



ADITYA UNIVERSITY

B.Tech. – I Semester End Examinations Regular (B.Tech2024)

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

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 Obtain condition for maxima and minima due to interference of reflected light in thin films of uniform thickness. L2 CO1 [8M]
b In Newton's rings experiment, the diameter of 4th and 12th dark rings are 0.4 cm and 0.7 cm respectively. Find the Diameter of 20th dark ring. L3 CO1 [2M]
(OR)
- 2 a Discuss Fraunhofer diffraction due to double slit. L2 CO1 [6M]
b Discuss Rayleigh criterion of resolution. L2 CO1 [4M]

UNIT-II

- 3 a Explain the working of Ruby laser with a neat energy level diagram. L2 CO2 [7M]
b List out the characteristics of Laser. L1 CO2 [3M]
(OR)
- 4 a With a neat diagram, explain the structure of Optical fibre. L2 CO2 [3M]
b What is acceptance cone? Derive an expression for acceptance angle of an optical fibre. L3 CO2 [7M]

UNIT-III

- 5 a Derive time independent Schrödinger wave equation. L3 CO3 [6M]
b What are matter waves? Show that the De'Brogile wavelength of electron is $\frac{12.26}{\sqrt{V}} \text{ \AA}$ L3 CO3 [4M]
(OR)
- 6 a Describe the Davisson-Germer experiment in demonstrating the wave nature of electrons. L2 CO3 [8M]
b What is the Physical significance of wave function ψ . L1 CO3 [2M]

UNIT-IV

- 7 a What is Quantum free electron theory. Write the success of quantum free electron theory. L1 CO4 [4M]
b Describe Fermi-Dirac distribution function and discuss the same for different temperature conditions. L3 CO4 [6M]
(OR)
- 8 a Explain Bloch Theorem. L2 CO4 [3M]
b Explain Origin of energy bands and classify solids basing on band theory. L3 CO4 [7M]

UNIT-V

- 9 a Write a short note on extrinsic semi-conductors. L1 CO5 [4M]
b Derive an expression for concentration of electrons in conduction band of an intrinsic semiconductor. L3 CO5 [6M]

(OR)

- 10 a What is Hall effect. Derive an expression for Hall Coefficient. L2 CO5 [7M]
b A copper strip 2 cm wide and 1 mm thick is placed in a magnetic field of 2.5 wb/m^2 . If a current of 200 A is setup in a strip, calculate Hall voltage across strip if $R_H = 6 \times 10^{-7} \text{ m}^3/\text{C}$. L3 CO5 [3M]

MODEL QUESTION PAPER