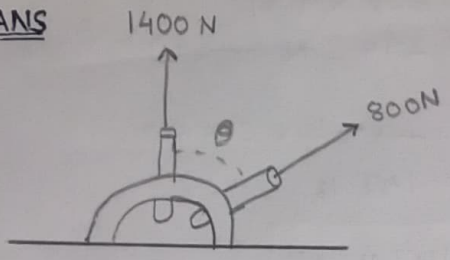
ANS



Resultant = 2000N

F_1 = 800 N

F_2 = 1400 N

θ = ?

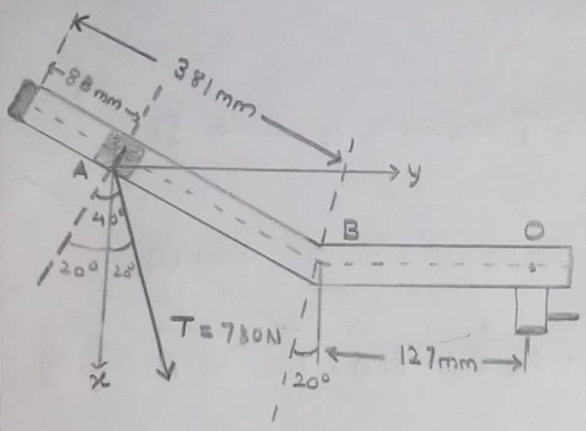
$$R = \sqrt{F_1^2 + F_2^2 + 2F_1F_2\cos\theta}$$

$$(2000)^2 = (800)^2 + (1400)^2 + 2(1400)(800)\cos\theta$$

$$\Rightarrow \cos\theta = 0.625$$

$$\boxed{\theta = 51.3178^\circ}$$

ANS



$$T = T\sin 20^\circ \hat{i} - T\cos 20^\circ \hat{j}$$

$$\boxed{T = 266.775\,\hat{i} - 732.960\,\hat{j}\ N}$$

Force at 'point A' and point B will be equal

Moment at 'B'

$$M_B = T\sin 50\,[0.381 - 0.83]$$

$$= 780\sin 50\,(0.298)$$

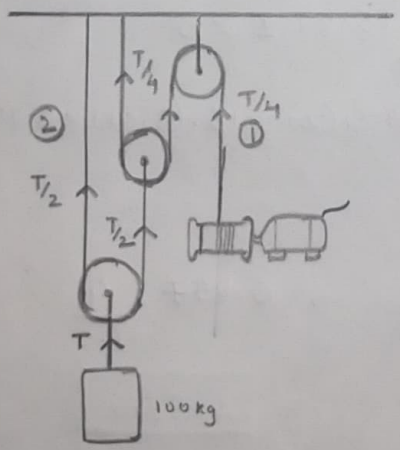
$$= \boxed{178.059\ N.m\ CCW}$$

Moment at 'O'

$$M_O = M_B + T\sin 50\,(0.127)$$

$$= \boxed{271.16\ N.m\ CCW}$$

ANS



The winch pulls the cable by 200 mm/s thus velocity is constant

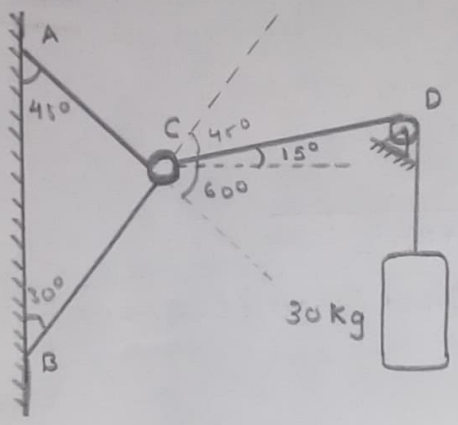
$\frac{dv}{dt} = 0$ thus acceleration is 'Zero'

$$T = 100 \times 9.81 = 981\ N$$

Tension in cable 1 is T/4

$$\Rightarrow \boxed{245.25\ N}$$

ANS



Tension in CD = $30\cancel{0} \times 9.81$

$T_{CD} = 294.3\ N \longrightarrow ①$

Tension in AC = $294.3 \cdot \cos 60°$

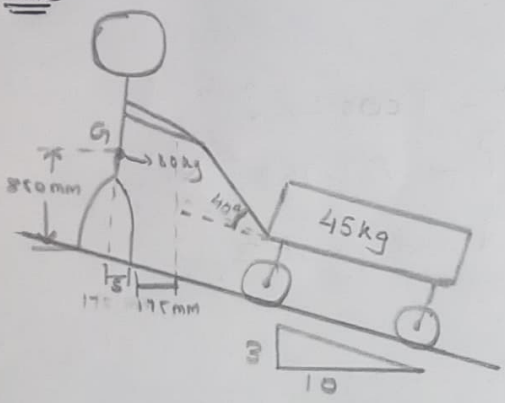
$= 147.15$

$$\boxed{T_{AC} = 147.15\ N}$$

Tension in BC = $294.3 \cdot \cos 45°$

$$\boxed{T_{BC} = 208.101\ N}$$

ANS



$\tan\theta = \frac{3}{10}$ $\quad \theta = 16.667°$

$\sum F_y = 0$

$N - 82\cos 16.67° - T\sin 40° = 0 \longrightarrow ①$

$\sum F_x = 0$

$82\sin 16.67° + T\cos 40° - F = 0 \longrightarrow ②$

$\sum M_c = 0$

$82 \cdot s - (175 \cdot T\sin 56.7°) - (850 \cdot T\cos 56.7°) \longrightarrow ③$

$\sum F_x = 0$

$45\sin 16.7° - T\cos 40° = 0$

$T = 16.84\ kg$

$F = 82\cos 16.67 + 16.84\cos 40°$

$= 91.45\ kg$

$N = 82\sin 16.667° + 16.84\cos 40°$

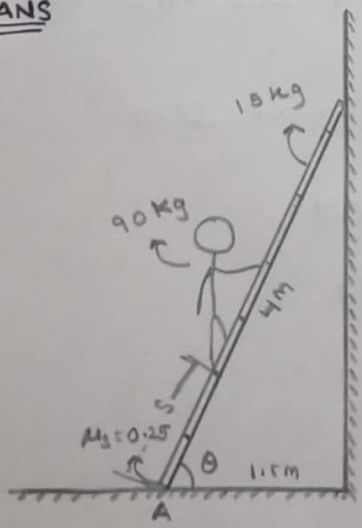
$= 36.41\ kg$

$\mu = \frac{N}{F} = \frac{36.41}{91.45} =$ $\boxed{\mu_s = 0.4094}$

$82 \cdot S = 16.84 \cdot 175 \cdot \sin 56.7° + 16.84 \cdot 850 \cdot \cos 56.7°$

$\boxed{S = 125.87\ mm}$

ANS



$\sum F_y = 0 \Rightarrow N_A - 90 \times 9.81 - 15 \times 9.81 = 0$

$N_A = 1030.05\ N$

$\rightarrow 0.25(N_A)(3.71) - N_A \cdot (1.5) + 90 \times 9.81(x) + 15 \cdot (9.81) \times 0.75 = 0$

$x = 0.543\ m$

$\Rightarrow d = 1.5 - x = 0.957\ m$

$\cos\theta = \frac{4}{1.5} \quad = \quad S = \frac{d}{\cos\theta} \Rightarrow 0.957 \cdot \frac{4}{1.5}$

$= \boxed{2.55\ m}$