

6. Consider an electron ( $m = 9.1 \times 10^{-31}$  kg) confined by electrical forces to move between two rigid walls separated by  $1.0 \times 10^{-9}$  m, which is about five atomic diameters. The quantized energy value for the lowest stationary state is

(A)  $12 \times 10^{-20}$  J

(B)  $6.0 \times 10^{-20}$  J

(C)  $6.0 \times 10^{-18}$  J

(D) 6 J

Sol: (B) It will form a stationary wave

$$\lambda = 2l = 2 \times 10^{-9} \text{ m}$$

$$\Rightarrow \lambda = \frac{h}{\sqrt{2mE}}$$

$$\Rightarrow E = \frac{h^2}{2m\lambda^2} = 6 \times 10^{-20} \text{ J}$$

