Reg. No.

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

Time : 3 Hours   Maximum Marks : 70

Instructions to Candidates :

All parts are Compulsory.

PART - A

Answer any **Four** of the following questions.   (4×5=20)

1. Explain the properties of reciprocal lattice.

2. Explain the different symmetry elements with suitable examples.

3. Explain Wigner-Seitz approximation method calculating energy bands.

4. Explain the classification of ferroelectric materials with suitable examples.

5. Obtain an expression for effective mass of electrons and holes.

6. Obtain an expression for electrical conductivity of thin films.
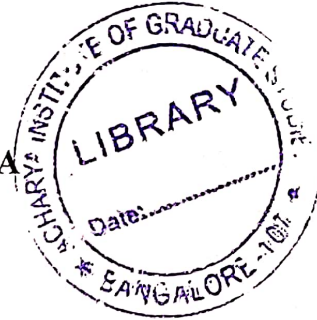
PART - B

Answer any **Four** of the following questions.   (4×10=40)

7. Describe Weissenberg and rotating crystal method of X-ray diffraction.

8. Discuss the motion of electrons in a one dimensional periodic potential using Kronig-Penney model.

9. Discuss the Tight binding method of energy band calculations.

10. Discuss the dipole theory of ferroelectrics with their assumptions and conclusions.

11. Describe the Molecular beam epitaxial method of thin film preparation.

12. Explain conditions for accurate determination of step height and film thickness using Fizeau fringes method.

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PART - C

Answer any **Two** of the following questions.   **(2×5=10)**

13. In a rotation photograph, six layer lines are observed both above and below the zero layer line. If the heights of these layer lines above the zero layer are 0.29, 0.59, 0.91, 1.25, 1.65 and 2.12cm. Obtain the cell height of the crystal along the axis of rotation. The radius of camera is 3cm and the wavelength of the X-rays is 1.54 A^0.

14. Show that the period of Bloch oscillation for one dimensional crystal having lattice period a is $\zeta = \dfrac{h}{e\varepsilon a}$

15. Discuss the Thermodynamics of ferroelectric transitions.

16. Explain the study of surface topography by multiple beam interferometer.