

(4) . TPH-201

5. (a) State Heisenberg's uncertainty principle and mention *one* of its applications.

(CO5)

- (b) What is the physical significance of wave function Ψ . Derive time-dependent Schrodinger equation. (CO5)

- (c) The position and momentum of a 1.0 KeV electron are simultaneously determined. If the position is located with 1 \AA , what is the percentage of certainty in momentum ?

(CO5)

TPH-201

1,550

H

Roll No.

TPH-201

**B. TECH. (SECOND SEMESTER)
END SEMESTER**

EXAMINATION, June, 2023

ENGINEERING PHYSICS

Time : Three Hours

Maximum Marks : 100

Note : (i) All questions are compulsory.

(ii) Answer any *two* sub-questions among (a), (b) and (c) in each main question.

(iii) Total marks in each main question are **twenty**.

(iv) Each sub-question carries 10 marks.

1. (a) Derive an expression for the intensity at a point in the region of interference by two coherent waves. Also, give the condition of maxima and minima. (CO1)
- (b) Newton's rings are observed normally in the reflected light of wavelength 6000 \AA .

P. T. O.

(2)

TPH-201

The diameter of the 10th dark ring is 0.5 metres. Find the radius of curvature of the lens and the thickness of the film.

(CO1)

- (c) Define diffraction of light and distinguish between Fresnel and Fraunhofer classes of diffraction. Deduce the resultant intensity of Fraunhofer diffraction due to single slit. (CO1)

2. (a) What is the working principle of LASER ? Derive the relation between Einstein's coefficients and explain their physical significance. (CO2)

- (b) Explain the construction and working of the He-Ne laser. (CO2)

- (c) Write short notes on (i) numerical aperture (NA), (ii) acceptance angle, and (iii) acceptance cone. Optical fiber has an NA of 0.20 and a cladding refractive index of 1.59. Determine the acceptance angle for fiber in water, which has a refractive index of 1.33. (CO2)

(3)

TPH-201

3. (a) What are the postulates of the special theory of relativity ? Using them derive Lorentz transformation equations. (CO3)

- (b) Prove $E^2 - p^2c^2 = m_0^2c^4$ using Einstein's mass-energy relation. If the kinetic energy of a body is thrice of its rest mass energy, then find its velocity. (CO3)

- (c) What is superconductivity ? Distinguish between type I and type II superconductors. (CO3)

4. (a) Write Maxwell's equations and derive their differential form using their integral form. (CO4)

- (b) Explain the physical significance of all Maxwell's equations. Show that the electromagnetic waves propagate in free space with the velocity of light. (CO4)

- (c) A point charge of $13.5 \mu\text{C}$ is enclosed at the center of the cube of side 6.0 cm. Find the electric flux (i) through the whole volume and (ii) through one face of the cube, where $\epsilon_0 = 8.85 \times 10^{-12} \text{C}^2\text{N}^{-1}\text{m}^{-2}$.

(CO4)

P. T. O.