Section - 1

Q2 Given

$PF = DF = 300\,mm$

$BF = 80\,mm$

$m = 10\,kg$

$M = 100\,kg$

$r_1 = 150\,mm$

$r_2 = 200\,mm$

Let N_1 = minimum speed when radius of rotation, $r_1 = Fh = 150\,mm$

N_2 = maximum speed when radius of rotation $r_2 = Fh = 200\,mm$

$$h_1 = Ph\sqrt{(PP)^2 - (Fh)^2}$$

$$= \sqrt{(300)^2 - (150)^2}$$

$$= 260\,mm = 0.26\,m$$

$FM = LD = Ph = 260\,mm = 0.26\,m$

$BM = BF + FM = 80 + 260 = 340\,mm$

$= 0.34\,m$

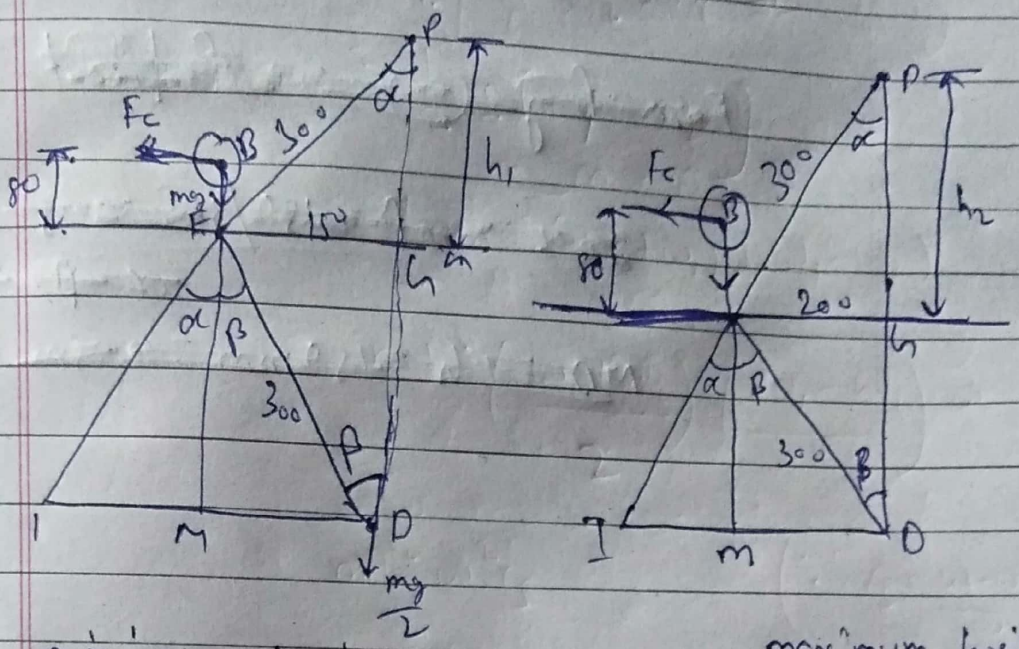
We know that

$$(N_1)^2 = \frac{FM}{BM}\left(\frac{M+m}{m}\right)\frac{895}{h_1}$$

$$= \frac{0.26}{0.34}\left(\frac{10+100}{10}\right)\frac{895}{0.26}$$

$= 28956$

or $N_1 = 170$ rpm



minimum position

maximum position

$$h_2 = PG = \sqrt{(PF)^2 - (FG)^2}$$

$$= \sqrt{(300)^2 - (200)^2}$$

$$= 224 \text{ mm} = 0.224 \text{ m}$$

$FM = GD = PG = 224 \text{ mm} = 0.224 \text{ m}$

$BM = BF + FM = 80 + 224 = 304 \text{ mm}$

$= 0.304 \text{ m}$

We know that $(N_2)^2 = \frac{FM}{BM}\left(\frac{m+M}{m}\right)\frac{895}{h_2}$

$\because \alpha = \beta$ or $\ell = 1$

$$N_2^2 = \frac{0.224}{0.304}\left(\frac{10+100}{10}\right)\frac{895}{0.224} = 32385$$

Shiva
Date
Page

$N_2 = 180$ r.p.m

We know that range of speed

$= N_2 - N_1 = 180 - 170 = 10$ r.p.m

Ans

~~From fig (a) we find that~~