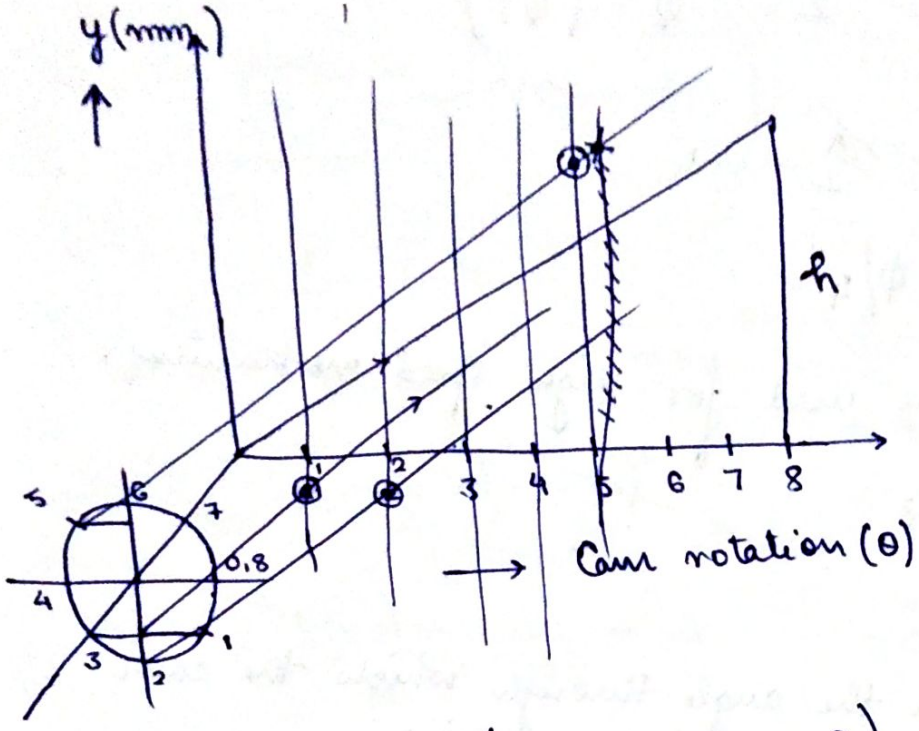
Displacement Diagram -

→ Cycloidal Motion -



Input -

→ Lift of the follower (h).

→ Max^{m}. cam rotation due with cycloidal motion occurs (ϕ).

$8\text{ cm} = \phi$

$1\text{ cm} = \frac{\phi}{8}$

$h = 2\pi r$

$r = \frac{h}{2\pi}$

$$y = \frac{h}{\pi}\left(\frac{\pi\theta}{\phi} - \frac{1}{2}\sin\frac{2\pi\theta}{\phi}\right)$$

$$\theta = \omega t \quad [0 \le \theta \le \phi]$$

$$\frac{dy}{dt} = \frac{dy}{d\theta}\cdot\frac{d\theta}{dt}$$

$$= \frac{h}{\pi}\left(\frac{\pi}{\phi} - \frac{1}{2}\cos\frac{2\pi\theta}{\phi}\cdot\frac{2\pi}{\phi}\right)\cdot\omega$$

For max^{m} velocity

$$\cos\frac{2\pi\theta}{\phi} = -1$$

$$\frac{2\pi\theta}{\phi} = \pi$$

$$\theta = \phi/2$$

$$V_{max.} = \frac{h}{\pi}\left(\frac{\pi}{\phi} + \frac{\pi}{\phi}\right)\omega$$

$$= \frac{2\pi}{\phi}\cdot\frac{h}{\pi}\cdot\omega$$

$$V_{max.} = 2h\omega/\phi$$

$$\frac{dv}{dt} = \frac{dv}{d\theta} \times \frac{d\theta}{dt}$$

$$= \frac{h}{\pi}\left(0 + \frac{1}{2}\sin\frac{2\pi\theta}{\phi}\left(\frac{2\pi}{\phi}\right)^2\right)\omega^2$$

$$\Rightarrow \frac{2\pi\theta}{\phi} = \frac{\pi}{2}$$

$$\theta = \phi/4$$

→ Cycloidal motion is used for high speed mechanism.

Eg. 7.1, 7.2, 7.3

~~Imp terms~~ -

→ Angle of asset - It is the angle through which the cam turns during the time the follower rises.

→ Angle of descent - It is the angle through which the cam turns during the time the follower return to the initial position.

→ Angle of dwell - It is the angle which cam turns when the follower remains stationary at to maximum or minimum position.

→ Base circle - It is the smallest circle tangent to the cam profile drawn from centre of rotation of a radial cam.

→ Trace point - It is the reference point on the follower to trace the cam profile.