

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

Topic :- Dual nature of radiation and matter

- 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)
$$\frac{E_1 E_2 (\lambda_1 - \lambda_2)}{\lambda_1 \lambda_2}$$
 b) $\frac{E_1 \lambda_1 - E_2 \lambda_2}{(\lambda_1 - \lambda_2)}$ c) $\frac{E_1 \lambda_1 - E_2 \lambda_2}{(\lambda_2 - \lambda_1)}$ d) $\frac{\lambda_1 \lambda_2 E_1 E_2}{(\lambda_2 - \lambda_1)}$

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 $h = 6.6 \times 10^{-34}$ 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)∞	
	c) Between 0 and ∞ d) Equal to that of an electron		lectron	
6.	The value of Plank energy is			
	a) $\frac{nhc}{\lambda}$	b) <i>nhλ</i>	c) $nhc\lambda$	d) $\frac{nh\lambda}{c}$
7.	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) *A* b) *B* c) *C* d) None of the above 9. Two identical metal plates shown photoelectric effect by a light of wavelength λA falls on plate *A* and λ_B on plate $B(\lambda_A = 2\lambda_B)$. 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 cm² per min. if average wavelength of solar light be taken at 5500 A then how many photons are received on the earth per cm² per min?

(Take $h = 6.6 \times 10^{-34}$ 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 naturea) 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 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

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

b) 0.7 m, 90°

c) 0.14 m, 90°

d) 0.14 m, 45°