1) Not normalisable

2) $E > V_0$ has zero bound states

3) $E = 6eV$ $\quad V_0 = 12eV$ $\quad L = 0.18nm$

$$T(E) = \left[1 + \frac{1}{4}\frac{V_0^2}{E(V_0 - E)} \sinh^2(\alpha L)\right]^{-1} \quad \text{where } \alpha^2 = \frac{2m(V_0 - E)}{\hbar^2}$$

$$\sinh(\alpha L) = 0.3668$$

$$T(E) = 0.88$$

4) For $E < 0$,

$$T = \left[1 + \frac{1}{4}\frac{V_0^2}{E(V_0 - E)}\left(\frac{e^{\alpha L} - e^{-\alpha L}}{4}\right)^2\right]^{-1}$$

1. for $\alpha L >> 1$

$$T = \left[1 + \frac{1}{16}\frac{V_0^2}{E(V_0 - E)} e^{2\alpha L}\right]^{-1} \approx e^{-2\alpha L} \cdot \frac{16 \cdot E(V_0 - E)}{V_0^2}$$

2. for $\alpha L << 1$

$$T = \left[1 + \frac{1}{16}\frac{V_0^2}{E(V_0 - E)}\left(e^{\alpha L} - e^{-\alpha L}\right)^2\right]^{-1}$$

$$T = \left[1 + \frac{1}{16}\frac{m^2 V_0^2 L^2}{\hbar^4 k^2}\right]^{-1}$$