THIRD SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2021
(Regular/Improvement/Supplementary)

CHEMISTRY
FCHE3C09 - ELECTROCHEMISTRY, SOLID STATE CHEMISTRY AND STATISTICAL THERMODYNAMICS

Time: 3 Hours   **Maximum Weightage: 30**

Section A: Short answer questions. *All* **questions can be answered.**
Each carries *one* **weightage (Ceiling 6 weightage).**

1.   What are alkaline fuel cells?

2.   Give the Debye-Huckel equation.

3.   What is dissolution potential?

4.   What is meant by oxygen overvoltage?

5.   Give the Butler -Volmer equation.

6.   What is meant by space groups?

7.   Give the stereographic projections of any D_2h and D_2d point groups.

8.   Illustrate the non-existence of 5-fold axis of symmetry.

9.   Explain relation between molecular and molar partition functions.

10. Give the free electron theory of solids.

11. What is statistical weight factor?

12. What are different types of ensembles?

Section B: Short essay question. *All* **questions can be answered.**
Each carries *four* **weightage (Ceiling 12 weightage).**

13. What are different types of glide planes?

14. Write a short note on Ni-MH cell.

15. What is the importance of dropping mercury electrode in polarography?

16. Write a note on Hall effect.

17. Derive the expressions for translational partition function.

18. Explain the significance of Sterling approximation in statistical thermodynamics.

19. Write a note on Bose-Einstein condensation.

(PTO)

Section C: Essay questions. Answer *All* questions can be answered.
Each carries *six* weightage (Ceiling 12 weightage).

20. Write notes on:
    (a) Efficiency of electrochemical cells and its comparison with heat engines
    (b) Polymer electrolyte fuel cell
    (c) Phosphoric acid fuel cells.

21. Discuss the crystallographic point groups in detail with Hermann–Mauguin notations.

22. Briefly discuss about:
    (a) Cooper theory of super-conductivity
    (b) optical and thermal properties of solids.

23. Describe the Einstein's theory of heat capacities of solids and the Debye's modification.