K25P 3532

Reg. No. : .....

Name : .....

I Semester M.Sc. Degree (CBCSS – OBE – Reg./Supple./Imp.) Examination, October 2025
(2023 Admission Onwards)
CHEMISTRY/CHEMISTRY WITH DRUG CHEMISTRY SPECIALIZATION
MSCHD01C04/MSCHE01C04 : Physical Chemistry – I

Time : 3 Hours Max. Marks : 60

SECTION – A

(Short answer questions. Answer **any five** questions and **each** carries **three** marks.)

1. State the Nernst heat theorem and explain its significance.
2. Define residual entropy with a suitable example.
3. State and explain Walden's rule for ionic conductance.
4. What is the exchange current density ? Explain.
5. Explain Lithium-ion battery.
6. What are pseudo-capacitors ? Explain with examples. **(5×3=15)**

SECTION – B

(Paragraph questions. Answer **any three** questions and **each** carries **six** marks.)

7. Derive the relation between chemical potential and pressure at constant temperature. Explain its significance.
8. Explain the assumptions of Debye-Huckel Limiting Law.
9. Calculate the mean ionic activity coefficient of 0.01 molal NaCl at 25°C. Given, A = 0.509.

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10. Derive the Tafel equation from the Butler-Volmer equation.

11. Draw and explain the Pourbaix diagram of water. **(3×6=18)**

SECTION – C

(Essay type questions. Answer **any three** questions and **each** carries **nine** marks.)

12. Explain the phase diagram of ternary solution with one pair of partially miscible liquids.

13. Derive the Debye-Huckel-Onsager equation and discuss its limitations in aqueous and non-aqueous solutions.

14. Explain the term over voltage. Discuss the different theories proposed to explain hydrogen overvoltage.

15. Discuss the theory, instrumentation and applications of polarography.

16. Explain the theory, applications, advantages and limitations of cathodic protection in corrosion prevention. **(3×9=27)**

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