



QP CODE: 25047660



25047660

Reg No :

Name :

M.Sc DEGREE (CSS) EXAMINATION, NOVEMBER 2025

Third Semester

M Sc Industrial Chemistry

Core Course - CH060302 - PHYSICAL CHEMISTRY - II

2020 ADMISSION ONWARDS

C0A9B9CC

Time: 3 Hours

Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

Weight 1 each.

1. Write the Stirlings approximation. Calculate the value of 20! and 100! using stirlings approximation.
2. What are Bosons? Give examples.
3. Classify the following into bosons and fermions: (a) 3He (b) Alpha particle (c) Deuterium (d) Hydrogen molecule (e) Electron (f) Photon.
4. What do you understand by collision cross section?
5. Distinguish between activated complex and transition state.
6. Give the Bronsted Bjerrum equation and explain the terms involved.
7. What are oscillating reactions? Give examples.
8. Explain the electrode – electrolyte double layer.
9. What do you understand by the term deposition potential?
10. What are the factors influencing oxygen over potential?

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

Weight 2 each.

11. Derive the value of β used in statistical mechanics.
12. Calculate the translational partition function of a molecule of oxygen at 1 atm and 298K moving in a vessel of 24.4 dm³.
13. Calculate the translational entropy of gaseous Iodine at 298 K and 1 atm.





14. For a unimolecular gas reaction, the pre-exponential term is $3.7 \times 10^{11} \text{ dm}^3/\text{mol/s}$ at 300K. Calculate the entropy of activation.
15. Explain Drude and Nernst's electrostriction model and Born's model.
16. Distinguish between relaxation effect and electrophoretic effect.
17. Discuss the validity of DHO in aqueous and non aqueous solvents.
18. Write a short note on Debye Falkenhagen effect and Wein effect.

(6×2=12 weightage)

Part C (Essay Type Questions)

*Answer any **two** questions.*

Weight 5 each.

19. Derive Maxwell-Boltzmann distribution law.
20. Write a note on classical and quantum statistical approach to heat capacity of gases.
21. Describe the $\text{H}_2\text{-Br}_2$ photochemical reaction by deducing the rate expression. How is it different from the thermal reaction?
22. Derive Butler –Volmer equation and explain its significance.

(2×5=10 weightage)

