Name: Ademilua Ojimkansola Oluwatunmilola.
Matric No: 16/ENG04/005.
Department: Electrical Engineering.
Level: 200.
Course: ENG 281

1. The power P dissipated in a resistor is given as a Equation 1

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

If E = 200 Volts and R = 8 ohms, find the change in P resulting from a drop of 5 volts.

Solution.

$$dp = \frac{\partial p}{\partial E} \partial E + \frac{\partial p}{\partial p_1} \partial p_1$$

E = 200V R = 8Ω ∂p = P E drop = 5V, Increase = 0.2Ω

$$\frac{\partial p}{\partial E} = \frac{2E}{R} \quad \frac{\partial P_0}{\partial p_1} = -E^2 R^{-2} = \frac{-E^2}{R^2}$$

$$\partial E = -5V \quad \partial R = \pm 0.2\Omega$$

$$dp = \left(\frac{2E}{R_1}\right)(-5V) + \left(\frac{-E^2}{R_2}\right)(\pm 0.2\Omega)$$

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

$$dp = -250 + (-125)$$

$$dp = -375 \text{ Watts}$$

∴ p decrease by 375 Watts.

2. The deflection y at the centre of a circular plate suspended at the edge and uniformly loaded is given in Equation (2).

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

where w = total load, d = diameter of plate, t = thickness and k is a constant.
Calculate the approximate percentage in y if w is increased by 3 per cent, d is increased by 2½ per cent and t is increased by 4 per cent.

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

$w = \pm 3\%$ $d = 2\frac{1}{2}\% \simeq 5/2\%$ $t = 4\%$.

$$\frac{dy}{dw}dw \pm \frac{dy}{dd}dd \pm \frac{dy}{dt}dt.$$

$$\frac{dy}{dw} = \frac{kd^4}{t^3}, \quad \frac{dy}{dd} = \frac{4kwd^3}{t^3}, \quad \frac{dy}{dt} = -\frac{3kwd^4}{t^4}$$

$$dw = \frac{3}{100}\text{ of } w \quad dd = \frac{5/2}{100}\text{ of } d \quad dt = \frac{4}{100}\text{ of } t$$

$$dy = \left(\frac{kd^4}{t^3}\right)\left(\frac{3w}{100}\right) \pm \left(\frac{4kwd^3}{t^3}\right)\left(\frac{5/2\,d}{100}\right) \pm \left(\frac{-3wd^4}{t^4}\right)\left(\frac{4t}{100}\right)$$

$$dy = \left[\frac{3wkd^4}{100t^3} + \frac{20kwd^4}{200t^3} - \frac{12kwd^4}{100t^3}\right]$$

$$dy = \frac{kwd^4}{t^3}\left[\frac{3}{100} + \frac{20}{200} - \frac{12}{100}\right]$$

$$\frac{kwd^4}{t^3}\left[\frac{6 + 20 - 24}{200}\right]$$

$$\frac{kwd^4}{t^3}\left[\frac{2}{200}\right]$$

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

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

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

Therefore y Increases by 1 percent (1%).