Printed Pages:02 **Sub Code: KAS201T**

Paper Id: 238069 **Roll No.** | | | | | | | | | | |

B.TECH

(SEM II) THEORY EXAMINATION 2022-23

ENGINEERING PHYSICS

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

(a) What is proper time interval?

(b) How velocity addition theorem is consistent with Einstein's second postulate?

(c) State equation of continuity.

(d) Write down Maxwell's equation in free space.

(e) What is black body radiation?

(f) Why Compton shift is undetectable for visible light?

(g) Two independent light sources could not produce interference, why?

(h) What do you mean by resolving power of an optical instrument?

(i) With the help of a neat diagram, name the different components of an optical fiber

(j) State difference between spontaneous emission and stimulated emission.

SECTION B

2. Attempt any *three* of the following: 10x3=30

(a) Calculate the amount of work to be done to increase the speed of an electron from 0.6c to 0.8c. Given that the rest mass energy of electron= 0.5 MeV.

(b) Derive the necessary expression for energy and momentum carried by an electro-magnetic wave.

(c) What is physical significance of wavefunction? Derive Schrodinger time independent wave equation. What happen if the particle is free?

(d) Explain interference in parallel thin films and prove that reflection and transmission are complementary with each other.

(e) Calculate the numerical aperture, acceptance angle and critical angle of the fiber from the following data: Refractive index of core (n_1) = 1.50 and refractive index of cladding (n_2) = 1.45.

SECTION C

3. Attempt any *one* part of the following: 10x1=10

(a) Deduce an expression for the time dilation on the basis of Lorentz transformation equations. Give an example to show that time dilation is real effect.

(b) Derive the relativistic velocity transformation equations. If two photons are approaching each other, calculate the speed of one photon as observed by the other.

4. Attempt any *one* part of the following: 10x1=10

(a) Derive electromagnetic wave equation in free space. Show that electromagnetic wave travels with speed of light in free space.

(b) What is Poynting vector? Discuss the work-energy theorem for the flow of energy in an electromagnetic field.

5. Attempt any *one* part of the following: 10x1=10

(a) Solve the Schrodinger equation for one-dimensional motion of a particle in a box of side L and show that its energy eigen value is inversely proportional to the square of side L. Also find the expression for normalized wave function.

(b) What is Compton effect? Deduce an expression for Compton shift.

6. Attempt any *one* part of the following: 10x1=10

(a) What are Newton's rings? Why the centre of Newton's rings appears dark? Derive the expressions for the diameter of nth dark as well as bright ring.

(b) Discuss the phenomena of Fraunhofer diffraction at a single slit and show that the relative intensities of the successive maximum are nearly 1: $4/9\pi^2$: $4/25\pi^2$: $4/49\pi^2$: ……..

7. Attempt any *one* part of the following: 10x1=10

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

(b) Describe the construction and action of the He-Ne laser. Write some important applications of laser.