



## M.Sc. III Semester Degree Examination, April/May - 2024

### PHYSICS

#### Advanced Condensed Matter Physics

#### (NEP)

Time : 3 Hours

Maximum Marks : 70

**Note :** Answer **any five** of the following questions with Question No. 1 (Q.1) is **Compulsory**, each question carries **equal** marks.

1. (a) Obtain Bragg's law in reciprocal space and discuss Brillouin zones of BCC lattice. **9**  
(b) Based on tight binding approximation arrive at the expression for band width in case of BCC. **5**
2. (a) Obtain Boltzmann transport equation. **9**  
(b) What is magnetoresistance ? Explain. **5**
3. (a) Arrive at the expression for internal field based on Lorentz in case of one dimensional array of dipoles in dielectrics. **9**  
(b) What is polarization ? Explain different polarization mechanisms in dielectrics. **5**
4. (a) Discuss the quantum theory of paramagnetism. **8**  
(b) What is hysteresis ? Explain ferromagnetic hysteresis curve. **6**
5. (a) Obtain London's equations of superconductivity. **9**  
(b) Explain flux quantization in a superconducting ring. **5**
6. (a) Discuss the Sommerfeld's theory of electrical conductivity. **8**  
(b) Arrive at Clausius-Mosotti relation. Mention its significance. **6**
7. (a) Discuss the molecular field theory of ferromagnetism. **8**  
(b) Outline the BCS theory of superconductivity. **6**
8. (a) State and explain Weidemann-Franz law. **5**  
(b) Explain the Classical theory of electronic polarization and optical absorption. **5**  
(c) Write a short note on macroscopic quantum interference. **4**

