Lab 2 Coupling & Bypass Capacitors

Name _____   Section _____

Purpose:
To demonstrate the effect of coupling and bypass capacitors.

Equipment:
1 - ac Function Generator
1 - Dual Trace Oscilloscope
1 - 0.022 μF Capacitor
4 - Resistors   2 - 22 kΩ, 1 - 68 kΩ, 1 - 100 kΩ

C_1 0.022 μF

$1\,v_{p\text{-}p}$

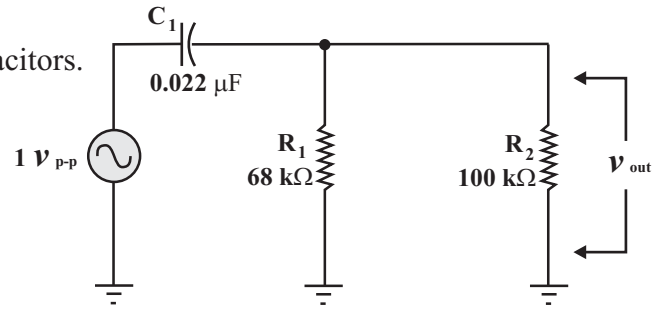R_1 68 kΩ

R_2 100 kΩ

v_{out}

Figure 1

Prelab:
Calculate f_c, 0.1f_c & 10f_c for Figure 1 and Figure 2.
Insert the calculated values in Tables 1 & 2

Table 1 Coupling Capacitor	Calculated Frequency	v_{out}
f_C		
$0.1\,f_C$		
$10\,f_C$		

Procedure:
Coupling Capacitors

1) Construct the circuit shown in Figure 1.

2) Connect the function generator to the circuit. - Set the function to sine wave.
   - Set the frequency to the calculated value of f_c.
3) Measure and record the output voltage.   - Set the output voltage of the generator to 1 V$_{p\text{-}p}$
   Record the values in Table 1
4) Repeat steps 2 and 3 with the generator set to 0.1f_c & 10f_c

R_3 22 kΩ

Set for 1 v$_{p\text{-}p}$

R_4 22 kΩ

Bypass Capacitors

1) Construct the circuit shown in Figure 2(a) *without the capacitor*.

2) Connect the function generator to the circuit.
   - Set the function to sine wave.
   - Set the frequency to the calculated value of f_c.
   - Adjust the output voltage of the generator for 1 V$_{p\text{-}p}$ *across R$_4$*

Figure 2(a)

3) Connect the capacitor across R$_4$.as shown in Figure 2(b)

R_3 22 kΩ

4) Measure and record the voltage across the capacitor.

R_4 22 kΩ

C_2 0.022 μF

v_{out}

5) Repeat steps 2, 3 and 4 with the function generator set to 0.1 f_c and 10 f_c.
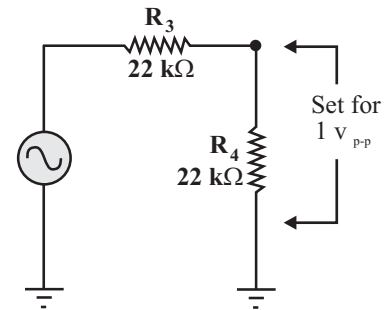
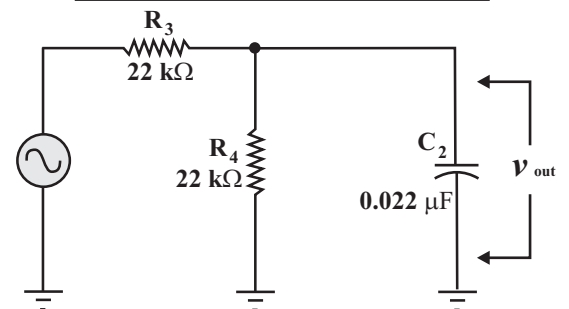### *Questions & Problems*

1) A coupling capacitor ideally looks like a dc _____circuit
   and an ac _____ circuit.

Figure 2(b)

2) If an amplifier is being designed for the audio frequency
   (20 Hz to 20 kHz), which is the worst case frequency that the
   designer has to worry about when selecting the size of the
   coupling capacitor.

Table 2 Bypass Capacitor	Calculated Frequency	v_{out}
f_C		
$0.1\,f_C$		
$10\,f_C$		