

14FE-1 A single loop, second-order circuit is described by the following differential equation.

$$2\frac{dv^2(t)}{dt^2} + 4\frac{dv(t)}{dt} + 4v(t) = 12u(t) \quad t > 0$$

Which is the correct form of the total (natural plus forced) response? **CS**

- (a) $v(t) = K_1 + K_2e^{-t}$
- (b) $v(t) = K_1 \cos t + K_2 \sin t$
- (c) $v(t) = K_1 + K_2te^{-t}$
- (d) $v(t) = K_1 + K_2e^{-t} \cos t + K_3e^{-t} \sin t$

SOLUTION:

Natural response has char eq: $s^2 + 2s + 2 = 0$

roots are at $s = -1 \pm j1 \Rightarrow$ natural response is sinusoidal!

Forced response is constant = K_1

Answer is (d)