Exam. Code : 209004
Subject Code : 4821

M.Sc. Physics 4th Semester (Batch 2020-22)
CONDENSED MATTER PHYSICS–II
Paper : PHY-552

Time Allowed—3 Hours] [Maximum Marks—100

Note :– Attempt **FIVE** questions in all, selecting at least **ONE** question from each Section. The **fifth** question may be attempted from any Section. All questions carry equal marks.

SECTION—A

1. (a) Discuss the origin of magnetism in paramagnetic materials. Evaluate the magnetic susceptibility of paramagnetic materials using quantum treatment. 15

   (b) Discuss the origin and consequences of quenching of orbital angular momentum. 5

2. (a) Discuss the origin of magnetism in diamagnetic materials. Find diamagnetic susceptibility and discuss its temperature dependence. 10

   (b) Compare the Gouy's and Quinck's methods used to find the magnetic susceptibility of paramagnetic materials. 10

SECTION—B

3. (a) Explain the formation of spin waves in ferromagnetic materials. 10

   (b) Compare the results of Weiss molecular field and Spin wave theory used to explain magnetism of ferromagnetic materials. 10

4. (a) Distinguish between superexchange interaction and exchange interaction. 10

   (b) Discuss the formation of antiferromagnetic magnons. 10

SECTION—C

5. (a) State and derive d.c. Josephson effect. 15

   (b) How the a.c. Josephson effect lead to precise measurement of e/h ? 5

6. (a) Discuss the structure and properties of any two high temperature superconductors. 10

   (b) How the infinite conductivity of superconductors can be explained ? 10

SECTION—D

7. (a) Compare the absorption process in direct and indirect band gap materials. 10

   (b) Explain the interaction of light with solids and its applications. 10

8. (a) Distinguish between luminescence and phosphorescence. 10

   (b) What are excitons and explain their formation. 10