Electronic Circuits II – Laboratory 03

2 stages AC Amplifier

#	Student ID	Student Name	Grade (10)	Instructor signature
1				
2				
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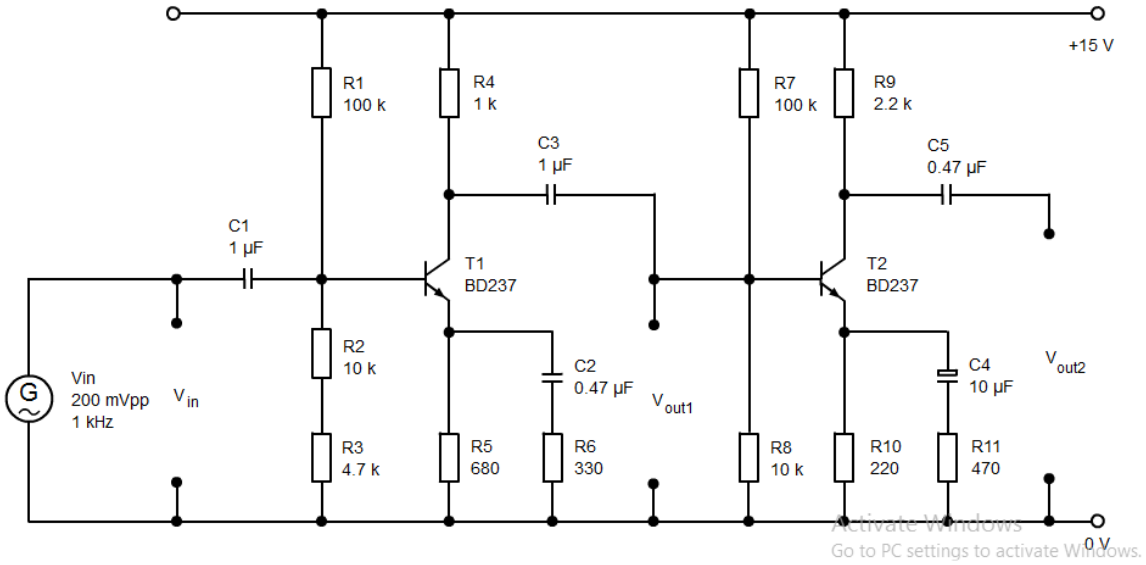
Delivery Date	

The main circuit Common collector circuit

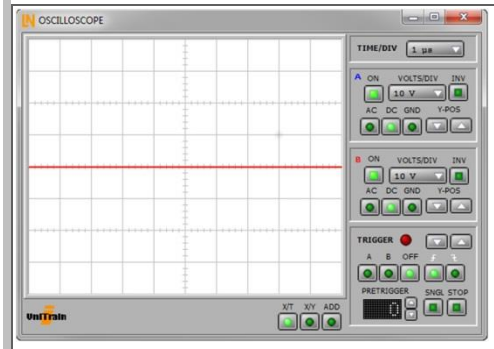
Circuit diagram

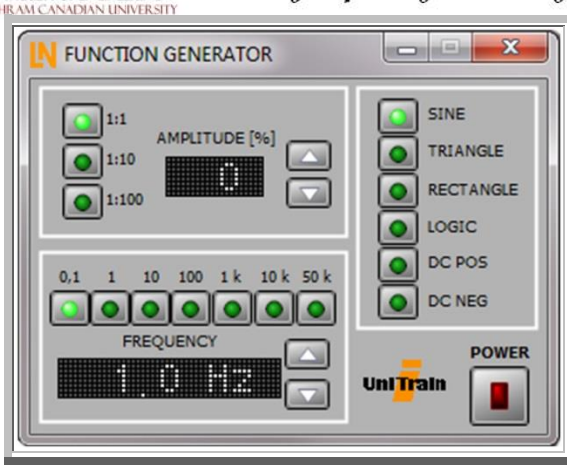
This experiment is based on the following circuit:



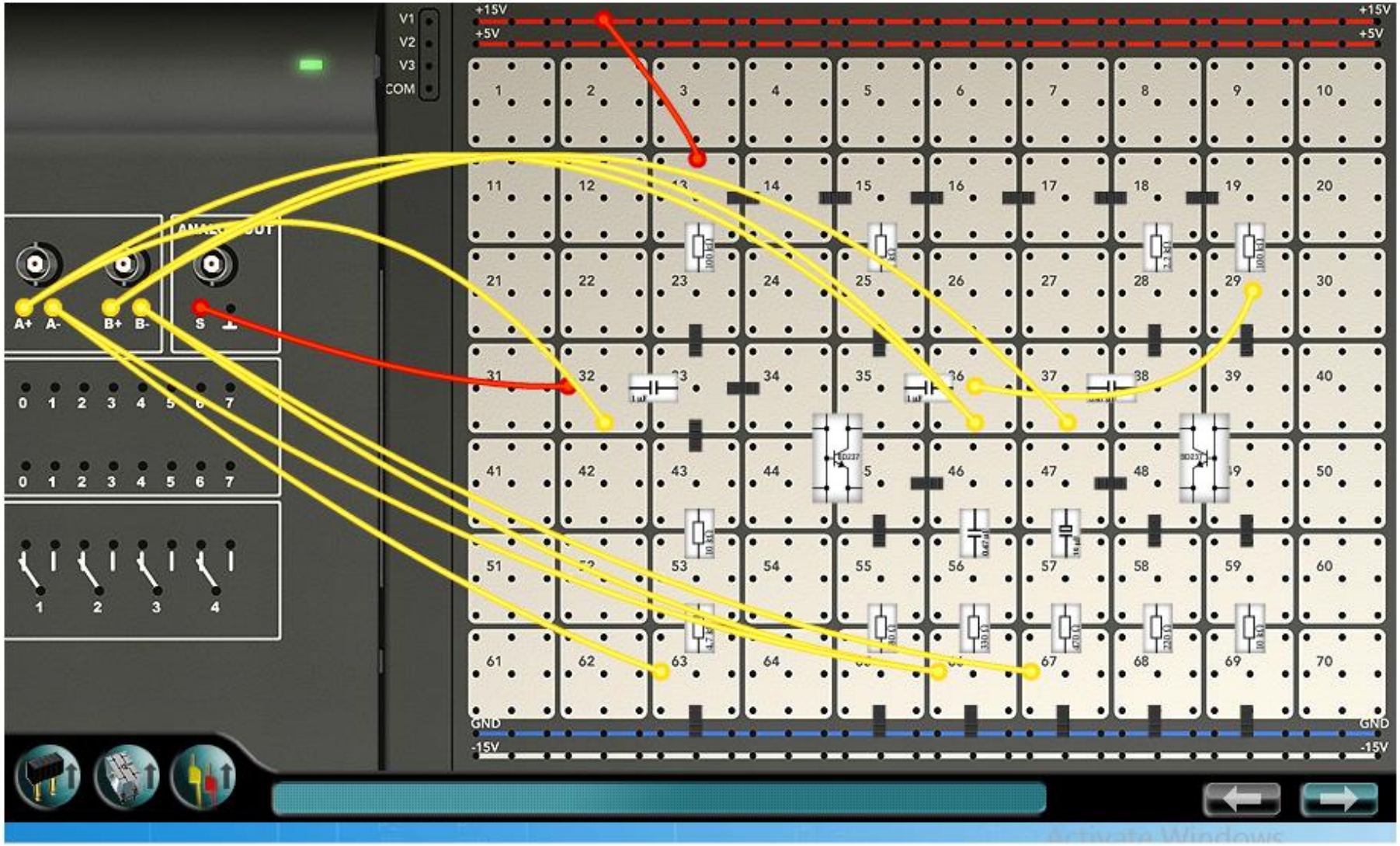
Equipment

The following equipment is needed for this experiment and should be configured as shown:

Equipment	Settings		
		**Channel A**	**Channel B**
	Sensitivity	100 mV/div	100 mV/div
	Coupling	AC	AC
	Polarity	Normal	Normal
	Y-pos	0	0
	Time base	200 µs/div	
	Mode	X/T	
	Trigger channel	A	
	Trigger edge	Positive	



Waveform	Sine
Amplitude	200 mVpp (1%)
Frequency factor	1 k
Frequency	1 kHz


V1
V2
V3
COM
+15V
+5V
A+
A-
B+
B-
S
0 1 2 3 4 5 6 7
0 1 2 3 4 5 6 7
1 2 3 4
GND
-15V

Experiment procedure and exercises

A sinusoidal AC voltage of 200 mV_{PP} with a frequency of 1 kHz is applied to the input V_{in}. Connect sets of leads numbers 1 and 2 to make these measurements.

Measure the input voltage V_{in} and the output voltage of the first stage V_{out1} and calculate the voltage gain.

V_{in} = _____ mV_{PP}

V_{out1} = _____ mV_{PP}

Voltage gain $G_{stage\ 1}$ = _____

Now remove capacitor C_2.

Measure the input voltage V_{in} once again, as well as the output voltage V_{out1} of the first stage, in order to determine the voltage gain of the first stage without AC current feedback.

V_{in} = _____ mV_{PP}

V_{out1} = _____ mV_{PP}

Voltage gain $G_{stage\ 1\ minus\ C2}$ = _____

Next, put the capacitor C_2 back. The following measurements are to be made with sets of leads numbers 3 and 4.

Now determine the voltage gain of the second stage by measuring the input voltage for stage 2 = V_{out1} and the output voltage for stage 2 = V_{out2}.

V_{out1} = _____ mV_{PP}

V_{out2} = _____ V_{PP}

Voltage gain $G_{stage\ 2}$ = _____

Calculate the total voltage for the circuit by two different means:

1. The ratio of the overall output voltage to the input voltage.

2. By multiplying the individual gain factors of the separate stages.

Method 1: Voltage gain G_{total} =

Method 2: Voltage gain G_{total} =

Now change the frequency of the function generators from 1 kHz to 200 Hz, keeping the voltage the same at 200 mV_{PP} and alter the oscilloscope time base from 200 µs/div to 1 ms/div in order to display two periods (two full waves).

Measure the input voltage V_{in} and the output voltage of the first stage V_{out1}, then calculate the voltage gain.

$V_{in\text{-}200Hz}$ = mV_{PP}

$V_{out1\text{-}200Hz}$ = mV_{PP}

Voltage gain $G_{stage\ 1\text{-}200Hz}$ =

Now determine the voltage gain of the second stage at f= 200 Hz by measuring the input to stage 2 = V_{out1} and the output voltage of stage 2 = V_{out2}.

$V_{out1\text{-}200Hz}$ = mV_{PP}

$V_{out2\text{-}200Hz}$ = V_{PP}

Voltage gain $G_{stage\ 2\text{-}200Hz}$ =

Calculate the total voltage for the circuit at f = 200 Hz by two different means:

1. The ratio of the overall output voltage to the input voltage.

2. By multiplying the individual gain factors of the separate stages.

Method 1: Voltage gain $G_{total\text{-}200Hz}$ =

Method 2: Voltage gain $G_{total\text{-}200Hz}$ =