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18/ENG05/048
Mechatronics Eng.

Soln

Case A

$y(t) = 50$ @ $t = 0$

Since $y(t) = 50$ and $y = y_0 e^{Kt}$.

Therefore: $50 = y_0 e^{Kt}$.

Remember $t = 0$ hr.

$\Rightarrow 50 = y_0 e^{K(0)}$

$50 = y_0 e^0$

$\therefore y_0 = 50$

Since $y(t) = 50$ and $y_0 = 50$

$\therefore$ To find K

From $y = y_0 e^{KT}$

$\therefore y = 50e^{KT}$

when $t = 9$ hrs

$y(t) = 150$ From (3×50)

$\therefore 150 = 50 e^{K(9)}$

$e^{K(9)} = 3$

$e^{9K} = 3$

$9K = \ln 3$

$9K = 1.0986$

$K = 0.122$ $\therefore$ $y_A = 50e^{0.122t}$.

Case B

$y(t) = 150$ @ $t = 0$

$y = y_0 e^{KT}$

$150 = y_0 e^{K(0)}$

$150 = y_0$

$\therefore y_0 = 150$

$$y = y_0 e^{KT}$$

$$y = 150 e^{KT}$$

when $t = 9$ hrs

$$y(t) = 3 \times 150$$

$$= 450$$

$$450 = 150 e^{KT}$$

$$3 = e^{K(9)}$$

$$\ln 3 = 9K$$

$$K = 0.122.$$

$$y_B = 150 e^{0.122t}.$$

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$t := 0..15$

$yA(t) := 50 \cdot e^{0.122 \cdot t}$

$yB(t) := 150 \cdot e^{0.122 \cdot t}$