorimeter. **(5 Marks)** |
|  | **(b)** | Draw and explain the phase diagram for water system. **(5 Marks)** |
|  | **(c)** | State Beer’s law. Explain in brief the estimation of copper by colorimetric method.  **(5 Marks)** |
|  | **(d)** | What is Photovoltaic cell? Explain the construction and working of Photovoltaic cell.  **(5 Marks)** |
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| **6.** | **(a)** | Discuss the mechanism of free radical addition polymerization with suitable example.  **(5 Marks)** |
|  | **(b)** | What are plastics? Explain the compounding of resins into plastics. **(5 Marks)** |
|  | **(c)** | How BOD of waste water is determined by Winkler’s method? **(5 Marks)** |
|  | **(d)** | What is temporary hard water? A precipitate of 0.110 g of CaC2O4.H2O was obtained from 250 ml of water. Express the calcium content in the sample in ppm. **(5 Marks)** |
|  |  | **OR** |
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| **7.** | **(a)** | What is a polymer? Discuss addition and condensation polymerization with suitable examples. **(5 Marks)** |
|  | **(b)** | Define polymerization? Give the synthesis reaction for (a) Teflon (b) Neoprene**(5 Marks)** |
|  | **(c)** | Give a brief procedure to estimate the COD of waste sample.  **(5 Marks)** |
|  | **(d)** | What is permanent hard water? Calculate the total hardness of the water sample when 50 ml of standard hard water containing 1mg of pure CaCO3 per 1 ml, consumed 20 ml of EDTA. 50 ml of water sample consumed 25 ml of EDTA solution using EBT indicator.  **(5 Marks)** |
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