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ELECTRICAL/ELECTRONICS ENGINEERING
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1. $P = \frac{E^2}{R}$

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

$E = 200$ Volts $\quad \delta P = ?$ $\quad \delta E = -5$ Volts

$R = 8$ ohms $\quad \delta R = \pm 0.2$

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

$$= -E^2 R^{-2}$$

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

$$\delta P = \frac{2E}{R} \cdot \delta E + \frac{-E^2}{R^2} \cdot \delta R$$

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

$\delta P = -250 + (-125)$

$\delta P = -375$

$\delta P = -375$ Watts

δP = A drop of 375 Watts

P decrease by 375 Watts

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

$$\delta Y = \frac{\delta Y}{\delta w} \cdot \delta w + \frac{\delta Y}{\delta d} \cdot \delta d + \frac{\delta Y}{\delta t} \cdot \delta t$$

$$\delta w = \frac{\pm 3}{100} w$$

$$\delta t = \frac{+4}{100} t$$

$$\delta d = \frac{+2.5}{100} d$$

$$\frac{\delta Y}{\delta w} = \frac{kd^4}{t^3} \qquad \frac{\delta Y}{\delta d} = \frac{4kwd^3}{t^3}$$

$$\frac{\delta Y}{\delta t} = \frac{-3kwd^4}{t^4}$$

$$\delta Y = \left\{\frac{kd^4}{t^3} \cdot \frac{3}{100} w\right\} + \left\{\frac{4kwd^3}{t^3} \cdot \frac{2.5}{100} d\right\}$$

$$+ \left\{\frac{-3kwd^4}{t^4} \times \frac{+4.0}{100} t\right\}$$

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

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

$\delta Y = 1\%$; Y Increased by 1%

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