Roll No. Total Pages : 04

(03)

D-C-190003

B.Tech. EXAMINATION, 2019

Semester I & II (CBS)

ENGINEERING PHYSICS

PH-101

Time : 3 Hours *Maximum 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 from each Section A, B, C and D. Q. No. **9** is compulsory.

Section A

1. (a) Write down the main postulates of special theory of relativity. **5**

(b) Deduce an expression for time dilation in regard to the interval between two events measured from two different inertial frames. **5**

2. (a) Explain the principal of optical pumping and stimulated emission of radiation. Discuss the properties of laser radiation and mention some of its application. **5**

(b) Calculate the population ratio of the two states in He-Ne laser that produce light of wavelength 6000 Å at 300 K. **5**

Section B

3. (a) Describe step index and graded index fiber and explain difference between them. **5**

(b) An optical fiber has NA of 0.20 and a cladding refractive index of 1.59. Determine the acceptance angle for the fiber in water which has refractive index of 1.33. **5**

4. (a) Derive an expression for the total energy of harmonic oscillator and shows that it is constant and proportional to square of the amplitude. **5**

(b) A particle of mass 100 gram is placed in a field of potential $U = 5x^2 + 10$ ergs/gm. Find the frequency. **5**

Section C

5. (a) Drive the energy Eigen values and normalized wave functions for a particles in one dimensional infinite square well potential width L. 5

   (b) Define Schrödinger time independent wave equation. What is the significance of wave functions ? 5

6. (a) Describe construction and working of Coolidge tube. How can you control intensity and quality of X-ray ? 5

   (b) Discuss X-rays in view of their production and properties. 5

Section D

7. (a) Define Pointing Vector. Derive an expression for it and explain its physical significance for electromagnetic waves in free space. 5

   (b) Obtain Maxwell equation and deduced an expression for the velocity of propagation of a plan electromagnetic waves in medium of dielectric constant ε and relative permeability μ. 5

8. (a) Describe effect of an external magnetic field on the superconducting state of material. What do you mean by flux Exclusion and what is Meissner effect ? 5

   (b) Write note on penetration of magnetic field in a superconductor and penetration depth. 5

Section E

(Compulsory Question)

9. (a) What do you mean by length contraction ?

   (b) Proper life of mason is $2^* 10^{-8}$ sec. Calculate the mean life of mason moving with velocity of 0.8 c.

   (c) What is active medium and energy source of laser ?

   (d) Define Optical Pumping ?

   (e) Define Single-mode and Multi-mode fiber.

   (f) What is Periodic Motion and Circular Motion ?

   (g) What do you understand by "Quality" factor ?

   (h) What is Heisenberg's Uncertainty Principle ?

   (i) What is Wave Packet ?

   (j) Explain the difference in origin of X-rays and visible light. **10×2=20(2 marks each)**