Iwuntabdulla teef
16/ENG03/0053
Civil Engineering
ENG 281

1 $P = \frac{E^2}{R}$

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

$\frac{\partial P}{\partial E} = \frac{2E}{R}$

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

$\delta E = -5$ volts

$\delta R = 0.2$ ohm

$E = 200$ volts

$R = 8$ ohms

$\delta P = \left[\frac{2E}{R} \times -5\right] + \left[\frac{-E^2}{R^2}\right] \times 0.2$

$\delta P = \left[\frac{2 \times 200}{8} \times -5\right] + \left[\frac{-200^2}{8^2} \times 0.2\right]$

$\delta P = \left[\frac{400}{8} \times -5\right] + \left[\frac{40000}{64} \times \frac{2}{10}\right]$

$\delta P = (50 \times -5) + (62.5 \times 2)$

$\delta P = -250 + 125$

$\delta P = -125$ watts

2 $y = \frac{kwd^4}{t^3}$

$$\delta y = \frac{\partial y}{\partial w}\delta w + \frac{\partial y}{\partial d}\delta d + \frac{\partial y}{\partial t}\delta t$$

$$\frac{\partial y}{\partial w} = \frac{kd^4}{t^3}$$

$$\frac{\partial y}{\partial t} = \frac{-3kwd^4}{t^4}$$

$$\partial w = \frac{3}{100} \times w = \frac{3w}{100}$$

$$\partial d = \frac{5}{200} \times d = \frac{5d}{200}$$

$$\delta t = 4/100 \times t = \frac{4t}{100}$$

$$\delta y = \left[\frac{kd^4}{t^3} \times \frac{3w}{100}\right] + \left[\frac{4kwd^3}{t^3} \times \frac{5d}{200}\right] + \left[\frac{-3kwd^4}{t^4} \times \frac{4t}{100}\right]$$

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

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

$$\delta y = \frac{kwd^4}{t^3}\left[\frac{1}{100}\right]$$

$$\delta y = y\left[\frac{1}{100}\right]$$

δy = 1% increase of y