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PHYS132 Enrol. No. .....

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END SEMESTER EXAMINATION : JAN. 2022

ENGINEERING PHYSICS

Time : 3 Hrs. *Maximum Marks : 60*

Note: ***Attempt questions from all sections as directed. Use of Scientific Calculator is allowed.***

SECTION – A (24 Marks)

Attempt any **four** *questions out of* **five.**
Each question carries **06** *marks.*

1. Discuss Fraunhofer type diffraction produced by a narrow single slit of width a and illuminated by the light of wavelength λ. Also, deduce the position of maxima and minima and plot the intensity distribution curve.

2. Write Maxwell's equations in differential and integral forms and explain their physical significance.

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3. Obtain the relativistic formula for the addition of velocities and also show that the speed of light is constant.

4. State the uncertainty principle. Describe the experiment based on γ-ray microscope which supports the principle.

5. Describe the construction and working of Ruby laser.

SECTION – B (20 Marks)

Attempt any **two** *questions out of* **three**.

Each question carries **10** *marks.*

6. (a) Prove that electromagnetic waves are transverse in nature. (6)

(b) Calculate the de-Broglie wavelength associated with a proton moving with a velocity equal to 1/20th of the velocity of light. (4)

7. (a) Explain Rayleigh's criterion of resolution with a proper diagram. Define the limit of resolution and resolving power. (5)

(b) In Newton's ring experiment the diameter of the 5th and 25th rings is 0.3 cm and 0.8 cm respectively. Find the wavelength of light. The radius of the curved surface of lens R = 100 cm. (5)

8. (a) State and prove Gauss's law in electrostatics. How it is related to Coulomb's law? (5)

(b) A particle of mass m is confined to a one-dimensional box of length 1. Drive an expression for (i) wave function (ii) probability density of the particle. (5)

SECTION – C (16 Marks)

(Compulsory)

9. (a) In Newton's ring arrangement, light consisting of wavelengths λ_1 and λ_2 incidents normally on a plane convex lens of the radius of curvature R resting on a glass plate. If the nth dark ring due to λ_1 coincides with (n+1)th dark ring due to λ_2, then show that the radius of the nth dark ring of $\lambda 2$ is given by $\sqrt{\frac{\lambda_1 \lambda_2 R}{\lambda_1 - \lambda_2}}$. (4)

(b) Drive the equation of continuity. Give its physical significance. (4)

(c) Describe Davisson and Germer's experiment to depict the wave nature of electrons. (4)

(d) Calculate the velocity of electrons accelerated through a potential difference of 10^6 volts. Given: rest mass of electron = 9×10^{-31} kg. (4)