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Advent Of Modern Physics

Chapter No.16 (MCQs)

1. Inertial frame of reference is that:

- a) Which has large inertia
- b) Which has no inertia?
- c) In which Newton's first law of motion is applicable.
- d) In which Newton's second law of motion is applicable.

2. Galilean transformations are not valid for frames of references:

- a) Which move with very high velocity?
- b) Which move with very low acceleration?
- c) Whose relative velocity approaches the velocity of light?
- d) Which move with high acceleration?

3. According to special theory of relativity, speed of light in vacuum:

- a) Is high for observer moving towards its source.
- b) Is high for observer moving away from its source.
- c) Same for all the observers in uniform relative motion with respect to each other.
- d) Depends upon the uniform translational motion of the source of light with respect to the observer.

4. According to special theory of relativity, mass of an object moving relative to an observer with a velocity comparable to the velocity of light:

- a) Increased.
- b) Decreases.
- c) Remains constant.

5. According to special theory of relativity, length of a body along the direction of motion relative to an observer moving with a velocity comparable to the velocity light:

- a) Increases.
- b) Decreases.
- c) Remains constant.

6. Time interval between two events as recorded by an observer in relative motion with velocity comparable to velocity of light with respect to the point of occurrence of the event:

- a) Dilates.
- b) Shortens.
- c) Remains constant.

7. The phenomenon of black body radiation can be explained on the basis of:

- a) Wave theory.
- b) Classical theory.
- c) Quantum theory.
- d) Bohr's theory.

8. According to Max Plank, the energy of each quantum is directly proportional to:

- a) Wave length of radiation.
- b) Amplitude of radiation.
- c) Speed of radiation.
- d) Frequency of radiation.

9. When light of suitable frequency falls on the surface of metal electrons are emitted from it, this phenomenon is known as:

- a) Compton Effect.
- b) Thermionic effect.
- c) Photomultiplier effect.
- d) Photoelectric effect.

10. Minimum frequency required to initiate photoelectric effect is called:

- a) Minimum frequency.
- b) Maximum frequency.
- c) Quantum frequency.
- d) Threshold frequency.

11. The minimum amount of energy required by an electron to escape from a metal surface is called:

- a) Latent energy.
- b) Ionization energy.
- c) Work function.
- d) Bond energy.

12. The value of work function depends upon:

- a) Frequency of incident light.
- b) Wave length of incident light.
- c) Nature of metal surface.
- d) All of them.

13. According to Einstein's energy of each photon is given by:

- a) $E = h/\nu$.
- b) $E = h\nu$.
- c) $E = hc/\nu$.
- d) $E = h\nu/c$.

14. Photo is a:

- a) Positively charged particle.
- b) Negatively charged particle.
- c) Neutral particle.
- d) 15. in photoelectric effect light exhibits:
- e) Wave nature.
- f) Particle nature.
- g) Neither wave nor particle nature.
- h) Particle as well as wave nature.

16. Maximum kinetic energy with which electrons are emitted depends upon the:

- a) Intensity of incident light.
- b) Frequency of incident light.
- c) Amplitude incident light.
- d) Speed of incident light.

17. Stopping potential V_0 is the:

- a) Retarding potential require to stop the slowest photo electrons.
- b) Retarding potential required to stop the fastest photo electrons.
- c) Retarding potential required to stop the emission of electrons from leaving the surface.
- d) Retarding potential required to control the number of electrons emitted during photoelectric effect.

18. If ν_0 is the threshold frequency, λ_0 is the threshold wave length and c is the speed of light in vacuum then the work function of the metal is given by:

- a) $\phi = h \lambda_0$.
- b) $\phi = h c/\lambda$.
- c) $\phi = h\nu_0/c$.

19. On increasing the intensity of light of frequency greater than the threshold frequency the number of photoelectrons emitted from the surface increases because by increasing intensity of light:

- a) Energy of photons increases.
- b) Energy of photons decreases.
- c) Number of incident photons increase.
- d) Value of work function decreases.

20. Momentum of a photon is directly proportional to:

- a) Intensity of light.
- b) Wave length of light.
- c) Frequency of light.
- d) Both frequency and wave length of light.

21. In Compton Effect frequency of scattered photon is:

- a) Greater than the frequency incident photon.
- b) Less than the frequency of incident photon.
- c) Equal to the frequency of incident photon.

22. The change in frequency of scattered photon depends upon the:

- a) Wave length of incident light.
- b) Frequency of incident light.
- c) Angle of scattering.
- d) All of them.

23. In Compton Effect light behaves as:

- a) Waves.
- b) Particles.
- c) None of these.

24. If m_0 is the rest mass of an electron then the pair production takes place only if the energy of incident photon is greater or equal to:

- a) $M_0 c^2$.
- b) $2 m_0 c^2$.
- c) $2 m_0/c^2$.
- d) $2 c^2/m_0$.

25. According to De Broglie, the momentum of a particle in terms of wave length associated with it is given by:

- a) $P = h\lambda$.
- b) $P = h/\lambda$.
- c) $P = \lambda/h$.
- d) $P = h c/\lambda$.

26. According to Einstein's special theory of relativity the mass of a particle moving with speed of light will be:

- a) Zero.
- b) Double.
- c) Infinite.
- d) Ten times.

27. Which theory proposes that the energy exchange takes place in discrete bundles or quanta?

- a) Theory of relativity.
- b) Uncertainty principle.
- c) Bohr's theory.
- d) Quantum theory.

28. Working of a photocell is based on:

- a) Photoelectric effect.
- b) Compton Effect.
- c) Pair production.
- d) Uncertainty principle.

29. According to uncertainty principle, the product of uncertainties Δp and Δx in the measurement of momentum and position respectively of a particle a certain instant is of the order of:

- a) Plank's constant.
- b) Rydberg constant.
- c) Joule's constant.
- d) Stephen's constant.

30. If λ is the wave length of light, momentum of its photo will be:

- a) $P = hv/\lambda$.
- b) $P = h/\lambda$.
- c) $P = hc/v$.
- d) $P = h \lambda/v$.

31. The scattering of X-ray photon by an electron is called:

- Photoelectric effect.
- Scattering effect.
- Compton Effect.
- Pair production.

32. Einstein's photoelectric equation is: (8-a, 1996)

- a) $\frac{1}{2} m v^2 = h v + \phi$.
- b) $H v = \phi - \frac{1}{2} m v^2$.
- c) $H v = \phi + \frac{1}{2} m v^2$.
- d) None of these.

33. When fast moving electrons are stopped by a metal of high atomic weight, the phenomenon gives rise to: (7-a, 1997)

- a) X-rays.
- b) β -rays.
- c) Y-rays.

34. Einstein's theory of relativity states that the speed of light in vacuum is: (7-a, 1999)

- a) Independent of the motion of the source and observer.
- b) Affected by the ether drift.
- c) Dependent on the motion of the source and observer.

35. Number of photo electrons emitted from a metal depends upon:

- a) Frequency of incident light.
- b) Wavelength of incident light.
- c) Intensity of incident light.

36. The relativistic changes in mass, length and time in daily life are not observed because: (7-a, 2001)

- a) The masses of objects are very large.
- b) The size of objects is very small in comparison to the velocity of light.
- c) The velocity of objects is very small in comparison to the velocity of light.
- d) None of the above.

37. In Compton Effect, the scattered photon has: (7-a, 2001)

- a) Greater frequency and smaller wave length.
- b) Smaller frequency and smaller wave length.
- c) Greater frequency and greater wave length.
- d) None of the above.

38. The fast moving electrons stopped by a heavy metallic target in an evacuated glass tube, give rise to the production of: (7-a, 2002, P.M)

- a) α - Particles.
- b) β - Particle.
- c) X-rays.
- d) Photons.

39. The maximum kinetic energy of photo electrons emitted from a metal depends upon: (7-a, 02, P.M)

- a) The frequency of incident light only.
- b) The wavelength of incident light only.
- c) The work function of the metal only.
- d) All of them.

40. Plank is well known for from the given options: (7-a, 02, P.E)

- a) Energy quantization.
- b) Energy conservation.
- c) Wave particle duality.
- d) Momentum quantization.

41. A frame of reference is called inertial if it is: (7-a, 2002, P.E)

- a) Rotatory.
- b) Accelerated.
- c) Moving with a uniform velocity.
- d) Vibratory.

42. According to Uncertainty principle: (7-a, 2002, P.E)

- a) $(\Delta x)(\Delta T) = h$.
- b) $(\Delta x)(\Delta p) = h$.
- c) $(\Delta E)(\Delta P) = h$.
- d) $(\Delta x)(\Delta E) = h$.

43. The Einstein photoelectric equation is: (8-a, 2002, P.E)

- a) $V_0 e = h \nu + \frac{1}{2} m v^2$
- b) $H \nu = m c^2 + V_0 e$
- c) $V_0 e = h \nu - h \nu_0$
- d) $V_0 e = \{h (1/\lambda - 1/\lambda_0)$

44. The absorption of the incident radiation by a perfect black body is: (8-a, 2002, P.E)

- a) Zero %.
- b) 100 %.
- c) 90 %.
- d) 50 %.

45. Pair production is only possible when incident photon has the wave length of the order of: (8-a, 02, P.E)

- a) 10^{-4} m.
- b) 10^{-6} m.
- c) 10^{-10} m.
- d) 10^{-14} m.

46. The number of photoelectrons emitted from a metal depends upon: (7-a and I, 2004)

- a) The frequency of the incident light.
- b) The wave length of the incident light.
- c) The color of the incident light.
- d) The intensity of incident light.

47. The disintegration of a photon into electron and positron near a heavy nucleus is known as.

- a) Annihilation.
- b) β Decay.
- c) α Decay.
- d) Pair production.

48. The frequency of the incident radiation corresponding to the work function is called: (7-and I, 2005)

- a) Fundamental frequency.
- b) Working frequency.
- c) Critical frequency.
- d) Thermal frequency.

49. The radiation from a black body depends upon the: (8-a I, 2005)

- a) Material of the body.
- b) Size of the body.
- c) Shape of the body.
- d) Temperature of the body.

50. As a result of elastic collision between a photon and an electron the:

- a) Frequency of the photon is increased.
- b) Wavelength of the photon is increased.
- c) Energy of the photon is increased.
- d) X-rays are produced.

51. The emissive power of a black body is proportional to: (1-viii, 2010)

- a) T .
- b) T^5 .
- c) T^4 .
- d) T^3 .

52. The phenomenon of pair production takes place if the energy of photon is greater than: (1-ix, 2010)

- a) 1.0 Mev.
- b) 1.02 Mev.
- c) 0.051 Mev.
- d) None of these.

ANSWERS

- (20) In which Newton's first law of motion is applicable.
- (21) Whose relative velocity approaches the velocity of light.
- (22) Same for all the observers in uniform relative motion with respect to each other.
- (23) Increases.
- (24) Decreases.
- (25) Dilates.
- (26) Quantum theory.
- (27) Frequency of radiation.
- (28) Photoelectric effect.
- (29) Threshold frequency.
- (30) Work function.
- (31) All of them.
- (32) $E = h\nu$.
- (33) Neutral particle.
- (34) Particle nature.
- (35) Frequency of incident light.
- (36) Retarding potential required to stop the fastest photo electrons.
- (37) $\phi = hc/\lambda_0$.
- (38) Number of incident photons increase.
- (39) Frequency of light.
- (40) Less than the frequency of incident photon.
- (41) All of them.
- (42) Particles.
- (43) $2m_0c^2$
- (44) $P = h/\lambda$.
- (45) Infinite.
- (46) Quantum theory.
- (47) Photoelectric effect.
- (48) Planck's constant.
- (49) $P = h/\lambda$.
- (50) Compton Effect.
- (51) $h\nu = \phi + \frac{1}{2}mv^2$
- (52) X-rays.
- (1) Independent of the motion of the source and observer.
- (2) Intensity of incident light.
- (3) The velocity of objects is very small in comparison to the velocity of light.
- (4) Smaller frequency and greater wave length.
- (5) X-rays.
- (6) All of them.
- (7) Energy quantization.
- (8) Moving with a uniform velocity.
- (9) $(\Delta x)(\Delta p) \approx \hbar$
- (10) $V_0 = h\nu - h\nu_0$
- (11) 100%
- (12) 10^{-14} m
- (13) The intensity of incident light
- (14) Pair production
- (15) Fundamental Frequency
- (16) Temperature of the body
- (17) Wavelength of the photon is increase
- (18) T^4
- (19) 1.02 Mev

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