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JBA-003-1103011 Seat No. _____

M. Sc. (Sem. III) (CBCS) Examination

December - 2019

C (PM) - 304 : Physical and Material Chemistry

(Electrochemistry) (Elective - II)

(New Course)

Faculty Code : 003

Subject Code : 1103011

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions : (1) All questions are compulsory.

(2) All questions carry equal marks.

1 Answer the following (Any **Seven**)

(a) Define : Conductance, polarization, Transference number, Degree of dissociation.

(b) What are Faraday's laws of electrolysis ?

(c) What are super conductors ? State the different types of super conductors.

(d) Explain acidity function.

(e) Write Tafel equation and give the significance of all the terms involved in it.

(f) Explain validity of Debye-Huckel-Onsagar equation.

(g) In moving boundary method, if the radius of capillary tube is 3 mm and the current passed of 25 mA was passed for 10 minutes in a solution of concentration 50 equi. M^{-3}, calculate the distance covered by hydrogen ions. [Given : $t_{H^+} = 0.8292$]

(h) Explain concentration polarization.

(i) Discuss the evidences of ionic theory.

(j) What is overvoltage ? State the factors affecting overvoltage.

2 Answer the following : (Any **Two**)

(a) Derive an expression to relate equivalent conductance to ionic mobility. Calculate the molar conductance of HIO_4 at infinite dilution from the following observation data at 25°C.

[Given: $\lambda^0_{KIO_4} = 127.92 \times 10^{-4}\ mho\ m^2 mol^{-1}$,

$\lambda^0_{HCl} = 426.16 \times 10^{-4}\ mho\ m^2 mol^{-1}$ and

$\lambda^0_{KCl} = 149.86 \times 10^{-4}\ mho\ m^2 mol^{-1}$]

(b) Explain :

(a) Hydrogen overvoltage and

(b) Evidences of dipolar ions

(c) Discuss the determination of dissociation constant of amino acid in detail.

3 Answer the following :

(a) Describe the ionic diffusion as slow process in overvoltage.

(b) What are the different types of solvents? Explain each with suitable examples.

OR

(c) Explain neutralization curve in detail.

(d) Discuss :

(i) Isoelectric point and

(ii) Electrolysis of water.

4 Answer the following :

(a) Discuss the determination of transference number by moving boundary method.

(b) Describe the Grotthuss mechanism of electrolysis.

5 Answer the following : (Any **Two**)

(a) Explain mechanism of electrolytic conductance in detail.

(b) Describe the properties of superconductors in detail.

(c) Discuss thickness of diffusion layer in overvoltage.

(d) Explain the determination of ionic product of water by emf method.
