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 ?

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 x = 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-Scherer method for X-ray structure analysis.

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.

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