PART 2

Filters and Peak Detector

- 1. Analyzing Operational Amplifier Operating As Low Pass Active Filter (3.7)
- 2. Analyzing Operational Amplifier Operating As High Pass Active Filter (3.8)
- 3. Analyzing Operational Amplifier Operating As Peak Detector (3.9)

MODULE Y-0014/03

EXPERIMENT: 3.7

ANALYZING OPERATIONAL AMPLIFIER OPERATING AS LOW PASS ACTIVE FILTER

EXPERIMENTAL PROCEDURE:

Connect the circuit as shown in the figure.



1- Apply power to the circuit. By using scope1, set the <u>output of the function generator</u> to sin with amplitude 1Vpp and with frequency given in Table 1 for each step. Take note of the output signal amplitude in each step. Calculate the voltage gain in each step.

Vi=1Vpp						
f(Hz)	Vo(Volt)	Gain	f(Hz)	Vo(Volt)	Gain	
100			1600			
200			1800			
500			2000			
1000			5000			
1200			10000			
1400						

Table 1

2- Calculate the cut-off frequency if R2=R3=1K and C1=C2=100nf.

$$fc = \frac{1}{2\pi . R2.C2} =$$

3- Compare the calculated cut-off frequency with the the experimental results. Write your comments.

4- Plot the frequency-gain graph according to the values in Table 1.



5- Calculate the frequency band of the circuit.

The bandwidth (**BW**) is from 100Hz to the frequency at which the output signal becomes $1/\sqrt{2} = 0,707$ of it. The voltage at which the output signal becomes $1/\sqrt{2} = 0,707$ is; Vo = The bandwidth of the circuit is; **BW** =

EXPERIMENT: 3.8

ANALYZING OPERATIONAL AMPLIFIER OPERATING AS HIGH PASS ACTIVE FILTER

EXPERIMENTAL PROCEDURE:

Connect the circuit as shown in the figure.



1- Calculate the cut-off frequency if R2=R3=1K and C1=C2=100nf.

$$fc = \frac{1}{2\pi . R2.C2} =$$

2- Apply power to the circuit. By using scope1, set the output of the function generator to sign with amplitude 1Vpp and with frequency given in table 1 for each step. Take note of the output signal amplitude in each step. Calculate the voltage gain in each step.

Vi=1Vpp						
f(Hz)	Vo(Volt)	Gain	f(Hz)	Vo(Volt)	Gain	
100			1600			
200			1800			
500			2000			
1000			3000			
1200			4000			
1400			5000			

Table	1
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3- Compare the calculated cut-off frequency with the the experimental results? Write your comments.

4- Plot the frequency-gain graph according to the values in Table 1.



5- Calculate the frequency band of the circuit.

The bandwidth (**fb**) is from 10KHz to the frequency at which the output signal becomes $1/\sqrt{2} = 0,707$ of it. The voltage at which the output signal becomes $1/\sqrt{2} = 0,707$ is; Vo=

BW=

EXPERIMENT: 3.9

ANALYZING OPERATIONAL AMPLIFIER OPERATING AS PEAK DETECTOR

EXPERIMENTAL PROCEDURE:

Connect the circuit as shown in the figure.



1- Apply power to the circuit. Take note of the input (**VM1**) and output (**VM2**) voltage values.

$VIYI = VIYI \geq $	VM1=	VM2=
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2- Press the button B1 and depress it after a while. Read the input and output voltage values. Explain the reason.



3- Observe the output voltage (VM2)? Is there any change? Why?

4- Press the button B2. Explain what happens.