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16/MHS01/021
Computer Engineering
ENG 2818

1) $P = \frac{I^2}{R}$

$E = 200V \quad R = 8\Omega$
$\Delta E = -5V \quad \Delta R = 0.2\Omega$

$$\Delta P = \frac{dP}{dE} \cdot \Delta E + \frac{dP}{dR} \cdot \Delta R$$

$$\frac{dP}{dE} = \frac{2E}{R} \qquad \frac{dP}{dR} = \frac{-E^2}{R^2}$$

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

$\Delta P = -250 - 125$
$\Delta P = -375W$
Change in P is $-375W$

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

$$\Delta w = \frac{3}{100} w \qquad \Delta d = \frac{2 \cdot 5}{100} d$$

$$\Delta t = \frac{4}{100} t$$

$$\frac{dy}{dw} = \frac{Kd^4}{t^3} \qquad \frac{dy}{dt} = \frac{4Kwd^3}{t^3} \qquad \frac{dy}{dt} = \frac{-3Kwd^4}{t^4}$$

$$\Delta y = \frac{dy}{dw} \cdot \Delta w + \frac{dy}{dd} \cdot \Delta d + \frac{dy}{dt} \cdot \Delta t$$

$$\Delta y = \frac{Kd^4}{t^3} \cdot \frac{3}{100} w + \frac{4Kwd^3}{t^3} \cdot \frac{2.5}{100} d = \frac{3.1Kwd^4}{t^3} \cdot \frac{4}{100}$$

$$\Delta y = \frac{Kwd^4}{t^3} \cdot \frac{3}{100} + \frac{10Kwd^4}{t^3} \cdot \frac{2.54}{100} - \frac{1Kwd^4}{t^3} \cdot \frac{12}{100}$$

$$\Delta y = \frac{Kwd^4}{t^3}\left(\frac{03}{100} + \frac{10}{100} - \frac{12}{100}\right)$$

$$\Delta y = \frac{Kwd^4}{t^3}\left(\frac{1}{100}\right)$$

$$y = \frac{Kwd^4}{t^3}$$

$$\therefore \Delta y = \frac{1}{100} y$$

$$= 1\% y$$

change in $y = \pm 1\%$