1.

Monochromatic radiation emitted when electron in hydrogen atom jumps from the first excited state to ground state irradiates a photosensitive material. The stopping potential is found to be 4V. The threshold wavelength of the material is

1. $2 \text{ x } 10^{-7}\text{m}$
2. $2 \text{ x } 10^{-6}\text{m}$
3. $4 \text{ x } 10^{-7}\text{m}$
4. $4 \text{ x } 10^{-6}\text{m}$

2.

In a photoelectric experiment using a metal of work function 1.8 eV, if the maximum kinetic energy of emitted electrons is 1.5eV, then the corresponding value to stopping potential is

1. 1.8V
2. 3.3V
3. 0.3V
4. 1.5V

3.

**Electrons used in an electron microscope are accelerated by a voltage 25kV. If the accelerating voltage is reduced to 6.25kV, the resolving power of the microscope would**

1. Increase to 4 time
2. Increases to 2 times
3. Decreases to half
4. Decrease to 1/4th

4.

**When light of wavelength $\lambda$ is used in a photoelectric experiment, the maximum kinetic energy of emitted electrons is found to be K. What will the maximum kinetic energy of the emitted photoelectrons when, light of wavelength $\frac{\lambda}{2}$ is used instead of $\lambda$**

1. Zero
2. Non zero but less than 2K
3. 2K
4. More than 2K

5.

When the light of wavelength $\lambda = 3100 \text{ Å}$ is made to fall on metal in a photoelectric experiment the maximum kinetic energy of emitted electrons is found to be 2.5eV. The work function of the metal is

1. 2.5eV
2. 3.1eV
3. 0.9eV
4. 1.5eV

6.

An electron at rest is acceleration by a potential difference of 600V. The de-Broglie wavelength associated with the electron is :

1. $1\overset{o}{A}$
2. $2\overset{o}{A}$
3. $3\overset{o}{A}$
4. $0.5\ \overset{o}{A}$

7.

The de-Broglie wavelength of a body of mass 1 kg moving with a velocity of 2000 m/s is

1. $3.32 \text{ x } 10^{-27}\ \text{Å}$
2. $1.5 \text{ x } 10^{7}\ \text{Å}$
3. $0.55 \text{ x } 10^{-22}\ \text{Å}$
4. None of these

8.

Light of wavelength 4000 Å falls on a photosensitive metal and a negative 2V potential stops the emitted electrons.

The work function of the material (in eV) is approximately

$\left(\text{h} = 6.6 \text{ x } 10^{-34}\ \text{Js},\ \text{e} = 1.6 \text{ x } 10^{-19}\ \text{C},\ \text{c} = 3 \text{ x } 10^{8}\ \text{ms}^{-1}\right)$

1. 1.1
2. 2.0
3. 2.2
4. 3.1

9.

A particle of mass M at rest decays into two particles of masses m1 and m2 having non-zero velocities.

The ratio of de-Brogliewavelength is:

1. $\frac{m_1}{m_2}$

2. $\frac{m_2}{m_1}$

3. 1

4. $\sqrt{\frac{m_2}{m_1}}$

10.

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 photoelectric will reach the anode A, if the stopping potential of A relative to C is

(a) +3 V (b) +4 V

(c) - 1V (d) -3 V

11.

A radiation of energy 'E' falls normally on a perfectly reflecting surface. The momentum transferred to the surface is (c=velocity of light)

(a)E/c

(b)2E/c

(c)2E/$c^2$

(d)E/$c^2$

12.

A certain metallic surface is illuminated with monochromatic light of wavelength λ. The stopping potential for photoelectric current for this light is $3V_o$. If the same surface is illuminated with light of wavelength 2λ. the stopping potential is $V_o$. The threshold wavelength for this surface for photoelectric effect is

(a)6λ

(b)4λ

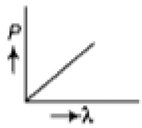
(c)λ/4

(d)λ/6

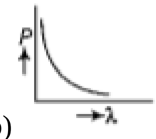
13.

Which of the following figures represent the variation of particle

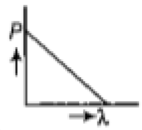
momentum and the associated de-Broglie wavelength?



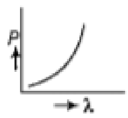
(a)



(b)



(c)



(d)

14.

A photoelectric surface is illuminated successively by monochromatic light of wavelength λ and λ/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 materiall is (h=Planck's constant, c=speed of light)

(a)hc/2λ

(b)hc/λ

(c)2hc/λ

(d)hc/3λ

15.

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

(a) 0.65eV

(b) 1.0eV

(c) 1.3eV

(d) 1.5eV

16.

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

17.

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

(a)$\sqrt{hv/(2m)}$

(b)$\sqrt{hv/(m)}$

(c)$\sqrt{2hv/(m)}$

(d)$2\sqrt{hv/(m)}$

18.

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

(a) wavelength

(b) intensity

(c) frequency

(d) power

19.

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

(a) decrease by 2 times

(b) decrease by 4 times

(c) increase by 4 times

(d) increase by 2 times

20.

The threshold frequency for a photo-sensitive metal is $3.3 \times 10^{14}$ Hz. If light of frequency $8.2 \times 10^{14}$ Hz is incident on this metal, the cut-off voltage for the photo-electric emission is nearly

(a) 2 V (b) 3 V

(c) 5 V (d) 1 V

21.

An electron in the hydrogen atom jumps from excited state n to the ground state. The wavelength so emitted illuminates a photo-sensitive material having work function 2.75 eV. If the stopping potential of the photo-electron is 10V,the value of n is

(a)3 (b)4

(c)5 (d)2

22.

A source $S_1$ is producing, $10^{15}$ photons/s of wavelength 5000 $\overset{\circ}{A}$. Another source $S_2$ is producing $1.02\times 10^{15}$ photons per second of wavelength 5100 $\overset{\circ}{A}$. Then, (power of $S_2$)/(power of $S_1$) is equal to

(a)1.00 (b)1.02

(c)1.04 (d)0.98

23.

The potential difference that must be applied to stop the fastest photoelectrons emitted by a nickel surface, having work function 5.01 eV, when ultraviolet light of 200nm falls on it, must be

(a) 2.4 V

(b) $-1.2$ V

(c) $-2.4$ V

(d) 1.2 V

24.

When monochromatic radiation of intensity $I$ falls on a metal surface, the number of photoelectrons and their maximum kinetic energy are $N$ and $T$ respectively. If the intensity of radiation is $2I$, the number of emitted electrons and their maximum kinetic energy are respectively

(a) $N$ and $2T$ (b) $2N$ and $T$

(c) $2N$ and $2T$ (d) $N$ and $T$

25.

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 nth state $E_n = -\frac{13.6}{n^2}$eV)

(a) $5.1$ V (b) $12.1$ V

(c) $17.2$ V (d) $7$ V

26.

Monochromatic light of wavelength 667 nm 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) $9 \times 10^{17}$

(b) $3 \times 10^{16}$

(c) $9 \times 10^{15}$

(d) $3 \times 10^{19}$

27.

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)

28.

The ratio of momenta of an electron and an $\alpha$- particle which are accelerated from rest by a potential difference of 100 V is

(a) 1 (b) $\sqrt{\frac{2m_e}{m_\alpha}}$

(c) $\sqrt{\frac{m_e}{m_\alpha}}$ (d) $\sqrt{\frac{m_e}{2m_\alpha}}$

29.

A narrow electron beam passes undeviated through an electric field E = $3 \times 10^4$ volt /m and an overlapping magnetic field $B = 2 \times 10^{-3}$ Weber $/m^2$. If electric field and magnetic field are mutually perpendicular. The speed of the electrons is

(a) 60 m/s (b) $10.3 \times 10^7$ m/s

(c) $1.5 \times 10^7$ m/s (d) $0.67 \times 10^{-7}$ m/s

30.

A beam of electrons is moving with constant velocity in a region having electric and magnetic fields of strength 20 $Vm^{-1}$ and 0.5 T at right angles to the direction of motion of the electrons. What is the velocity of the electrons

(a) 20 $ms^{-1}$ (b) 40 $ms^{-1}$

(c) 8 $ms^{-1}$ (d) 5.5 $ms^{-1}$

31.

When the light source is kept 20 cm away from a photo cell, stopping potential 0.6 V is obtained. When source is kept 40 cm away, the stopping potential will be

(a) 0.3 V (b) 0.6 V

(c) 1.2 V (d) 2.4 V

32.

A photon of $1.7 \times 10^{-13}$ Joules is absorbed by a material under special circumstances. The correct statement is

(a) Electrons of the atom of absorbed material will go the higher energy states

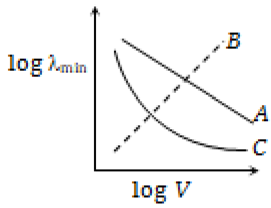
(b) Electron and positron pair will be created

(c) Only positron will be produced

(d) Photoelectric effect will occur and electron will be produced

33.

The dependence of the short wavelength limit $\lambda_{min}$ on the accelerating potential V is represented by the curve of figure




(a) A
(b) B
(c) C
(d) None of these

34.

Light of wavelength 5000 $\mathring{A}$ falls on a sensitive plate with the photoelectric work function of 1.9 eV. The kinetic energy of the photoelectron.

(1) 0.58 eV

(2) 2.48 eV

(3) 1.24 eV

(4) 1.16 eV

35.

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

(1) 4125 $\mathring{A}$

(2) 3000 $\mathring{A}$

(3) 6000 $\mathring{A}$

(4) 2062.5 $\mathring{A}$

36.

A light source is at a distance d from a photoelectric cell, then the number of photoelectrons emitted from the coil is n. If the distance of light source and cell is reduced to half, then the number of photoelectrons emitted will become

(1) $\frac{n}{2}$

(2) 2n

(3) 4n

(4) n

37.

If particles are moving with the same velocity, then the de Broglie wavelength is maximum for

(1) proton

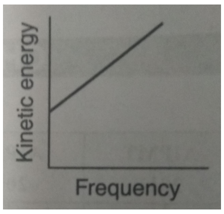
(2) $\alpha-$particle

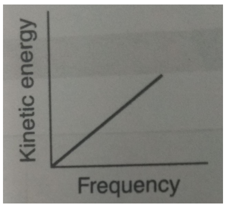
(3) neutron

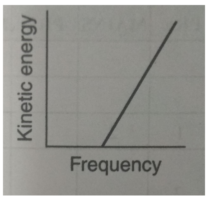
(4) $\beta-$particle

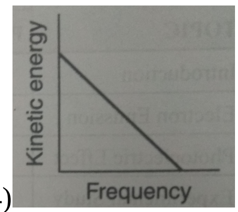
38.

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

(1) 


(2) 


(3) 


(4) 


39.

When photons of energy hv fall on an aluminium plate (of work function $E_0$), photoelectrons of 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+hv

40.

A 5 W source emits a monochromatic light of wavelength 5000 $\overset{0}{A}$. 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 photoelectrons liberated will be reduced by a factor of

(1) 8

(2) 16

(3) 2

(4) 4

41.

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 5 V lies in the

(1) X-ray region

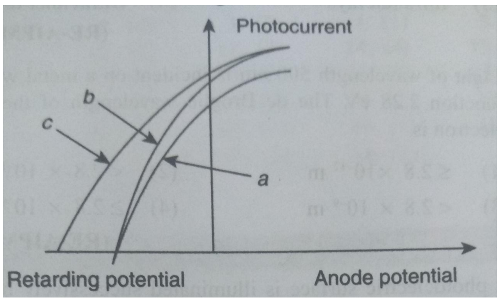
(2) ultraviolet region

(3) visible region

(4) infrared region

42.

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




(1) Curves (a) and (b) represent incident radiations of same frequency but of different intensities.

(2) Curves (b) and (c) represent incident radiations of different frequencies and different intensities.

(3) Curves (b) and (c) represent incident radiations of same frequency having same intersity.

(4) Curves (a) and (b) represent incident radiations of different frequencies and different intensities.

43.

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 speeds of emitted electrons will be

(1) 1 : 5

(2) 1 : 4

(3) 1 : 2

(4) 1 : 1

44.

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 the electron will be

(1) $\frac{p}{200}$

(2) 100 p

(3) 200 p

(4) 400 p

45.

Electrons of mass m m with de Broglie wavelength $\lambda$ fall on the target in an X-ray tube. The cut off wavelength $(\lambda_0)$ of the emitted X-ray is

(1) $\lambda_0 = \frac{2h}{mc}$

(2) $\lambda_0 = \frac{2m^2c^2\lambda^3}{h^2}$

(3) $\lambda_0 = \lambda$

(4) $\lambda_0 = \frac{2mc\lambda^2}{h}$

**Fill OMR Sheet**