

EASTERN UNIVERSITY SRI, LANKA
DEPARTMENT OF CHEMISTRY
THIRD YEAR IN SCIENCE
FIRST SEMESTER -2004/2005
CH 303: ELECTROCHEMISTRY (Proper)

Time: 1 Hour

($F = 96485 \text{ C}$; $2.303 \text{ RT/F} = 0.059$)

Answer **all** questions.

1. a) Write down the Debye-Huckel equation for the mean activity coefficient of electrolytes and identify the terms in it.
 - b) A solution contains 0.005 , 0.01 and $0.005 \text{ mol kg}^{-1}$ NaCl , MgCl_2 and $\text{K}_3[\text{Fe}(\text{CN})_6]$ respectively, calculate the ionic strength of the solution and the mean activity coefficient of the electrolyte $\text{K}_3[\text{Fe}(\text{CN})_6]$ in the solution.
 - c) The resistance of a 0.01 M solution of acetic acid when measured in a cell of cell constant 0.20 cm^{-1} was found to be 760Ω at 25°C . The limiting molar conductivity of CH_3COONa , HCl and NaCl at the same temperature are 91.0 , 425.0 and $128.0 \text{ S cm}^2 \text{ mol}^{-1}$ respectively. Calculate the degree of dissociation of acetic acid.
2. a) $\text{Pb/PbCl}_2(\text{s})/\text{KCl}/\text{AgCl}(\text{s})/\text{Ag}(\text{s})$
The emf of the above is given by the equation,
 $E = 8.23 \times 10^{-5} T + 1.74 \times 10^{-7} (T^2 - 25)$ where T is the temperature in K. Write down the cell reaction and calculate ΔG , ΔH and ΔS for the reaction occurring in the cell at 25°C .
 - b) (i) Define the term transport number of an ion.
(ii) In a Hittorf experiment a CdI_2 solution containing 0.2763 g CdI_2 per gram of solution was electrolysed using Pt electrodes. During the electrolysis 0.3462 g of Cd was deposited in the cathode. After electrolysis the mass of anode solution was found to be 1.5264 g , and analysis showed that it contained 0.3718 g of CdI_2 . Calculate the transport number of Cd^{2+} ion and I^- ions ($\text{Cd} = 112.5 \text{ g}$ and $\text{I} = 127 \text{ g}$).
