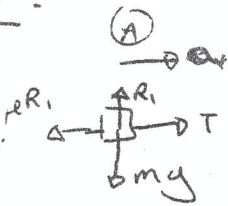


1990 Q4 :

(i)

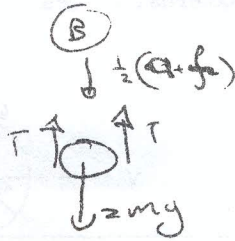
Acceler

forces:

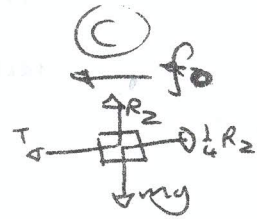


masses

m



2m



m

$$(ii) \sum F_y = \downarrow R_1 - mg = 0$$

$$\Leftrightarrow T - \mu R_1 = ma$$

$$\therefore T - \mu mg = ma \quad (1)$$

$$\begin{cases} 2T + 2mg = 2m \cdot \frac{1}{2}(a+f) \\ \Rightarrow -2T + 2mg = ma + mf \end{cases} \quad (2)$$

$$\begin{cases} \updownarrow R_2 - mg = 0 \\ \Leftrightarrow T - \frac{1}{4}R_2 = mf \\ \Rightarrow T - \frac{1}{4}mg = mf \end{cases} \quad (3)$$

Solve for T: $(2) - (1) - (3) \Rightarrow$

$$\begin{aligned} -2T + 2mg &= ma + mf \\ -T + \mu mg &= -ma \\ -T + \frac{1}{4}mg &= -mf \\ \hline -T + \left(\frac{9}{4} + \mu\right)mg &= 0 \\ \Rightarrow T &= \frac{mg}{4} \left(\frac{9}{4} + \mu\right) \end{aligned}$$

(iii) A will not move if $\mu R_1 > T$.

$$\Rightarrow \mu mg > \frac{mg}{4} \left(\frac{9}{4} + \mu\right)$$

$$\Rightarrow \mu > \frac{1}{4} \left(\frac{9}{4} + \mu\right)$$

$$\Rightarrow 16\mu > 9 + 4\mu$$

$$\Rightarrow 12\mu > 9$$

$$\Rightarrow \mu > \frac{3}{4}$$