Q.1 The wave and particle nature of moving bodies can be observed at -
(A) The same time. **(B)**The different time.
(C) Both options (A) and (B) are possible. **(D)**None of these

Q.2 Electron guns are used in -
(A) Computer and television monitors **(B)**Ionize particles
(C) Ionize particles **(D)**All of these

Q.3 Which of the following is NOT the possible angular orbital momentum of an electron?
h is the Planck constant.
(A)$\frac{3h}{2\pi}$ **(B)**$\frac{5h}{2\pi}$ **(C)**$\frac{7h}{2\pi}$ **(D)**$\frac{8.5h}{2\pi}$

Q.4 Davisson-Germer experiment is performed first with $\mathbf{X}$ −rays of wavelength $\boldsymbol{\lambda}$ and then with electrons of same wavelength$\boldsymbol{\lambda}$. The ratio of energy of $\mathbf{X}$ − rays to that of the electrons in of the order of $(\mathbf{m = mass\ of\ electron})$
(A)1 **(B)**$2\left(\frac{mc\lambda}{h}\right)^2$ **(C)**$\frac{2mc\lambda}{h}$ **(D)**$\frac{mc\lambda}{h}$

Q.5 The energy of a photon whose de-Broglie wavelength is equal to the wavelength of an electron accelerated through a potential difference of $\mathbf{125\ V}$ is near to
(A)11.3 eV **(B)**11.3 keV **(C)**125 eV **(D)**1250 eV

Q.6 Calculate the wavelength of an electron if it is travelling at a speed of $\mathbf{1.6 \times 10^{8}\ ms^{-1}}$.
Mass of an electron $= \mathbf{9.1 \times 10^{-31}\ kg}$
(A)4.5×10^{-12} m **(B)**4.5×10^{-10} m **(C)**4.5×10^{-11} m **(D)**4.5×10^{-13} m

Q.7 Calculate the de-Broglie wavelength of an electron having kinetic energy of **1 GeV**. Given mass of electron $\mathbf{m = 9.1 \times 10^{-31}\ kg}$, $\mathbf{h = 6.6 \times 10^{-34}\ Js}$ and $\mathbf{e = 1.6 \times 10^{-19}\ C}$
(A)78×10^{-14} m **(B)**7.8×10^{-14} m **(C)**3.8×10^{-14} m **(D)**38×10^{-14} m

Q.8 A proton and an alpha particle are accelerating by the same potential difference. Find the ratio of their de-Broglie wavelength?
$(\mathbf{charge(q_\alpha) = +2e,\ q_{proton} = +e\ \ and\ \ m_\alpha = 4m_{proton}})$
(A)$\sqrt{2}$ **(B)**$\sqrt{8}$ **(C)**$\sqrt{6}$ **(D)**$\sqrt{16}$

Q.9 Find the ratio of de-Broglie wavelength of an$\boldsymbol{\alpha}$ −particle to that of a proton. The proton is subjected to double the strength of the magnetic field that of $\boldsymbol{\alpha}$ −particles so that the radii of their path are equal to each other. Assume the field induction $\vec{\mathbf{B}}$ perpendicular to the velocity vector of the $\boldsymbol{\alpha}$ −particle.
(A)1:1 **(B)**1:2 **(C)**1:3 **(D)**1:4

Q.10 We wish to see inside the atom. Assuming the atom to have a diameter of **100 pm**, this means that one must be able to resolve a width of say **10 pm**. If an electron-microscope is used, the minimum electron energy required is about. (Assume the wavelength of light used in an electron microscope is nearly equal to the resolving power of the electron microscope.)
(A)15 keV **(B)**1.5 keV **(C)**150 keV **(D)**1.5 MeV

ANSWER KEY

Q.	1	2	3	4	5	6	7	8	9	10
Sol.	(B)	(D)	(D)	(C)	(B)	(A)	(C)	(B)	(A)	(A)