

THIRD SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2024
(Regular/Improvement/Supplementary)

CHEMISTRY
FCHE3C09 - ELECTROCHEMISTRY, SOLID STATE CHEMISTRY AND
STATISTICAL THERMODYNAMICS

Time: 3 Hours

Maximum Weightage: 30

Section A: Short answer questions. Answer any *eight* questions. Each carries *one* weightage.

1. What are direct methanol fuel cells?
2. Give a short note on decomposition potential.
3. What is meant by oxygen overvoltage?
4. Explain the term Bravais lattices.
5. What is meant by screw axes?
6. Give the Cooper theory of superconductivity.
7. What are Brillouin zones?
8. Write down the Debye-Hückel equation.
9. Give the relationship between molecular & molar partition functions.
10. Define the term 'statistical weight factor.'
11. Give the Sterling approximation.
12. What are Bosons and Fermions?

(8 × 1 = 8 weightage)

Section B: Short essay questions. Answer any *four* questions. Each carries *three* weightage.

13. Write a short note on polymer electrolyte fuel cell.
14. Explain the working of Ni-MH cell.
15. Explain the importance of dropping mercury electrode in polarography.
16. Give the theories of hydrogen overvoltage.
17. Derive the mathematical proof for the non-existence of 5-fold axis of symmetry.
18. Write a note on Hall effect.
19. What are the different types of ensembles?

(4 × 3 = 12 weightage)

Section C: Essay questions. Answer any *two* questions. Each carries *five* weightage.

20. Discuss the crystallographic point groups in detail with Hermann–Mauguin notations.
21. Discuss in detail about the Optical and Magnetic properties of solids.
22. Define the term 'partition function'. Illustrate the molecular partition function and its relation to the thermodynamic properties. Derive the expressions for translational partition function.
23. Derive the Fermi - Dirac distribution law. Give the relationship between Maxwell-Boltzmann, Bose-Einstein, and Fermi-Dirac statistics.

(2 × 5 = 10 weightage)