B. Tech. Examination 2023-24

(Even Semester)

ENGINEERING PHYSICS

Time : Three Hours] *[Maximum Marks : 60*

Note :– Attempt all questions.

SECTION–A

1. Attempt all parts of the following : $8 \times 1 = 8$

(a) What are coherent sources?

(b) What do you mean by grating element?

(c) What are the characteristics of a wave function?

(d) What is Bragg's law?

(e) Define specific rotation.

(f) Show that velocity of matter wave is greater than velocity of light.

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(g) What are inertial and non-inertial frames?

(h) Show that rest mass of photon is zero.

SECTION – B

2. Attempt any two parts of the following : 2×6=12

(a) In Newton's ring experiment, the diameter of 15^{th} dark ring was found to be 0.590 cm and that of 5^{th} ring is 0.336 cm. If the radius of plano-convex lens is 100 cm, calculate the wavelength of light used.

(b) An electron has speed 4×10^5 ms^{-1} within the accuracy of 0.01%. Calculate the uncertainty in the position of electron.

(c) If earth receives 2 cal min^{-1} cm^{-2} solar energy, what are the amplitudes of electric and magnetic field of radiation?

(d) If the kinetic energy of a body is twice the rest energy, find the velocity of body.

SECTION – C

Note :– Attempt all questions. Attempt any two parts from each questions. 8×5=40

3. (a) Discuss the formation of Newton's ring in reflected light. Prove that in reflected light, the diameter of dark ring is proportional to the square root of natural number.

(b) Describe the Rayleigh's criterion for resolution. Derive an expression for resolving power of grating.

(c) Explain the construction and working of Nicol prism.

4. (a) Derive time independent Schrodinger wave equation.

(b) Show that group velocity is equal to the velocity of particle.

(c) What are matter waves? Show that De-broglie wavelength associated with a particle of mass 'm' and kinetic energy 'E' is given by :

$$\lambda = \frac{h}{\sqrt{2mF}}$$

5. (a) What is Poynting vector? Derive and explain Poynting theorem.

(b) Show that velocity of plane electromagnetic wave in free space is given by :

$$C = \frac{1}{\sqrt{\mu_o \in_o}}$$

(c) Explain the basic principle of optical fibre. Discuss fibre classification.

6. (a) What was the objectives of Michelson-Morley experiment? Describe the experiment. How is the negative result of experiment interpreted?

(b) Establish mass-energy relation.

(c) Derive relativistic formula for the variation of mass with velocity.

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