

22P213

(Pages: 2)

Name:

Reg.No:

SECOND SEMESTER M.Sc. DEGREE EXAMINATION, APRIL 2023

(CBCSS - PG)

(Regular/Supplementary/Improvement)

CC19P CHE2 C08 - ELECTROCHEMISTRY, SOLID STATE CHEMISTRY, AND STATISTICAL THERMODYNAMICS

(Chemistry)

(2019 Admission onwards)

Time : 3 Hours

Maximum : 30 Weightage

Section A

Answer any *eight* questions. Each question carries 1 weightage.

1. State and explain debye-falkenhagen effect.
2. Define 'mean ionic activity coefficient'. Explain its significance.
3. What is meant by fuel cells? Give two examples.
4. Draw a Tafel plot. Explain the significance of the slope and intercept of the Tafel plot.
5. Define activation overpotential.
6. Define Hall effect.
7. What is most probable distribution? What is its importance?
8. Explain the physical significance of partition function.
9. Give an idea about nuclear partition function.
10. What are the assumptions of Bose- Einstein statistics?
11. Distinguish between bosons and fermions.
12. Differentiate between primary cells and secondary cells.

(8 × 1 = 8 Weightage)

Section B

Answer any *four* questions. Each question carries 3 weightage.

13. The emf of the cell $\text{Cd}, \text{CdCl}_2 \cdot 2.5\text{H}_2\text{O} (\text{saturated}) \parallel \text{AgCl} (\text{s}), \text{Ag}$ in which the cell reaction is $\text{Cd} (\text{s}) + 2\text{AgCl} (\text{s}) + \text{aq} \rightarrow \text{CdCl}_2 \cdot 5/2 \text{H}_2\text{O} (\text{sat}) + 2\text{Ag} (\text{s})$ is 0.6753 V at 25°C and 0.6915 V at 30°C. Calculate the free energy change (ΔG), enthalpy change (ΔH), and entropy change (ΔS) of the cell reaction at 25°C.
14. Discuss briefly the theory of hydrogen overvoltage.

15. Show that 5-fold axis of symmetry is absent in solids
16. Derive Fermi-Dirac distribution law.
17. Explain various types of magnetic properties
18. Derive the relation between entropy and partition function.
19. Explain the drawbacks of Debye's theory of heat capacity of solids with special reference to metals at liquid helium temperature.

(4 × 3 = 12 Weightage)

Section C

Answer any *two* questions. Each question carries 5 weightage.

20. What is meant by Electrochemical Series? Using the data given in the series explain why (i) Cu(I) sulphate does not exist in solution. (ii) Neither Cu* nor Co³⁺ is stable in aqueous solution. (iii) Zinc reacts with H₂SO₄ to give H₂ but silver does not.
21. Discuss the basis of the polarography method of analysis. What is the significance of limiting current, diffusion current and half wave potential.
22. Derive Bragg's law and explains its application.
23. Write a brief account of superconductivity in solids.

(2 × 5 = 10 Weightage)
