

**THIRD SEMESTER M. Sc. DEGREE EXAMINATION, NOVEMBER 2020  
CHEMISTRY**

**FCHE3C09 - ELECTROCHEMISTRY, SOLID STATE CHEMISTRY AND  
STATISTICAL THERMODYNAMICS**

**Time: Three Hours**

**Maximum Weightage: 30**

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

1. What are the applications of electrochemical series?
2. Give the Debye-Huckel equation.
3. What is deposition potential?
4. What is meant by hydrogen overvoltage?
5. Define the term *screw axes*.
6. What are ensembles?
7. Illustrate different types of glide planes.
8. Give the Stereographic projections of any  $D_{3h}$  and  $D_{3d}$  point groups
9. What is Hall effect?
10. Explain the term birefringence.
11. What is meant by Meissner effect?
12. Give examples of microstates and macrostates.

**(8 × 1 = 8 weightage)**

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

13. Explain the importance of dropping mercury electrode in polarography.
14. Write a short note on Ni-Cd cell.
15. What is meant by half wave potential? Explain with graph.
16. Explain the metal deposition over voltage and its determination.
17. Write a short note on Bravais lattices.
18. Derive the third law of thermodynamics.
19. Write a note on Bose-Einstein condensation.

**(4 × 3 = 12 weightage)**

**(P.T.O.)**

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

20. (a) Describe the Limiting and extended forms of the Debye- Hückel equation.
- (b) Write a short note on:
- i) Direct methanol fuel cells.
  - ii) Phosphoric acid fuel cells
21. (a) Give the mathematical proof for the non-existence of 5-fold axis of symmetry.  
(b) Write a short note on Zone theory and Brillouin zones.
22. Derive the expressions for (a) translational partition function, (b) rotational partition function and (c) vibrational partition function.
23. Describe in detail about the Bose-Einstein distribution law.

**(2 × 5 = 10 weightage)**