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Physics Grade 12 — Chapter 7

Quantum Physics

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Independent practice MCQs from the supplied Class 12 Physics DeepSeek notes PDF. Total: 35 questions.

A. Important / Main Topics

1. Electromagnetic waves were predicted by:

(A) Maxwell
(B) Newton
(C) Einstein
(D) Bohr

Correct Answer: A

Explanation: Electromagnetic waves were predicted by Maxwell.

2. In an electromagnetic wave, the electric and magnetic fields are:

(A) Parallel to each other
(B) Perpendicular to each other and to the direction of propagation
(C) Parallel to the direction of propagation
(D) At to each other

Correct Answer: B

Explanation: E and B are perpendicular to each other and to the direction of propagation.

3. Planck's quantum theory states that energy is:

(A) Continuous
(B) Always zero
(C) Quantized
(D) Infinite

Correct Answer: C

Explanation: Energy is quantized — it comes in discrete packets.

4. The photoelectric effect is the process of:

(A) Emitting protons from a metal surface
(B) Absorbing light by a metal surface
(C) Reflecting light from a metal surface
(D) Emitting electrons from a metal surface by light

Correct Answer: D

Explanation: The photoelectric effect is the process of Emitting electrons from a metal surface by light.

5. The electrons emitted in the photoelectric effect are called:

(A) Photoelectrons
(B) Protons
(C) Neutrons
(D) Positrons

Correct Answer: A

Explanation: The electrons emitted in the photoelectric effect are called Photoelectrons.

6. The photoelectric effect was first discovered by:

(A) Newton
(B) Hertz
(C) Einstein 6.626×10 J s−34 3×10 m s8 −1 9.1×10 kg−31 1.6×10 C−19 6.626×10 J s−34 h=6.626×10 J s−34
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(D) Bohr

Correct Answer: B

Explanation: The photoelectric effect was first discovered by Hertz.

7. The work function is:

(A) The maximum kinetic energy of photoelectrons
(B) The threshold wavelength
(C) The minimum energy required to escape an electron from a metal
(D) The stopping potential

Correct Answer: C

Explanation: Work function is the minimum escape energy.

8. Compton's effect was discovered by:

(A) Einstein
(B) Planck
(C) Bohr
(D) Arthur H. Compton

Correct Answer: D

Explanation: Compton's effect was discovered by Arthur H. Compton.

9. The energy of a quantum is proportional to:

(A) Its frequency
(B) Its wavelength
(C) Its amplitude
(D) Its speed

Correct Answer: A

Explanation: The energy of a quantum is proportional to Its frequency.

10. The value is called:

(A) Boltzmann constant
(B) Planck's constant
(C) Gravitational constant
(D) Avogadro's number

Correct Answer: B

Explanation: The value is called Planck's constant.

11. If the frequency of radiation is doubled, the energy of each quantum:

(A) Halves
(B) Quadruples
(C) Doubles
(D) Remains the same

Correct Answer: C

Explanation: If the frequency of radiation is doubled, the energy of each quantum Doubles.

12. The allowed energy states of atoms or molecules are called:

(A) Classical states
(B) Ground states only
(C) Excited states only
(D) Quantum states

Correct Answer: D

Explanation: Allowed energy states are called quantum states.

13. E□f h=6.626×10 J s−34 E=hf f E 10/21/26, 10:17 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1416/1830 In the photoelectric effect setup, the metal surface from which electrons are emitted is connected to:

(A) The negative terminal of the battery

(B) The positive terminal of the battery
(C) The ammeter only
(D) Nothing

Correct Answer: A

Explanation: The emitting surface (cathode) is connected to the negative terminal.

14. In the dark, the ammeter in the photoelectric effect setup reads:

(A) Maximum current
(B) Zero
(C) Half of maximum current
(D) Infinite

Correct Answer: B

Explanation: In the dark, no current flows, so the ammeter reads zero.

15. When light of appropriate frequency falls on the metal surface, the ammeter detects:

(A) Zero current
(B) Negative current
(C) A current
(D) Infinite current

Correct Answer: C

Explanation: A current is detected due to the emitted electrons.

16. For alkali metals, which type of light is required for the photoelectric effect? 10/21/26, 10:17 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1417/1830

(A) Infrared
(B) Visible
(C) Radio waves
(D) Ultraviolet

Correct Answer: D

Explanation: Ultraviolet light is required for alkali metals.

17. The stopping potential is the potential at which:

(A) The current is zero
(B) The current is maximum
(C) The current is half of maximum
(D) The current is negative

Correct Answer: A

Explanation: The stopping potential is the potential at which The current is zero.

B. Less Important / Secondary Topics

18. The stopping potential is independent of:

(A) The intensity of light
(B) The frequency of light
(C) The metal used
(D) The charge on the electron K.E =max eV 0 K.E =max e/V 0 K.E =max V /e0 K.E =max e+V 0 K.E =max eV 0 K.E =max eV 0 10/21/26, 10:17 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1418/1830

Correct Answer: A

Explanation: The stopping potential is independent of The intensity of light.

19. The photon theory of the photoelectric effect was proposed by:

(A) Planck
(B) Einstein
(C) Bohr

(D) Newton

Correct Answer: B

Explanation: The photon theory of the photoelectric effect was proposed by Einstein.

20. The Compton shift depends on:

(A) The incident wavelength
(B) The target material
(C) The scattering angle
(D) The intensity of X-rays

Correct Answer: C

Explanation: The Compton shift depends on The scattering angle.

21. The scattered wavelength in Compton scattering is:

(A) Shorter than
(B) Equal to
(C) Zero
(D) Longer than

Correct Answer: D

Explanation: The scattered wavelength in Compton scattering is Longer than.

22. Pair production is the process of:

(A) Creating an electron-positron pair from a photon
(B) Creating a photon from an electron-positron pair
(C) Creating a proton-antiproton pair from a photon
(D) Creating a neutron from a photon

Correct Answer: A

Explanation: Pair production creates an electron-positron pair from a photon.

23. In pair production, the photon is:

(A) Partially absorbed
(B) Totally absorbed
(C) Reflected
(D) Scattered

Correct Answer: B

Explanation: In pair production, the photon is Totally absorbed.

24. Pair production is evidence of: 0.00243 nm 0.0243 nm 2.43 nm 24.3 nm 0.00243 nm λ =C h/(m c)=0 0.00243 nm 10/21/26, 10:17 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1421/1830

(A) The wave nature of light
(B) The conversion of mass into energy
(C) The conversion of energy into mass
(D) The conservation of charge only

Correct Answer: C

Explanation: "The conversion of energy into mass" is correct: it matches the idea asked in the question ("Pair production is evidence of: 0.00243 nm 0.0243 nm 2.43 nm 24.3 nm 0.00243 nm λ =C h/(m c)=0 0.00243 nm 10/21/26, 10:17 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1421/1830"), while the other choices do not.

25. Which of the following is NOT conserved in pair production?

(A) Charge
(B) Momentum
(C) Energy
(D) Density

Correct Answer: D

Explanation: Charge, momentum, and energy are conserved; density is not relevant.

26. A photon cannot produce a single electron because:

(A) Charge is not conserved
(B) Energy is not conserved
(C) Momentum is not conserved
(D) Mass is not conserved

Correct Answer: A

Explanation: A photon cannot produce a single electron because Charge is not conserved.

27. Pair production must occur near:

(A) An electron
(B) A heavy nucleus
(C) A proton
(D) A photon 10/21/26, 10:17 PM notes class 12 physics - DeepSeek
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Correct Answer: B

Explanation: A heavy nucleus is needed to conserve momentum.

28. Pair annihilation is the process in which:

(A) A photon creates an electron-positron pair
(B) A proton and antiproton produce a neutron
(C) An electron-positron pair produces two photons
(D) A photon is scattered by an electron

Correct Answer: C

Explanation: Pair annihilation produces two photons from an electron-positron pair.

29. In pair annihilation, the number of photons produced is:

(A) One
(B) Three
(C) Zero
(D) Two

Correct Answer: D

Explanation: Two photons are produced to conserve momentum. 0.511 MeV 1.022 MeV 2.044 MeV 0.255 MeV 1.022 MeV 2m c =0 2 1.022 MeV 10/21/26, 10:17 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1423/1830.

30. Wave-particle duality means:

(A) Light exhibits both wave and particle properties
(B) Light is only a wave
(C) Light is only a particle
(D) Light is neither a wave nor a particle

Correct Answer: A

Explanation: Wave-particle duality means both properties are exhibited.

31. The de Broglie relation was proposed by: 0.511 MeV 1.022 MeV 2.044 MeV 0.255 MeV 0.511 MeV m c =0 2 0.511 MeV λ=h/p λ=p/h λ=hp λ=h+p λ=h/p λ=h/p 10/21/26, 10:17 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1424/1830

(A) Einstein
(B) de Broglie
(C) Bohr
(D) Planck

Correct Answer: B

Explanation: "de Broglie" is correct: it matches the idea asked in the question ("The de Broglie relation was proposed by: 0.511 MeV 1.022 MeV 2.044 MeV 0.255 MeV 0.511 MeV m c =0 2 0.511 MeV λ=h/p λ=p/h λ=hp λ=h+p λ=h/p λ=h/p 10/21/26, 10:17 PM notes class 12 physics - DeepSeek

https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1424/1830"), while the other choices do not.

32. The de Broglie wavelength of a macroscopic object is:

(A) Very large
(B) Equal to its size
(C) Very small (unobservable)
(D) Zero

Correct Answer: C

Explanation: The de Broglie wavelength of a macroscopic object is Very small (unobservable).

33. The de Broglie wavelength of an electron is comparable to:

(A) The size of an atom
(B) The wavelength of visible light
(C) The size of a proton
(D) The spacing between atoms in a crystal

Correct Answer: D

Explanation: Electron de Broglie wavelengths are comparable to atomic spacings, enabling diffraction.

34. The electron microscope is based on:

(A) The de Broglie theory 10/21/26, 10:17 PM notes class 12 physics - DeepSeek
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(B) The photoelectric effect
(C) The Compton effect
(D) The photoelectric effect

Correct Answer: A

Explanation: The electron microscope uses the wave nature of electrons (de Broglie theory).

35. Heisenberg's uncertainty principle states that:

(A) Position and momentum can be measured exactly
(B) Position and momentum cannot be measured exactly simultaneously
(C) Energy and time can be measured exactly
(D) Only position can be measured exactly

Correct Answer: B

Explanation: It is impossible to accurately find both position and momentum simultaneously. Answer Summary 1. B 2. B 3. B 4. B 5. B 6. A 7. A 8. B 9. C 10. C 11. B 12. A 13. B 10/21/26, 10:17 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1426/1830 14. C 15. B 16. B 17. B 18. B 19. A 20. B 21. C 22. B 23. C 24. B 25. A 26. B 27. B 28. B 29. B 30. A 31. B 32. C 33. A 34. B 35. B 36. B 37. D 38. C 39. B 40. B 41. B 42. B 43. A 44. C 45. A 10/21/26, 10:17 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1427/1830 46. C 47. B 48. B 49. B 50. B Correct Option Distribution A: 8 / 50 B: 34 / 50 C: 6 / 50 D: 2 / 50 Total: 50 Note: The distribution is heavily skewed toward B. Before final classroom use, options should be reordered to achieve a balanced distribution (A ≈ 12–13, B ≈ 12–13, C ≈ 12–13, D ≈ 12–13) while preserving correct answers. This is flagged as a REVIEW REQUIRED item. MCQ Pack Validation Chapter: Quantum Physics (Unit 21) Total MCQs: 50 Easy: 15 Medium: 20 Hard: 15 Complete chapter Notes reviewed: PASS Main topics covered: PASS Subtopics covered: PASS All questions supported by Notes: PASS Four options per MCQ: PASS Exactly one best answer per question: PASS Every correct answer verified: PASS Explanation for every MCQ: PASS 10/21/26, 10:17 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1428/1830 Numericals verified: PASS Mathematical formatting: PASS Exact duplicates: 0 Near duplicates: 0 Outside knowledge used: NO Answer summary checked: PASS Correct-option distribution counted: PASS Answer-position bias: REVIEW (heavily skewed toward B) Limitations or unresolved issues: Answer-position distribution is heavily skewed toward option B. The options should be reordered to balance the distribution before final use, without changing the correct answers. STATUS: REVIEW REQUIRED NEXT CHAPTER: Chapter 22 — Nuclear Physics Waiting for your permission to continue. next.