PHYSICS

BOOKS - NEET PREVIOUS YEAR (YEARWISE + CHAPTERWISE)

ELECTRONS AND PHOTONS

Others

1. The photoelectric threshold wavelength of silver is $3250 \times 10^{-10} m$. The velocity of the

electron ejected from a silver surface by ultraviolet light of wavelength $2536 \times 10^{-10} m$ is

$\left(Given h = 4.14 \times 10^{6} ms^{-1} eVs \text{ and } c = 3 \times 10^{8} ms^{-1}\right)$

A. $\approx 6 \times 10^{5} ms^{-1}$

B. $\approx 0.6 \times 10^{6} ms^{-1}$

C. $\approx 61 \times 10^{3} ms_{-1}$

D. $\approx 0.3 \times 10^{6} ms^{-1}$

Answer: A::B

Watch Video Solution

2. The de - Broglie wavelength of a neutron in thermal equilibrium with heavy water at a temperature $T(\text{kelvin})$ and mass m, is

A. $\frac{h}{\sqrt{mkT}}$

B. $\frac{h}{\sqrt{3mkT}}$

C. $2\frac{h}{\sqrt{3mkT}}$

D. $2\frac{h}{\sqrt{mkT}}$

Answer: B

Watch Video Solution

3. An electron of mass m and a photon have same energy E. The ratio of de - Broglie wavelengths associated with them is :

A. $\left(\frac{E}{(em)^{\frac{1}{2}}}\right.$

B. $c(2mE)^{\frac{1}{2}}$

C. $\frac{1}{c}\left(\frac{2m}{E}\right)^{\frac{1}{2}}$

D. $\frac{1}{c}\left(\frac{E}{2}m\right)^{\frac{1}{2}}$

Answer: D

Watch Video Solution

4. When a metallic surface is illuminated with radiation of wavelength λ, the stopping potential is V. If the same surface is illuminated with radiation of wavelength 2λ, the stopping potential is $\frac{V}{4}$. The threshold wavelength surface is :

A. 5λ

B. $\frac{5}{2}\lambda$

C. 3λ

D. 4λ

Answer: C

 Watch Video Solution

5. Electrons with de-Broglie wavelength λ fall on the target in an X-ray tube. The cut-off wavelength of the emitted X-ray is

A. $\lambda_{\circ} = \frac{2mc\lambda^2}{h}$

B. $\lambda_{\circ} = \frac{2h}{mc}$

C. $\lambda_0 = \frac{2m^2c^2\lambda^2}{h^2}$

D. $\lambda_{\circ} = \lambda$

Answer: A

Watch Video Solution

6. Photons with energy $5eV$ are incident on a cathode C in a photoelectric cell . The maximum energy of emitted photoelectrons is

$2eV$. When photons of energy $6eV$ are incident on C , no photoelectrons will reach the anode A , if the stopping potential of A relative to C is

A. $+3V$

B. $+4V$

C. $-1V$

D. $-3V$

Answer: D

Watch Video Solution

7. A radiation of energy E falls normally on a perfctly refelecting surface . The momentum transferred to the surface is

A. $\frac{E}{C}$

B. $\frac{2E}{C}$

C. $\frac{2E}{C^2}$

D. $\frac{E}{C^2}$

Answer: B

Watch Video Solution

8. When a certain metallic surface is illuminated with monochromatic light of wavelength λ, the stopping potential for photoelectric current is $3V_0$ and when the same surface is illuminated with light of wavelength 2λ, the stopping potential is V_0. The threshold wavelength of this surface for photoelectrice effect is

A. 6λ

B. 4λ

C. $\frac{\lambda}{4}$

D. $\frac{\lambda}{6}$

Answer: B

Watch Video Solution

9. Which of the following figure represents the variation of particle momentum and the associated de - Broglie wavelength ?

A. 

B. 

C. 

D. 

Answer: B

Watch Video Solution

10. A photoelectric surface is illuminated successively by monochromatic light of wavelength λ and $\frac{\lambda}{2}$. If the maximum kinetic energy of the emitted photoelectrons in the

second case is 3 times than in the first case , the work function of the surface of the material is

(h = Plank's constant , c = speed of light)

A. $\frac{hc}{2\lambda}$

B. $\frac{hc}{\lambda}$

C. $\frac{2hc}{\lambda}$

D. $\frac{hc}{3\lambda}$

Answer: A

Watch Video Solution

11. Light of wavelength $500nm$ is incident on a metal with work function $2.28eV$. The de Broglie wavelength of the emitted electron is

A. $< 2.8 \times 10^{-10} m$

B. $< 2.8 \times 10^{-19} m$

C. $\geq 2.8 \times 10^{-9} m$

D. $\leq 2.8 \times 10^{-12} m$

Answer: C

Watch Video Solution

12. When the energy of the incident radiation is increased by $20\,\%$, kinetic energy of the photoelectrons emitted from a metal surface increased from $0.5eV \rightarrow 0.8eV$. The work function of the metal is

A. $0.65eV$

B. $1.0eV$

C. $1.3eV$

D. $1.5eV$

Answer: B

 Watch Video Solution

13. If the kinetic energy of the particle is increased to 16 times its previous value , the percentage change in the de - Broglie wavelength of the particle is

A. 25

B. 75

C. 60

D. 50

Answer: B

Watch Video Solution

14. For photoelectric emission from certain metal the cut - off frequency is v. If radiation of frequency $2v$ incident on the metal plate , the maximum possible velocity of the emitted electron will be (m is the electron mass).

A. $\left(\frac{\sqrt{hv}}{2m}\right)$

B. $\left(\frac{\sqrt{hv}}{m}\right)$

C. $\frac{\sqrt{2hv}}{m}$

D. $2\left(\frac{\sqrt{hv}}{m}\right)$

Answer: C

Watch Video Solution

15. The wavelength λ_e of an electron and λ_p of a photon of same energy E are related by

A. $\lambda_p \quad \alpha \quad \lambda^2 e$

B. $\lambda_p \quad \alpha \quad \lambda_e$

C. $\lambda_p \quad \alpha \quad \sqrt{\lambda_e}$

D. $\lambda_p \quad \alpha \quad \frac{1}{\sqrt{\lambda_e}}$

Answer: A

Watch Video Solution

16. Monochromatic radiation emitted when electron on hydrogen atom jumps from first excited to the ground state irradiates a photosensitive material. The stopping

potential is measured to be $3.57V$. The threshold frequency of the material is

A. 4×10^{15} Hz

B. 5×10^{15}Hz

C. 1.6×10^{15}Hz

D. 2.5×10^{15}Hz

Answer: C

Watch Video Solution

17. A modern 200 W sodium street lamp emits yellow light of wavelength 0.6 μm. Assuming it to be 25% efficient in converting electrical energy to light, the number of photons of yellow light it emits per second is

A. 1.5×10^{20}

B. 6×10^{18}

C. 62×10^{20}

D. 3×10^{19}

Answer: A

Watch Video Solution

18. Light of two different frequencies whose photons have energies 1eV and 2.5 eV respectively illuminate a metallic surface whose work function is 0.5 eV successively. Ratio of maximum kinetic energy of emitted electrons will be:

A. $1:2$

B. $1:1$

C. $1:5$

D. $1:4$

Answer: A

 Watch Video Solution

19. Photoelectric emission occurs only when the incident light has more than a certain minimum

A. wavelength

B. intensity

C. frequency

D. power

Answer: C

Watch Video Solution

20. In photoelectric emission process from a metal of work function $1.8eV$, the kinetic energy of most energetic electrons is $0.5eV$. The corresponding stopping potential is

A. $1.3eV$

B. $0.5eV$

C. $2.3eV$

D. $1.8eV$

Answer: B

Watch Video Solution

21. A source S_1 is producing 10^{15} photons/s of wavelength 5000Å Another source S_2 is producing 1.02×10^{15} photons per second of

wavelength 5100Å. Then (power of S_(2))/("power of" S_(1))` is equal to

A. 1.00

B. 1.02

C. 1.04

D. 0.98

Answer: A

Watch Video Solution

22. The number of photoelectrons emitted for light of a frequency v (higher than the threshold frequency V_0) is proportional to

A. $v - v_0$

B. threshold frequency (v_(0)`

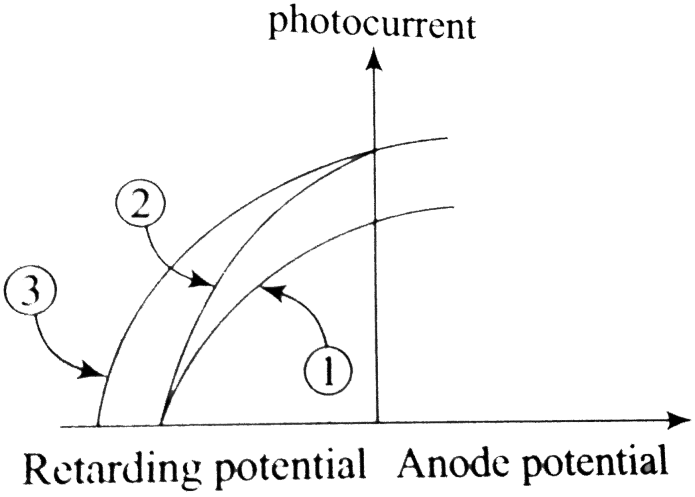
C. intensity of light

D. frequency of light (v)

Answer: C

Watch Video Solution

23. The figure shows a plot of photo current versus anode potential for a photosensitive surface for three different radiations. Which one of the following is a correct statement ?



A. Curves a and b represent incident radiations of different frequencies and

different intensities

B. curves a and b represent incident radiations of same frequency but of different intensities.

C. curves b and c represent incident radiations of different frequencies and different intensities.

D. Curves b and c represent incident radiations of same frequency having same intensity

Answer: B

Watch Video Solution

24. Monochromatic light of wavelength $667nm$ is produced by a helium neon laser . The power emitted is $9mW$. The number of photons arriving per second on the average at a target irradiated by this beam is

A. 9×10^{17}

B. 3×10^{16}

C. 9×10^{15}

D. 3×10^{19}

Answer: B

Watch Video Solution

25. A particle of mass $1mg$ has the same wavelength as an electron moving with a velocity of $3 \times 10^{6} ms^{-1}$. The velocity of the particle is

A. $2.7 \times 10^{-18} ms^{-1}$

B. $9 \times 10^{-2} ms_1$

C. $3 \times 10^{-31} ms_{-1}$

D. $2.7 \times 10^{-21} ms^{-1}$

Answer: A

Watch Video Solution

26. In the phenomenon of electric discharge through gases at low pressure , the coloured glow in the tube appears as a result of

A. excitation of electrons in the atoms

B. collision between the atoms of the gas

C. collissions between the charged particles emitted from the cathode and the atoms of the gas

D. collission between diferent electrons of the atoms of the gas

Answer: C

Watch Video Solution

27. The work function of a surface of a photosensitive material is $6.2eV$. The wavelength of the incident radiation for which the stopping potential is $5V$ lies in the

A. ultraviolet region

B. visible region

C. infrared region

D. X-ray region

Answer: D

Watch Video Solution

28. Monochromatic light of frequency $6.0 \times 10^{14} Hz$ is produced by a laser. The power emitted is 2×10^{-3} w. The number of photons emitted, on the average, by the sources per second is

A. 5×10^{15}

B. 5×10^{16}

C. 5×10^{17}

D. 5×10^{14}

Answer: A

Watch Video Solution

29. A $5W$ source emits monochromatic light of wavelength 5000Å. When placed $0.5m$ away , it liberates photoelectrons from a photosensitive metallic surface . When the source is moved to a distance of $1.0m$ the number of photoelectrons liberated will be reduced by a factor of

A. 4

B. 8

C. 16

D. 2

Answer: A

 Watch Video Solution

30. The momentum of a photon of energy $1MeV$ "in"kgm/s will be

A. 0.33×10^{6}

B. 7×10^{-24}

C. 10^{-22}

D. 5×10^{-22}

Answer: D

Watch Video Solution

31. In a discharge tube ionization of enclosed gas is produced due to collisions between

A. positive ions and neutral atoms/molecules

B. negative electrons and neutral atoms/molecules

C. photons and neutral atoms/molecules

D. neutral gas atoms/molecules

Answer: B

Watch Video Solution

32. A photocell employs photoelectric effect to convert

A. change in the frequency of light into a change in electric voltage

B. change in the intensity of illumination into a change in photoelectric current.

C. change in the intensity of illumination into a change in the work function of the photocathode

D. change in the frequency of light into a change into the electric current

Answer: B

Watch Video Solution

33. A photosensitive metallic surface has work function , hv_0. If photons of energy $2hv_0$ fall on this surface , the electrons come out with a maximum velocity of $4 \times 10^6 m/s$. When the

photon energy is increased to $5hv_0$,then the maximum velocity of photoelectrons will be

A. $2 \times 10^6 m/s$

B. $2 \times 10^7 m/s$

C. $8 \times 10^5 m/s$

D. $8 \times 10^6 m/s$

Answer: D

Watch Video Solution

34. The work function for metals A, B and C are respectively $1.92eV, 2.0eV$ and $5eV$. According to Einstein's equation , the metals which will emit photoelectrons for a radiation of wavelength 4100Å are

A. None of these

B. A only

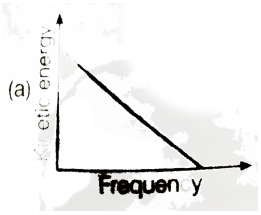
C. A and B only

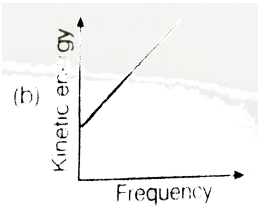
D. All the three metals.

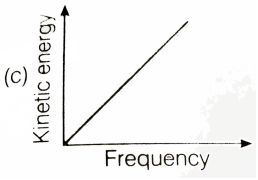
Answer: C

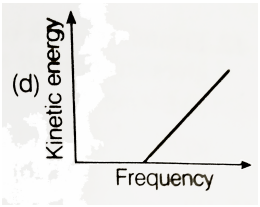
Watch Video Solution

35. According to Einstein's photoelectric equation , the graph between the kinetic energy of photoelectrons ejected and the frequency of incident radiation is

A. 

B. 

C. 

D. 

Answer: D

Watch Video Solution

36. A photoelectric cell is illuminated by a point source of light $1m$ away . When the source is shifted to $2m$ then

A. each emitted electorns carries half the initial energy

B. number of electrons emitted is a quarter of the initial number

C. each emitted electron carries one quarter of the initial energy

D. number of electrons emitted is half the initial number

Answer: B

Watch Video Solution

37. When ultraviolet rays are incident ono metal plate, the photoelectric effect does not occur. It occurs by incidence of

A. infrared rays

B. X-rays

C. radiowaves

D. light waves

Answer: B

View Text Solution

38. Which of the following is not the property of a cathode rays

A. it produces heating effect

B. it does not deflect in electric field

C. its casts shadow

D. it produces fluorescence

Answer: D

 Watch Video Solution

39. If particles are moving with same velocity , then maximum de - Broglie wavelength will be for

A. proton

B. α particle

C. neutron

D. βparticles

Answer: D

Watch Video Solution

40. A caesium photocell , with a steady potential difference of $60V$ across , is alluminated by a bright point source of light $50cm$ away. When the same light is placed $1m$ away the photoelectrons emitted from the cell

A. $\left(\frac{n}{2}\right)$

B. $2n$

C. $4n$

D. n

Answer: C

Watch Video Solution

41. If we express the energy of a photon in KeV and the wavelength in angstroms , then energy of a photon can be calculated from the relation

A. $4125nm$

B. $412.5nm$

C. $41250nm$

D. $4nm$

Answer: D

Watch Video Solution

42. Einstein's work on photoelectric effect gives support to

A. $E = mc^2$

B. $E = hv$

C. $hv = \left(\frac{1}{2}\right)mv^2$

D. $E = \frac{h}{\lambda}$

Answer: B

View Text Solution

43. As the intensity of incident light increases

A. photocurrent increases

B. photocurrent decreases

C. kinetic energy of emitted photoelectrons increases

D. kinetic energy of emitted photoelectrons decreases

Answer: A

 Watch Video Solution

44. The photoelectric work function for a metal surface is $4.125eV$. The cut - off wavelength for this surface is

A. $4125Å$

B. 3000Å

C. 6000Å

D. 2062.5Å

Answer: B

 Watch Video Solution

45. In a photoemissive cell, with exciting wavelength λ, the faster electron has speed v. If the exciting wavelength is changed to $3\lambda/4$, the speed of the fastest electron will be

A. $v\left(\frac{3}{4}\right)^{\frac{1}{2}}$

B. $v\left(\frac{4}{3}\right)^{\frac{1}{2}}$

C. less than $v\left(\frac{4}{3}\right)^{\frac{1}{2}}$

D. greater than $v\left(\frac{4}{3}\right)^{\frac{1}{2}}$

Answer: B

Watch Video Solution

46. Light of wavelength 5000Å falls on a sensitive plate with photoelectric work

function of $1.9eV$. The kinetic energy of the photoelectron emitted will be

A. $0.58eV$

B. $2.48eV$

C. $1.24eV$

D. $1.16eV$

Answer: A

Watch Video Solution

47. The $21cm$ radio wave emitted by hydrogen in interstellar space is due to the interaction called the hyperfine interaction in atomic hydrogen. The energy of the emitted wave is nearly

A. 10^{-17}

B. $1J$

C. $7 \times 10^{-6}J$

D. 10^{-24}J

Answer: D

Watch Video Solution

48. Which of the following is true?

A. The stopping potential increases with increasing intensity of incident light

B. The photocurrent increases with increasing intensity of light

C. the current in photocell increases with increasing frequency of light

D. The photocurrent is proportional to applied voltage

Answer: B

View Text Solution

49. An electron of mass m and charge e is accelerated from rest through a potential difference V in vacuum. The final speed of the electron will be

A. $\frac{eV}{2m}$

B. $\frac{eV}{m}$

C. $\sqrt{\frac{2eV}{m}}$

D. $\sqrt{\frac{ev}{2m}}$

Answer: C

Watch Video Solution

50. The wavelength associated with an electron accelerated through a potential difference of $100V$ is nearly

A. 1000Å

B. 100Å

C. 10.5Å

D. 1.2Å

Answer: D

Watch Video Solution

51. If the threshold wavelength for a certain metal is 2000Å, then the work function of the metal is

A. 6.2J

B. $6.2eV$

C. $6.2MeV$

D. $6.2Ev$

Answer: D

View Text Solution

52. The nature of ions knocked out from hot surface is

A. protons

B. electrons

C. neutrons

D. nuclei

Answer: B

View Text Solution

53. Kinetic energy of an electron accelerated in a potential difference of $100V$ is

A. 1.6×10^{-17} J

B. 1.6×10^{-19} J

C. 1.6×10^{-21} J

D. 1.6×10^{-25}J

Answer: A

Watch Video Solution

54. Gases begin to conduct electricity at low pressure because

A. at low pressure gases trun to plasma

B. coliding electrons can acquired higher kinetic energy due to increased mean free path leading to ionisation of atoms

C. atoms break up into electronis and protons

D. the electrons in atoms can move freely at low pressure.

Answer: B

Watch Video Solution

55. Doubly ionised helium atoms and hydrogen ions are accelerated from rest through the same potential drop. The ratio of the final velocities of the helium and the hydrogen ion is

A. $\frac{1}{2}$

B. 2

C. $\frac{1}{\sqrt{2}}$

D. $\sqrt{2}$

Answer: C

View Text Solution

56. In photoelectric effect the work function of a metal is 3.5 eV. The emitted electrons can be stopped by applying a potential of –1.2 V. Then

A. the energy of the incident photons is $4.7eV$

B. the energy of the incident photons is $2.3eV$

C. if higher frequency photons be used , the photoelectric current will rise

D. when the energy of photons is $3.5eV$, the photoelectric current will be maximum

Answer: A

Watch Video Solution

57. Momentum of a photon of wavelength λ is

A. $\frac{h}{\lambda}$

B. zero

C. $\frac{h\lambda}{c^2}$

D. $\frac{h\lambda}{c}$

Answer: A

Watch Video Solution

58. Number of ejected photoelectron increases with increase

A. in intensity of light

B. in wavelength of light

C. in frequency of light

D. never

Answer: A

View Text Solution

59. When light of wavelength $300nm$ (nanometre) falls on a photoelectric emitter , however light of $600nm$ wavelength is

sufficient for creating photoemission . What is the ratio of the work functions of the two emitters ?

A. $1:2$

B. $2:1$

C. $4:1$

D. $1:4$

Answer: B

Watch Video Solution

60. An ionization chamber with parallel conducting plates as anode and cathode has 5×10^7 electrons and the same number of singly-charged positive ions per cm^2. The electrons are moving at $0.4m/s$. The current density from anode to cathodes $4\mu A/m^2$. The velocity of positive ions moving towards cathode is

A. $0.4m/s$

B. $1.6m/s$

C. zero $0.1m/s$

D. $0.1m/s$

Answer: D

Watch Video Solution

61. The cathode of a photoelectric cell is changed such that the work function changes from $(W_1 \to W_2(W_2 > W_1)$. If the current before and after change are I_1 and I_2, all other conditions remaining unchanged , then (assuming $hv > W_2$)

A. $(l_1 = l_2)$

B. $(l_1 < l_2)$

C. $l_1 > l_2)$

D. $(l_1 < l_2 < 2L_1)$

Answer: A

Watch Video Solution

62. Photoelectric work- function of a metal is $1eV$. Light of wavelength $\lambda = 3000\text{Å}$ falls on

it. The photoelectrons come out with maximum velocity

A. $10\frac{m}{s}$

B. $10^2 m/s$

C. $10^4 m/s$

D. $10^6 m/s$

Answer: D

Watch Video Solution

63. Wavelength of a $1keV$ photon is $1.24 \times 10^{-9}m$. What is the frequency of $1MeV$ photon ?

A. $1.\ u24 \times 10^{15}$Hz

B. $2.5 \times 10^{20}Hz$

C. 1.24×10^{18} Hz

D. 2.4×10^{23}Hz

Answer: B

Watch Video Solution

64. The momentum of photon of electromagnetic radiation is $3.3 \times 10^{-29} kgms^{-1}$. What is the frequency and wavelength of the waves associated with it ? $h = 6.6 \times 10^{-34} Js$.

A. 1.5×10^{13} Hz

B. $7.5 \times 10^{12} Hz$

C. $6.0 \times 10^{13} Hz$

D. $3.0 \times 10^{3} Hz$

Answer: A

Watch Video Solution

65. A radio transmitter operates at a frequency of $880kHz$ and a power of $10kW$. The number of photons emitted per second are

A. 1.72×10^{31}

B. 1.327×10^{25}

C. 1.327×10^{37}

D. 1.327×10^{45}

Answer: A

Watch Video Solution

66. The de - Broglie wavelength associated with the particle of mass m moving with velocity v is

A. $\frac{h}{mv}$

B. hmv

C. $\frac{mh}{v}$

D. $\frac{m}{hv}$

Answer: A

Watch Video Solution

67. Ultraviolet radiation of 6.2 eV falls on an aluminium surface (work - function = 4.2 eV). The kinetic energy in joule of the fastest electrons emitted is

A. $3.2 \times 10^{-21} J$

B. 3.2×10^{-19} J

C. 7×10^{-25} J

D. 3×10^{-19} J

Answer: B

Watch Video Solution

68. Threshold wavelength for photoelectric effect on sodium is 5000Å . Its work function is

A. $4 \times 10^{-19} J$

B. $1 J$

C. 2×10^{-19} J

D. 3×10^{-19} J

Answer: A

Watch Video Solution

69. Which of the following are thermions?

A. Protons

B. Electrons

C. photons and neutral atoms/molecules

D. Positrons

Answer: B

View Text Solution

70. The energy of a photon of wavelength λ is

A. $hc\lambda$

B. $\frac{hc}{\lambda}$

C. $\frac{\lambda}{hc}$

D. $\lambda\frac{h}{c}$

Answer: B

View Text Solution