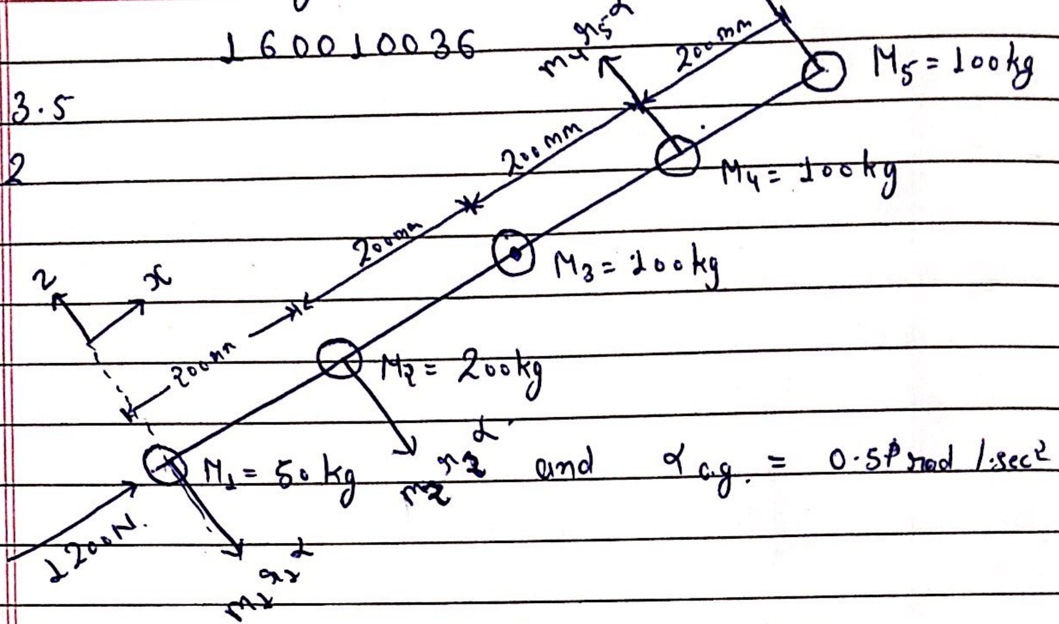
Assignment No. 1.

16001003 6

$n_z = 3.5$

$n_x = 2$



and $\alpha_{c.g.} = 0.5$ rad / sec²

First we will find the c.g. point i.e.

$$x_{cg} = \frac{50 \times 0 + 200 \times .2 + 100 \times .4 + 100 \times .6 + 100 \times .8}{50 + 200 + 100 + 100 + 100}$$

$x_{c.g} = 0.4\ m$ = 400 mm

and similarly

$z_{c.g} = 0.$

Now for part. ⓐ

★★ for m_1 Forces in z direction

$n_z W = 3.5 \times 10 \times 50 = 1750 N.$

$n_x W = 2 \times 10 \times 50 = 1000 N.$

Because of I. $m_1 r_1 \alpha_1 = 50 \times .4 \times 0.75 =$ 15N

So. $\sum F_z = 1235 N.$

and. forces in x direction is.

So

ⓐ $W_{net} = \sqrt{F_z^2 + F_x^2}$

$= 1590 N.$

★★ Similarly for m_2.

$n_z W_2 = 3.5 \times 200 \times 10 = 7000 N$

$n_x W_2 = 2 \times 200 \times 10 = 4000 N$

$M_2 r_2 \alpha_2 = 200 \times .2 \times 0.75 = 30 N.$

PAGE No.
DATE / /

$\Sigma F_2 = 4970\ N.$

So

$$W_{net,app} = \sqrt{F_2^2 + F_x^2}$$
$$= 6380\ N.$$

Similarly for m_3.

$m_2 W = 3.5 \times 100 \times 10 = 3500\ N.$

$m_x W = 2 \times 100 \times 10 = 2000\ N$

$m_3 r_3 \alpha = [illegible] \times 0.$

$\Sigma F_2 = 2500\ N$

So

$$W_{app,net} = \sqrt{F_2^2 + F_x^2}$$
$$= 3201\ N.$$

Similarly for m_4

$m_2 W_2 = 3.5 \times 1000 \times 10 = 3500\ N.$

$m_x W_x = 2 \times 1000 \times 10 = 2000\ N.$

$m_4 r_4 \alpha = 100 \times 0.2 \times 0.75 = 15$

$\Sigma F_2 = 2515$

So

$$W_{app,net} = \sqrt{F_2^2 + F_x^2}$$
$$= 3213\ N.$$

Similarly for m_5

$m_2 W = 3.5 \times 10 \times 100 = 3500\ N$

$m_x W = 2 \times 10 \times 100 = 2000\ N$

$m_5 \alpha r_5 = 100 \times 4 \times 0.75 = [illegible] 30\ N$

$\Sigma F_2 = 1530\ N.$

So

$W_{app.net} = 2518\ N.$

PAGE No.
DATE / /

[b] We have to find Bending moment at centre of gravity

$$\tau_{net} = \Sigma F_i x_i$$

+↑ $\tau_{net} = 1590 \times 0.4 + 6380 \times 0.2 + 250 \times 0 - 3213 \times 0.2 - 2518 \times 0.2$

$= 636 + 1276 - 642.6 - 503.6$

$\Rightarrow$ $\boxed{\tau_{net.c.g} = 765.8 \text{ N-m}}$