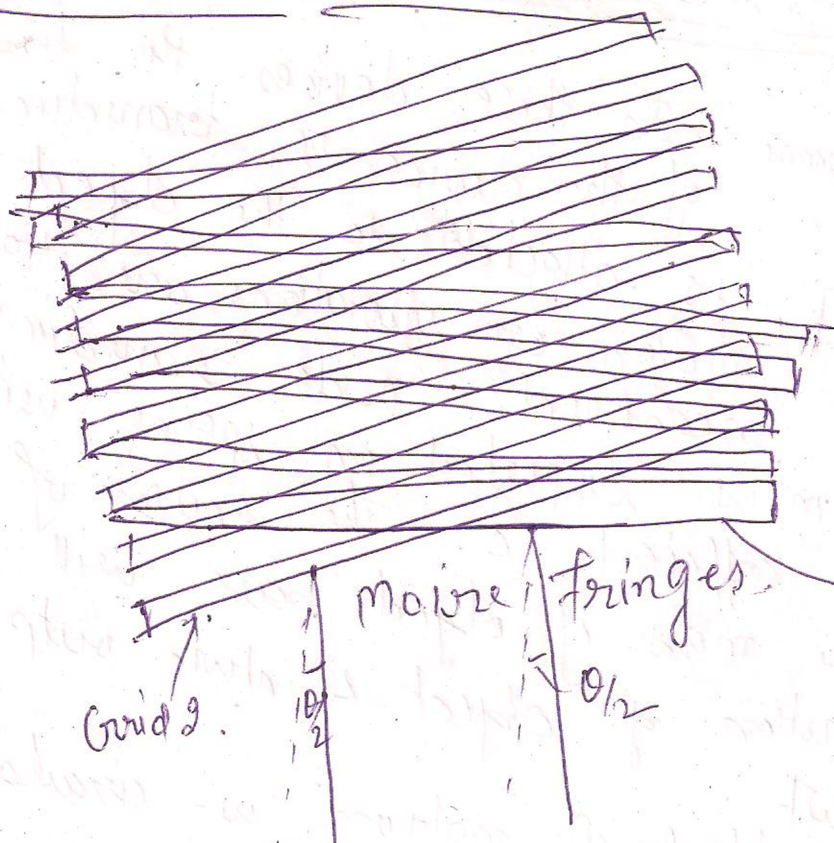
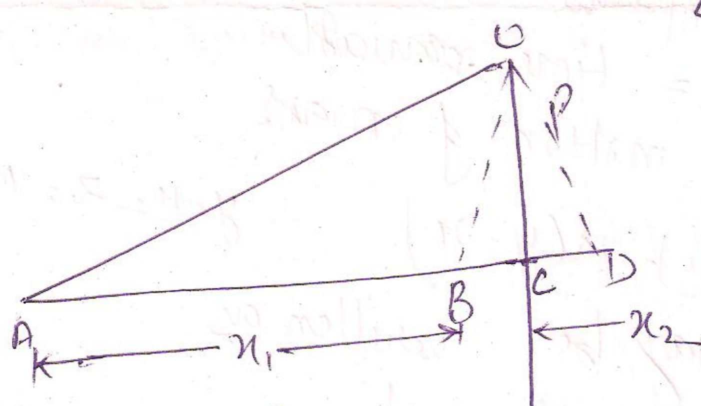
Unit - 5

* Moire Fringe Method :-





∠BOC & ∠COD are congurant having three equal angles and one side common

$OB = OD = P$

Gri fringe spacing $AC = x_1 + x_2$

$$= \frac{OB}{\tan\theta} + OB \cdot \tan\frac{\theta}{2}$$

$$= \frac{P}{\tan\theta} + P \cdot \tan\frac{\theta}{2}$$

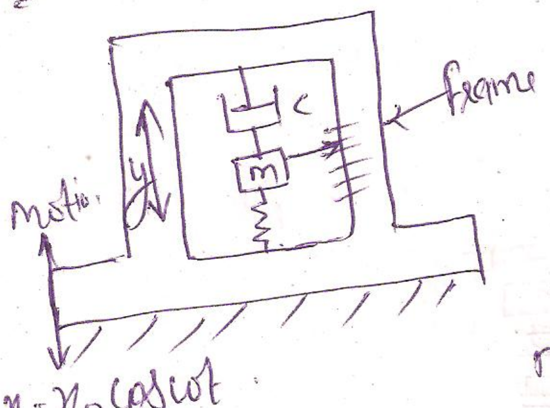
$$= P\left[\frac{\cos\theta}{\sin\theta} + \frac{1-\cos\theta}{\sin\theta}\right]$$

Spacing of fringe $= \dfrac{P}{\sin\theta}$

As θ is very small

∴ fringe spacing >> p.

* Absolute motion or vibration Devices :-



In these devices the box of the device or transducer is attached to the object whose motion or vibrations are to be measured. Inside transducer a mass m is supported on spring with damper of cofficient c. The motion of mass relative to the ~~mass of object~~ base will give indication of motion of object & inturn output also.

Let $x = x_0 \cos\omega t$

where x_0 = Amplitude of motion. ω = circular frequency ($\omega = 2\pi f$) t = time variable

∴ Equation of motion of mass

$$m\ddot{y} = -c(\dot{y} - \dot{x}) - K(y - x) \qquad y - x = z = \text{motion relative to frame}$$

The equation may be written as

$$m\ddot{z} + c\dot{z} + Kz = m\omega^2 x_0 \cos\omega t$$

For steady state value

$$z = z_0 \cos(\omega t - \psi)$$

Amplitude $$z_0 = \frac{m\omega^2 x_0}{\sqrt{(K - m\omega^2)^2 + (c\omega)^2}}$$

Amplitude Ratio $$\frac{z_0}{x_0} = \frac{r^2}{\sqrt{(1 - r^2)^2 + (2\xi r)^2}}$$