

[Q] In a hydrogen like atom electrons make transition from an energy level with quantum number  $n$  to another quantum number  $(n-1)$ . If  $n \gg 1$  the frequency of radiation emitted is proportional to -

(a)  $\frac{1}{n}$

(b)  $\frac{1}{n^2}$

(c)  $\frac{1}{n^{3/2}}$

(d)  $\frac{1}{n^3}$

Sol<sup>n</sup>:-

$$\frac{1}{\lambda} = RZ^2 \left[ \frac{1}{n_1^2} - \frac{1}{n_2^2} \right] \quad n \gg 1$$

$$\nu = RCZ^2 \left[ \frac{1}{(n-1)^2} - \frac{1}{n^2} \right]$$

$$\nu = RCZ^2 \left[ \frac{2n-1}{n^2(n-1)^2} \right]$$

option (D) correct