Electron

1. An electron is accelerated through a potential difference of 200 *volts.* If *e/m* for the electron be 1.6×10^{11} *coulomb/kg.* the velocity acquired by the electron will be

(a) $8\times10^{6}\,m/s$ (b) $8\times10^{5}\,m/s$ (c) $5.9\times10^{6}\,m/s$ (d) $5.9\times10^{5}\,m/s$

2. If the speed of electron is $5\times10^{5}\,m/s$. How long does one electron take to traverse 1*m*

(a) $1\times10^{6}\,s$ (b) $2\times10^{-6}\,s$ (c) $2\times10^{5}\,s$ (d) $1\times10^{5}\,s$

3. A metal plate gets heated, when cathode rays strike against, it due to

(a) Kinetic energy of cathode rays (b) Potential energy of cathode rays

(c) Linear velocity of cathode rays (d) Angular velocity of cathode rays

4. In Milikan'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 2*V*. If magnitude of electric field is decreased to $\frac{E}{2}$, then terminal velocity will become

(a) $\frac{V}{2}$ (b) V (c) $\frac{3V}{2}$ (d) $2V$

5. The current conduction in a discharged tube is due to

(a) Electrons only (b) +*ve* ions and electrons

(c) – *ve* ions and electrons (d) + *ve* ions, – *ve* ions and electrons

6. For moving ball of cricket, the correct statement about de-Broglie wavelength is

(a) It is not applicable for such big particle (b) $\frac{h}{\sqrt{2mE}}$

(c) $\sqrt{\frac{h}{2mE}}$ (d) $\frac{h}{2mE}$

7. Photon and electron are given same energy $(10^{-20}\,J)$. Wavelength associated with photon and electron are λ_{Ph} and λ_{el} then correct statement will be

(a) $\lambda_{Ph}>\lambda_{el}$ (b) $\lambda_{Ph}<\lambda_{el}$ (c) $\lambda_{Ph}=\lambda_{el}$ (d) $\frac{\lambda_{el}}{\lambda_{Ph}}=C$

8. Consider the two following statements *A* and *B* and identify the correct choice given in the answers

(A) In photovoltaic cells the photoelectric current produced is not proportional to the intensity of incident light.

(B) In gas filled photoemissive cells the velocity of photoelectrons depends on the wavelength of the incident radiation

(a) Both *A* and *B* are true (b) Both *A* and *B* are false (c) *A* is true but *B* is false (d) *A* is false *B* is true

9. There are n_1 photons of frequency γ_1 in a beam of light. In an equally energetic beam, there are n_2 photons of frequency γ_2. Then the correct relation is

(a) $\frac{n_1}{n_2}=1$ (b) $\frac{n_1}{n_2}=\frac{\gamma_1}{\gamma_2}$ (c) $\frac{n_1}{n_2}=\frac{\gamma_2}{\gamma_1}$ (d) $\frac{n_1}{n_2}=\frac{\gamma_1^2}{\gamma_2^2}$

10. Two identical photo-cathodes receive light of frequencies f_1 and f_2. If the velocities of the photo electrons (of mass *m*) coming out are respectively v_1 and v_2, then

(a) $v_1-v_2=\left[\frac{2h}{m}(f_1-f_2)\right]^{1/2}$ (b) $v_1^2-v_2^2=\frac{2h}{m}(f_1-f_2)$ (c) $v_1+v_2=\left[\frac{2h}{m}(f_1+f_2)\right]^{1/2}$ (d) None of these

11. If λ_1 and λ_2 are the wavelengths of characteristic X-rays and gamma rays respectively, then the relation between them is

(a) $\lambda_1=\frac{1}{\lambda_2}$ (b) $\lambda_1=\lambda_2$ (c) $\lambda_1>\lambda_2$ (d) $\lambda_1<\lambda_2$

12. The binding energy of the innermost electron in tungsten is 40 *keV*. To produce characteristic X-rays using a tungsten target in an X-ray tube the potential difference *V* between the cathode and the anticathode should be

(a) $V<40\ kV$ (b) $V\le40\ kV$ (c) $V>40\ kV$ (d) $V>/<40\ kV$

13. The wavelength of K_α-line in copper is 1.54 Å. The ionisatin energy of *K* electron in copper in *Joule* is

(a) 11.2×10^{-27} (b) 12.9×10^{-16} (c) 1.7×10^{-15} (d) 10×10^{-16}

14. The characteristic X-ray radiation is emitted when

(a) The electrons are accelerated to a fixed energy

(b) The source of electrons emits a monenergetic beam

(c) The bombarding electrons knock out electrons from the inner shell of the target atoms and one of the outer electrons falls into this vacancy

(d) The valence electrons in the target atom are removed as a result of the collision

15. In radio-theraphy, X-rays are used to

(a) Detect bone fractures

(b) Treat cancer by controlled exposure

(c) Detect heart diseases

(d) Detect fault in radio receiving circuits