K23P 3075

Reg. No. : .....

Name : .....

I Semester M.Sc. Degree (C.B.C S.S. -OBE-Regular)
Examination, October 2023
(2023 Admission)
CHEMISTRY
MSCHE01C04 – Physical Chemistry – I

Time : 3 Hours Max. Marks : 60

SECTION – A

Answer **any 5** questions from the following. **Each** question carries **three** marks.

1. What is meant by partial molar property of a component in a system ? Give the expression for chemical potential.
2. Calculate the standard entropy change of the reaction.
   $C_{(s)} + H_2O_{(l)} \longrightarrow CO_{(g)} + H_{2(g)}$. Given that entropies are $CO_{(g)} = 197.90\ JK^{-1}$, $H_{2(g)} = -328.50\ JK^{-1}$, $C_{(s)} = 5.69\ JK^{-1}$, $H_2O_{(l)} = 70.29$.
3. What is meant by ionic activity ? Write an equation for mean ionic activity.
4. Represent Buttler- Volmer equation and explain the terms.
5. Explain the basic working principle of super capacitor.
6. How is EMF of a cell measured ? **(5×3=15)**

SECTION – B

Answer **any 3** questions from the following. **Each** question carries **six** marks.

7. Discuss on the basis of phase rule the behaviour of a three component system of three liquids where two pairs are partially miscible and one pair is completely miscible.
8. Calculate the activity coefficients of Ca^{2+} and Cl^- in 0.01 molal solution $CaCl_2$ in water. The A value in the Debye-Huckel equation is 0.509.

P.T.O.

9. How would you modify Debye-Huckel limiting law to more concentrated solutions ?

10. Explain the term 'decomposition potential'. How is it experimentally measured ?

11. Explain about the Pourbaix diagram for water. **(3×6=18)**

SECTION – C

Answer **any 3** questions from the following. **Each** question carries **nine** marks.

12. a) Describe Nernst heat theorem.

    b) Explain the method for determining absolute entropies using third law.

13. Derive Debye Huckel Onsager equation.

14. Explain the principle and instrumentation of polarography and also explain about polarogram. Discuss about the advantages and disadvantages of dropping mercury electrode.

15. Explain about overvoltage and the theoreis of overvoltage.

16. What is polarization and how is polarization measured ? Explain the polarization diagram of corroding metals. **(3×9=27)**

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