

Chapter :- **Dual nature of radiation and matter**

Assignment 1

Class 12

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|  **Class : XIIth Subject : PHYSICS** **Date : DPP No. : 1** |

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| **Topic :- Dual nature of radiation and matter**  |

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| **1.** | **The ratio of the energy of an** $X$**-ray photon of wavelength** $1 Å$ **to that of visible light of wavelength** $5000 Å$ **is** |
|  | **a)** | **1 :5000** | **b)** | **5000 :1** | **c)** | $$1:25×10^{6}$$ | **d)** | $$25×10^{6}$$ |
| 2. | If light of wavelength $λ\_{1}$ is allowed to fall on a metal, then kinetic energy of photoelectrons emitted is $E\_{1}.$ If wavelength of light changes to $λ\_{2}$ then kinetic energy of electrons changes to $E\_{2}.$ Then work function of the metal is |
|  | a) | $$\frac{E\_{1}E\_{2}(λ\_{1}-λ\_{2})}{λ\_{1}λ\_{2}}$$ | b) | $$\frac{E\_{1}λ\_{1}-E\_{2}λ\_{2}}{(λ\_{1}-λ\_{2})}$$ | c) | $$\frac{E\_{1}λ\_{1}-E\_{2}λ\_{2}}{(λ\_{2}-λ\_{1})}$$ | d) | $$\frac{λ\_{1}λ\_{2}E\_{1}E\_{2}}{(λ\_{2}-λ\_{1})}$$ |
| 3. | When two different materials *A* and *B* having atomic number $Z\_{1}$ and $Z\_{2}$ are used as the target in Coolidge $γ$-ray tube at different operating voltage $V\_{1}$ and $V\_{2}$ respectively their spectrums are found as below. The correct relation is  |
|  | a) | $V\_{1}>V\_{2}$ and $ Z\_{1}>Z\_{2}$  | b) | $V\_{1}<V\_{2}$ and $Z\_{1}<Z\_{2}$ | c) | $V\_{1}<V\_{2}$ and $Z\_{1}>Z\_{2}$ | d) | $V\_{1}>V\_{2}$ and $Z\_{1}<Z\_{2}$ |
| **4.** | **If the linear momentum of a particle is** $2.2×10^{4} kg$**-**$ms^{-1}$**, then what will be its de-Broglie wavelength?****(Take** $h=6.6×10^{-34} Js)$ |
|  | **a)** | $3×10^{-29}$**m** | **b)** | $3×10^{-29}$**nm** | **c)** | $6×10^{-29}$**m** | **d)** | $6×10^{-29}$**nm** |
| **5.** | **The rest mass of the photon is** |
|  | **a)** | **0** | **b)** | $$\infty $$ |
|  | **c)** | **Between 0 and** $\infty $ | **d)** | **Equal to that of an electron** |
| **6.** | **The value of Plank energy is** |
|  | **a)** | $$\frac{nhc}{λ}$$ | **b)** | $$nhλ$$ | **c)** | $$nhcλ$$ | **d)** | $$\frac{nhλ}{c}$$ |
| **7.** | **The ratio of specific charge of an** $α$**-particle to that of a proton is** |
|  | **a)** | **2 :1** | **b)** | **1 :1** | **c)** | **1 :2** | **d)** | **1 :3** |
| 8. | The correct graph between the maximum energy of a photoelectron and the inverse of wavelength of the incident radiation is given by the curve*A**C*1*/λ*1*/λ*0*K*max0*B* |
|  | a) | $$A$$ | b) | $$B$$ | c) | $$C$$ | d) | None of the above |
| **9.** | **Two identical metal plates shown photoelectric effect by a light of wavelength** $λÅ$ **falls on plate A and** $λ\_{B}$ **on plate** $B\left(λ\_{A}=2λ\_{B}\right).$ **The maximum kinetic energy is** |
|  | **a)** | $$2 K\_{A}=K\_{B}$$ | **b)** | $$K\_{A}<K\_{B}/2$$ | **c)** | $$K\_{A}=2K\_{B}$$ | **d)** | $$K\_{A}=K\_{B}/2$$ |
| **10.** | **Quantum nature of light is explained by which of the following phenomenon** |
|  | **a)** | **Huygen wave theory** | **b)** | **Photoelectric effect** |
|  | **c)** | **Maxwell electromagnetic theory** | **d)** | **De-Broglie theory** |
| **11.** | **Energy from the sun is received on earth at the rate of 2 cal per** $cm^{2}$ **per min. if average wavelength of solar light be taken at 5500 A then how many photons are received on the earth per** $cm^{2}$ **per min?****(Take** $h=6.6×10^{-34}$**Js, 1cal=4.2 J).** |
|  | **a)** | $$1.5×10^{13}$$ | **b)** | $$2.9×10^{13}$$ | **c)** | $$2.3×10^{19}$$ | **d)** | $$1.75×10^{19}$$ |
| **12.** | **Which phenomenon best supports the theory that matter has a wave nature** |
|  | **a)** | **Electron momentum** | **b)** | **Electron diffraction** | **c)** | **Photon momentum** | **d)** | **Photon diffraction** |
| 13. | The figure represents the observed intensity of $X$-rays emitted by an $X$-ray tube as a function of wavelength. The sharp peaks $A$ and $B$ denote*A**O*Wave length*B*Intensity |
|  | a) | Band spectrum | b) | Continuous spectrum |
|  | c) | Characteristic radiations | d) | White radiations |
| **14.** | **The frequency of a photon, having energy** $100 eV$ **is (**$h=6.6×10^{-34}J$**-**$s$**)** |
|  | **a)** | $$2.42×10^{26}Hz$$ | **b)** | $$2.42×10^{16}Hz$$ | **c)** | $$2.42×10^{12}Hz$$ | **d)** | $$2.42×10^{9}Hz$$ |
| **15.** | **Which of the following have highest specific charge** |
|  | **a)** | **Positron** | **b)** | **Proton** | **c)** | $$He$$ | **d)** | **None of these** |
| **16.** | **Planck’s constant has the dimensions of**  |
|  | **a)** | **Energy** | **b)** | **Mass** | **c)** | **Frequency** | **d)** | **Angular momentum** |
| **17.** | **The de-Broglie wavelength is proportional to** |
|  | **a)** | $$λ∝\frac{1}{v}$$ | **b)** | $$λ∝\frac{1}{m}$$ | **c)** | $$λ∝\frac{1}{p}$$ | **d)** | $$λ∝p$$ |
| **18.** | **A parallel beam of light is incident normally on a plane surface absorbing 40% of the light and reflecting the rest. If the incident beam carries 60 W of power, the force exerted by it on the surface is** |
|  | **a)** | $$3.2×10^{-8}N$$ | **b)** | $$3.2×10^{-7}N$$ | **c)** | $$5.12×10^{-7}N$$ | **d)** | $$5.12×10^{-8}N$$ |
| 19. | Given below is a list of electromagnetic spectrum and its mode of production. Which one does not match |
|  | a) | Gamma rays – Radioactive of the nucleus |
|  | b) | Ultraviolet – Magnetron valve |
|  | c) | Infrared – Vibration of atoms and molecules |
|  | d) | Radiowave – Rapid acceleration and decelaration of electrons in conducting wires |
| 20. | A proton of mass $1.67×10^{-27}$ kg enters a uniform magnetic field of 1 T at point $A$ as shown in figure, with a speed of $10^{7} ms^{-1}$. The magnetic field is directed normal to the plane of paper downwards. The proton emerges out of the magnetic field at point $C$, then the distance $AC$ and the value of angle $θ$ will respectively be  |
|  | a) | 0.7 m, $45°$ | b) | 0.7 m, 90$°$ | c) | 0.14 m, 90$°$ | d) | 0.14 m, 45$°$ |