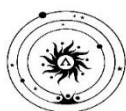


H.T.No: 

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

Course Code: 241PH002



# ADITYA UNIVERSITY

B.Tech – I Semester End Examinations Supplementary – Mar 2026

## MODERN PHYSICS (Common to EEE, ECE, IT & DS)

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 Derive the condition of the maxima and minima in thin films due to reflected light. L2 CO1 [14M]  
b A parallel beam of light with wavelength  $6000\text{\AA}$  was incident on a thin glass plate of refractive index 1.5 with an angle of refraction of  $50^\circ$ . Find the lowest thickness of the glass plate which will appear dark. L3 CO1 [6M]

(OR)

- 2 a Explain the Fraunhofer's diffraction due to a single slit in detail. L2 CO1 [14M]  
b Write a short note on types of diffraction. L1 CO1 [6M]

### UNIT-II

- 3 a Explain the Absorption and emission process. L2 CO2 [6M]  
b Derive the relation between Einstein coefficients. L2 CO2 [14M]

(OR)

- 4 a Explain the structure and principle of an optical fiber. L2 CO2 [12M]  
b Discuss in detail the types of optical fibers based on modes and refractive index. L2 CO2 [8M]

### UNIT-III

- 5 a What is de-Broglie's hypothesis and derive an expression for the wavelength associated with an electron. L2 CO3 [12M]  
b Discuss the Davisson and Germer experiment. L2 CO3 [8M]

(OR)

- 6 Derive the eigen values and eigen functions of a particle confined in a one-dimensional potential box. L2 CO3 [20M]

### UNIT-IV

- 7 a Derive the expression for the electrical conductivity of a metal by using the quantum-free electron theory. L2 CO4 [14M]  
b Write the merits and demerits of classical free electron theory. L1 CO4 [6M]

(P.T.O)

**(OR)**

- |   |   |   |    |     |       |
|---|---|---|----|-----|-------|
| 8 | a | Explain the formations of energy bands in solids. | L2 | CO4 | [10M] |
|   | b | Derive the expression for the density of states.  | L2 | CO4 | [10M] |

**UNIT-V**

- |   |   |  |    |     |       |
|---|---|--|----|-----|-------|
| 9 | a | Discuss in detail the Hall effect.     | L2 | CO5 | [16M] |
|   | b | Write the applications of Hall effect. | L1 | CO5 | [4M]  |

**(OR)**

- |    |   |  |    |     |       |
|----|---|--|----|-----|-------|
| 10 | a | Discuss the classification of semiconductors in detail.              | L1 | CO5 | [6M]  |
|    | b | Explain I-V characteristics of a p-n junction diode and Zener diode. | L2 | CO5 | [14M] |

\*\*\*\*\*