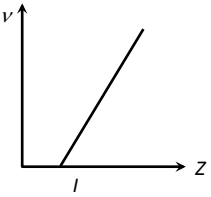
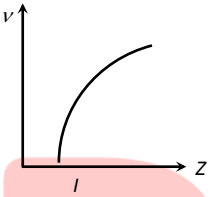
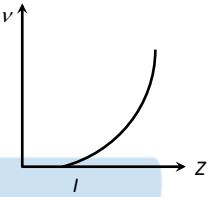
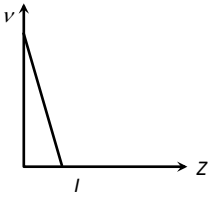
DPP
DAILY PRACTICE PROBLEMS

Class : XIIth **Subject : PHYSICS**
Date : **DPP No. : 9**

Topic :- Dual nature of radiation and matter

1. X-ray will travel minimum distance in
   a) Air b) Iron c) Wood d) Water
2. When cathode rays strike a metal target of high melting point with very high velocity, then
   a) X-rays are produced b) Alpha-rays are produced
   c) UV waves are produced d) Ultrasonic waves are produced
3. X-ray of wavelength $\lambda = 2\text{Å}$ is emitted from the metal target. The potential difference applied across the cathode and the metal target is
   a) 5525 V b) 320 V c) 6200 V d) 3250 V
4. X-rays are produced in laboratory by
   a) Radiation b) Decomposition of the atom
   c) Bombardment of high energy electron on heavy metal d) None of these
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. Light of wavelength λ strikes a photo-sensitive surface and electrons are ejected with kinetic energy E. If the kinetic energy is to be increased to $2E$, the wavelength must be changed to λ' where
   a) $\lambda' = \frac{\lambda}{2}$ b) $\lambda' = 2\lambda$ c) $\frac{\lambda}{2} < \lambda' < \lambda$ d) $\lambda' > \lambda$
7. An oil drop with charge q is held stationary between two plates with an external potential difference of 400 V. If the size of the drop is doubled without any change of charge, the potential difference required to keep the drop stationary will be
   a) 400 V b) 1600 V c) 3200 V d) 4000 V
8. A beam of cathode rays is subjected to crossed Electric (E) and Magnetic field (B). The fields are adjusted such that the beam is not deflected. The specific charge of the cathode rays is given by
   a) $\frac{E^2}{2VB^2}$ b) $\frac{B^2}{2VE^2}$ c) $\frac{2VB^2}{E^2}$ d) $\frac{2VE^2}{B^2}$
9. A charged oil drop falls with terminal velocity v_0 in the absence of electric field. An electric field E keeps it stationary. The drop acquires charge $3q$, it starts moving upwards with velocity v_0. The initial charge on the drop is
   a) $q/2$ b) q c) $3q/2$ d) $2q$

10. Light of wavelength 4000Å is incident on a metal surface. The maximum kinetic energy of emitted photoelectron is 2 eV. What is the work function of the metal surface ?
    a) 4 eV b) 1 eV c) 2 eV d) 6 eV
11. A charged particle is moving in a uniform magnetic field in a circular path. The energy of the particle is tripled. If the initial radius of the circular path was R, the radius of the new circular path after the energy is tripled will be
    a) $\frac{R}{3}$ b) $\sqrt{3}\,R$ c) $3\,R$ d) $R/\sqrt{3}$
12. Cathode rays enter a magnetic field making oblique angle with the lines of magnetic induction. What will be the nature of the path followed?
    a) Parabola b) Helix c) Circle d) Straight line
13. The graph that correctly represents the relation of frequency v of a particular characteristic X-ray with the atomic number Z of the material is
    a) 
    b) 
    c) 
    d) 
14. Einstein's photoelectric equation states that $Ek = hv - \phi$. In this equation E_k refers to
    a) Kinetic energy of all the emitted electrons
    b) Mean kinetic energy of the emitted electrons
    c) Maximum kinetic energy of the emitted electrons
    d) Minimum kinetic energy of the emitted electrons
15. Let λ_α,λ_β and λ'_α denote the wavelengths of the X-rays of the K_α,K_β and L_α lines in the characteristic X-rays for a metal. Then
    a) $\lambda_\alpha > \lambda'_\alpha > \lambda_\beta$ b) $\lambda'_\alpha > \lambda_\beta > \lambda_\alpha$ c) $\frac{1}{\lambda_\beta} = \frac{1}{\lambda_\alpha} + \frac{1}{\lambda'_\alpha}$ d) $\frac{1}{\lambda_\alpha} + \frac{1}{\lambda_\beta} = \frac{1}{\lambda'_\alpha}$
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 3.57 V. the threshold frequency of the material is
    a) $4 \times 10^{15} Hz$ b) $5 \times 10^{15} Hz$ c) $1.6 \times 10^{15} Hz$ d) $2.5 \times 10^{15} Hz$
17. Who discovered the charge on an electron for the first time?
    a) Millikan b) Thomson c) Kelvin d) Coulomb
18. An electron microscope is used to probe the atomic arrangement to a resolution of 5 Å. What should be the electric potential to which the electrons need to be accelerated
    a) 2.5 V b) 6 V c) 2.5 kV d) 5 kV
19. A light of wavelength 4000 Å is allowed to fall on a metal surface having work function 2 eV. The maximum velocity of the emitted electrons is ($R = 6.6 \times 10^{-34}$Js)
    a) 1.35×10^5 ms^{-1} b) 2.7×10^5 ms^{-1} c) 6.2×10^5 ms^{-1} d) 8.1×10^5 ms^{-1}
20. The wavelength λ of the K_α line of characteristic X-rays spectra varies with atomic number approximately

a) $\lambda \propto Z$ b) $\lambda \propto \sqrt{Z}$ c) $\lambda \propto \frac{1}{Z^2}$ d) $\lambda \propto \frac{1}{\sqrt{Z}}$