# DPP
DAILY PRACTICE PROBLEMS

**Class : XIIth** **Subject : PHYSICS**
**Date :** **DPP No. : 10**

## Topic :- Dual nature of radiation and matter

1. There are $n_1$ photons of frequency $v_1$ in a beam of light. In an equally energetic beam there are $n_2$ photons of frequency $v_2$. Then the correct relation
   a) $\frac{n_1}{n_2} = \frac{v_1}{v_2}$ b) $\frac{n_1}{n_2} = 1$ c) $\frac{n_1}{n_2} = \frac{v_2}{v_1}$ d) $\frac{n_1}{n_2} = \frac{v_2^2}{v_1^2}$
2. The photosensitive surface is receiving light of wavelength Å at the rate of $10^{-8}$ $Js^{-1}$. The number of photons received per second is
   a) $2.5 \times 10^{10}$ b) $2.5 \times 10^{11}$ c) $2.5 \times 10^{12}$ d) $2.5 \times 10^{9}$
3. When radiation is incident on a photoelectron emitter, the stopping potential is found to be 9 V. I $e/m$ for the electron is $1.8 \times 10^{11}$ C $Kg^{-1}$,the maximum velocity the ejected electron is
   a) $6 \times 10^{5}$ $ms^{-1}$ b) $8 \times 10^{5}$ $ms^{-1}$ c) $1.8 \times 10^{6}$ $ms^{-1}$ d) $1.8 \times 10^{5}$ $ms^{-1}$
4. In Millikans oil drop experiment, a charged drop of mass $1.8 \times 10^{-14} kg$ is stationary between its plates. The distance between its plates is 0.90 $cm$ and potential difference is 2.0 $kilo\ volts$. The number of electrons on the drop is
   a) 500 b) 50 c) 5 d) 0
5. $X$-rays beam can be deflected by
   a) Magnetic field b) Electric field c) Both (a) and (b) d) None of these
6. The minimum wavelength of $X$-ray emitted by $X$-rays tube is 0.4125 Å. The accelerating voltage is
   a) 30 $kV$ b) 50 $kV$ c) 80 $kV$ d) 60 $kV$
7. If the wavelength of incident light changes from 400 nm to 300 nm, the stopping potential for photoelectrons emitted from a surface becomes approximately
   a) 1.0 V greater b) 1.0 V smaller c) 0.5 V greater d) 0.5 V smaller
8. If $n_R$ and $n_V$ denote the number of photons emitted by a red bulb and violet bulb of equal power in a given time, then
   a) $n_R = n_V$ b) $n_R > n_V$ c) $n_R < n_V$ d) $n_R \geq n_V$
9. Mosley measured the frequency $(f)$ of the characteristic $X$-rays from many metals of different atomic number (Z) and represented his results by a relation known as Mosley's law. This law is (a, b are constants)
   a) $f = a(Z-b)^2$ b) $Z = a(f-b)^2$ c) $f^2 = a(Z-b)$ d) $f = a(Z-b)^{1/2}$
10. The minimum energy required to remove an electron is called
    a) Stopping potential b) Kinetic energy c) Work function d) None of these

11. In Millikan's oil drop experiment, a charged drop falls with terminal velocity $V$. if an electric field $E$ is applied in vertically upward direction then it starts moving in upward direction with terminal velocity $2V$. if magnitude of electric field is decreased to $E/2$, then terminal velocity will becomes
    a) $V/2$ b) $V$ c) $3V/2$ d) $2V$
12. X-rays are
    a) Stream of electrons
    b) Stream of positively charged particles
    c) Electromagnetic radiantions of high frequency
    d) Stream of uncharged particles
13. X-rays are used in determining the molecular structure of crystalline because its
    a) Energy is high
    b) It can penetrate the material
    c) Its wavelength is comparable to interatomic distance
    d) Its freqency is low
14. For an electron in the second orbit of Bohr's hydrogen atom, the moment of linear momentum is
    a) $\pi h$ b) $2\pi h$ c) $\frac{h}{\pi}$ d) $\frac{2h}{\pi}$
15. The potential difference applied to an X-ray tube is 5 kV and the current through it is 3.2 mA. The number of electrons striking the target per second is (Take $e = 1.6 \times 10^{-19}$ C)
    a) $1.6 \times 10^{6}$ b) $2 \times 10^{-6}$ c) $4 \times 10^{16}$ d) $2 \times 10^{16}$
16. What is the de-Broglie wavelength of the $\alpha$-particle accelerated through a potential difference $V$
    a) $\frac{0.287}{\sqrt{V}}$ Å b) $\frac{12.27}{\sqrt{V}}$ Å c) $\frac{0.101}{\sqrt{V}}$ Å d) $\frac{0.202}{\sqrt{V}}$ Å
17. In the phenomenon of electron discharge through gases at low pressure, the coloured glow in the tube appears as a result of
    a) Collisions between the charged particles emitted from the cathode and the atoms of the gas
    b) Collision between different electrons of the atoms of the gas
    c) Excitation of electrons in the atoms
    d) Collision between the atoms of the gas
18. An electron is moving with constant velocity along $x$-axis. If a uniform electric field is applied along $y-$ axis, then its path in the $x-y$ plane will be
    a) A straight line b) A circle c) A parabola d) An ellipse
19. Choose the correct answer
    a) Photoelectric effect can take place from bound electron
    b) Photoelectric effect can take place from free electron
    c) Photoelectric effect can take place from bounded or free electron
    d) Nothing can be said
20. An electron with (rest mass $m_0$) moves with a speed of $0.8c$. Its mass when it moves with this speed is
    a) $m_0$ b) $m_0/6$ c) $5m_0/3$ d) $3m_0/5$