PROGRAM SEPENUH MASA *UTMSPACE*
UNIVERSITI TEKNOLOGI MALAYSIA INTERNATIONAL CAMPUS

EXPERIMENT 2

TITLE: **MULTIMETER AND VOLTAGE CONTROL OSCILLATOR.**

OBJECTIVES:
1. To identify the function of Digital Multimeter (DMM), Frequency Counter, Ampere Meter and Multifunction Meter.
2. To compare precision of Analog Meter and Digital Multimeter (DMM)
3. To understand the function of Voltage Control Oscillator (VCO) in Digital Multimeter.

LIST OF EQUIPMENTS AND COMPONENTS:

1 DC Power Supply
1 Digital Multimeter
1 Analog Multimeter
1 Digital Frequency Counter
1 Decade Box
1 VCO circuit on PCB which consists of:
- 1 IC LM 566
- 1 Resistor 5.1 kΩ
- 2 Resistor 10 kΩ
- 1 Capacitor 0.01μF
- 1 Capacitor 0.02μF

INTRODUCTION

Digital Multimeter (DMM) has same function as Analog Multimeter (AMM), DMM shown the digital display with high precision and more fragile compared to AMM. DMM is consists of the circuit which convert DC analog input to periodic waveform signal. Voltage Control Oscillator (VCO) is to convert DC analog input to periodic waveform. The output of VCO frequency is proportional to the input voltage of VCO and its display the frequency value.

In this experiments, Digital Frequency Counter will be use to calculate and to display output of VCO. The concept of VCO is similar to DMM.

EXPERIMENT A : Measurement of Voltage by AMM and DMM. [CO2, PO3] 40%

Procedure:

1. Figure 1 shown the circuit for this experiment on Printed Circuit Board (PCB)
2. Set the DC power supply to 12V
3. Confirm the voltage across DC power supply is 12V by using AMM
4. Measure the voltage across R_2 by using AMM
5. Repeat step 3 and 4 using DMM.
6. Record all the reading in Table 1.
7. Calculate the voltage across R_2 (theory)
8. Calculate the percentage of error for all voltage reading in Table 1.

EXPERIMENT B: Voltage Control Oscillator (VCO) [CO2, PO2] 60%

Procedure

1. Figure 2 shown the circuit for this experiment. Some portion of the circuit is built on PCB.
2. Connect the decade box, DMM and Frequency Counter to the exact point on the PCB (Refer to attachment 1)
3. Make sure the DC power supply is set to 12V and connected to exact point at PCB.
4. Connect the capacitor C_1 at PCB.
5. Set the decade box to 0.5kΩ and record the reading of
   i) Digital Multimeter
   ii) Frequency Counter
6. Increase the resistance value of decade box by 0.5kΩ step by step until 5kΩ. Record the reading of voltage and frequency for each value of resistance in Table 2.

7. Connect the capacitor C_2 at PCB and repeat step 5 and 6

8. Plot the graph for frequency and voltage on same graph paper for different capacitor (C_1 and C_2).

9. Calculate the slope of each graph.

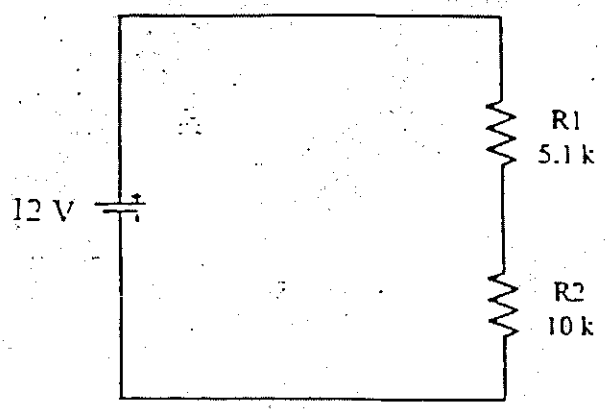


Figure 1

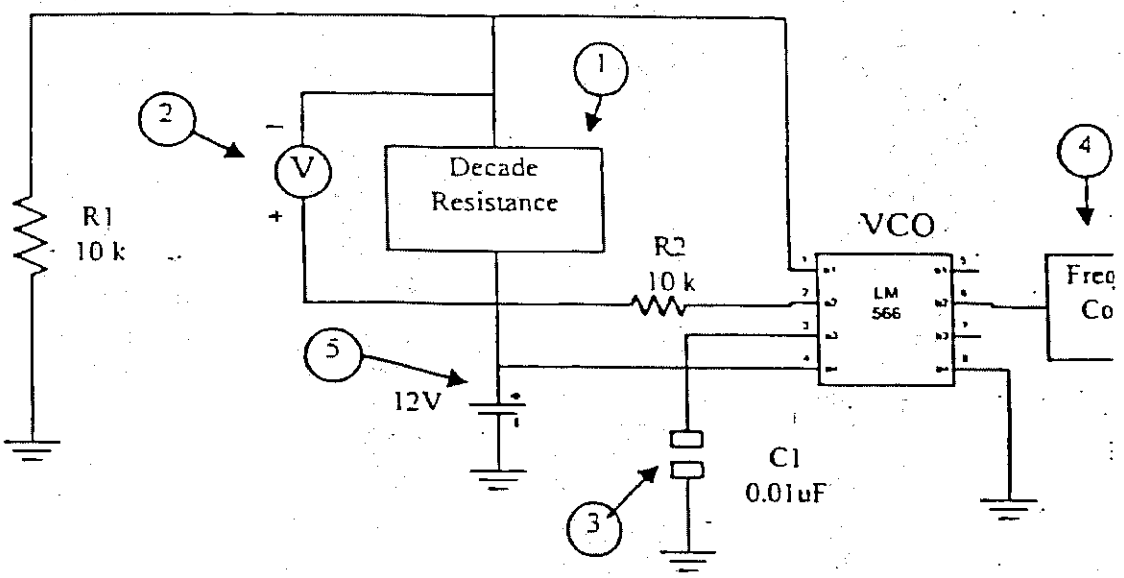
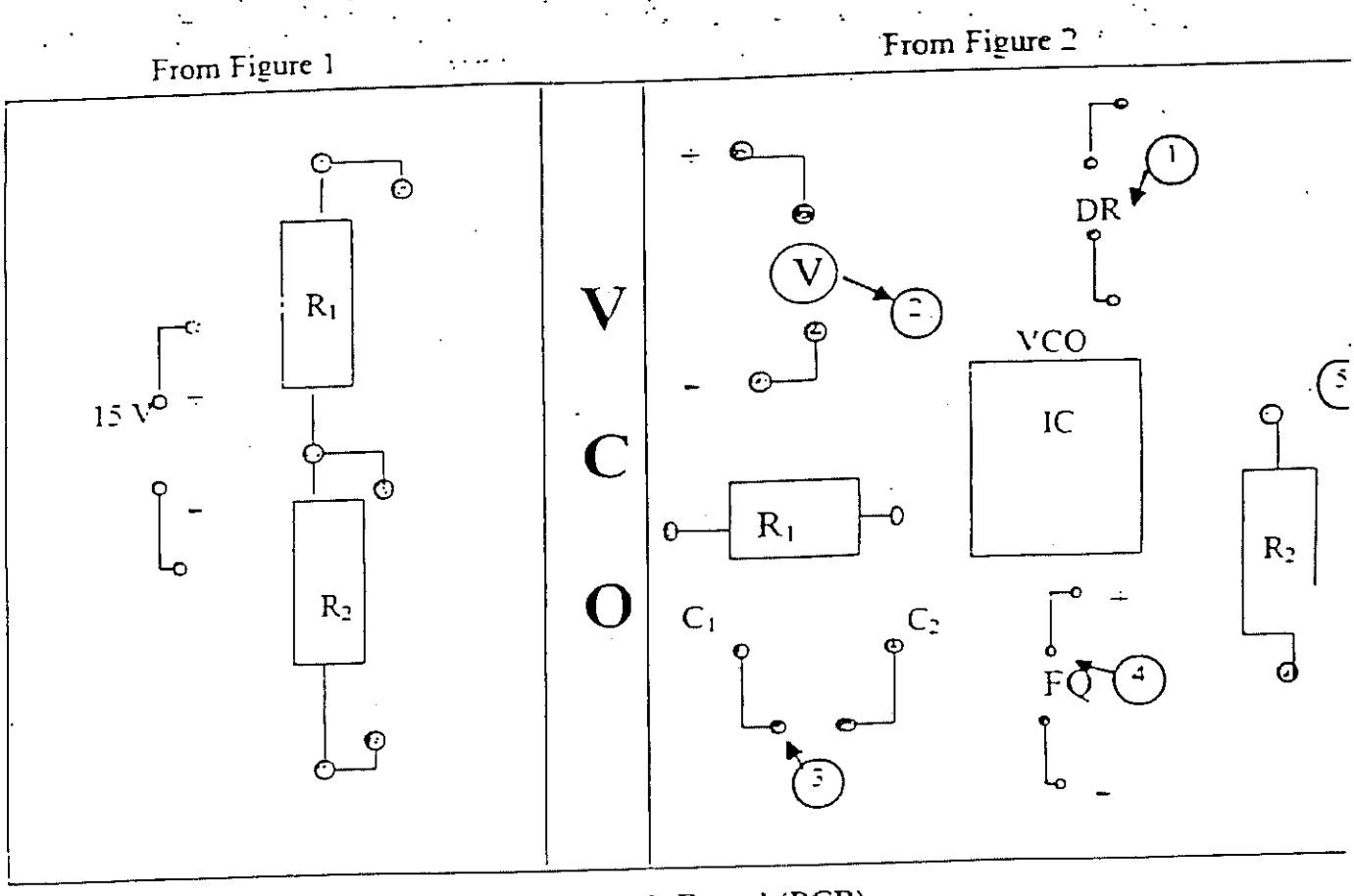


Figure 2

Attachment 1



Printed Circuit Board (PCB)

1. Decade Resistance
2. Digital Multimeter
3. Capacitor C_1 or C_2
4. Frequency Counter
5. DC Power Supply

DDB/DDE/DDK/DDP 1412
MEASUREMENT

EXPERIMENT 2

RESULT

NAME: .....

COURSE : 1 DDB/1DDE/1DDK/1DDP*

SECTION: .....

GROUP: .....

TITLE: .....

EXPERIMENT A : Measurement of Voltage by AMM and DMM.

Calculation for V_{R2}:

C01 , P01 - 10m

DC Power Supply		Voltage V_{R2}		% of Error for Voltage V_{R2}	
AMM Reading	DMM Reading	AMM Reading	DMM Reading	AMM	DMM

Table 1

C03, P02 - 20m

Conclusion

C01 , P01 - 10m

EXPERIMENT B: Voltage Control Oscillator (VCO)

R = (kΩ)	C_1 (0.01 μF)		C_2 (0.02 μF)	
	V (volt)	f(kHz)	V (volt)	f(kHz)
0.5				
1.0				
1.5				
2.0				
2.5				
3.0				
3.5				
4.0				
4.5				
5.0				

Table 2

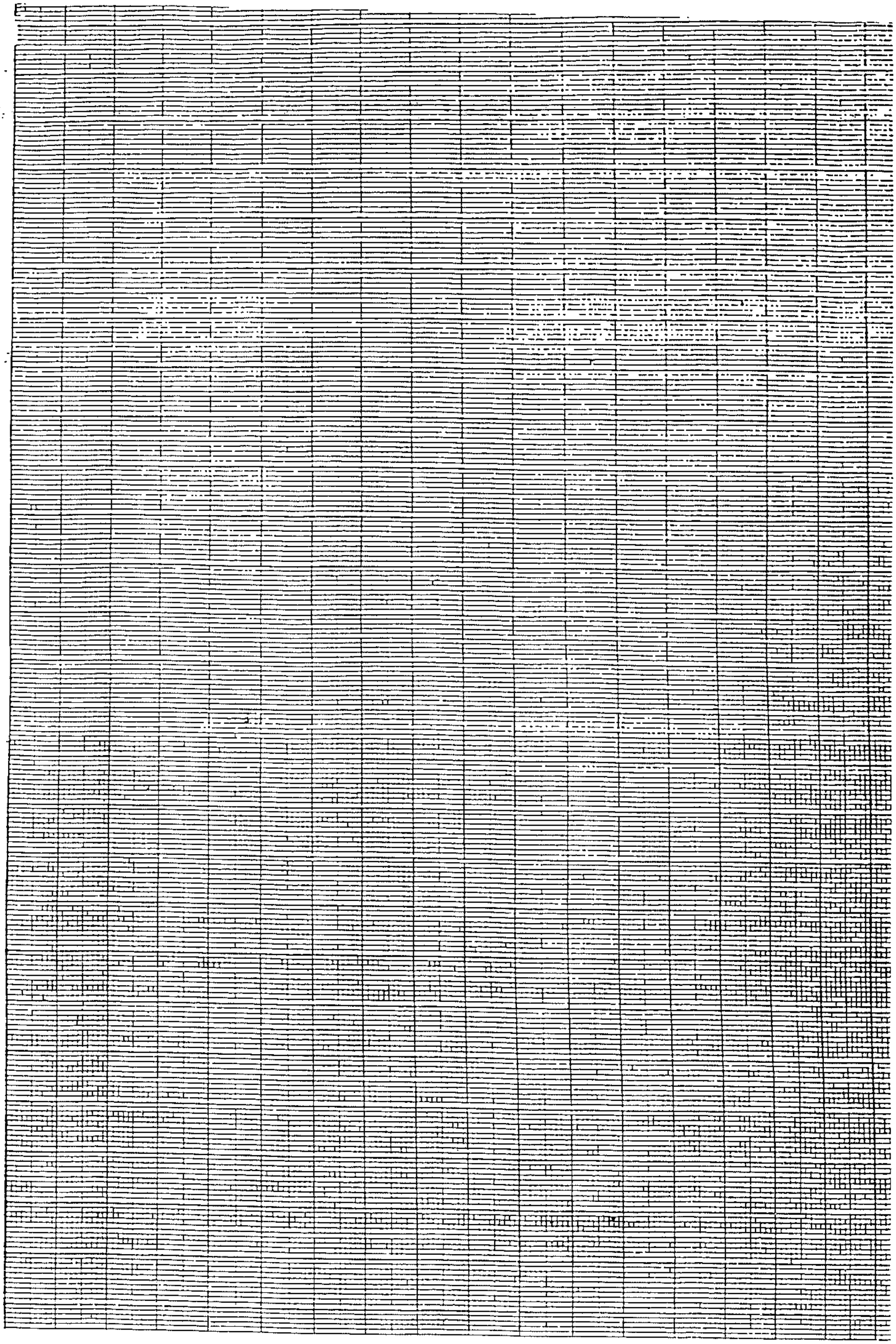
C03 , P02 - 30m

Slope of graph for C = 0.01 μF = _____ C01 , P01 - 5m

Slope of graph for C = 0.02 μF = _____ C01 , P01 - 5m

Conclusion

C01 , P01 - 10m



C01, P01 -10m