



K23P 0463

Reg. No. :

Name :

II Semester M.Sc. Degree (C.B.S.S. – Reg./Supple./Imp.)
Examination, April 2023
(2019 Admission Onwards)
CHEMISTRY
CHE2C.07 : Physical Chemistry – II

Time : 3 Hours

Max. Marks : 60

SECTION – A

Answer **all** questions in **one** word or **one** sentence. **Each** question carries **1** mark :

1. Expand $\ln(n!)$, according to Stirling's approximation.
2. What is partition function ?
3. What are bosons ?
4. What do you mean by liquid crystal ?
5. Give one example of non-stoichiometric defects.
6. What will be the magnitude of magnetic field inside a superconductor ?
7. State the Law of Constancy of Interfacial Angles.
8. Write Bragg's equation and explain the terms.

SECTION – B

Answer **any eight** questions. **Each** question carries **2** marks :

9. What is the difference between ortho and para hydrogen ?
10. Why do we need quantum statistics ?
11. What is Einstein's theory of heat capacity ?

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12. Differentiate between micro and macro states in thermodynamics.
13. Write Sackur Tetrode equation and what are its advantages ?
14. What do you understand about mesomorphic state in liquid crystals ?
Give examples.
15. What are F centers in an ionic crystal ?
16. Differentiate between intrinsic and extrinsic defects.
17. What do you mean by the Meissner effect ?
18. What is meant by the structure factor ?
19. Differentiate between isomorphism and polymorphism.
20. What are Miller indices ? Compute the Miller indices for a plane intersecting at $x = \frac{1}{4}$, $y = 1$ and $z = \frac{1}{2}$.

SECTION – C

Answer **any four** questions. **Each** question carries **3** marks :

21. Derive Boltzmann distribution law.
22. Compare the heat capacity of gases using classical and quantum theories.
23. Compare Bose-Einstein and Fermi-Dirac statistics.
24. Explain shortly on Communal Entropy.
25. How imperfections of a crystal influence its physical properties ?
26. Write a short note on spinel's and perovskites.
27. Write a short note on different types of crystal lattices.
28. Explain the Debye-Scherrer method for X-ray structure analysis.



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SECTION – D

Answer **four** questions. **Each** question carries **6** marks :

29. Derive : (i) vibrational partition function (ii) internal energy in terms of the partition function.

OR

Derive : (i) translational and (ii) electronic partition function.

30. Apply Fermi Dirac statistics for electrons gas.

OR

Derive an expression for Bose-Einstein condensate.

31. Explain : (i) Bragg method of crystal analysis (ii) indexing of reflections.

OR

How systematic absences can be used for space-group determination ?

32. Explain briefly on crystal defects.

OR

Explain the electronic structure of solids by using band theory.