[Total No. of Questions - 9] [Total No. of Printed Pages - 3]
(2123)

1312

B. Tech 1st Semester Examination

Applied Physics-I (O.S.)

AS-1002

Time : 3 Hours **Max. Marks : 100**

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 from each Sections A, B, C and D. Section E (question 9) is compulsory.

SECTION - A

1. (a) Describe construction, working and formation of Interference fringes in Michelson Interferometer. **(10)**

   (b) Explain the theory of formulation of Newton's rings in reflected system and derive the expression for diameter of the nth bright fringe. **(10)**

2. (a) What are the differences between Fraunhofor and Fresnel diffraction. **(5)**

   (b) Describe Michelson-Morley experiment and discuss its outcomes. **(10)**

   (c) Find the mass and speed of 2 MeV electrons.

   $m_0 = 9.1 \times 10^{-31}$ kg **(5)**

SECTION - B

3. (a) Derive Maxwell's equations in differential form. **(12)**

(b) State and Prove Gauss's Law in the presence of dielectric. **(8)**

4. (a) Discuss the characteristics of simple harmonic oscillations. Obtain differential equation of motion for a simple pendulum and hence find the time period and frequency of motion. **(15)**

(b) A simple pendulum has a length of 1 metre and a mass of 1 kg suspended at one end. Assuming the oscillations to be of small amplitude, find the period of the oscillations. **(5)**

SECTION - C

5. (a) What is Heisenberg's Uncertainty Principle? Describe an experiment to illustrate it. **(10)**

(b) What is Planck's quantum hypothesis to explain the observed spectrum of a black body? Give short comings of old quantum theory. **(10)**

6. Derive Schrodinger's time-dependent and time independent equations for a non-relativistic particle. Also give physical significance of the wave-function Ψ. **(20)**

SECTION - D

7. (a) Describe the construction and working of Scintillation counter. **(10)**

(b) Describe the construction and working of cloud chamber. **(10)**

8. (a) What is a nuclear fission reactor? Describe principle, construction and working of fission reactor. **(13)**

(b) Write short note on ionisation chamber. **(7)**

SECTION - E (Compulsory question)

9. (a) What is time dilation?

(b) What is a wave guide?

(c) What are dielectric losses?

(d What do you understand by dispersive power of a grating?

(e) What is the difference between phase velocity and group velocity?

(f) Explain De-Broglie hypothesis.

(g) What is Nuclear fusion reactor?

(h) What do you understand by dead time and recovery time of G.M. counter?

(i) What is meant by specific rotation?

(j) Write unit and dimensions of Poynting Vector. **(10×2=20)**