

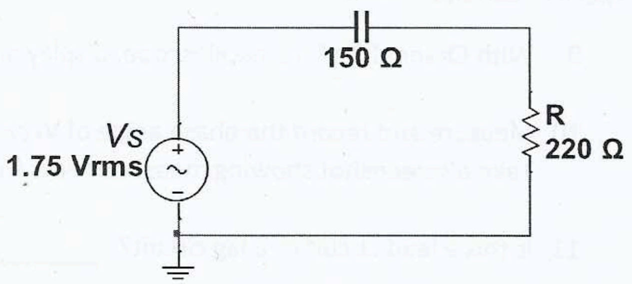


Figure 6-1

MATERIALS

1. Function Generator / Oscilloscope
2. (1) 0.100 μF Capacitor
3. (1) 220 Ω Resistor
4. Digital Multimeter (DMM)

QUICK INITIAL SURVEY (SIMPLE VOLTAGE DIVIDER):

1. Given the circuit in ***Figure 6–1*** above, what do you expect the voltage drop to be across R using a voltage divider of the 'resistances'?

$V_R =$ .826 ∠ 34.29°

2. What do you expect the voltage drop to be across C using a voltage divider of the 'resistances'?

$V_C =$ ~~[illegible]~~ .563 ∠ -55.71°

3. Do you expect the sum of V_C and V_R to be 1.75 Vrms? yes

PROCEDURE

1. Construct the circuit above in Figure 6 – 1 on your breadboard using a **0.100** μF Capacitor.

2. Using this capacitor, what frequency will cause X_C = 150 Ω?

$f =$ ~~[illegible]~~ 10.610 kHz

3. Turn on the Function Generator/Oscilloscope and adjust the generated signal to 1.75 Vrms and the frequency calculated above.
4. Using the DMM, measure the voltage drop across R:

$V_R =$ 1.23 V

5. Using the DMM, measure the voltage across X_C:

$V_C =$ .845 V

6. How do these measured voltages compare to the 'expected' voltages in steps 1 and 2 above?

They don't match

7. Do the measured voltage drops equal the source voltage? ______

8. With Channel 1 of the oscilloscope, display the source voltage and measure it.

9. With Channel 2 of the oscilloscope, display and measure the voltage across the resistor.

10. Measure and record the phase angle of V_R (with respect to Vs)? ________________
Take a screenshot showing measurements from steps 8 through 10.

11. Is this a lead circuit or a lag circuit? ________________

12. Now, reverse the polarity of the source and again use Channel 1 to display the source voltage, but now use Channel 2 to display the capacitor voltage.

13. Again, measure V_S, V_C and θ. Record the phase angle of V_C? ________________
Take a screenshot.

14. Is this a lead circuit or a lag circuit? ________________

15. Using the magnitudes and phases measured in Steps 9 and 10 and 13, then :

$V_R =$ ________ $\angle$ ________ $=$ ________ j ________ V

$V_C =$ ________ $\angle$ ________ $=$ ________ j ________ V

Now add them:

________ j ________ V

Is this equal to the source voltage? ________________

16. What is the impedance of the circuit in Figure 6-1? $Z_T =$ ________ j ________ Ω

$Z_T =$ ________ $\angle$ ________ Ω

17. What is the current of the circuit in Figure 6-1? $I_T =$ ________ j ________ A

$I_T =$ ________ $\angle$ ________ A

18. Why does I_T have the same phase as V_R? ________________

____

____

19. What is V_{out} of the lead circuit?

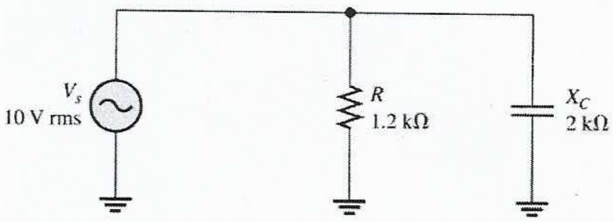
$$V_{OUT} = V_R = I_T * R = \_\_\_\_\_\_\_\_ + j \ \_\_\_\_\_\_\_\_ V$$

20. What is V_{out} of the lag circuit?

$$V_{OUT} = V_C = I_T * X_C = \_\_\_\_\_\_\_\_ - j \ \_\_\_\_\_\_\_\_ V$$

21. In the circuit below, what is the relationship between the voltages of the resistor and capacitor?

a) They have the same magnitude
b) They have different magnitudes
c) They have the same phase
d) They have different phases



SUBMITTAL – Complete this handout and submit along with 2 screenshots.