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NY—314—2023

FACULTY OF SCIENCE

M.Sc. (Second Semester) EXAMINATION

NOVEMBER/DECEMBER, 2023

(New/CBCS Pattern)

PHYSICS

Paper-PHY-204

(Condensed Matter Physics)

(Wednesday, 13-12-2023) **Time : 10.00 a.m. to 1.00 p.m.**

Time—3 *Hours* *Maximum Marks*—75

1. Explain Bragg's law of X-ray diffraction and obtain an expression for spacing between two crystalline planes. 15

Or

(*a*) Explain types of surface defects. 8

(*b*) Explain reciprocal lattice of FCC is BCC. 7

2. Explain in detail the Bloch theorem and its implementation in Kronig-Penny model to find the band structure of a solid. 15

Or

(*a*) Explain Agumented plane wave model to calculate the band structure of the solid. 7

(*b*) Explain electron motion in one-dimensional crystal lattice. 8

3. Explain in detail the Hall effect to determine the carrier concentration and mobility in a semiconductor. 15

Or

(*a*) Describe why Fermi level in n-type and p-type semiconductor shifts towards valence and conduction band. 8

(*b*) Define Ferroelectricity in detail. 7

P.T.O

4. Explain the formation of M-H curve in ferromagnetic materials. 15

Or

(*a*) Explain in detail the London penetration depth. 7

(*b*) Explain the Curie Weiss law for susceptibility. 8

5. Write short notes on any *three* of the following : 15

(*i*) Cooper pair

(*ii*) The cellular method

(*iii*) The dipolar dispersion in solids

(*iv*) Diamond structure.