Section - 2

Q.2 Function of governor:-

1. The function of a governor is to regulate the mean speed of an engine when there are variation in the load e.g. When the load on an engine increase its speed decrease, therefore it become necessary to increase the supply of working fluid

2. On the other hand when the load on the engine decrease its speed increase and thus less working fluid is required.

3. The governor automatically controls the supply of working fluid to the engine with the varying load condition and keeps the means speed within certain limits.

expression

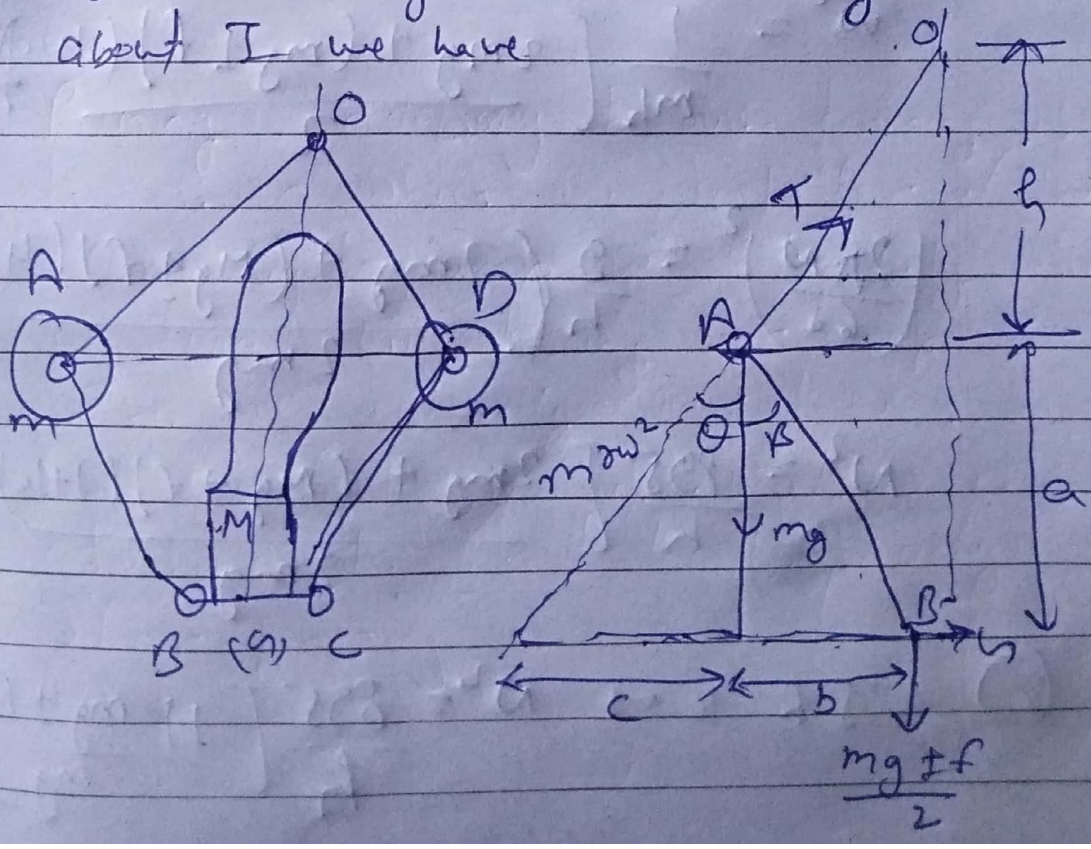
Let M - mass of sleeve
m - mass of each ball
f - force of friction at the sleeve
h - ~~Sleeve~~ height of the governor
r - distance of the centre of each ball from axis of rotation

2. When motion of sleeve is in upword direction friction force will act in downword direction and vice-versa.

3. For Upword motion of sleeve the downword force acting on the sleev is $(Mg+f)$ and for downward motion of sleev, the downword force acting on the sleeve is $(Mg-f)$.

4. We find an Instantaneous Center I lies at the point of Intersection of OA Produced and a line through C perpendicular to Spindle axis as show.

6. Considering the equilibrium of the left half of the governor and taking moment about I we have



$$mr\omega^2 a = mgc + \left(\frac{Mg \pm f}{2}\right)(c+b)$$

or $$mr\omega^2 = mg\frac{c}{a} + \left(\frac{Mg \pm f}{2}\right)\left(\frac{c}{a} + \frac{b}{a}\right)$$

$$= mg\tan\theta + \left(\frac{Mg \pm f}{2}\right)(\tan\theta + \tan\beta)$$

$$\left(\because \text{From fig } \tan\theta = c/a \quad \tan\beta = b/a\right)$$

$$= \tan\theta\left[mg + \frac{Mg \pm f}{2}(1+k)\right]$$

$$\left[\text{Let } x = \frac{\tan\beta}{\tan\theta}\right]$$

$$= \frac{x}{h}\left[mg \pm \frac{Mg \pm f}{2}(1+k)\right]$$

$$\omega^2 = \frac{1}{mh}\left[\frac{2mg + (mg \pm f)(1+k)}{2}\right]$$

$$\left(\frac{2\pi N}{60}\right)^2 = \frac{g}{h}\left[\frac{2mg + (Mg \pm f)(1+k)}{2mg}\right]$$

$$N^2 = \frac{895}{h}\left[\frac{2mg + (Mg \pm f)(1+k)}{2mg}\right]$$

(8) If $k = 1$ $N^2 = \frac{855}{h}\left(1 + \frac{mg \pm f}{mg}\right)$

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If $f=0$ $\quad N^2 = \frac{8\pi^5}{h}\left[1+\frac{M}{2m}(1+k)\right]$

If $f\neq 0$, $k=1$

$$N^2 = \frac{8\pi^5}{h}\left[\frac{4m+M}{m}\right]$$