

[Total No. of Questions - 9] [Total No. of Printed Pages - 2]

Dec-24-0277 (CBCS)
PH-101 (Engineering Physics)
B.Tech. 1st

Time : 3 Hours

Max. Marks : 60

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all, selecting one question each from section A, B, C and D. Section E is compulsory.

SECTION - A

1. State the fundamental postulates of special theory of relativity and deduce from them the Lorentz transformations and show how these are superior to Galilean transformations. (10)
2. (i) Comment on the statement "Moving clock appears to go slow." (3)
(ii) Discuss with suitable diagrams, the principle, construction, and working of Helium-Neon laser. Describe the various applications of lasers. (7)

SECTION - B

3. What do you understand by the term "simple harmonic motion"? Obtain the differential equation for simple harmonic motion and obtain expressions for time period and angular frequency. (10)
4. Give the principle of optical fibers. How the terms angle of acceptance and numerical aperture are used in optical fibers? How can optical fibers be used in medical and communication fields? (10)

SECTION - C

5. What do you mean by particle in a box? Show that $E_n = n^2\pi^2h^2/2mL^2$. (10)
6. What are X-rays? How are they produced? Describe the continuous and characteristic X-rays. (10)

SECTION - D

7. Derive Maxwell's equations and give their physical interpretation. (10)
8. What is Meissner effect? Distinguish between type I and type II superconductors. Describe briefly how has it been explained. (10)

SECTION - E (Compulsory)

9. (i) What do you mean by inertial and non-inertial frames?
- (ii) Explain the terms 'spontaneous emission' and 'stimulated emission'.
- (iii) Write a note on population inversion.
- (iv) What do you mean by 'quality factor'?
- (v) What is meant by step index and graded index optical fiber?
- (vi) What are the properties of wave function?
- (vii) What do you mean by hard and soft X-rays?
- (viii) Discuss some applications of superconductors.
- (ix) What is superconductivity?
- (x) What do you mean by electromagnetic waves? (10×2=20)