EMMANUEL BEMSEN UKURA
MECHANICAL ENGINEERING
16/ENG06/1070

ENG281

① $P = \frac{E^2}{R}$ given $E = 200v$, $R = 8\Omega$, $\gamma E = -5v$, $\gamma R = 0.2\Omega$

$P = f(E,R)$

$\partial p = \frac{\gamma P}{\gamma E}\gamma E + \frac{\gamma I}{\gamma R}\gamma R$

$\frac{\partial P}{\partial E} = \frac{2E \times 1}{R} = \frac{2E}{R}$

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

$\partial P = \frac{2E}{R}(-5) - \frac{E^2}{R^2}(0.2)$

$= \frac{2(200)(-5)}{8} - \frac{(200)^2(0.2)}{40{,}000(8)^2}$

$= \frac{-2000}{8} - \frac{25 \times 0.2}{64}$

$= -250 - 125 = -375\ w$

P decreases by 375 watts.

② $y = \frac{kwd^4}{t^3}$ given $\partial w = \frac{3w}{100}$, $\partial d = \frac{25d}{100}$, $\partial t = \frac{4t}{100}$

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

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

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

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

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

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

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

$= 1$ percent of y.