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

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

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

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

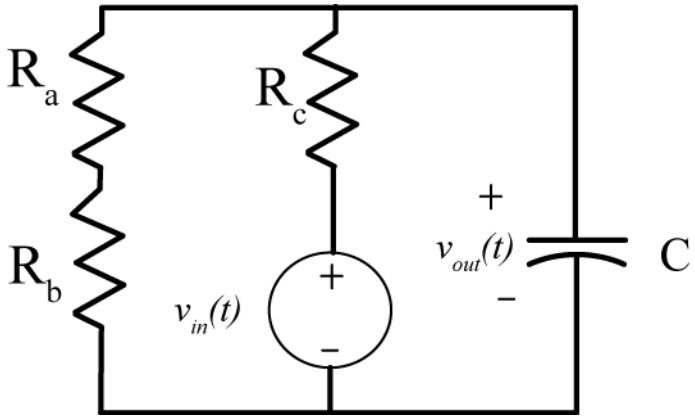
a) $\dfrac{1}{\tau}\dfrac{dy(t)}{dt} + y(t) = Kx(t)$ b) $\tau\dfrac{dy(t)}{dt} + y(t) = Kx(t)$ c) $\dfrac{dy(t)}{dt} + \tau\ y(t) = Kx(t)$

d) $\dfrac{dy(t)}{dt} + \tau\ y(t) = \dfrac{1}{K}x(t)$ e) $\tau\dfrac{dy(t)}{dt} + y(t) = \dfrac{1}{K}x(t)$ f) $\dfrac{dy(t)}{dt} + \tau y(t) = Kx(t)$

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:



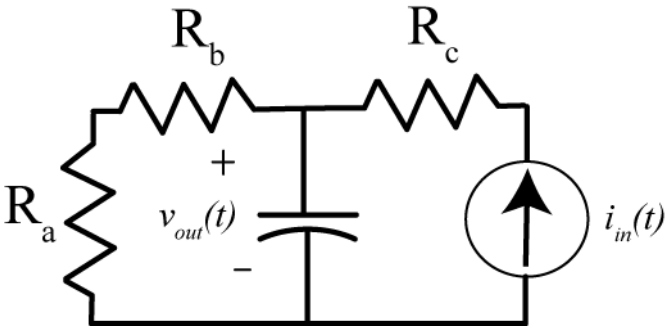
8) The Thevenin resistance seen from the ports of the capacitor is

a) $R_{th} = R_a + R_b$ b) $R_{th} = R_c$ c) $R_{th} = R_c \,||\, (R_a + R_b)$ 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) $K = \dfrac{R_c}{R_a + R_b + R_c}$ c) $K = \dfrac{R_a + R_b}{R_a + R_b + R_c}$ d) $K = \dfrac{R_c}{R_a + R_b}$ e) none of these

Problems 10 and 11 refer to the following circuit



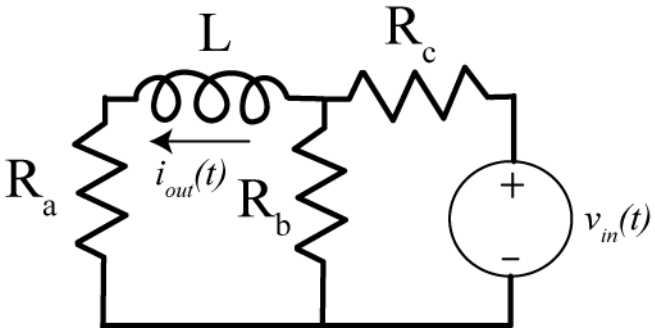
10) The Thevenin resistance seen from the ports of the capacitor is

a) $R_{th} = R_a + R_b$ b) $R_{th} = R_c$ c) $R_{th} = R_c \,||\, (R_a + R_b)$ 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) $K = R_c \,||\, (R_a + R_b)$ e) none of these

Problems 12 and 13 refer to the following circuit



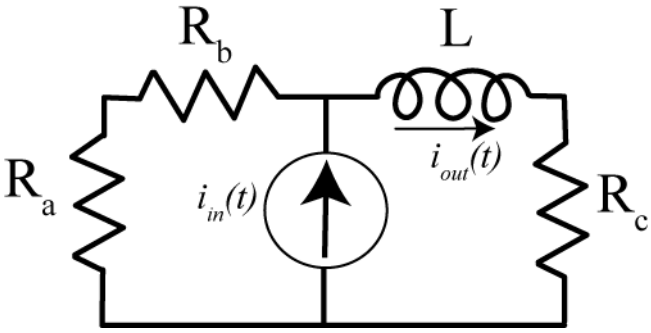
12) The Thevenin resistance seen from the ports of the inductor is

a) $R_{th} = R_a + R_b \,||\, R_c$ b) $R_{th} = R_c + R_a \,||\, R_b$ 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) $K = \dfrac{R_b}{R_a + R_b}$ c) $K = \dfrac{R_a}{R_a + R_b}$ d) $K = \dfrac{R_b}{R_c + R_b}$ 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) $R_{th} = R_c \,||\, (R_a + R_b)$ 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) $K = \dfrac{R_a + R_b}{R_a + R_b + R_c}$ c) $K = \dfrac{R_c}{R_a + R_b + R_c}$ d) $K = \dfrac{R_c}{R_a + R_b}$ e) none of these

16) 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

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

a) 45^o b) -45^o c) 90^o d) -90^o e) none of these

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

a) 45^o b) -45^o c) 135^o d) -135^o e) none of these

19) 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-a, 17-b, 18-b, 19-b