62137

Reg. No. | | | | | | | | | |

IV Semester M.Sc. Degree Examination, September/October - 2022
PHYSICS
Condensed Matter Physics II (Elective)
(CBCS Scheme 2020-21 Onwards)
Paper - 404 b

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates :

Answer all questions.

1. a) What are the various symmetry elements present in crystals. Explain. **(6)**
   b) Discuss the analysis of powder photographs obtained by rotating crystal method. **(9)**

(OR)

2. a) Explain the method of calculation of cohesive energy of ionic crystal. **(6)**
   b) Derive an expression for the calculation of Madelung constant for NaCl crystal. **(9)**

(OR)

3. a) Explain the Heisenberg's exhange interaction of ferromagnets. **(6)**
   b) Derive Bloch $T^{3/2}$ law for ferromagnets. **(9)**

(OR)

4. a) Describe the properties of anti-ferromagnetic materials. **(5)**
   b) Based on two sub-lattice model, explain the theory of antiferromagnetism. Arrive at an expression for the Neel temperature. **(10)**

(OR)

5. a) Describe the dipole theory of ferroelectricity. **(7)**
   b) Discuss the thermodynamics of second order ferroelectric phase transitions. **(8)**

(OR)

6. a) Describe the laser ablation technique for the synthesis of thin films. **(7)**
   b) Explain the method of accurate determination of step height and film thickness using the technique of Fizeau fringes. **(8)**

Answer any **Five** of the following. **(5×5=25)**

7. a) Outline the Born - Haber cycle applied to sodium chloride.
   b) Describe the covalent bonding process occurs between pair of hdrogen atoms.
   c) Discuss the applications of giant and colossal Magneto - resistive materials.
   d) Explain the effect of dipolar interactions occurs in ferromagnetic materials.
   e) Explain the ferroelectric properties of Rochelle salt.
   f) Describe briefly the analysis of thin film using multiple beam interferometry.
