## ECE-205 Practice Quiz 1

## (No Calculators)

1) For a first order RC circuit, the time constant is of the form
a) $\tau=R_{t h} C$
b) $\tau=R_{t h} / C$
c) $\tau=C / R_{t h}$
d) none of these
2) For a first order RL circuit, the time constant is of the form
a) $\tau=R_{t h} L$
b) $\tau=R_{t h} / L$
c) $\tau=L / R_{t h}$
d) none of these
3) The differential equation that relates the current through a capacitor to the voltage across a capacitor is
a) $i_{c}(t)=C \frac{d v_{c}(t)}{d t}$
b) $v_{c}(t)=C \frac{d i_{c}(t)}{d t}$
c) $i_{c}(t)=\frac{1}{C} \frac{d v_{c}(t)}{d t}$
d) $v_{c}(t)=\frac{1}{C} \frac{d i_{c}(t)}{d t}$
4) The differential equation that relates the current though an inductor to the voltage across an inductor is
a) $i_{L}(t)=L \frac{d v_{L}(t)}{d t}$
b) $v_{L}(t)=L \frac{d i_{L}(t)}{d t}$
c) $i_{L}(t)=\frac{1}{L} \frac{d v_{L}(t)}{d t}$
d) $v_{L}(t)=\frac{1}{L} \frac{d i_{L}(t)}{d t}$
5) The standard form for an RC or RL first order circuit, with input $x(t)$ and output $y(t)$, is
a) $\frac{1}{\tau} \frac{d y(t)}{d t}+y(t)=K x(t)$
b) $\tau \frac{d y(t)}{d t}+y(t)=K x(t)$
c) $\frac{d y(t)}{d t}+\tau y(t)=K x(t)$
d) $\frac{d y(t)}{d t}+\tau y(t)=\frac{1}{K} x(t)$
e) $\tau \frac{d y(t)}{d t}+y(t)=\frac{1}{K} x(t)$
f) $\frac{d y(t)}{d t}+\tau y(t)=K x(t)$
6) A capacitor is a/an
a) open circuit
b) short circuit
to DC signals.
7) An inductor is $a / a n$
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) $R_{t h}=R_{a}+R_{b}$
b) $R_{t h}=R_{c}$
c) $R_{t h}=R_{c} \|\left(R_{a}+R_{b}\right)$
d) $R_{t h}=R_{a}+R_{b}+R_{c}$
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) $R_{t h}=R_{a}+R_{b}$
b) $R_{t h}=R_{c}$
c) $R_{t h}=R_{c} \|\left(R_{a}+R_{b}\right)$
d) $R_{t h}=R_{a}+R_{b}+R_{c}$
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) $K=R_{c} \|\left(R_{a}+R_{b}\right)$
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) $R_{t h}=R_{a}+R_{b} \| R_{c}$
b) $R_{t h}=R_{c}+R_{a} \| R_{b}$
c) $R_{t h}=R_{a}+R_{b}$
d) $R_{t h}=R_{a}+R_{c}$
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) $R_{t h}=R_{c} \|\left(R_{a}+R_{b}\right)$
b) $R_{t h}=R_{c}$
c) $R_{t h}=R_{a}+R_{b}$
d) $R_{t h}=R_{a}+R_{b}+R_{c}$
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 $\begin{array}{llll}\text { a) } 1.0 & \text { b) } 2.0 & \text { c) } 3.0 & \text { d) } 4.0\end{array}$
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 $z=\frac{2-j}{3-2 j}$, the complex conjugate of $z, z^{*}$, is
a) $z=\frac{2+j}{3-2 j}$
b) $z=\frac{2+j}{3+2 j}$
c) $z=\frac{2-j}{3+2 j}$
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

