Consider FBD of block 2

$\Sigma V = 0$

$N_2 - 88.2 = 0$

$N_2 = 88.2 N$

$F_2 = \mu_2 N_2 = \frac{1}{4} \times 88.2$

$= 22.05 N$

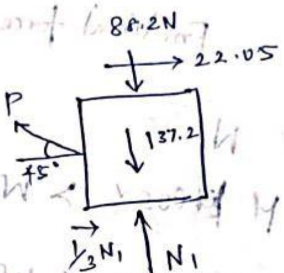
$\Sigma H = 0$

$T - (\mu_2 \cdot N_2) = 0$

$T - (\frac{1}{4} \times N_2) = 0$

$T = 0.25 N_2$

Consider FBD of block 1



$\Sigma H = 0$

$22.05 + (\frac{1}{3} N_1) - P\cos 45° = 0$

$P\cos 45° = 22.05 + 0.33333 N_1$

$\Sigma V = 0 \; (\uparrow +)$

$N_1 + P\sin 45° - 88.2 - 137.2 = 0$

$P\sin 45 = 225.4 - N_1$

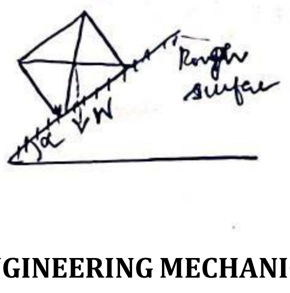
$\frac{②}{①} \Rightarrow \frac{P\sin 45°}{P\cos 45°} = \frac{225.4 - N_1}{22.05 + 0.333 N_1}$

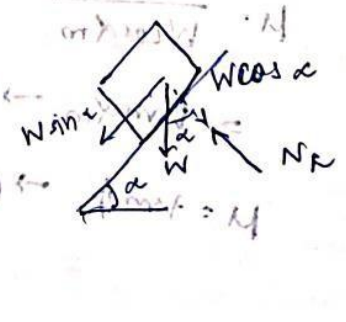
$\tan 45 = 1 = \frac{225.4 - N_1}{22.05 + 0.333 N_1}$

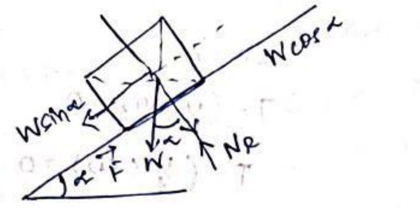
$\boxed{N_1 = 152.55 N}$

$\boxed{P = 103 N}$

Angle of Repose: ϕ







Normal reaction $N_R = W\cos\alpha$

Frictional force $F = \mu N_R$
$= \mu W\cos\alpha$

when $\mu W\cos\alpha > W\sin\alpha \rightarrow$ Block is at rest

$\mu W\cos\alpha < W\sin\alpha$, the impending downwards motion takes place.

When the angle of plane with horizontal α, is increased, and sliding takes place $W\sin\alpha$ will be more than $\mu W\cos\alpha$

⇒ "The angle of the inclined plane, at which the body tends to slide down, known as angle of repose. denoted by α_m.

$\mu W\cos\alpha_m \leq W\sin\alpha_m$

$\mu W\cos\alpha_m = W\sin\alpha_m$

$$\mu = \frac{W\sin\alpha_m}{W\cos\alpha_m}$$

$= \tan\alpha_m \rightarrow (1)$

$\phi \Rightarrow$ angle of static friction.

$\mu = \tan\phi \rightarrow (2)$.