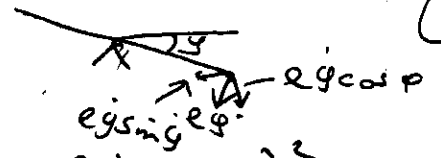


(3)



$$4) \quad T = \frac{1}{2} m l^2 \dot{\varphi}^2 + \frac{1}{2} m (-l \dot{\varphi} \sin \varphi + l \dot{\theta} \cos \theta)^2 + \frac{1}{2} m (l \dot{\varphi} \cos \varphi + l \dot{\theta} \sin \theta)^2$$

$$V = m g l \sin \varphi - m g l \sin \varphi - m g l \cos \theta = -m g l \cos \theta$$

$$\Rightarrow T = \frac{1}{2} m l^2 \dot{\varphi}^2 + \frac{1}{2} m l^2 \dot{\theta}^2 + \frac{1}{2} m l^2 \dot{\theta}^2 - m l \sin(\theta + \varphi) \dot{\theta} \dot{\varphi} = m l^2 \dot{\varphi}^2 + \frac{1}{2} m l^2 \dot{\theta}^2 - m l \dot{\theta} \dot{\varphi} \sin(\theta + \varphi)$$