

H.T.No:

--	--	--	--	--	--	--	--	--	--

Course Code: 241PH001



ADITYA UNIVERSITY

B.Tech – I Semester End Examinations Regular – Dec 2024

SOLID STATE PHYSICS (Common to CE, ME, Min.E & PT)

Time: 3 hours

Max. Marks: 50

Answer ONE question from each unit

All Questions Carry Equal Marks

All parts of the questions must be answered at one place only

UNIT-I

- 1 a Explain the generalized Hooke's law including thermal strains for isotropic materials. L3 CO1 [5M]
b Describe the factors affecting the bending moment in beams with examples. L2 CO1 [5M]

(OR)

- 2 a Define the Young's Modulus and derive an expression for depression in single cantilever beam. Include practical considerations. L3 CO1 [5M]
b Analyze the stress-strain curve for materials under different loading conditions. L2 CO1 [5M]

UNIT-II

- 3 a Differentiate between simple cubic, body-centered cubic, and face-centered cubic crystal structures with diagrams. L2 CO2 [5M]
b Explain the concept of Miller indices and calculate the indices for a given crystal plane. L3 CO2 [5M]

(OR)

- 4 a Discuss the powder method of X-ray diffraction for crystal structure determination and its advantages over other methods. L2 CO2 [5M]
b Deduce an expression for Bragg's law with neat diagram. L3 CO2 [5M]

UNIT-III

- 5 a Illustrate the process of doping in semiconductors and its effect on electrical properties. L2 CO3 [5M]
b Compare the properties of P-type and N-type semiconductors. L3 CO3 [5M]

(OR)

- 6 a Describe the Hall effect and its application in determining the type of semiconductor. L2 CO3 [5M]
b Calculate the drift velocity in a semiconductor given the electric field and charge carrier concentration. L3 CO3 [5M]

UNIT-IV

- 7 a Discuss the quantum mechanical basis of the origin of magnetic dipole moment in atoms. L3 CO4 [5M]
b Classify magnetic materials and provide examples where each type is typically used. L2 CO4 [5M]

(P.T.O)

(OR)

- | | | | | | |
|---|---|---|----|-----|------|
| 8 | a | Compare Soft and Hard Magnets. | L2 | CO4 | [5M] |
| | b | Explain the process of magnetization in ferromagnetic materials by domain theory and the role of temperature. | L2 | CO4 | [5M] |

UNIT-V

- | | | | | | |
|---|---|---|----|-----|------|
| 9 | a | Explain ionic polarization and its significance in dielectric materials. Include mathematical derivation. | L2 | CO5 | [6M] |
| | b | Explain polar and non-polar Dielectrics. | L1 | CO5 | [4M] |

(OR)

- | | | | | | |
|----|---|--|----|-----|------|
| 10 | a | Define the dielectric constant and discuss its temperature dependence. | L3 | CO5 | [5M] |
| | b | Summarize the characteristics of ferro-electric materials. | L2 | CO5 | [5M] |
