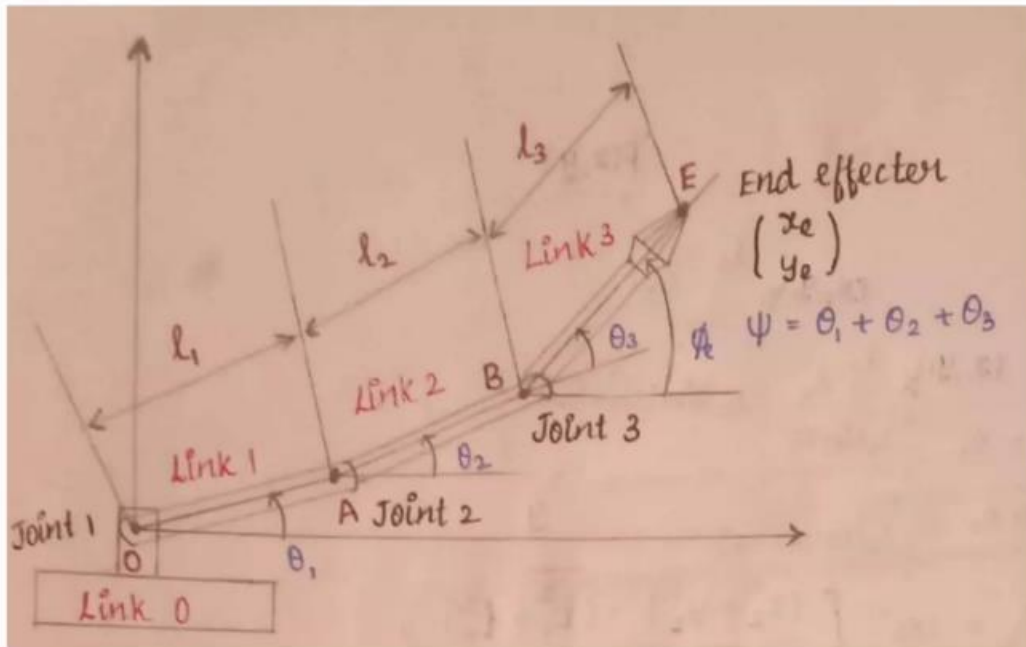


FORWARD KINEMATICS FOR 3 DEGREE OF FREEDOM WITH 2 DIMENSIONS



X - components : -

$$x = L_1 \cos \theta_1 \quad \dots \dots \dots (\text{link 1})$$

$$x = L_2 \cos (\theta_1 + \theta_2) \quad \dots \dots \dots (\text{link 2})$$

$$x = L_3 \cos (\theta_1 + \theta_2 + \theta_3) \quad \dots \dots \dots (\text{link 3})$$

Adding above x- component we get,

$$x = L_1 \cos \theta_1 + L_2 \cos (\theta_1 + \theta_2) + L_3 \cos (\theta_1 + \theta_2 + \theta_3) \quad \dots \dots (1)$$

Y - component : -

$$y = L_1 \sin \theta_1 \quad \dots \dots \dots (\text{link 1})$$

$$y = L_2 \sin (\theta_1 + \theta_2) \quad \dots \dots \dots (\text{link 2})$$

$$y = L_3 \sin (\theta_1 + \theta_2 + \theta_3) \quad \dots \dots \dots (\text{link 3})$$

Adding above y- component we get,

$$y = L_1 \sin \theta_1 + L_2 \sin (\theta_1 + \theta_2) + L_3 \sin (\theta_1 + \theta_2 + \theta_3) \quad \dots \dots (2)$$

$$\psi = \theta_1 + \theta_2 + \theta_3$$