2. A sodium atom is in one of the states labeled 'Lowest excited levels'. It remains in that state for an average time of 10^{-8} sec, before it makes a transition back to a ground state. What is the uncertainty in energy of that excited state?

(A) 6.56×10^{-8} eV (B) 2×10^{-8} eV

(C) 10^{-8} eV (D) 8×10^{-8} eV

Sol: (A) The average time that the atom spends in this excited state is equal to Δt, so by using $\Delta E\cdot\Delta t=\frac{h}{2\pi}$

$\Rightarrow$ Uncertainty in energy $=\frac{h/2\pi}{\Delta t}$

$=\frac{6.6\times10^{-34}}{2\times3.14\times10^{-8}}=1.05\times10^{-26}J=6.56\times10^{-8}$ eV