

45 Lecture - PHY101

Important Mcqs

Which equation is used to describe the behavior of a quantum particle?

- a) Maxwell's equations
- b) Newton's laws of motion
- c) Schrödinger equation
- d) Einstein's field equations

Answer: c) Schrödinger equation

What is the smallest unit of energy in quantum mechanics?

- a) Electron
- b) Photon
- c) Quark
- d) Proton

Answer: b) Photon

Which of the following is NOT a postulate of quantum mechanics?

- a) The state of a system is described by a wave function.
- b) The wave function must be normalized.
- c) Physical observables are represented by Hermitian operators.
- d) Only classical mechanics can accurately describe the behavior of particles.

Answer: d) Only classical mechanics can accurately describe the behavior of particles.

What is the Heisenberg uncertainty principle?

- a) The position and momentum of a particle cannot be simultaneously known with arbitrary precision.
- b) The energy and momentum of a particle cannot be simultaneously known with arbitrary precision.
- c) The position and energy of a particle cannot be simultaneously known with arbitrary precision.
- d) The spin and angular momentum of a particle cannot be simultaneously known with arbitrary precision.

Answer: a) The position and momentum of a particle cannot be simultaneously known with arbitrary precision.

Which of the following particles are fermions?

- a) Protons
- b) Electrons
- c) Photons
- d) Neutrons

Answer: b) Electrons

What is entanglement in quantum mechanics?

- a) The state in which two particles have the same spin.
- b) The state in which two particles have opposite spins.
- c) The state in which two particles share a wave function, making their properties correlated.
- d) The state in which two particles have different energy levels.

Answer: c) The state in which two particles share a wave function, making their properties correlated.

What is the wave-particle duality?

- a) The concept that light can behave both as a wave and a particle.
- b) The concept that electrons can behave both as a wave and a particle.
- c) The concept that photons can behave both as a wave and a particle.

d) The concept that all particles can behave both as a wave and a particle.

Answer: d) The concept that all particles can behave both as a wave and a particle.

Which of the following is a consequence of the Pauli exclusion principle?

- a) No two electrons in an atom can have the same set of quantum numbers.
- b) Electrons occupy the lowest energy levels available to them.
- c) Electrons move in circular orbits around the nucleus.
- d) Electrons can absorb and emit energy only in discrete quanta.

Answer: a) No two electrons in an atom can have the same set of quantum numbers.

What is the role of the Hamiltonian operator in quantum mechanics?

- a) It describes the position of a particle.
- b) It describes the momentum of a particle.
- c) It describes the total energy of a system.
- d) It describes the spin of a particle.

Answer: c) It describes the total energy of a system.

What is a quantum state?

- a) The position of a particle.
- b) The momentum of a particle.
- c) The total energy of a system.
- d) A mathematical description of the state of a quantum system.

Answer: d) A mathematical description of the state of a quantum system.