PG/IS/PHS/104/24

M.Sc. 1st Semester Examination, 2024

PHYSICS

(Condensed Matter Physics-I)

PAPER—PHS-104

Full Marks : 25

Time : 1 hour

Answer **all** questions

The figures in the right hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

GROUP — A

Answer any **two** questions : 2×2

1. Distinguish between Single Crystal and Poly Crystal characteristics of a solid.

2. Find the stereogram and matrix representation of 6 fold rotation.

3. Derive Bragg's diffraction condition in terms of Reciprocal lattice.

4. Show that for one dimensional linear Diatomic lattice, the number of acoustical and optical branches must be equal.

GROUP – B

Answer any **two** questions : 4×2

5. Explain in details the glide and screw symmetry elements in a crystal.

6. Explain in details how will you index different planes in a polycrystal by 'Powder Diffraction' method.

7. Find the density of states of a linear monoatomic chain in one dimension.

(*Continued*)

8. What is meant by effective mass of electron and find an expression of effective mass in a solid.

GROUP – C

Answer any **one** question :   8 × 1

9. Find the expression of scatterd intensity when X-ray falls on a crystal and hence find the Laue diffraction condition.

10. Explain from nearly free electron model the physical origin of energy gap in a solid. What is meant by extended and reduced zone scheme.

[Internal Assessment — 5 Marks]

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