

## ECE-205 Practice Quiz 1

(No Calculators)

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

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

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

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

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

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

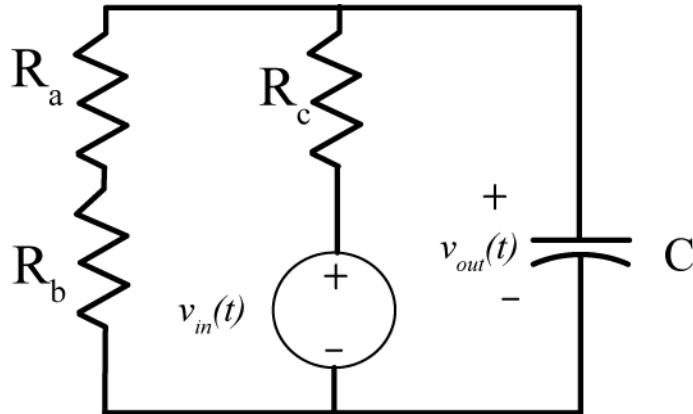
5) The standard form for an RC or RL first order circuit, with input  $x(t)$  and output  $y(t)$ , is

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

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

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

Problems 8 and 9 refer to the following circuit:



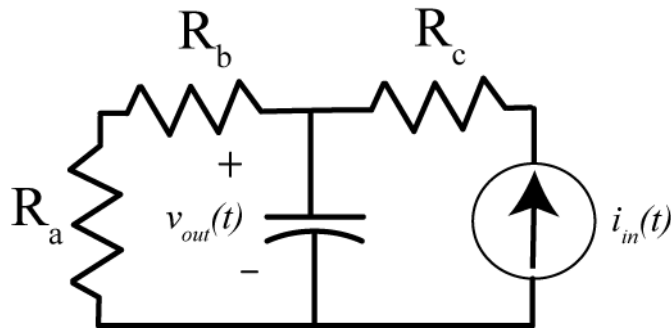
8) The Thevenin resistance seen from the ports of the capacitor is

- a)  $R_{th} = R_a + R_b$    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

9) The static gain for the system is

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

Problems 10 and 11 refer to the following circuit



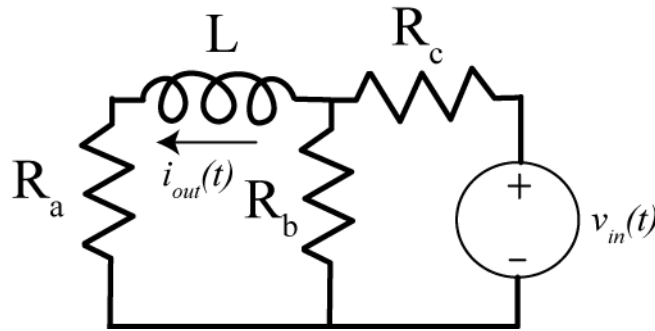
10) The Thevenin resistance seen from the ports of the capacitor is

- 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



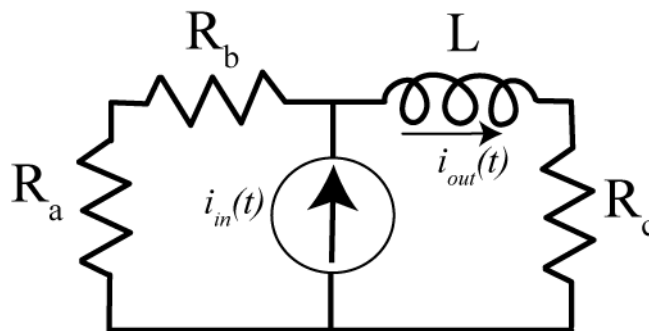
12) The Thevenin resistance seen from the ports of the inductor is

- 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



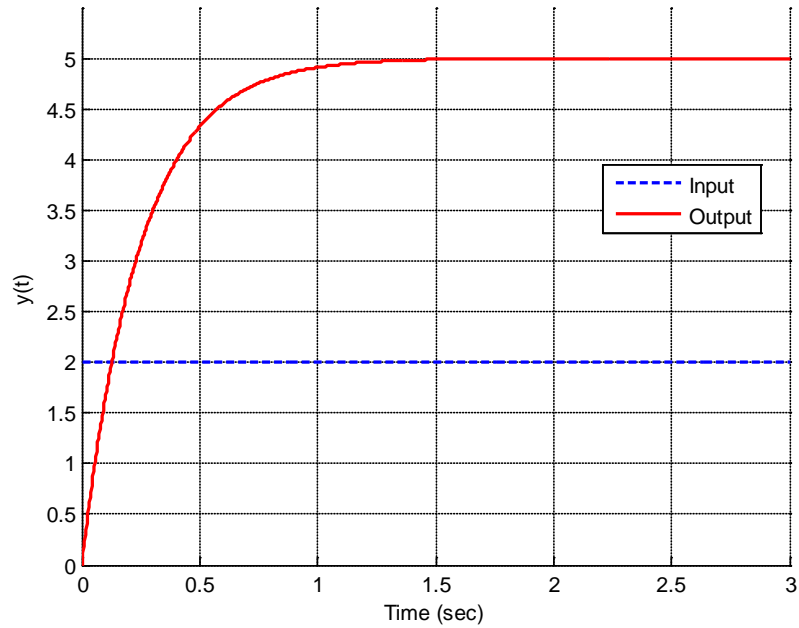
14) The Thevenin resistance seen from the ports of the inductor is

- 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

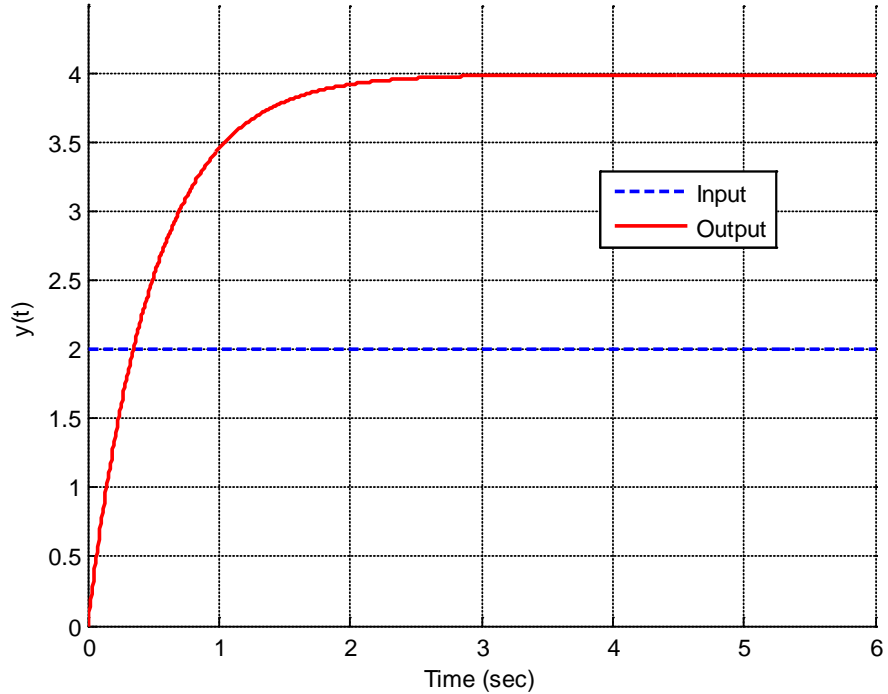
- a)  $K = 1$    b)  $K = \frac{R_a + R_b}{R_a + R_b + R_c}$    c)  $K = \frac{R_c}{R_a + R_b + R_c}$    d)  $K = \frac{R_c}{R_a + R_b}$    e) none of these

16) 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) 2.5 d) 5.0

17) 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) 4.0

18) If  $z = \frac{1-j}{2+j}$ , the **magnitude** of  $z$ ,  $|z|$  is

- a)  $\sqrt{\frac{2}{5}}$     b) 0    c)  $\sqrt{\frac{2}{3}}$     d) none of these

19) If  $z = 1-j$ , the **phase** of  $z$ ,  $\angle z$ , is

- a)  $45^\circ$     b)  $-45^\circ$     c)  $90^\circ$     d)  $-90^\circ$     e) none of these

20) If  $z = \frac{-j}{1-j}$ , the **phase** of  $z$ ,  $\angle z$ , is

- a)  $45^\circ$     b)  $-45^\circ$     c)  $135^\circ$     d)  $-135^\circ$     e) none of these

21) If  $z = \frac{2-j}{3-2j}$ , the **complex conjugate** of  $z$ ,  $z^*$ , is

- a)  $z = \frac{2+j}{3-2j}$     b)  $z = \frac{2+j}{3+2j}$     c)  $z = \frac{2-j}{3+2j}$     d) none of these

*Answers: 1-a, 2-c, 3-a, 4-b, 5-b, 6-a, 7-b, 8-c, 9-c, 10-a, 11-c, 12-a, 13-e, 14-d, 15-b, 16-c, 17-b, 18-a, 19-b, 20-b, 21-b*