Usman [illegible]

mechanical [illegible]

16[illegible]

Assignment

1) $P = E^2/R$

$E = 200V$, $R = 8\,\Omega$, $\partial E/\partial t = -5V$, $\partial R = 0.2$

$$\frac{\partial P}{\partial t} = \frac{\partial P}{\partial E}\frac{\partial E}{\partial t} + \frac{\partial P}{\partial R}\cdot\frac{\partial R}{\partial t}$$

$$\frac{\partial P}{\partial E} = \frac{2E}{R}, \quad \frac{\partial P}{\partial R} = \frac{-E^2}{R^2}$$

$$\therefore \frac{\partial P}{\partial t} = \frac{2E}{R}\cdot\frac{\partial E}{\partial t} + \left(\frac{-E^2}{R^2}\right)\frac{\partial R}{\partial t}$$

$$= \frac{2\times 200\times(-5)}{8} - \left[\frac{200^2}{8^2}\times 0.2\right.$$

$$= -250 - 125$$

$$\partial P = -375W$$

2) $y = \dfrac{k\,w d^4}{t^3}$ $\partial w = 3\%$, $\partial d = 2\tfrac{1}{2}\%$, $\partial t = 4\%$

$$\partial y = \frac{\partial y}{\partial w}\partial w + \frac{\partial y}{\partial d}\cdot\partial d + \frac{\partial y}{\partial t}\cdot\partial t \Rightarrow \frac{kd^4}{t^3}\partial w$$

$$= \frac{kd^4}{t^3}(3w\%) + \frac{4k\,wd^3}{t^3}\left(\frac{5d\%}{2}\right) - \frac{3kwd^4}{t^4}(4t\%)$$

$$= \frac{3}{100}\frac{kwd^4}{t^3} + \frac{10}{100}\frac{kwd^4}{t^3} - \frac{12kwd^4}{100t^3}$$

$$\Rightarrow \frac{kwd^4}{t^3}\left(\frac{3}{100} + \frac{10}{100} - \frac{12}{100}\right)$$

$$= \frac{1}{100}\frac{kwd^4}{t^3} = 1\%y$$