M.Sc Chemistry Examination, SEM-IV

Physical Chemistry Paper – XIV

(Electrochemistry-3539)

(April-2017)

Time: $2^{1/2}$ hours **Total Marks: 70**

Instructions: All questions carry equal marks

1 (A) Give definition of the following terms: 10

i) Levelling & differentiating solvents

ii) Electrolytic conductors

iii) Dielectric constant

iv) Faraday's second law of electrolysis

v) Solvation

(B) Define and explain the types of electrolysis with suitable examples. 04

OR

1 (A) Discuss the mechanism of electrolysis suggested by scientist Grotthuss and Clausis. 07

(B) Explain Faraday's first law of electrolysis in detail. 04

(C) Define metallic conductors giving suitable examples. 03

2 (A) Discuss the theory related to the variation of ionic speeds. 05

(B) Define: i) Time of relaxation, ii) asymmetry effect and iii) Electrophoretic effect 06

(C) Explain abnormal transference numbers giving suitable examples. 03

OR

2 (A) Explain moving boundary method used to determine transport numbers in detail. 05

(B) A dilute solution of $CuSO_4$ was electrolysed using Pt electrodes. The amount of Cu per unit weight of the anodic solution was found to be 0.6350 g and 0.6236 g before electrolysis respectively. The weight of solver deposited in a silver coulometer placed in series was found to be 0.1351 g. Calculate the transport numbers of Cu^{2+} and SO_4^{2-} ions.

(At. Wts.: Ag = 107.88; Cu = 63.6). 05

(C) Discuss Faraday's laws and ionic velocities. 04

3 Answer any **TWO** of the following. 14

(A) Explain dissociation constant of dibasic acids by E.M.F. measurement method.

(B) Define: i) Protogenic solvent, ii) Protophillic solvents, iii) Amphiprotic solvents iv) Aprotic solvents and v) Super acid solutions.

(C) Write brief note on dissociation constants of acids and bases.

(D) Discuss ionic product of water.

4 (A) Answer the following questions 10

i) Write atleast five other names given to "Dipolar" ion.

ii) Give one evidence in support for the existence of dipolar ion.

iii) What is isoelectric point?

iv) Draw only figure of uncorrected and corrected neutralization curves of glycine.

v) Write four equation showing glycine available in neutral and dual ions form.

(B) Explain in brief about amphoteric electrolytes. 04

OR

4. (A) Explain dissociation constants of amino acids. 10

(B) What are the outcomes of neutralization curves of ampholytes? 04

5 (A) Answer the following questions 14

i) Define dissolution and deposition potential.

ii) What is concentration polariation?

iii) Explain decomposition voltage.

iv) Define the term "Overvoltage"

v) Explain the phenomena of limiting current density (I_d) and relation with diffusion current.

vi) Define "Hydrogen overvoltage"

vii) How pH influence overvoltage?

OR

5 (A) Explain influence of temperature and current density (C.D) on overvoltage. 08

(B) Discuss the determination of anode and cathode potentials in detail. 06