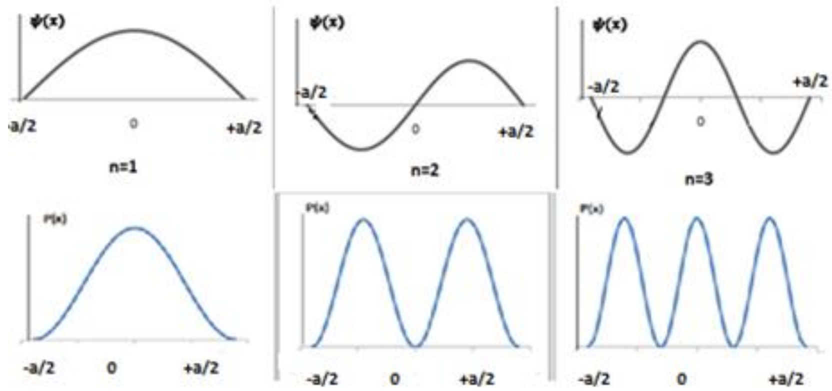
CL19_Q1. Plot the probability densities for the first three excited quantum states of an electron trapped in an infinite potential well of width L.



CL19_Q2. A particle is free to move in a one dimensional region of zero potential between the two rigid walls at $x = -a$ and $x = a$. If E_n is the energy of the nth state and ΔE_n is the energy separation between the $(n+1)^{th}$ and n^{th} state, then show that $\frac{\Delta E_n}{E_n} = \frac{(2n+1)}{n^2}$

Ans:

Energy of the n^{th} and $(n+1)^{th}$ is

$E_n = \frac{n^2h^2}{8mL^2}$ and $E_{n+1} = \frac{(n+1)^2h^2}{8mL^2}$

$$\Delta E_n = \frac{h^2}{8mL^2}[(n+1)^2 - n^2]$$

$$\Delta E_n = \frac{h^2}{8mL^2}(2n+1)$$

$$\therefore \frac{\Delta E_n}{E_n} = \frac{(2n+1)}{n^2}$$