

Prob (1) $m\ddot{x} = mg - S \cos \phi$
 $m\ddot{y} = -S \sin \phi$

10

(2) (i) at

$$m l \times [-\dot{\phi}^2 \cos \phi - \ddot{\phi} \sin \phi] = mg - S \cos \phi \quad \text{--- (1)}$$

$$m l \times (-\dot{\phi}^2 \sin \phi + \ddot{\phi} \cos \phi) = -S \sin \phi \quad \text{--- (2)}$$

at $\phi = 0$ $\Rightarrow \cos \phi = 1$ at

$$-m l \ddot{\phi} = mg \sin \phi$$

$$\therefore \ddot{\phi} = -\frac{g \sin \phi}{l}$$

10

at $\phi = 0$ $\Rightarrow \cos \phi = 1$ at

$$-m l \dot{\phi}^2 = mg \cos \phi - S$$

$$\therefore S = mg \cos \phi + m l \dot{\phi}^2$$