14PHU16

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION DECEMBER 2019
(Fifth Semester)

Branch - **PHYSICS**

QUANTUM MECHANICS & RELATIVITY

Time : Three Hours Maximum : 75 Marks

SECTION-A (20 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 x 2 = 20)

1 Define photons and gravity.
2 What are matter waves?
3 State Heisenberg's uncertainty principle.
4 List out any two application of electron microscope.
5 Write the admissibility condition on wave functions.
6 What do you mean by tunneling effect?
7 Define frame of reference.
8 Write the energy equivalent of one atomic mass unit.
9 Write the principle of Einstein's law of gravitation.
10 Write the effect of gravitational field on a ray of light.

SECTION - B (25 Marks!
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 5 = 25)

11 a Derive the Einstein's photo electric equation and also explain its physical significance.

OR

b Determine the expression for De braglie wave length of matter waves.

12 a Write a short note on electron microscope.

OR

b Illustrate Heisenberg's uncertainty principle with Bohr's experiment.

13 a Derive Schrodinger's time dependent equation from time independent equation.

OR

b Explain the concept of tunneling of particle through a barrier.

14 a Give a short note on Fitzgerals length contraction.

OR

b Describe Einstein's mass-energy equivalence.

15 a State and explain the principle of equivalence.

OR

b Write a short note on geodesics effect.

SECTION - C f30 Marks)
Answer any **THREE** Questions
ALL Questions Carry **EQUAL** Marks (3 x 10 = 30)

16 Explain in detail the construction and working of Davisson and Germer's experiment to prove the existence of matter waves.
17 Illustrate Heisenberg's uncertainty principle using gamma-ray microscope experiment.
18 Formulate Schrodinger's equation for a particle in a box. Solve it for a its eigen values and eigen functions.
19 Discuss the formulate for variation of mass with velocity.
20 Examine precision of perihelion of mercury and its red shift experimental