19U508 (Pages: 2) Name: .....

Reg.No: .....

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2021

(CBCSS - UG)

CC19U PHY5 B07 - QUANTUM MECHANICS

(Physics - Core Course)

(2019 Admission - Regular)

Time : 2.00 Hours Maximum : 60 Marks

Credit : 3

Part A (Short answer questions)

Answer ***all*** questions. Each question carries 2 marks.

1. Write the equation denoting direction of the electron after Compton scattering.
2. What is Bremsstrahlung?
3. What is distance of closest approach in Rutherford scattering?
4. Write down the names of the spectral lines emitted by a hydrogen atom.
5. Give any two deficiencies of Bohr model.
6. What is de Broglie waves. Give any two properties.
7. What is a wave packet?
8. Distinguish between expectation value and eigen value.
9. When the energy of the particle becomes discrete? What is the nature of energy of a free particle, Quantum mechanically.
10. Sketch the diagram of simple harmonic oscillator and write down the expression for the Hamiltonian operator.
11. What is meant by reduced mass.Write down an expression for it?

12. Write down the expression for electron probability in spherical polar co-ordinates and explain the symbols?

(Ceiling: 20 Marks)

Part B (Short essay questions - Paragraph)

Answer ***all*** questions. Each question carries 5 marks.

13. What are the experimental observations in photoelectric effect?

14. Explain the drawbacks of Thomsons model.

15. A proton is accelerated from rest through a potential difference of 2.36×10^5 V. What is its de Broglie wavelength?

16. Explain the concept of probability and randomness

17. Find the eigenfunctions, for the operator x+ d/dx , when the eigen value is b.

18. Using tunneling effect, explain the principle of scanning tunneling microscope.

19. Give a short note on orbital magnetic dipole moment.

(Ceiling: 30 Marks)

Part C (Essay questions)

Answer any ***one*** question. The question carries 10 marks.

20. What is meant by ultraviolet catastrophe? How could Plank solve the same?

21. Solve the Schrodingers equation of a particle confined in a one-dimensional box. Find the energy eigen values and the normalised eigen functions.

(1 × 10 = 10 Marks)

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