

## ECE-205 Quiz 1

1) For a first order RC circuit, the time constant is of the form

- a)  $\tau = C / R_{th}$    b)  $\tau = R_{th} / C$    c)  $\tau = R_{th}C$    d) none of these

2) For a first order RL circuit, the time constant is of the form

- a)  $\tau = R_{th}L$    b)  $\tau = L / R_{th}$    c)  $\tau = R_{th} / L$    d) none of these

3) The differential equation that relates the current through a capacitor to the voltage across a capacitor is

- a)  $v_c(t) = C \frac{di_c(t)}{dt}$    b)  $i_c(t) = \frac{1}{C} \frac{dv_c(t)}{dt}$    c)  $i_c(t) = C \frac{dv_c(t)}{dt}$    d)  $v_c(t) = \frac{1}{C} \frac{di_c(t)}{dt}$

4) The differential equation that relates the current through an inductor to the voltage across an inductor is

- a)  $i_L(t) = L \frac{dv_L(t)}{dt}$    b)  $v_L(t) = \frac{1}{L} \frac{di_L(t)}{dt}$    c)  $i_L(t) = \frac{1}{L} \frac{dv_L(t)}{dt}$    d)  $v_L(t) = L \frac{di_L(t)}{dt}$

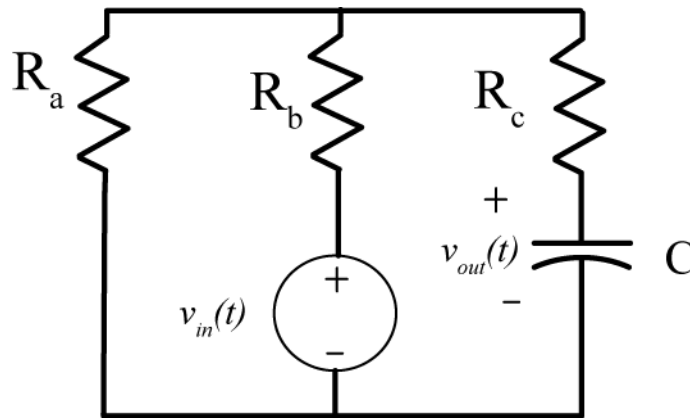
5) The standard form for an RC or RL first order circuit, with input  $x(t)$  and output  $y(t)$ , is

- a)  $\frac{dy(t)}{dt} + \tau y(t) = Kx(t)$    b)  $\frac{dy(t)}{dt} + \tau y(t) = Kx(t)$    c)  $\frac{1}{\tau} \frac{dy(t)}{dt} + y(t) = Kx(t)$   
d)  $\frac{dy(t)}{dt} + \tau y(t) = \frac{1}{K} x(t)$    e)  $\tau \frac{dy(t)}{dt} + y(t) = \frac{1}{K} x(t)$    f)  $\tau \frac{dy(t)}{dt} + y(t) = Kx(t)$

6) A capacitor is a/an   a) short circuit   b) open circuit   to DC signals.

7) An inductor is a/an   a) short circuit   b) open circuit   to DC signals.

Problems 8 and 9 refer to the following circuit:



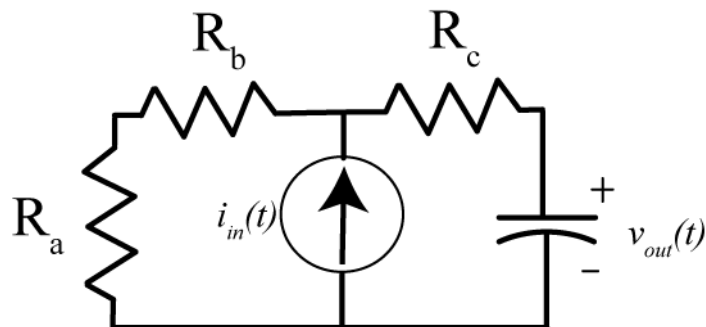
8) The Thevenin resistance seen from the ports of the capacitor is

- a)  $R_{th} = R_c + R_a \parallel R_b$    b)  $R_{th} = R_c$    c)  $R_{th} = R_c \parallel (R_a + R_b)$    d)  $R_{th} = R_a + R_b + R_c$    e) none of these

9) The static gain for the system is

- a)  $K = 1$    b)  $K = \frac{R_c}{R_a + R_b + R_c}$    c)  $K = \frac{R_b}{R_a + R_b}$    d)  $K = \frac{R_a}{R_a + R_b}$    e) none of these

Problems 10 and 11 refer to the following circuit



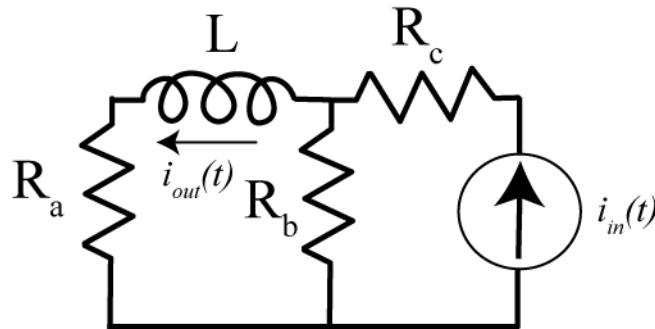
10) The Thevenin resistance seen from the ports of the capacitor is

- a)  $R_{th} = R_a + R_b$    b)  $R_{th} = R_c$    c)  $R_{th} = R_c \parallel (R_a + R_b)$    d)  $R_{th} = R_a + R_b + R_c$    e) none of these

11) The static gain for the system is

- a)  $K = 1$    b)  $K = R_c$    c)  $K = R_a + R_b$    d)  $K = R_c \parallel (R_a + R_b)$    e) none of these

Problems 12 and 13 refer to the following circuit



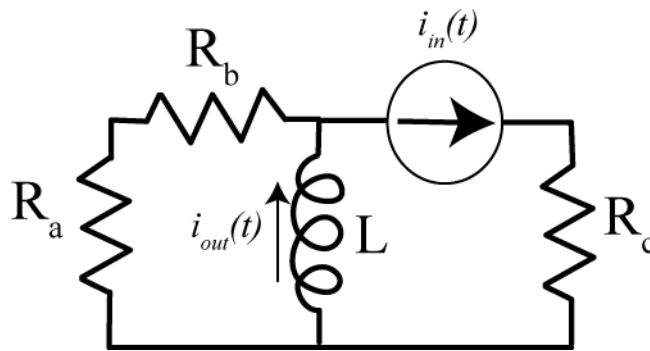
12) The Thevenin resistance seen from the ports of the inductor is

- a)  $R_{th} = R_a + R_b \parallel R_c$    b)  $R_{th} = R_c + R_a \parallel R_b$    c)  $R_{th} = R_a + R_b$    d)  $R_{th} = R_a + R_c$    e) none of these

13) The static gain for the system is

- a)  $K = 1$    b)  $K = \frac{R_b}{R_a + R_b}$    c)  $K = \frac{R_a}{R_a + R_b}$    d)  $K = \frac{R_b}{R_c + R_b}$    e) none of these

Problems 14 and 15 refer to the following circuit



14) The Thevenin resistance seen from the ports of the inductor is

- a)  $R_{th} = R_c \parallel (R_a + R_b)$    b)  $R_{th} = R_c$    c)  $R_{th} = R_a + R_b$    d)  $R_{th} = R_a + R_b + R_c$    e) none of these

15) The static gain for the system is

- a)  $K = 1$    b)  $K = \frac{R_a + R_b}{R_a + R_b + R_c}$    c)  $K = \frac{R_c}{R_a + R_b + R_c}$    d)  $K = \frac{R_c}{R_a + R_b}$    e) none of these

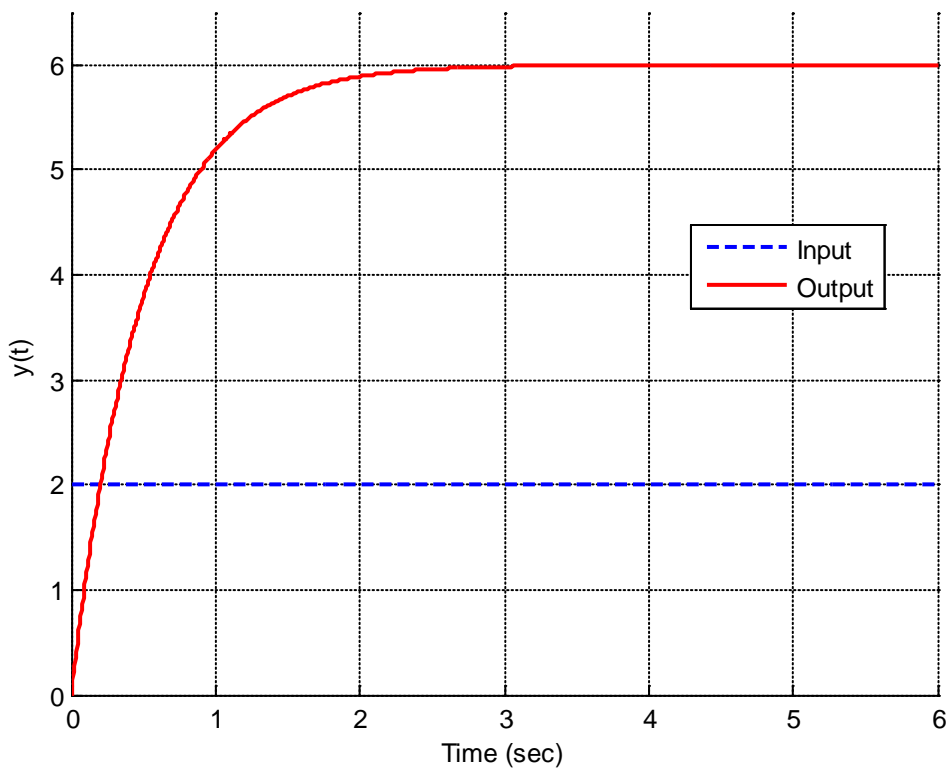
16) If  $z = \frac{1+j}{1-j}$ , then

- a)  $\angle z = 0^\circ$    b)  $\angle z = 90^\circ$    c)  $\angle z = -90^\circ$    d)  $\angle z = -45^\circ$    e)  $\angle z = 45^\circ$

17) If  $z = \frac{1+j}{3+j}$ , then

- a)  $|z| = 0$    b)  $|z| = \frac{2}{8}$    c)  $|z| = \sqrt{\frac{2}{8}}$    d)  $|z| = \sqrt{\frac{2}{10}}$

18) The following graph shows the step response of a first order system



The best estimate of the static gain of this system is a) 1.0   b) 2.0   c) 3.0   d) 6.0