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VA—35—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

PHYSICS

Paper—XIII

(Solid State Physics)

(Friday, 6-12-2024)

Time : 10.00 a.m. to 12.00 noon

Time—2 Hours

Maximum Marks—40

N.B. :— Attempt all questions.

1. Describe the formation of metallic and covalent bond. Also write down their physical properties. 15

Or

- (a) Explain the assumptions of classical theory of Lattice Heat Capacity and derive equation for specific heat. 8
- (b) Considering the following expression for specific heat from Einstein's

$$\text{theory : } C_v = 3NK_B \left(\frac{\hbar\omega_0}{K_B T} \right) \frac{e^{-\frac{\hbar\omega_0}{KT}}}{\left(e^{-\frac{\hbar\omega_0}{KT}} - 1 \right)^2}.$$

Derive expressions for the behaviour of specific heat of high and low temperature. 7

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2. Derive an expression for the energy of electron, i.e. $E_n = \frac{n^2 h^2}{8mL^2}$ by using Sommerfield model. 15

Or

- (a) Determine packing factor of HCP crystal. 8
- (b) Describe rotation symmetry operation. 7
3. Write notes on any *two* : 10
- (i) Rotating crystal method
- (ii) Point group and space group
- (iii) Limitations of Debye model
- (iv) Outstanding properties of metals.

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