

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION DECEMBER 2018
(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 What is the conclusion drawn from Davisson and Germer's experiments?
- 2 What is gravitational red shift?
- 3 State Heisenberg's uncertainty principle.
- 4 Mention the limitations of electron microscope.
- 5 Define zero point energy.
- 6 What is a potential barrier?
- 7 What is meant by time dilation?
- 8 Write mass - energy relation.
- 9 What is principle of equivalence?
- 10 State Einstein's law of gravitation.

SECTION - B (25 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks (5x 5 = 25)

- 11 a Write short notes on quantum properties of micro particle.
OR
b Calculate the wavelength of the matter waves associated with the body of mass one gram moving with velocity of 6.625 km/s. Planck's constant $h = 6.625 \times 10^{34}$ Js.
- 12 a State and prove Heisenberg's uncertainty principle.
OR
b Differentiate between optical microscope and electron microscope.
- 13 a Explain the concepts of tunneling effect.
OR
b Establish Schrodinger's equation for a linear harmonic oscillator.
- 14 a Explain the fundamental postulates of special theory of relativity,
OR
b Write a note on relativity of simultaneity.
- 15 a Write briefly the precession of perihelion of mercury.
OR
b Explain the basic concepts of general theory of relativity.

SECTION - C (30 Marks)

Answer any THREE Questions

ALL Questions Carry EQUAL Marks (3 x 10 = 30)

- 16 Describe the effect of gravity on astronomical radiations.
- 17 Explain the working of electron microscope with neat diagram.
- 18 Obtain Schrodinger's time dependent and independent wave equation.
- 19 Derive Einstein's laws of addition of velocity.