DPP
DAILY PRACTICE PROBLEMS

Class : XIIth **Subject : PHYSICS**
Date : **DPP No. : 6**

Topic :- Dual nature of radiation and matter

1. The ratio of the energy of a photon with $\lambda = 150$ nm to that with $\lambda = 300$ nm is
   a) 2 b) $\frac{1}{4}$ c) 4 d) $\frac{1}{2}$
2. Photoelectric emission is observed from a metallic surface for frequencies v_1 and v_2 of the incident light rays $(v_1 > v_2)$. If the maximum values of kinetic energy of the photoelectrons emitted in the two cases are in the ratio of $1 : k$, then the threshold frequency of the metallic surface is
   a) $\frac{v_1 - v_2}{k-1}$ b) $\frac{kv_1 - v_2}{k-1}$ c) $\frac{kv_2 - v_1}{k-1}$ d) $\frac{v_2 - v_1}{k}$
3. The cathode rays have particle nature because of the fact that
   a) They can propagate in vacuum
   b) They are deflected by electric and magnetic fields
   c) They produced fluorescence
   d) They cast shadows
4. The light rays having photons of energy 1.8 eV are falling on a metal surface having a work function 1.2 eV. What is the stopping potential to be applied to stop the emitting electrons
   a) 3 eV b) 1.2 eV c) 0.6 eV d) 1.4 eV
5. The cathode of a photoelectric cell is changed such that the work function changes from W_1 to $W_2(W_2 > W_1)$. If the current before and after change are I_1 and I_2, all other conditions remaining unchanged, then (assuming $hv > W_2$)
   a) $I_1 = I_2$ b) $I_1 < I_2$ c) $I_1 > I_2$ d) $I_1 < I_2 < 2I_1$
6. The magnitude of saturation photoelectric current depends upon
   a) Frequency b) Intensity c) Work function d) Stopping potential
7. In Thomson mass spectrograph, singly and doubly ionised particles from similar parabola corresponding to magnetic fields of 0.8 T and 1.2 T for a constant electric field. The ratio of masses f ionised particles will be
   a) 3 : 8 b) 2 : 9 c) 8 : 3 d) 9 : 2
8. The energy of a photon of light with wavelength 5000 Å is approximately 2.5 eV. This way the energy of an X-ray photon with wavelength 1Å would be
   a) $2.5/5000$ eV b) $2.5/(5000)^2 eV$ c) 2.5×5000 eV d) $2.5 \times (5000)^2 eV$
9. Which of the following event, support the quantum nature of light?

a) Diffraction b) Polarization c) Interference d) Photoelectric effect

10. For photoelectric emission, tungsten requires light of 2300 Å. If light of 1800 Å wavelength is incident then emission
    a) Takes place b) Doesn't take place
    c) May or may not take place d) Depends on frequency
11. The ratio of de-Broglie wavelength of a α-particle to that of a proton being subjected to the same magnetic field so that the radii of their path are equal to each other assuming the field induction vector $\vec{B}$ is perpendicular to the velocity vectors of the α-particle and the proton is
    a) 1 b) $1/4$ c) $1/2$ d) 2
12. Light of wavelength 4000 Å incident on a sodium surface for which the threshold wavelength of photoelectrons is 5420 Å. The work function of sodium is
    a) 0.57 eV b) 1.14 eV c) 2.29 eV d) 4.58 eV
13. What is the difference between soft and hard X-rays
    a) Velocity b) Intensity c) Frequency d) Polarization
14. An electron of mass m when accelerated through a potential difference V has de-Broglie wavelength λ. The de-Broglie wavelength associated with a proton of mass M accelerated through the same potential difference will be
    a) $\lambda\frac{m}{M}$ b) $\lambda\sqrt{\frac{m}{M}}$ c) $\lambda\frac{M}{m}$ d) $\lambda\sqrt{\frac{M}{m}}$
15. When a beam of accelerated electrons hits a target, a continuous X-ray spectrum is emitted from the target. Which of the following wavelength is absent in the X-ray spectrum, if the X-ray tube is operating at 40,000 $volts$
    a) 0.25 Å b) 0.5 Å c) 1.5 Å d) 1.0 Å
16. The mass of a photo electron is
    a) $9.1 \times 10^{-27} kg$ b) $9.1 \times 10^{-29} kg$ c) $9.1 \times 10^{-31} kg$ d) $9.1 \times 10^{-34} kg$
17. In a region, steady and uniform electric magnetic fields are present. These two fields are parallel to each other. A charged particle is released from rest in this region. The path of the particle will be a
    a) Helix b) Straight line c) Ellipse d) Circle
18. The photoelectric effect represents that
    a) Light has a particle nature b) Electron has a wave nature
    c) Proton has a wave nature d) None of the above
19. Consider the following two statements A and B and identify the correct choice in the given answer
    A: The characteristic X-ray spectrum depends on the nature of the material of the target
    B: The short wavelength limit of continuous X-ray spectrum varies inversely with the potential difference applied to the X-rays tube
    a) A is true and B is false b) A is false and B is true
    c) Both A and B are true d) Both A and B are false
20. During X-ray production from coolidge tube if the current in increased, then
    a) The penetration power increases b) The penetration power decreases
    c) The intensity of X-rays increases d) The intensity of X-rays decreases