20PHU16

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2024
(Fifth Semester)

Branch – **PHYSICS**

QUANTUM MECHANICS AND RELATIVITY

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1 Energy of a wave divided by its momentum gives……..
(i) Phase velocity (ii) group velocity
(iii) Wave velocity (iv) Classical velocity

2 V_p/V_s suggest that……..
(i) Particle is lagging behind the wave packet
(ii) Particle is traveling with wave packet
(iii) particle is lagging ahead the wave packet
(iv) None of the above

3 The schrodinger wave equation is …..
(i) Linear (ii) Quadratic
(iii) Continuous (iv) Discreate

4 The device used in Michaclon Morley experiment was _____
(i) Telescope (ii) Plane greating
(iii) Interferometer (iv) Prism

5 The total probability of finding the particle in space must be _____
(i) Negative (ii) Infinity
(iii) Positive (iv) One

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6 a) Write a short notes on photon and gravity.
OR
b) Write a short notes on significance of constants "h" and "c".

7 a) Write a important applications of Hesisenberg uncertainty principle.
OR
b) Write short notes on electron microscope.

8 a) Derive the expression for schrodinger's time dependent wave equation.
OR
b) Write a short notes on tunneling effect.

9 a) Derive the expression for Galilean transformation.
OR
b) Derive the expression for Lorentz transform equation.

10 a) Express the principle of equivalence.
OR
b) Write a notes on qualitative ideas of curvature of space and time.

Cont…

SECTION -C (30 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 6 = 30)

11 a) Explain the effect of gravity on astronomical radiation effect.

OR

b) Explain Davisson and Germer's experiment on diffraction of electrons.

12 a) Explain Hesisenberg uncertainty principle with Bohr's idealized thought Experiment.

OR

b) Explain electron microscope and the applications of ordinary optical microscope.

13 a) Explain linear harmonic oscillator with neat sketch.

OR

b) Derive the expression for schrodinger time dependent and independent equation.

14 a) Explain construction and working of Michelson-Morley with neat sketch.

OR

b) Explain the Fitzgerald contraction and time dilation.

15 a) Explain equality of gravitational and inertial masses.

OR

b) Explain Mercury and red shift experiment verification with neat diagram.

Z-Z-Z END