**Question 4. An electron in a hydrogen atom undergoes a transition from an orbit with quantum number ni to another with quantum number nf. $V_i$ and $V_f$ are respectively the initial and final potential energies of the electron. If $V_i / V_f = 6.25$, then the smallest possible $n_f$.**

**Solution: (5)**

The potential energy of an electron in Bohr's modal is given by (assuming Coulombic force)

$U = -Kze^2 / \gamma$

Where, $\gamma$ = radius

& radius for Bohr's orbital (for mono-electronic system) $=0.529\ n^2 / z$

so, $U_i / U_r = \gamma_2 / \gamma_1 = n_2^2 / n_1^2$ …(1)

As, given $n_2 / n_1 = 6.25$

By comparing the above equation and equation (1).

$n_2 / n_1 = \sqrt{6.25}$

$n_2 / n_1 = 2.5$

So, $n_2 / n_1 = 5 / 2$

It can be written as,

$n_2 = 5\ n_1 = 2$

so the final value of $n_2 = 5$.