the equation we written as

$x - y = n$.

y being absolute motion of mass

$K_1 I + m\ddot{y} + c\dot{y} = 0$

K_1 = actuator constant $I = K_2 Z$, K_2 Transducer constant

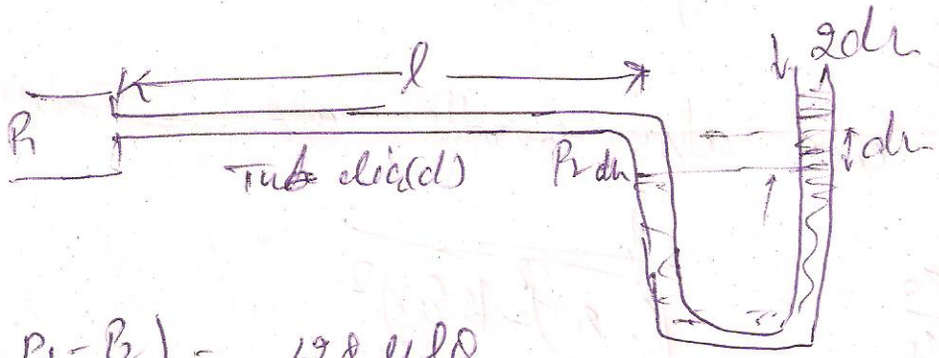
~~$K_1 I + mD^2$~~ $I = -\dfrac{mD^2(Z+n) - cDZ}{K_1}$

output $E_0 = IR$.

$(mD^2 + cD + K_1K_2) E_0 = -$ ~~K_1~~ mK_2RD^2n

(Unit- 6)

* Effect of tubing connecting on measurement



$(P_1 - P_2) = \dfrac{128 \mu l Q}{\pi d^4}$

$Q = \dfrac{\pi d^4 (P_1 - P_2)}{128 \mu l}$ — (1)

$\dfrac{P dv}{dt} + \dfrac{v dP}{dt}$ — (2)

$dv = A dh$.

$2dh = \dfrac{dP_2}{\rho g}$ & $dh = \dfrac{dP_2}{2\rho g}$.

$\dfrac{dv}{dt} = \dfrac{A}{2\rho g} \dfrac{dP_2}{dt}$ — (3)

further increase in pressure

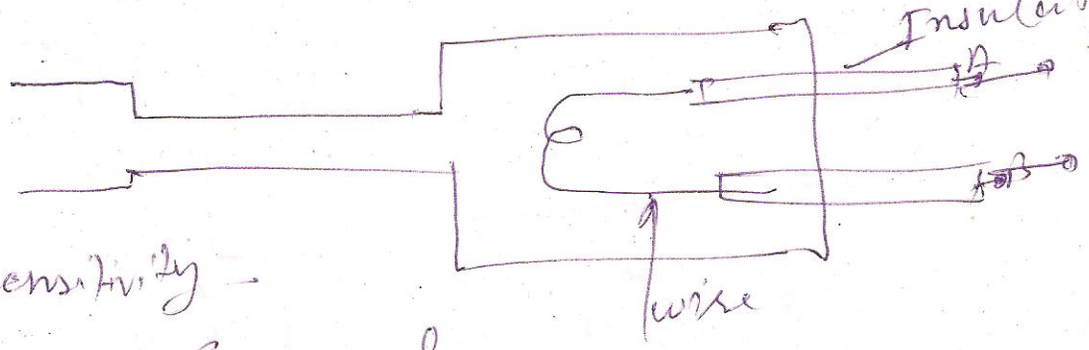
$\dfrac{dP}{dt} = \dfrac{P}{P_2} \dfrac{dP_2}{dt}$ — (4)

from eqn ① & ② and substitute ③ & ④. ⑤

$$\therefore \tau \frac{dP_2}{dt} + P_2 = q,$$

$$\tau = \frac{128 \mu l}{\pi d^4} \left(\frac{A}{\rho g} + \frac{V}{P_2} \right)$$

* High Pressure measurement :-



for sensitivity -

$$R = \frac{4\rho l}{\pi d^2}$$

$$\frac{dR}{R} = \frac{dl}{L} - \frac{2dD}{D} + \frac{d\rho}{\rho}$$

Relation b/w three strains $\epsilon_x, \epsilon_y, \epsilon_z$ in three l dirn. in terms of σ_x, σ_y & σ_z.

$$\epsilon_x = \frac{1}{E}\left[\sigma_x - \nu(\sigma_y + \sigma_z)\right]$$

$$\epsilon_y = \frac{1}{E}\left[\sigma_y - \nu(\sigma_x + \sigma_z)\right]$$

$$\epsilon_z = \frac{1}{E}\left[\sigma_z - \nu(\sigma_x + \sigma_y)\right]$$

ν - poisson's Ratio, E = Young's modulus of ela

If $\sigma_x = \sigma_y = -P$, $\sigma_z = 0$

$$\therefore \epsilon_a = \epsilon_y = -\frac{P}{E}(1-\nu) = \frac{dD}{D}.$$

$$\epsilon_z = \frac{2\nu P}{E} = \frac{dl}{L}$$

$$\therefore \frac{dR}{R} = \frac{2\nu P}{E} + \frac{2P}{E}(1-\nu) + \frac{dP}{P}$$

$$= \frac{2P}{E} + \frac{dP}{P}$$