Worksheet: Dual Nature of Radiation and Matter

Rajasthan State Board · Class 12 · Physics · 9 questions · 27 marks

Name: _____ Date: _____ Score: _____ / 27

Q1. The work function of a metal is 2.0 eV. Find the maximum kinetic energy of photoelectrons when light of energy 3.2 eV falls on it. *[2 marks]*

Q2. Find the energy in electronvolts of a photon of wavelength 620 nm. *[2 marks]*

Q3. Find the de Broglie wavelength of an electron moving at 2.0 x 10^6 m/s. *[2 marks]*

Q4. The threshold wavelength of a metal is 500 nm. Find its work function and the stopping potential when light of 400 nm falls on it. *[3 marks]*

Q5. Light of frequency 1.5 times the threshold frequency falls on a metal of work function 3.0 eV. Find the maximum kinetic energy of the photoelectrons. *[3 marks]*

Q6. A 60 W lamp emits monochromatic light of wavelength 600 nm. Find how many photons it emits per second. *[3 marks]*

Q7. An electron and a proton have the same kinetic energy. Which has the longer de Broglie wavelength, and by what factor? *[4 marks]*

Q8. When light of wavelength 350 nm falls on a metal the stopping potential is 1.2 V. Find the threshold wavelength of the metal. *[4 marks]*

Q9. Find the minimum wavelength of X-rays produced by electrons accelerated through 50 kV, and explain why a sharp cut-off exists. *[4 marks]*