AIPMT 2006

1. A photo-cell employs photoelectric effect to convert
(1) Change in the frequency of light into a change in electric voltage
(2) Change in the intensity of illumination into a change in photoelectric current
(3) Change in the intensity of illumination into a change in the work function of the photocathode
(4) Change in the frequency of light into a change in the electric current

2. When photons of energy hν fall on an aluminium plate (of work function E_0), photoelectrons on maximum kinetic energy K are ejected. If the frequency of the radiation is doubled, the maximum kinetic energy of the ejected photoelectrons will be:-
(1) $K + E_0$ (2) $2K$
(3) K (4) $K + h\nu$

3. The momentum of a photon of energy 1MeV in kg m/s, will be :-
(1) 0.33×10^6 (2) 7×10^{-24}
(3) 10^{-22} (4) 5×10^{-22}

AIPMT 2007

4. A 5 watt source emits monochromatic light of wavelength 5000 Å. When placed 0.5 m away, it liberates photoelectrons from a photosensitive metallic surface. When the source is moved to a distance of 1.0 m, the number of photo electrons liberated will :
(1) be reduced by a factor of 2
(2) be reduced by a factor of 4
(3) be reduced by a factor of 8
(4) be reduced by a factor of 16

5. Monochromatic light of frequency 6.0×10^{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 source per second is :
(1) 5×10^{14}
(2) 5×10^{15}
(3) 5×10^{16}
(4) 5×10^{17}

AIPMT 2008

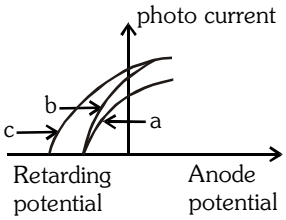
6. The work function of a surface of a photosensitive material is 6.2 eV. The wavelength of the incident radiation for which the stopping potential is 5V lies in the :-
(1) Infrared region (2) X-ray region
(3) Ultraviolet region (4) Visible region

AIPMT 2009

7. The number of photo electrons emitted for light of a frequency ν (higher than the threshold frequency ν_0) is proportional to :-
(1) Frequency of light (ν)
(2) $\nu - \nu_0$
(3) Threshold frequency (ν_0)
(4) Intensity of light

8. Monochromatic light of wavelength 667 nm is produced by a helium neon laser. The power emitted is 9 mW. The number of photons arriving per sec. on the average at a target irradiated by this beam is :-
(1) 3×10^{19} (2) 9×10^{17}
(3) 3×10^{16} (4) 9×10^{15}

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



(1) curves (b) and (c) represent incident radiations of same frequency having same intensity
(2) curves (a) and (b) represent incident radiations of different frequencies and different intensities
(3) curves (a) and (b) represent incident radiations of same frequency but of different intensities
(4) curves (b) and (c) represent incident radiations of different frequencies and different intensities

AIPMT (Pre) 2010

10. A source S_1 is producing, 10^{15} photons per second of wavelength 5000 Å. Another source S_2 is producing 1.02×10^{15} photons per second of wavelength 5100 Å.
Then, (power of S_2)/(power of S_1) is equal to :-
(1) 0.98 (2) 1.00 (3) 1.02 (4) 1.04

11. The potential difference that must be applied to stop the fastest photo electrons emitted by a nickel surface, having work function 5.01 eV, when ultraviolet light of 200 nm falls on it, must be -
(1) 1.2 V (2) 2.4 V (3) –1.2 V (4) –2.4V

AIPMT (Mains) 2010

12. The electron in the hydrogen atom jumps from excited state (n = 3) to its ground state (n = 1) and the photons thus emitted irradiate a photosensitive material. If the work function of the material is 5.1 eV, the stopping potential is estimated to be (the energy of the electron in n^{th} state $E_n = -\frac{13.6}{n^2} eV$):-
(1) 12.1 V (2) 17.2 V (3) 7 V (4) 5.1 V

IPMT (Pre) 2011

13. Photoelectric emission occurs only when the incident light has more than a certain minimum :-
(1) Power (2) Wavelength
(3) Intensity (4) Frequency

14. Light of two different frequencies whose photons have energies 1 eV and 2.5 eV respectively illuminate a metallic surface whose work function is 0.5 eV successively. Ratio of maximum speed of emitted electrons will be :
(1) 1 : 4 (2) 1 : 2 (3) 1 : 1 (4) 1 : 5

15. In photoelectric emission process from a metal of work function 1.8eV, the kinetic energy of most energetic electrons is 0.5 eV. The corresponding stopping potential is :
(1) 1.8 V (2) 1.3V (3) 0.5V (4) 2.3V

16. A radioactive nucleus of mass M emits a photon of frequency ν and the nucleus recoils. The recoil energy will be :-
(1) $Mc^2 - h\nu$ (2) $h^2\nu^2 / 2Mc^2$
(3) Zero (4) $h\nu$

17. In the Davisson and Germer experiment, the velocity of electrons emitted from the electron gun can be increased by :
(1) increasing the potential difference between the anode and filament
(2) increasing the filament current
(3) decreasing the filament current
(4) decreasing the potential difference between the anode and filament

18. Electrons used in an electron microscope are accelerated by a voltage of 25 kV. If the voltage is increased to 100 kV then the de-Broglie wavelength associated with the electrons would :
(1) increase by 2 times (2) decrease by 2 times
(3) decrease by 4 times (4) increase by 4 times

AIPMT (Mains) 2011

19. The threshold frequency for a photosensitive metal is 3.3×10^{14} Hz. If light of frequency 8.2×10^{14} Hz is incident on this metal, the cut-off voltage for the photoelectric emission is nearly :-
(1) 1 V (2) 2 V (3) 3 V (4) 5 V

20. An electron in the hydrogen atom jumps from excited state n to the ground state. The wavelength so emitted illuminates a photosensitive material having work function 2.75 eV. If the stopping potential of the photoelectron is 10 V, then the value of n is :-
(1) 2 (2) 3 (3) 4 (4) 5

AIPMT (Pre) 2012

21. Monochromatic radiation emitted when electron on hydrogen atom jumps from first excited to the grounds state irradiates a photosensitive material. The stopping potential is measured to be 3.57V. The threshold frequency of the material is :
(1) 1.6×10^{15} Hz (2) 2.5×10^{15} Hz
(3) 4×10^{15} Hz (4) 5×10^{15} Hz

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

(1) 62×10^{20} (2) 3×10^{19}

(3) 1.5×10^{20} (4) 6×10^{18}

23. An α-particle moves in a circular path of radius 0.83 cm in the presence of a magnetic field of 0.25 Wb/m^2. The de Broglie wavelength associated with the particle will be :

(1) 10Å (2) 0.1Å (3) 1Å (4) 0.01Å

24. An electron of stationary hydrogen atom passes from the fifth energy level to the ground level. The velocity that the atom acquired a result of photon emission will be :

(1) $\frac{25m}{24hR}$ (2) $\frac{24m}{25hR}$ (3) $\frac{24hR}{25m}$ (4) $\frac{25hR}{24m}$

(m is the mass of the atom, R, Rydberg constant and h Planck's constant)

AIPMT (Mains) 2012

25. If the momentum of an electron is changed by P, then the de Broglie wavelength associated with it changes by 0.5%. The initial momentum of electron will be :-

(1) $\frac{P}{200}$ (2) 100 P (3) 200 P (4) 400 P

NEET-UG 2013

26. For photoelectric emission from certain metal the cutoff frequency is ν. If radiation of frequency 2ν impinges on the metal plate, the maximum possible velocity of the emitted electron will be (m is the electron mass) :-

(1) $2\sqrt{h\nu/m}$ (2) $\sqrt{h\nu/(2m)}$

(3) $\sqrt{h\nu/m}$ (4) $\sqrt{2h\nu/m}$

27. The wavelength λ_e of an electron and λ_P of a photon of same energy E are related by:

(1) $\lambda_P \propto \frac{1}{\sqrt{\lambda_e}}$ (2) $\lambda_P \propto \lambda_e^2$

(3) $\lambda_P \propto \lambda_e$ (4) $\lambda_P \propto \sqrt{\lambda_e}$

AIPMT 2014

28. Light with an energy flux of 25×10^4 Wm^{-2} falls on a perfectly reflecting surface at normal incidence. If the surface area is 15 cm^2, the average force exerted on the surface is :-

(1) 1.25×10^{-6} N

(2) 2.50×10^{-6} N

(3) 1.20×10^{-6} N

(4) 3.0×10^{-6} N

29. When the energy of the incident radiation is increased by 20%, the kinetic energy of the photoelectrons emitted from a metal surface increased from 0.5 eV to 0.8 eV. The work function of the metal is :-

(1) 0.65 eV (2) 1.0 eV

(3) 1.3 eV (4) 1.5 eV

30. 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 :-

(1) 25 (2) 75

(3) 60 (4) 50

AIPMT 2015

31. A certain metallic surface is illuminated with monochromatic light of wavelength, λ. The stopping potential for photo-electric current for this light is $3V_0$. if the same surface is illuminated with light of wavelength 2λ, the stopping potential is V_0. The threshold wavelength for this surface for photoelectric effect is :-

(1) 4 λ (2) $\frac{\lambda}{4}$

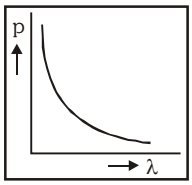
(3) $\frac{\lambda}{6}$ (4) 6 λ

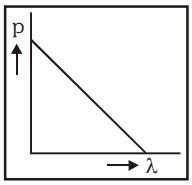
32. A radiation of energy 'E' falls normally on a perfectly reflecting surface. The momentum transferred to the surface is (C = Velocity of light) :-

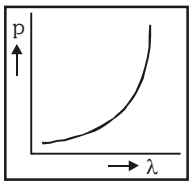
(1) $\frac{2E}{C}$ (2) $\frac{2E}{C^2}$

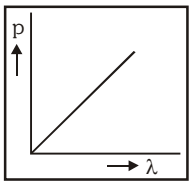
(3) $\frac{E}{C^2}$ (4) $\frac{E}{C}$

33. Which of the following figures represent the variation of particle momentum and the associated de-Broglie wavelength ?

(1) 

(2) 

(3) 

(4) 

RE-AIPMT 2015

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

(1) $\leq 2.8 \times 10^{-12}$m

(2) $< 2.8 \times 10^{-10}$m

(3) $< 2.8 \times 10^{-9}$ m

(4) $\geq 2.8 \times 10^{-9}$ m

35. A photoelectric surface is illuminated successively by monochromatic light of wavelength λ and $\lambda/2$. If the maximum kinetic energy of the emitted photoelectrons in the second case is 3 times that in the first case, the work function of the surface of the material is :

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

(1) $\frac{hc}{3\lambda}$ (2) $\frac{hc}{2\lambda}$

(3) $\frac{hc}{\lambda}$ (4) $\frac{2hc}{\lambda}$

NEET-I 2016

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

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

(3) $c(2mE)^{\frac{1}{2}}$ (4) $\frac{1}{xc}\left(\frac{2m}{E}\right)^{\frac{1}{2}}$

37. 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 for the metallic surface is :-

(1) 4λ (2) 5λ (3) $\frac{5}{2}\lambda$ (4) 3λ

NEET-II 2016

38. Photons with energy 5 eV are incident on a cathode C in a photoelectric cell. The maximum energy of emitted photoelectrons is 2 eV. When photons of energy 6 eV are incident on C, no photoelectrons will reach the anode A, if the stopping potential of A relative to C is :-

(1) – 1 V (2) – 3 V (3) + 3 V (4) + 4 V

NEET(UG) 2017

39. The de-Broglie wavelength of a neutron in thermal equilibrium with heavy water at a temperature T (Kelvin) and mass m, is :-

(1) $\frac{h}{\sqrt{3mkT}}$ (2) $\frac{2h}{\sqrt{3mkT}}$

(3) $\frac{2h}{\sqrt{mkT}}$ (4) $\frac{h}{\sqrt{mkT}}$

40. The photoelectric threshold wavelength of silver is 3250×10^{-10}m. The velocity of the electron ejected from a silver surface by ultraviolet light of wavelength 2536×10^{-10} m is :-

(Given h = 4.14×10^{-15} eVs and c = 3×10^8 ms^{-1})

(1) $\approx 0.6 \times 10^4$ ms^{-1} (2) $\approx 61 \times 10^3$ ms^{-1}

(3) $\approx 0.3 \times 10^6$ ms^{-1} (4) $\approx 6 \times 10^5$ ms^{-1}

NEET(UG) 2018

41. An electron of mass m with an initial velocity $\vec{V} = V_0\hat{i}(V_0 > 0)$ enters an electric field $\vec{E} = -E_0\hat{i}$ (E_0 = constant >0) at t = 0. If λ_0 is its de-Broglie wavelength initially, then its de-Broglie wavelength at time t is :-

(1) $\frac{\lambda_0}{\left(1+\frac{eE_0}{mV_0}t\right)}$ (2) $\lambda_0\left(1+\frac{eE_0}{mV_0}t\right)$

(3) $\lambda_0 t$ (4) λ_0

42. When the light of frequency $2\nu_0$ (where ν_0 is threshold frequency), is incident on a metal plate, the maximum velocity of electrons emitted is v_1. When the frequency of the incident radiation is increased to $5\nu_0$, the maximum velocity of electrons emitted from the same plate is v_2. The ratio of v_1 to v_2 is :-

(1) 1 : 2 (2) 1 : 4 (3) 4 : 1 (4) 2 : 1

NEET(UG) 2019

43. An electron is accelerated through a potential difference of 10,000 V. Its de Broglie wavelength is, (nearly): ($m_e = 9 \times 10^{-31}$ kg)

(1) 12.2×10^{-13} m (2) 12.2×10^{-12} m

(3) 12.2×10^{-14} m (4) 12.2 nm

NEET(UG) 2019 (Odisha)

44. The work function of a photosensitive material is 4.0 eV. The longest wavelength of light that can cause photon emission from the substance is (approximately)

(1) 3100 nm (2) 966 nm

(3) 31 nm (4) 310 nm

45. A proton and an α–particle are accelerated from rest to the same energy. The de Broglie wavelengths λ_p and λ_α are in the ratio,

(1) 2 : 1 (2) 1 : 1

(3) $\sqrt{2} : 1$ (4) 4 : 1

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	**2**	**4**	**4**	**2**	**2**	**3**	**4**	**3**	**3**	**2**	**3**	**3**	**4**	**2**	**3**
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	**2**	**1**	**2**	**2**	**3**	**1**	**3**	**4**	**3**	**3**	**4**	**2**	**2**	**2**	**2**
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	**1**	**1**	**1**	**4**	**2**	**1**	**4**	**2**	**1**	**4**	**1**	**1**	**2**	**4**	**1**