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Course Code: **241PH001**



# ADITYA UNIVERSITY

B.Tech – I Semester End Examinations Supplementary – Dec 2025

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

**Time: 3 hours**

**Max. Marks: 100**

**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 State and explain Hooke's law with stress-strain curve. L2 CO1 [6M]  
b Derive Relation between Bulk modulus and Young's modulus. L3 CO1 [14M]

**(OR)**

- 2 a Describe depression of cantilever. L2 CO1 [10M]  
b Derive an expression for bending moment for a beam. L3 CO1 [10M]

### UNIT-II

- 3 a Describe BCC crystal structure in detail and calculate atomic packing fraction. L2 CO2 [10M]  
b Describe FCC crystal structure in detail and calculate atomic packing fraction. L2 CO2 [10M]

**(OR)**

- 4 a Deduce the relation  $2d\sin\theta = n\lambda$  L3 CO2 [8M]  
b Explain powder crystal method. L2 CO2 [12M]

### UNIT-III

- 5 a What are N-type and P-type semiconductors? How can you produce them from pure germanium? L2 CO3 [8M]  
b Discuss the operation of Zener diode. L2 CO3 [12M]

**(OR)**

- 6 a Explain Hall effect and obtain an expression for Hall voltage. L3 CO3 [14M]  
b Mention important applications of Hall effect. L3 CO3 [6M]

### UNIT-IV

- 7 a Obtain relation between B, H and I L3 CO4 [6M]  
b Write a note on origin of magnetism in atomic scale. L2 CO4 [14M]

**(OR)**

- 8 a Explain B-H curve in ferromagnetism. L3 CO4 [14M]  
b Distinguish hard and soft ferromagnetic materials. L2 CO4 [6M]

### UNIT-V

- 9 a Define: Dielectric polarization, Dielectric polarizability and Susceptibility, L1 CO5 [6M]  
b Explain electronic polarization and derive expression for polarizability L3 CO5 [14M]

**(OR)**

- 10 a The dielectric constant of helium at  $0^{\circ}\text{C}$  is 1.00074. Calculate its electric susceptibility at this temperature. L3 CO5 [4M]  
b Mention various types of polarizations in dielectric materials. L1 CO5 [16M]

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