

# ECE 207L - SINUSOIDAL STEADY STATE RESPONSES - LAB 24 FIRST ORDER RC CIRCUITS

FALL 2003

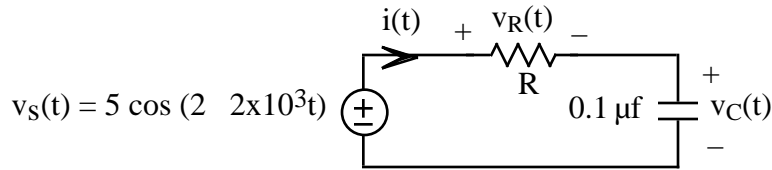
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## OBJECTIVE

The objective of this lab is to measure sinusoidal steady state responses of first order RC circuits

## LAB

1. Given the following first order RC circuit with sinusoidal input



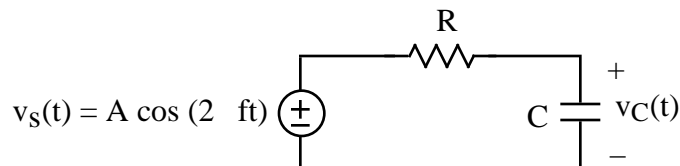
PARTNER 1:  $R = 1K$     PARTNER 2:  $R = 2K$

- a. Measure your resistor and capacitor values. Compare with nominal values
- b. Make use of what you see on the scope to sketch graphs of  $v_S(t)$ ,  $v_R(t)$  and  $v_C(t)$
- c. Make use of what you see on the scope to find equations for  $v_R(t)$  and  $v_C(t)$
- d. Make use of measured voltages to verify that KVL is satisfied at  $t = 0$  and  $t = 0.4$  msec
- e. Verify that the amplitudes of the sinusoids do not obey KVL
- f. Calculate the steady state values of  $v_R(t)$  and  $v_C(t)$ . Hint - first calculate  $v_C(t)$ , then calculate

$$i(t) = C \frac{dv(t)}{dt}$$

and finally calculate  $v_R(t) = Ri(t)$

- g. Compare the amplitude and phase of your measured and calculated values of  $v_R(t)$  in parts (c) and (f)
2. Given the following first order RC circuit with sinusoidal input



Make use of the scope to see how

- a. Increasing  $R$  affects the amplitude of the steady state  $v_C(t)$ .
- b. Increasing  $C$  affects the amplitude of the steady state  $v_C(t)$ .
- c. Increasing  $A$  affects the amplitude of the steady state  $v_C(t)$ .
- d. Increasing  $f$  affects the amplitude of the steady state  $v_C(t)$ .