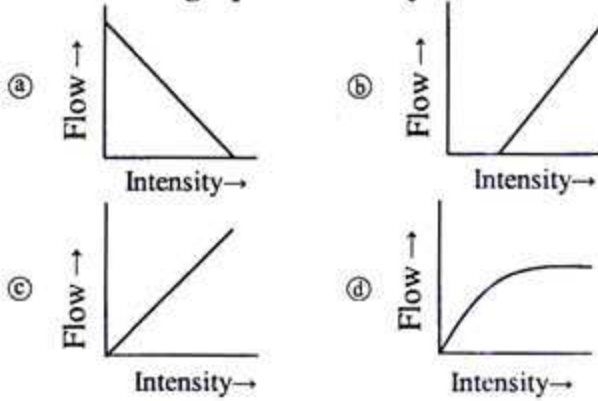


Chapter Eight : Introduction to Modern Physics

1. The velocity of light in an inertial frame of reference S and S' is c and c' . If frame S' moves at v velocity with respect to frame S along X-axis— [D. B.-15]
 - (a) $c' = c - v$
 - (b) $c' = c$
 - (c) $c' = c + v$
 - (d) $v = c + c'$
2. Who proposed the postulate of special relativity?
 - (a) Newton
 - (b) Kepler
 - (c) Einstein
 - (d) Galileo
3. Clock ticks slowly in moving frame compared to still frame— what is this event called? [Ctg. B.-15]
 - (a) Length contraction
 - (b) Relativity of mass
 - (c) Time dilation
 - (d) Time contraction
4. An astronaut changed 60 LY distance less than 48 LY distance using his velocity. This requires his velocity to be— [R.B.-15]
 - (a) More than $0.6c$
 - (b) Less than $0.6c$
 - (c) More than $0.8c$
 - (d) Less than $0.8c$
5. At what speed, the length of a rocket will be one-fourth of its initial length? [All Board-18]
 - (a) $3 \times 10^8 \text{ m.s}^{-1}$
 - (b) $2.99 \times 10^8 \text{ m.s}^{-1}$
 - (c) $2.92 \times 10^8 \text{ m.s}^{-1}$
 - (d) $2.90 \times 10^8 \text{ m.s}^{-1}$
6. The relative mass of a particle with m_0 rest mass is m , the kinetic energy of the particle is 3 times more than its potential energy. Which of the following relations is correct? [S. B.-17]
 - (a) $m = 4m_0$
 - (b) $m = 3m_0$
 - (c) $m = 2m_0$
 - (d) $m = m_0$
7. What is the equivalent energy of 2 a.m.u mass? [Ctg. B.-15]
 - (a) $1.494 \times 10^{-10} \text{ J}$
 - (b) $1.494 \times 10^{-10} \text{ eV}$
 - (c) $2.988 \times 10^{-10} \text{ J}$
 - (d) $2.088 \times 10^{-10} \text{ eV}$
8. Equivalent energy of 1amu mass— [Dj. B.-17]
 - (a) $9.30 \times 10^8 \text{ eV}$
 - (b) $9.32 \times 10^8 \text{ eV}$
 - (c) $9.35 \times 10^8 \text{ eV}$
 - (d) $9.38 \times 10^8 \text{ eV}$
9. Equivalent energy of 1amu mass? [R.B.-15]
 - (a) 934 J
 - (b) 934 MeV
 - (c) 934 eV
 - (d) 934 kg
10. $E = h\nu$ law was given by— [J.B.-15]
 - (a) Faraday
 - (b) Einstein
 - (c) Planck
 - (d) Newton
11. $E_\lambda \propto T^4$ law was given by — [All Board-18]
 - (a) Raleigh-Jeans
 - (b) Einstein
 - (c) Planck
 - (d) Newton
12. Which force combines proton and neutron to form nucleus?
 - (a) Gravitational force
 - (b) Electromagnetic force
 - (c) Strong nuclear force
 - (d) Weak nuclear force
13. If a material particle moves at light speed then its mass will be— [Ctg.B.-16]
 - (a) Half
 - (b) Zero
 - (c) Double
 - (d) Infinite
14. Which is radiated quanta? [D.B.-16]
 - (a) Photon
 - (b) Proton
 - (c) Neutron
 - (d) Electron
15. h is known as? [R.B.-16]
 - (a) Dirac's Constant
 - (b) Planck's constant
 - (c) Compton constant
 - (d) De Broglie constant
16. If the temperature of blackbody is slowly increased then what will be its colour at 850 K temperature?
 - (a) Red
 - (b) Orange
 - (c) Yellow
 - (d) White
17. Relation between wavelength λ and photon energy E — [J.B.-15, 17]
 - (a) $E = \frac{hc}{\lambda^2}$
 - (b) $E = \frac{hc}{\lambda}$
 - (c) $E = \frac{h\lambda}{c}$
 - (d) $E = \frac{h\lambda^2}{c}$
18. If the wavelength of electromagnetic wave in vacuum is 0.03 cm, what is the frequency of the wave? [R.B.-15]
 - (a) 10^{-12} Hz
 - (b) 10^{10} Hz
 - (c) 10^{12} Hz
 - (d) 10^{14} Hz
19. Which order is correct for the wavelength of light? [R.B.-17]
 - (a) $\lambda_R > \lambda_Y > \lambda_V$
 - (b) $\lambda_R < \lambda_Y < \lambda_V$
 - (c) $\lambda_V > \lambda_R < \lambda_Y$
 - (d) $\lambda_Y > \lambda_R < \lambda_V$
20. What is the energy of a photon with $6650 \times 10^{-10} \text{ m}$ wavelength? [R.B.-15]
 - (a) $4.4 \times 10^{-40} \text{ J}$
 - (b) $9.97 \times 10^{-28} \text{ J}$
 - (c) $2.99 \times 10^{-19} \text{ J}$
 - (d) $2.99 \times 10^{49} \text{ J}$
21. What is the energy of an electromagnetic wave with 1 Å wavelength? [B.B.-16]
 - (a) $2 \times 10^{-15} \text{ J}$
 - (b) $2 \times 10^{-16} \text{ J}$
 - (c) $2 \times 10^{-17} \text{ J}$
 - (d) $2 \times 10^{-18} \text{ J}$
22. Which scientist named quantum as the smallest unit of energy?
 - (a) Galileo
 - (b) Max Planck
 - (c) Maxwell
 - (d) Einstein
23. Einstein's mass-energy equation is— [S.B.-15]
 - (a) $E_0 = m_0c^2$
 - (b) $E = h\nu$
 - (c) $E_0 = mc^2$
 - (d) $E = mc^2$
24. Discoverer of X-ray— [Ctg.B.-15]
 - (a) Max Planck
 - (b) Rontgen
 - (c) Maxwell
 - (d) Einstein
25. If the wavelength of x-ray is 3 Å then its frequency is— [S.B.-15]
 - (a) 10^{15} Hz
 - (b) 10^{16} Hz
 - (c) 10^{18} Hz
 - (d) 10^{21} Hz
26. The relation between stopping potential V and velocity of electron v — [S.B.-15]
 - (a) $v = \sqrt{\frac{eV}{m}}$
 - (b) $v = \sqrt{\frac{2eV}{m}}$
 - (c) $v = \sqrt{\frac{eV}{2m}}$
 - (d) $v = \sqrt{\frac{m}{2eV}}$
27. If a photon of 3 eV energy strikes on a metallic surface of 1.5 eV work function, then what is the maximum kinetic energy of emitted electron? [C.B.-17]
 - (a) 0.5 eV
 - (b) 1.5 eV
 - (c) 2 eV
 - (d) 4.5 eV

28. Current flow changes if light intensity is changed without changing frequency in photoelectric effect. Which is the graph of intensity-current flow-



29. By increasing light intensity in photoelectric effect- [Ctg.B.-16]

- (a) Incidence photon increases
 (b) Kinetic energy of electron increases
 (c) Number of photons stay same
 (d) Emitted electrons decrease

30. What is the unit of work function?

- (a) Newton (b) Joule
 (c) Watt (d) Volt

31. Threshold wavelength of sodium is 6800 \AA . How much is its work function? [Ctg.B.-16]

- (a) $2.82 \times 10^{-30} \text{ eV}$ (b) $2.93 \times 10^{-19} \text{ eV}$
 (c) $1.83 \times 10^{-10} \text{ eV}$ (d) 1.83 eV

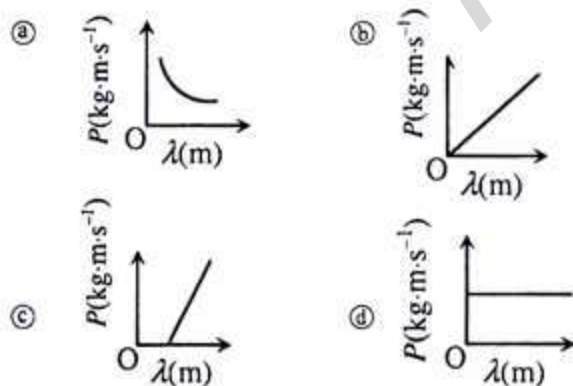
32. What will be the threshold frequency if the work function of a metal is 2.3 eV ?

- (a) $5.55 \times 10^{12} \text{ Hz}$ (b) $5.55 \times 10^{13} \text{ Hz}$
 (c) $5.55 \times 10^{14} \text{ Hz}$ (d) $5.55 \times 10^{15} \text{ Hz}$

33. Threshold frequency of a surface is $8 \times 10^{14} \text{ Hz}$. If a light with 2400 \AA wavelength strikes on that surface then the maximum kinetic energy of the emitted electron- [S.B.-16]

- (a) 1.86 J (b) $2.98 \times 10^{-19} \text{ J}$
 (c) $8.29 \times 10^{-19} \text{ J}$ (d) $13.59 \times 10^{-19} \text{ J}$

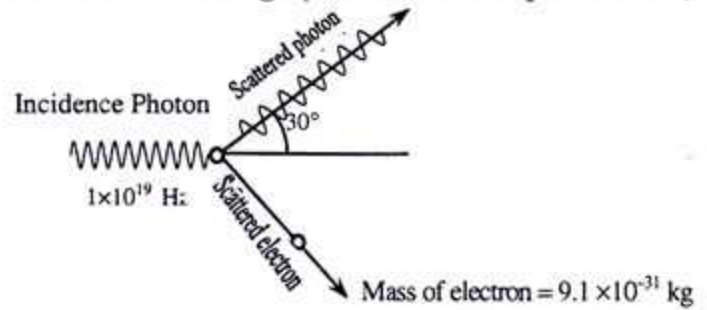
34. According to De Broglie's proposal, which of the following graphs can determine the Broglie wavelength? [Ctg.B.-15]



35. What will be the De Broglie wavelength if kinetic energy of electron is 500 eV ? [Dj.B.-16]

- (a) 0.55 \AA (b) 1.55 \AA
 (c) 2.55 \AA (d) 3.55 \AA

36. The following figure shows Compton effect. [Dj.B.-15]



What is the wavelength of scattered photon?

- (a) $3.26 \times 10^{-13} \text{ m}$ (b) $3 \times 10^{-11} \text{ m}$
 (c) $3.03 \times 10^{-11} \text{ m}$ (d) 2.43×10^{-12}

37. Observation of photoelectric effect experiment is- [B.B.-17]

- i. Electron emission is more in high temperature
 ii. This is an instantaneous event
 iii. Emission electron increases with more light intensity

Which of the following is correct?

- (a) i and ii (b) ii and iii
 (c) i and iii (d) i, ii and iii

38. Process related with particle nature- [Dj.B.-17]

- i. Photoelectric effect
 ii. Compton effect
 iii. Doppler effect

Which of the following is correct?

- (a) i and ii (b) ii and iii
 (c) i and iii (d) i, ii and iii

39. If a body travel in the speed of light then with respect to a still frame it will have- [R.B.-15]

- i. Infinite mass (ii) Infinite length
 iii. Infinite time

Which of the following is correct?

- (a) i and ii (b) ii and iii
 (c) i and iii (d) i, ii and iii

40. In case of theory of relativity- [C.B.-16]

- i. Clock in motion ticks faster than clock at rest
 ii. Length of a body in motion is less than its rest length
 iii. Mass of a moving body is more than its rest mass

Which of the following is correct?

- (a) i and ii (b) ii and iii
 (c) i and iii (d) i, ii and iii

41. In case of photon- [C.B.-15]

- i. Rest mass of photon is zero
 ii. Photon energy, $E = h\nu$
 iii. Photon velocity is $3 \times 10^8 \text{ m·s}^{-1}$

Which of the following is correct?

- (a) i and ii (b) ii and iii
 (c) i and iii (d) i, ii and iii

42. Weak nuclear force has-

- i. Existence in nucleus due to beta decay
 ii. Range of 10^{-16} m
 iii. Strength more than gravitational force

Which of the following is correct?

- (a) i and ii (b) ii and iii
 (c) i and iii (d) i, ii and iii

43. Heisenberg's uncertainty principle is— [D.B.-16]

- i. $\Delta x \Delta p \geq \frac{h}{2\pi}$ ii. $\Delta p \Delta E \geq \frac{h}{2\pi}$
iii. $\Delta E \Delta t \geq \frac{h}{2\pi}$

Which of the following is correct?

- (a) i and ii (b) i and iii
(c) ii and iii (d) i, ii and iii

44. Photoelectric effect— [B.B.-16]

- i. Is an instantaneous event
ii. Isn't affected by temperature
iii. Different materials have different threshold frequency

Which of the following is correct?

- (a) i and ii (b) i and iii
(c) ii and iii (d) i, ii and iii

Answer questions 45 and 46 according to following data:

Photon with 6630 Å wavelength strikes sodium plate. Threshold wavelength of sodium is 6800 Å and Planck's constant $h = 6.63 \times 10^{-34} \text{ J}\cdot\text{s}$ [D.B.-17]

45. How much is photon energy?

- (a) $2 \times 10^{-19} \text{ J}$ (b) $3 \times 10^{-19} \text{ J}$
(c) $4 \times 10^{-19} \text{ J}$ (d) $5 \times 10^{-19} \text{ J}$

46. How much is the work function of sodium?

- (a) $2 \times 10^{-19} \text{ J}$ (b) $2.235 \times 10^{-19} \text{ J}$
(c) $2.925 \times 10^{-19} \text{ J}$ (d) $3.5 \times 10^{-19} \text{ J}$

Read the following stem and answer question no. 47 and 48: Half-life of radioactive material X is equal to the half-life of radioactive material Y. The atomic number of both radioactive materials were equal. The decay constant of X is 10^{-3} d^{-1} . [C.B.-16]

47. How long is the half-life of X?

- (a) 0.693 (b) 6.93
(c) 69.3 (d) 693

48. Which of the following is correct?

- (a) Decay rate of both X and Y was equal initially
(b) Decay rate of both X and Y is always equal
(c) Decay rate of Y is much more than decay rate of X
(d) Decay rate of X is much more than decay rate of Y

Answer question no. 49 and 50 according to the following stem:

The frequency of each photon in a bunch of x-ray is $3 \times 10^{17} \text{ Hz}$. [D.J.B.-16]

49. How much is the energy of the mentioned photon?

- (a) $1.989 \times 10^{-16} \text{ J}$ (b) $2.89 \times 10^{-16} \text{ J}$
(c) $19.89 \times 10^{-16} \text{ J}$ (d) $91.98 \times 10^{-16} \text{ J}$

50. Photon mentioned in the stem has—

- i. Velocity of $3 \times 10^8 \text{ m}\cdot\text{s}^{-1}$
ii. Wavelength of 10 Å
iii. Momentum of $6.63 \times 10^{-25} \text{ kg}\cdot\text{m}\cdot\text{s}^{-1}$

Which of the following is correct?

- (a) i and ii (b) i and iii
(c) ii and iii (d) i, ii and iii