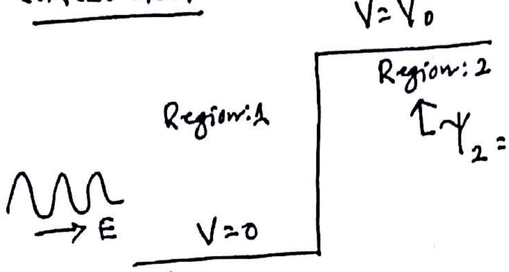
REVISION UNIT - V

To Explore Numericals

*** STEP POTENTIALS CASE 1: $E > V_0$**

CONCLUSION



$$\psi_2 = De^{ik_2 x}$$

$$\psi_1 = Ae^{ik_1 x} + Be^{-ik_1 x}$$

wave number of deBroglie wave $\Big\}$ $k_1 = \sqrt{\dfrac{2mE}{\hbar^2}} > k_2 = \sqrt{\dfrac{2m(E-V_0)}{\hbar^2}}$

Momentum in Region 1 $\Big\}$ $P_1 = \hbar k_1 > P_2 = \hbar k_2$

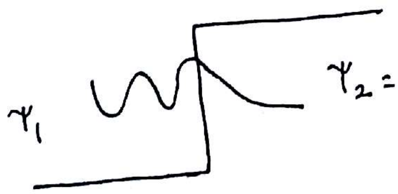
$$\therefore V_1 > V_2$$

$$KE_1 > KE_2$$

$$B = A\left(\frac{k_1 - k_2}{k_1 + k_2}\right) = A \cdot \frac{\sqrt{E} - \sqrt{E - V_0}}{\sqrt{E} + \sqrt{E \mp V_0}} = A\left(\frac{1 - \sqrt{1 - \frac{V_0}{E}}}{1 + \sqrt{1 - \frac{V_0}{E}}}\right)$$

$$D = 2A\left(\frac{k_1}{k_1 + k_2}\right) = 2A \cdot \frac{\sqrt{E}}{\sqrt{E} + \sqrt{E - V_0}} = \frac{2A}{1 + \sqrt{1 - \frac{V_0}{E}}}$$

CASE 2: $E < V_0$



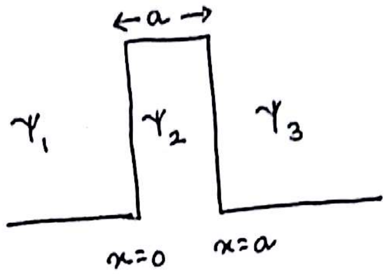
$$\psi_2 = De^{-\alpha x}$$

$$\psi_1 = Ae^{ik_1 x} + Be^{-ik_1 x}$$

$$\alpha = \sqrt{\frac{2m(V_0 - E)}{\hbar^2}}$$

$\Delta x =$ penetration depth $= \dfrac{\hbar}{\sqrt{2m(V_0 - E)}}$

* POTENTIAL BARRIER



$$\psi_1 = A e^{ik_1x} + B e^{-ik_1x}$$

$$\psi_2 = D e^{-\alpha x}$$

$$\psi_3 = G e^{ik_3x}$$

Transmission Probability or Transmission Coefft: or % Particle Transmitted

$$T = \frac{G^* G \times V_3}{A^* A \times V_1} \cong 16 \frac{E}{V_0}\left[1-\left(\frac{E}{V_0}\right)^2\right] e^{-2\alpha a}$$

$$= e^{-2\alpha a}$$