S.No. : 705

BAS 3102

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Following Paper ID and Roll No. to be filled in your Answer Book.

PAPER ID : 39902 Roll No.

B. Tech. Examination 2022-23

(Odd Semester)

PHYSICS - I

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

Note :– Attempt all questions.

SECTION–A

1. Attempt all parts of the following : 8×1=8

   (a) What is non-inertial frames of reference?

   (b) Why a moving rod appears shorter than its real length?

   (c) What is dispersive power?

   (d) What do you mean by grating element?

   (e) Wha do you mean by fringe width?

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(f) What is population inversion?

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

(h) Write Einstein's postulates of theory of relativity.

SECTION – B

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

(a) Newton's rings are observed normally in reflected light of wave length 6000Å. The diameter of 10th dark ring is 0.50 cm. Find the radius of curvature of the lens and thickness of the film.

(b) A grating has 6000 per cm drawn on it. If its width is 10 cm, calculate :

(i) The resolving power in second order

(ii) The smallest wavelength that can be resolved in 3rd order in 6000 Å wavelength region.

(c) Calculate the numerical aperture, acceptance angle and the critical angle of the fibre, if refractive indices of core and cladding are 1.50 and 1.45 respectively.

(d) If the total energy of a particle is exactly thrice its rest energy, what is the velocity of particle?

SECTION – C

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

3. (a) Describe the formation of Newton's ring in reflected monochromatic light. Prove that in reflected light diameter of dark rings are proportional to the square root of natural numbers.

(b) Explain phenomenon of double refraction. Describe the construction and working of Nicol prism.

(c) Explain Rayleigh's criterion for resolution. Derive an expression for resolving power of grating.

4. (a) Explain basic principle of optical fiber. Discuss fiber classification.

(b) Describe the construction and working of Ruby laser.

(c) Explain the principle of holography using construction and reconstruction of images on hologram.

5. (a) Show that the relativistic invariance of law of conservation of momentum leads to the concept of variation of mass with velocity.

(b) Establish Einstein's mass-energy relation.

(c) Explain why a moving clock appears to go slow to the stationary observer using the concept of time dilation.

6. (a) Discuss the effect of introducing a thin plate in the path of one of the interfering beams in a biprism experiment. Also deduce an expression for the displacement of fringes.

(b) Define acceptance angle and numerical aperture. Also derive expression for acceptance angle and numerical aperture.

(c) Show that acceleration is invariant under Galilean transformation.

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