WEST DA-ORIGIM ASIEMIEA.
16/ENC061074
MECH ENG

1 The Power P dessipated in a resistor is given by $P = \mathcal{E}^2/R$ If $\mathcal{E} = 200$ volts and $R = 8$ ohms, find the change in P, resulting from a drop of 5 volts in $\mathcal{E}$ and an increase of 0.2 ohms in R.

AND.

$$\delta P = \frac{\partial P}{\partial \mathcal{E}} \delta\mathcal{E} + \frac{\partial P}{\partial R} \delta R$$

$$P = \mathcal{E}^2 R^{-1} \qquad \frac{\partial P}{\partial I} = \frac{-\mathcal{E}^2}{A^2}$$

$$\frac{\partial P}{\partial I} = 2\mathcal{E} R^{-1}$$

$$= 2\mathcal{E}/R$$

$R = 8, \quad \mathcal{E} = 200, \quad \delta R = 0.2, \quad \delta\mathcal{E} = -5$

$$\delta P = \frac{(2)(200)(-5)}{8} - \frac{(200)^2 (0.2)}{8^2}$$

$$= -250 - 125$$

$$= -375 \text{ W}$$

hence power decreases by 375 watts.

Calculate the approximate percentage change in y if w increase by 3 percent, d is increase by 2% percent and t is increase by 4 per cent.

Ans

$$\delta y = \pm\left(\frac{dy}{dw}\delta w + \frac{dy}{dd}\delta d + \frac{dy}{dt}\delta t\right)$$

$$\frac{dy}{dw} = \frac{d^4}{t^3}, \quad \frac{dy}{dd} = \frac{4wd^3}{t^3}, \quad \frac{dy}{dt} = \frac{-3wd^4}{t^4}$$

$$\delta w = \frac{3w}{100}, \quad \delta d = \frac{2d}{200}, \quad \delta t = \frac{4t}{100}$$

$$\delta y = \left(\frac{kd^4}{t^3}\left(\frac{3w}{100}\right) + \frac{4wd^3}{t^3}\left(\frac{2d}{200}\right) - \frac{kwd^4}{t^4}\left(\frac{4t}{100}\right)\right)$$

$$\delta y = \frac{3kwd^4}{100t^3} + \frac{200wd^4k}{200t^3} - \frac{kwd^4}{100t^3}$$

$$\delta y = \frac{1}{100}\left(\frac{3kwd^4}{t^3} + \frac{10kwd^4}{t^3} - \frac{12kwd^4}{t^3}\right)$$

$$\delta y = \frac{1}{100}(uy)$$

$$\delta y = \frac{1}{100}y$$