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① The power P displaced in a resistor is given as in equation 1

$$P = \frac{\varepsilon^2}{R} \quad -①$$

If E = 200 volts, R = 8 ohms find the change in power resulting from a drop of 5 volts in ε and an increase of 0.2 ohm in R

$$P = f(E, R)$$

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

$$\frac{\partial P}{\partial t} = \frac{1}{R} = \frac{1}{\partial} \quad \text{and} \quad \frac{\partial P}{\partial R} = -\varepsilon^2 R^{-2} = \frac{-\varepsilon^2}{R^2}$$

$$-\varepsilon^2 R^{-2} = \frac{-\varepsilon^2}{R^2} = \frac{(200)^2}{(8)^2} = \frac{40000}{64} = 625$$

$$\frac{\partial P^2}{\partial \varepsilon} = \left[\frac{2\varepsilon}{R} \cdot \partial\varepsilon\right] + \left[\frac{-\varepsilon^2}{R^2}\right] \cdot \partial R$$

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

$$= -250 + -125$$

$$= -375 //$$

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② The deflection y at the centre plate suspended at the edge and uniformly loaded is given in equation 2

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

w = total load, d = diameter of plate
t = thickness & k is constant

Calculate the approximate percentage in y if w is increased by 3 percent, d is increased by $2\frac{1}{2}$ percent and t is increased by 4 percent

$$y = kwd^4$$

$$\frac{dy}{dw} = \frac{kd^4}{t^3}, \quad \frac{dy}{\partial d} = \frac{4kwd^3}{t^3}, \quad \frac{\partial y}{\partial t} = \frac{-3kwd^4}{t^4}$$

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

$$\partial y = \left[\frac{kd^4}{t^3} \times \frac{3}{100} w\right] + \left[\frac{4kwd^3}{t^3} \times \frac{2.5d}{100}\right] + \left[\frac{-3kwd^4}{t^4} \times \frac{4t}{100}\right]$$

$$\partial y = \frac{kwd^4}{t^3}\left[\frac{3}{100} + \frac{10}{100} + \frac{-12}{100}\right] + \left[\frac{3}{100} + \frac{16}{100} - \frac{12}{100}\right]$$

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

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

$\partial y = 1\%$