



BAŞKENT UNIVERSITY
ELECTRIC & ELECTRONICS ENGINEERING

EEM 214 ~ ELECTRONICS–I
LABORATORY
REPORT

Experiment Name : Oscilloscopes,DMM,Function Generator,Potentiometer

Experiment Number : 1

Student Name : [REDACTED]

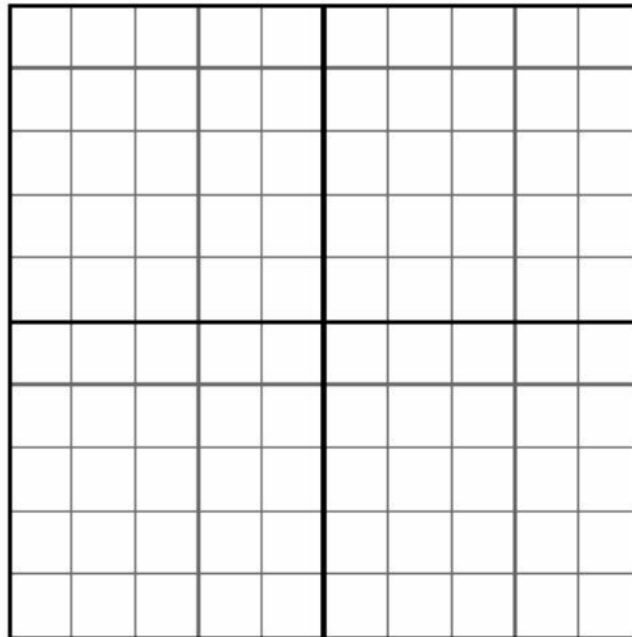
Student Number [REDACTED]

Section Number : 02

Experiment Day: 10 / 3 / 2006

Part_1:

1-)



2-)

$$V_{\max} = 0,98V$$

$$V_{\min} = -0,98V$$

$$V_{\text{avg}} = 0 V$$

$$V_{\text{rms}} = 705,7 \text{ mV}$$

$$V_{\text{p-p}} = 1,96V$$

$$\text{Period} = 10,08\text{ms}$$

$$\text{Frequency} = 99,20\text{Hz}$$

3-) Volts / Div : It doesn't change the amplitude of the sine wave, it only changes the voltage value per a square, for example if we select 1 volts/div it means every square value is 1 volt on our oscilloscope screen.

Time / Div : It doesn't change the frequency of the sine wave, it's function is to change the time scale, for example if its on 2ms time/div it means that every square is 2ms.

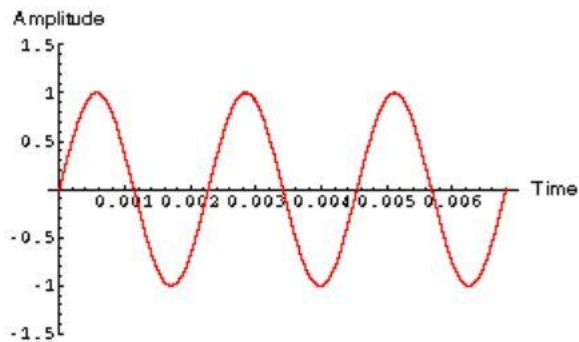
Position dial doesn't add a constant voltage, it changes only the position of our signal.

4-) The plot is given at question 1. (with same scales)

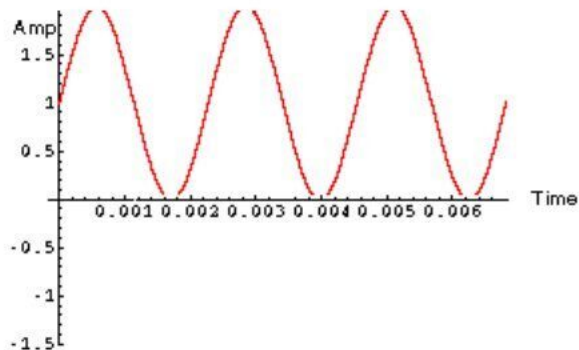
5-) Peak-to-peak voltage can't read when we give full amplitude at 2 V/div scale. Because there are 8 square along the Y axis on our oscilloscope screen, the maximum peak-to-peak voltage can be read is $8 \times 2 = 16V$ at this scale (2 V/div), our signal with full amplitude is greater than 16V so we can't read.

6-) It can't be seen correctly when we changed the trigger channel 1 to 2. Because these changes settings for the 2nd channel.

7-) When we pull the DC offset button on function generator, we can add a DC voltage to our signal. If the scope's coupling is set to AC, we can't see this DC voltage that we added. When we set it to DC, we saw that both AC and DC voltage can be read.

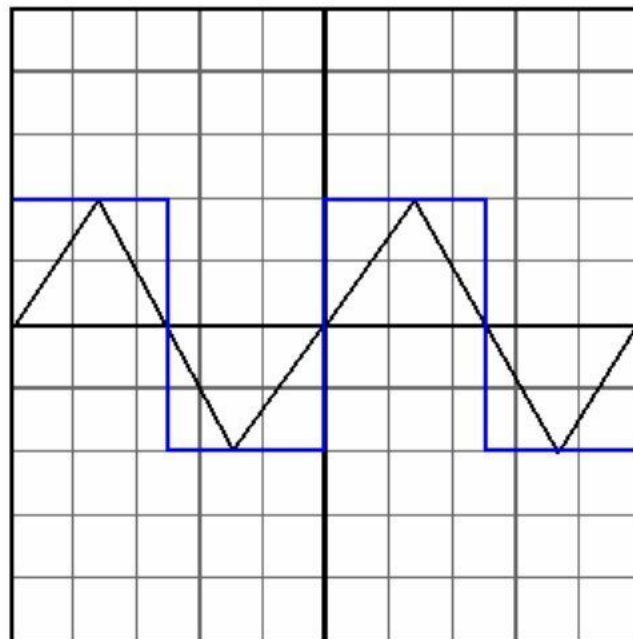


For example we have a sine wave like this. As shown it's $V_p = 1\text{ V}$. If we add a DC voltage (for example 1 V) we would be seeing the same wave until we set the DC couple on the scope.



When we set the DC couple on the scope, we can see both our sine wave and our 1 V DC voltage that was added to the sine wave.

8-)

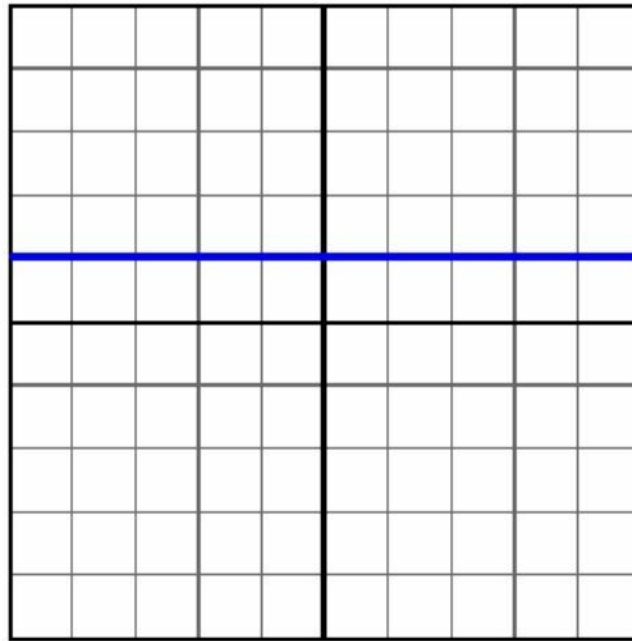


Volts/Div = 1V , Time/Div = 2mS

$f = 100\text{ Hz}$

Black signal is triangle, Blue signal is square wave

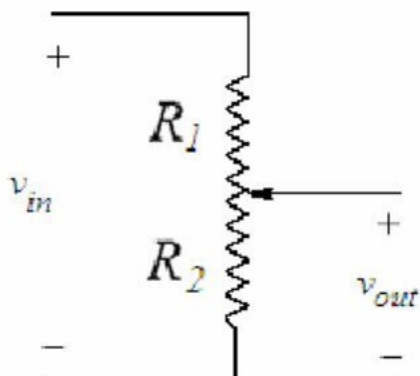
9-)



We get a constant voltage(5V) with function generator at 5 V/div voltage scale

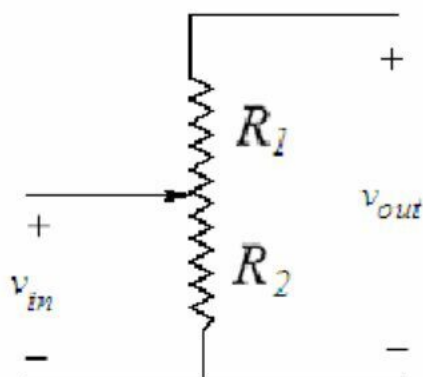
Part_2:

1-)



$$V_{out} = [R_2 / (R_1 + R_2)] \times V_{in}$$

2-)



$$V_{out} = [(R_1 + R_2) / R_2] \times V_{in}$$

We should never use these.

Because $(R_1 + R_2) / R_2$ is a number greater than 1. So our output voltage should be greater than input voltage but it's not possible.

3-)

	R₁	R₂	V_{out} (R_L=∞)	V_{out} (R_L=150Ω)
Full clockwise	4,970 K	1 Ω	0,6 mV	0,6 mV
The center	2,580 K	2,512 K	5 V	0,6 V
Full counter-clockwise	1 Ω	4,888 K	10 V	7,2 V

4-) Measurement values of V_{out} are not same with the expected values.

When full clockwise R₂ should 0 so V_{out} = 0 in theory, but measurements detect a small 1 Ω value so we get a small 0,6 mV V_{out} value.

When potentiometer is centered and full counter-clockwise measured values are nearly same with the expected values.