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PETROLEUM ENGINEERING ENG 281

Answer To Assignment.

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

$E = 200v$, $R = 8\Omega$ $\partial E/\partial t = -5v$, $\partial R/\partial t = 0.2$

$$\frac{\partial P}{\partial t} = \frac{\partial P}{\partial \varepsilon} \cdot \frac{\partial \varepsilon}{\partial t} + \frac{\partial P}{\partial R} \cdot \frac{\partial R}{\partial t}$$

$$\frac{\partial E}{\partial t} = \frac{2\varepsilon}{R}, \quad \frac{\partial R}{\partial t} = \frac{-\varepsilon^2}{R^2}$$

$$\therefore \frac{dP}{dt} = \frac{2\varepsilon}{R}\frac{dE}{dt} + \left(\frac{-E^2}{R^2}\right)\frac{dR}{dt}$$

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

$$= -250 - 125$$

$dP = -375N$

2) $y = \frac{Kwd^4}{t^3}$ $\partial w = 3\%$ $\partial d = 22\frac{1}{2}\%$, $dt = 4\%$

$$\partial y = \frac{\partial y}{\partial w}\partial w + \frac{\partial y}{\partial d} \cdot \partial d + \frac{\partial y}{\partial t} \cdot \partial t \Rightarrow \frac{hd^4}{t^3} dw^3$$

$$= \frac{Kd^4}{t^3}(3w\%) + \frac{4hwd^3}{t^3}\left(\frac{5d\%}{2}\right) - \frac{3hwd^4}{t^4}(4t\%)$$

$$= \frac{3}{100}\frac{Kwd^4}{t^3} + \frac{10}{100}\frac{Kwd^4}{t^3} - \frac{12Kwd^4}{100t^3}$$

$$\Rightarrow \frac{Kwd^4}{t^3}\left(\frac{3}{100} + \frac{10}{100} - \frac{12}{100}\right)$$

$$= \frac{1}{100}\frac{Kwd^4}{t^3} = 1\%y$$