



QP CODE: 22002354



Reg No :

Name :

MSc DEGREE (CSS) EXAMINATION , NOVEMBER 2022

Second Semester

CORE - PH010204 - CONDENSED MATTER PHYSICS

M Sc PHYSICS, M.Sc. SPACE SCIENCE

2019 Admission Onwards

EDDDAAA8

Time: 3 Hours

Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

*Weight **1** each.*

1. Write down two drawbacks of Lorentz Drude theory.
2. What do you understand by a Fermi gas?
3. State Wiedemann Franz Law and explain Lorenz number.
4. Define spin waves. Briefly explain quantisation of spin waves.
5. Define Bloch walls in a ferromagnetic crystal. Write an expression for total energy per unit area of a Bloch wall.
6. Explain Brillouin Zone in two dimension square lattice with a neat diagram
7. Discuss the merits and demerits of Einstein's theory of specific heat of solids.
8. Differentiate between Magnetic permeability and Magnetic susceptibility.
9. What is meant by antiferromagnetism?
10. Explain geomagnetism and biomagnetism

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

*Weight **2** each.*

11. Calculate the glancing angle on the plane (110) of the cube of rock salt ($a=2.81A_0$) corresponding to second order diffraction minimum for the X-rays of wavelength $0.71A_0$
12. Write a short note on Brillouin zones.





13. Write down the geometrical structure factor of fcc crystal and hence name and explain three each of allowed and forbidden reflections.
14. Starting from Schrodinger equation , reach central equation for an electron in a periodic potential
15. Explain the inelastic scattering of neutrons by phonons.
16. What are normal and Umclapp processes? Explain with the help of vector diagram.
17. Give an account of neutron magnetic scattering.
18. Briefly explain the domain structure in ferromagnetic materials.

(6×2=12 weightage)

Part C (Essay Type Questions)

*Answer any **two** questions.*

Weight 5 each.

19. Define the geometrical structure factor. How is it related to the atomic scattering factor? Obtain the structure factor for bcc crystal and account for the missing reflections for this crystal.
20. What do you understand by the term intrinsic semiconductor? Get an expression for intrinsic carrier concentration in an intrinsic semiconductor
21. Discuss in detail the vibrations of crystals with monoatomic basis.
22. Discuss the spontaneous magnetic moment of a ferromagnet. Obtain an expression for ' χ ' in terms of Curie point. Derive the expression for mean field constant

(2×5=10 weightage)

