



PRABHAT KUMAR COLLEGE, CONTAI

M. Sc. 4th Semester Examinations 2021
(Under CBCS pattern)

Subject : Physics

PAPER/COURSE – PHS: 404A
Solid State Physics II

FULL MARKS : 50

TIME : 02 Hr.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the right-hand margin indicate full marks.

Attempt any four (04) of the following:

4 x 10 = 40

1. Distinguish between paramagnetism and diamagnetism and explain the quantum theory of magnetic susceptibility. [4+6]
2. Explain the Heisenberg's exchange interaction in ferromagnetism and discuss the ferromagnetic domains. [5+5]
3. Give an account of Neel's theory of antiferromagnetism and explain spin waves. [5+5]
4. Write a note on Two of the following:
 - a) Electron Spin Resonance (ESR)
 - b) Adiabatic demagnetization
 - c) High Temperature superconductors. [5+5]
5. (a) Differentiate between type-I and type-II superconductors.
(b) Explain the basic features of BCS theory of superconductivity. [4+6]



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6. (a) What is magnetic resonance? Write down the principle and applications of NMR.
(b) What is the difference between antiferromagnetic and ferrimagnetic materials? [2+3+3+2]
7. Write a short note on Josephson Effect. [10]
8. What is the penetration depth and coherence length of a superconductor? Explain the formation of Cooper pair. What is the significance of electron phonon interaction in the formation of Cooper pair? [2+2+3+3]

(All the symbols have their usual meaning)

Internal Assessment marks: 10