EXPT. NO. 3 NAME

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MIXER

Aim:

To generate the difference Signal Using Mixer circuit

Components Required

1. BJT - 2N 904 - 1 Nos
2. Resistor - 10KΩ, 22 KΩ, 4.7KΩ - (4) 1 each.
3. Capacitor - 0.1μF, 0.001μF, 1μF - 1, 2, 1
4. Bread Board - - - 1 Nos
5. Function generator - 20M Hz - 2 ~~Nos~~
6. VRPS - (0-30)v - 1
7. DSO - 200MHZ - 1

Theory:

Mixer are used for frequency conversion and are critical components in Modern Radio frequency (RF) system. A Mixer converts RF Power at one frequency into Power at another frequency to make Signal Processing easier and also inexpensive. A fundamental reason for frequency Conversion is to allow amplification of the recieved Signal at a frequency other than the RF, or the audio frequency. A receiver may require as much as 140 decibles (dB) of gain. It might not be possible to Put more than 40 decible of gain into RF Section without risking instability and Potential Oscillation. Like wise the gain of the audio Section might be Limited to 60dB because of Parasitic feedback Paths, and

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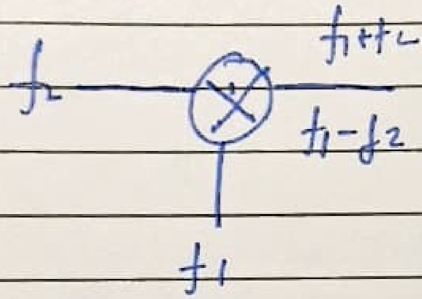
microphonics. The additional gain needed for a Sensitive receiver is normally achieved in an Intermediate frequency (IF) Section of the receiver.

The Ideal Mixer, is a device which multiplies two input Signal if the Input are Sinusoidal, the Ideal Mixer output is Sum and difference frequencies given by

$$V_o = [A_1 \cos(\omega_1 t)][A_2 \cos(\omega_2 t)] = \frac{A_1 A_2}{2}[\cos(\omega_1 - \omega_2 t) + \cos(\omega_1 + \omega_2)t]$$

Typically, either the Sum, or the difference, frequency is removed with a filter



Circuit Symbol for a Mixer.

Procedure:

1. Connection are made as per the circuit Diagram
2. with the Oscilloscope, adjust $V_x = 5\,V_{p\text{-}p}$. Set the frequency to 100 KHz
3. Next adjust V_y to $5\,V_{p\text{-}p}$ and set the frequency to 116 KHz

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4. Measure the Signal frequency at the output of the Mixer.

Result:

We have got the difference between the two input Signal via the Mixer Circuit.

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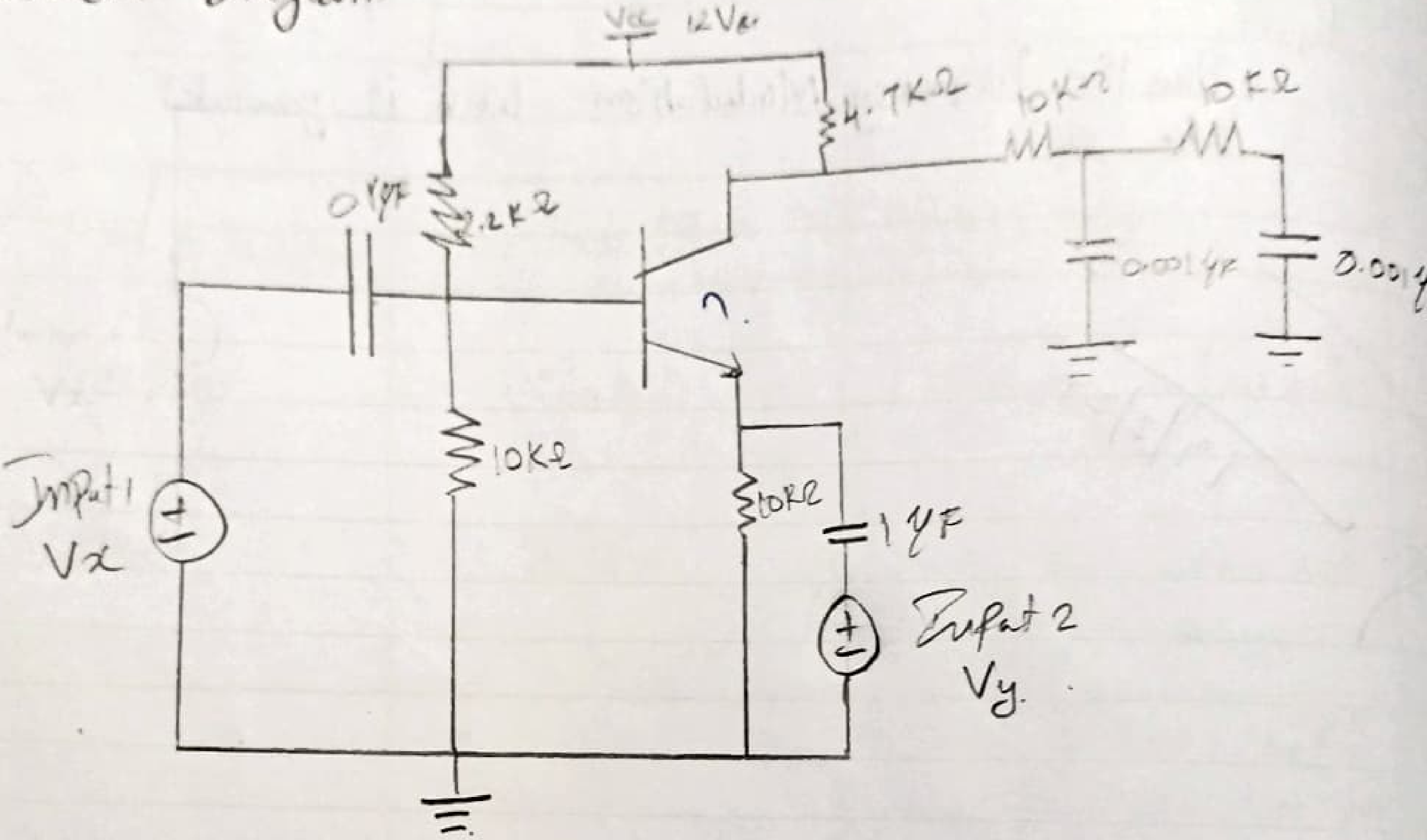
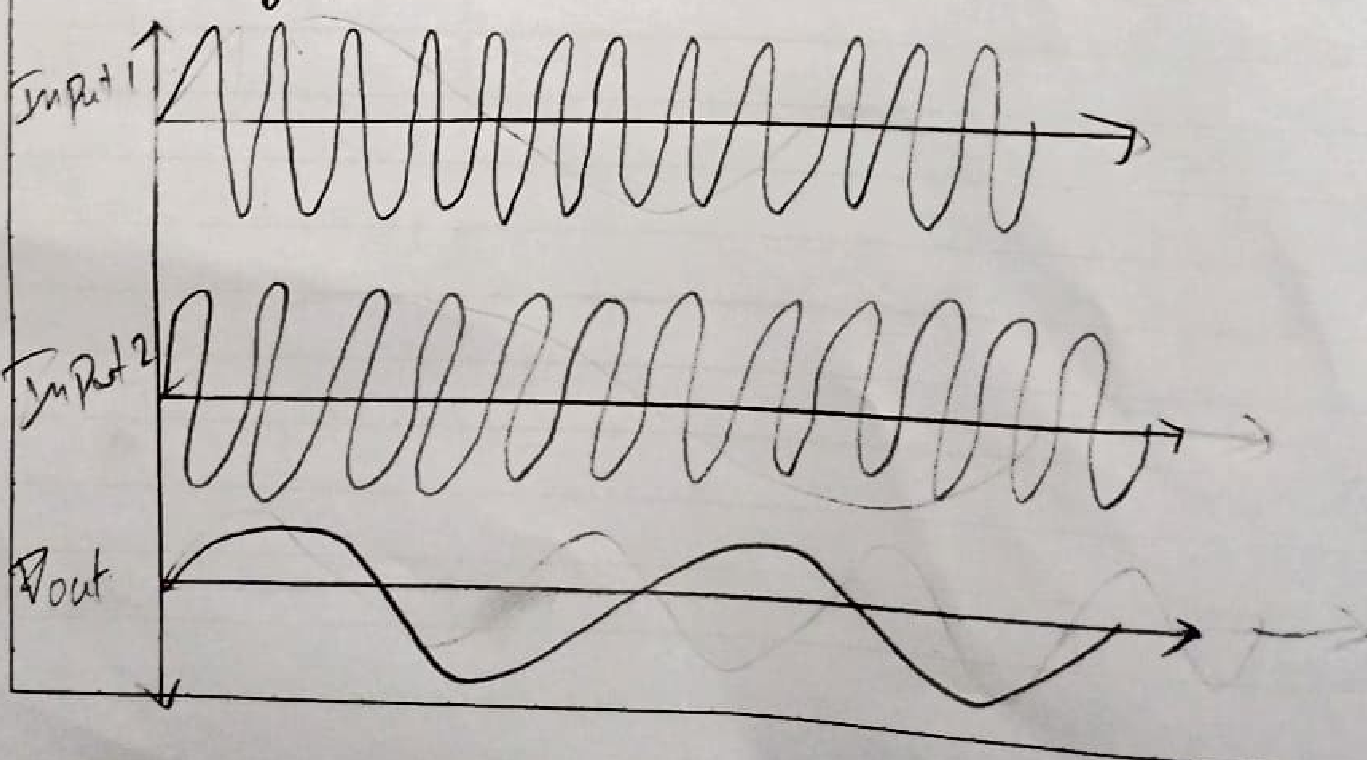
Circuit Diagram.



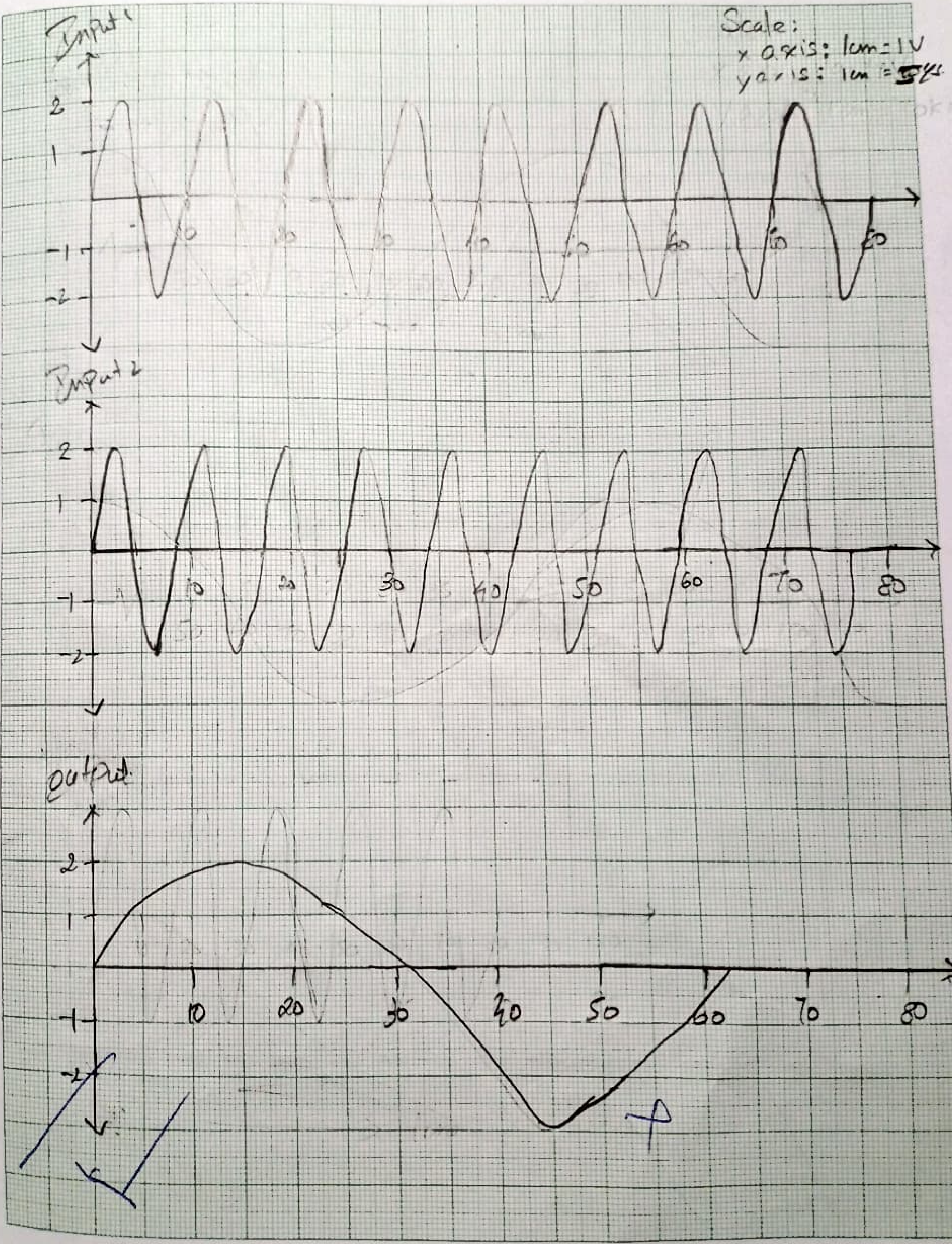
Model graph.



Observation Table:-

Input 1	Input 2	Difference Frequency
100	116 KHz	16.419 KHz
100	105 KHz	5.0023 KHz
100	110 KHz	10.01 KHz

ExP3 Mixer



Pulse Amplitude Modulation.

Aim:-

To construct a Pulse amplitude Modulation circuit and observe its Waveform.

Components Required:-

Transistor - BC147 - 1Nos
Resistor - 1KΩ - 1Nos
2.2KΩ - 1Nos
22KΩ - 1Nos
10KΩ - 1Nos

Theory:

In Pulse amplitude modulation, the amplitude of individual Pulses in the Pulse Train is Varied from its default Value in Accordance with the ~~instantaneous~~ ~~to~~ instantaneous amplitude of the modulating Signal at Sampling intervals. The Width and Position of the Pulses is kept constant.

The PAM Transmitter design is Very Simple Since the Very act of Sampling the modulating Signal at regular intervals Produces Pulse amplitude modulation. Main advantage of PAM are Simple Transmitter and reciever design. PAM is Used to carry information as Well as to generate other Pulse modulations.

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Procedure :-

1. Connection are made as per the circuit diagram
2. Apply a modulating Singal with 1 KHz frequency and carrier Pulse Signal with 100 KHz frequency from the function generator.
3. Apply 12V dc Supply to the collector.
4. Take the modulated Supply Signal output at the collector and observe the Same on CRO
5. Note the reading of Amplitude and frequency of PAM output Signal.

Result:

The ~~PAM wav~~ Pulse Amplitude Modulation is constructed and the Waveform is been observed.

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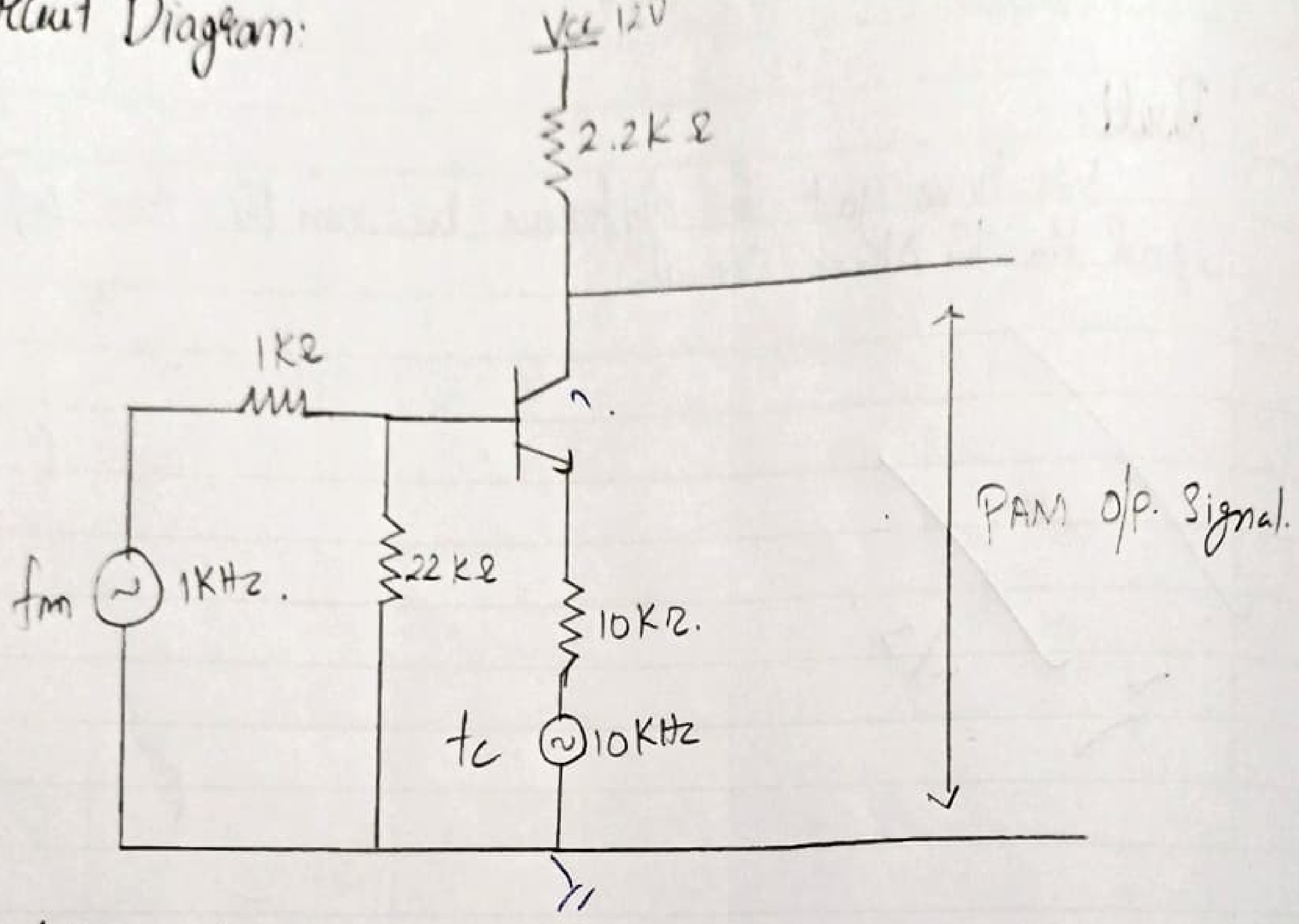
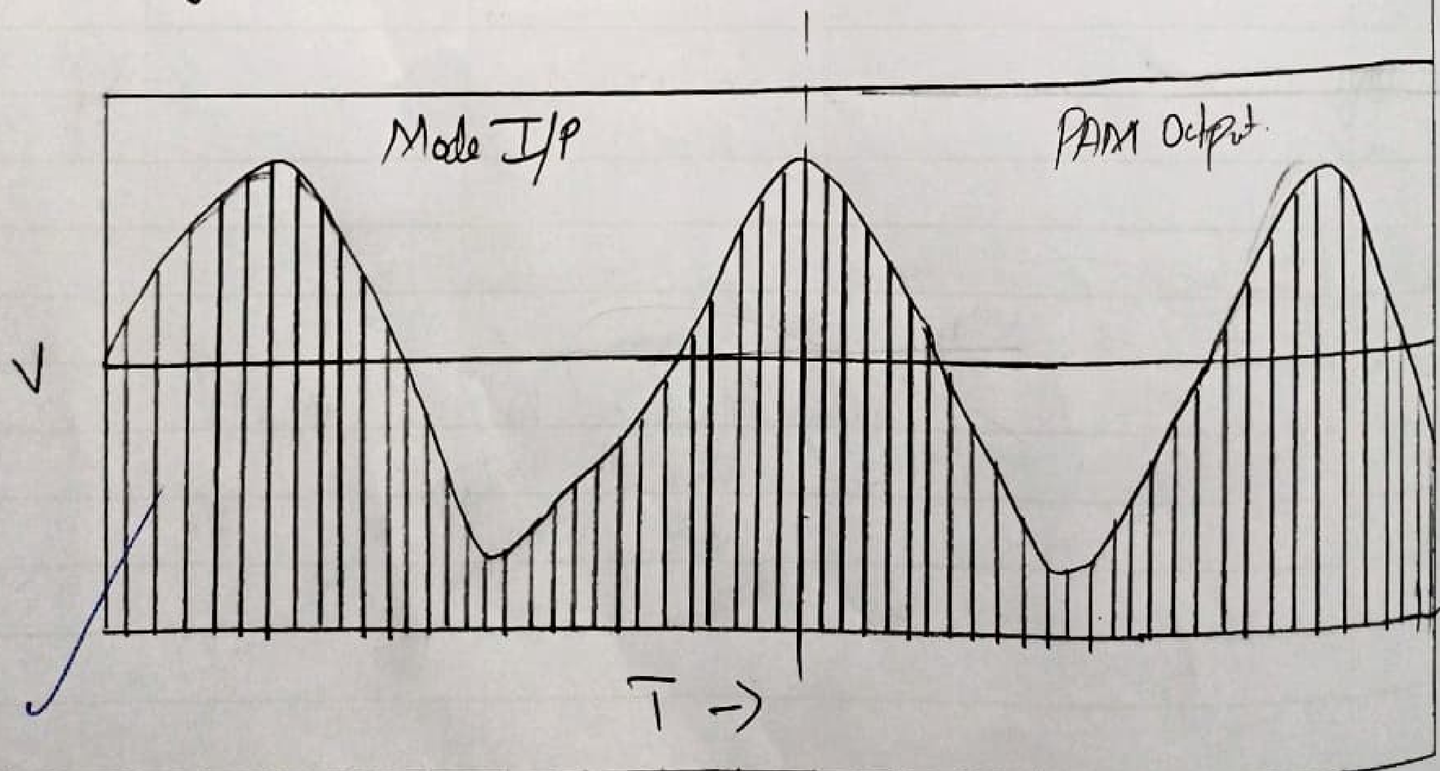
Circuit Diagram:



Model graph:

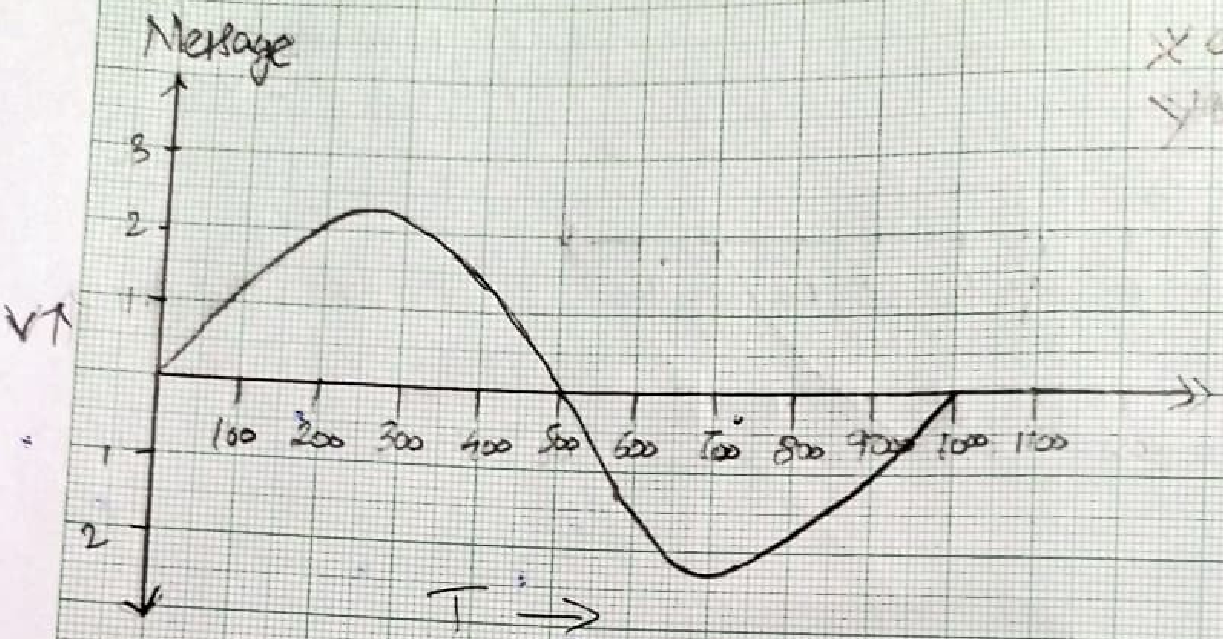


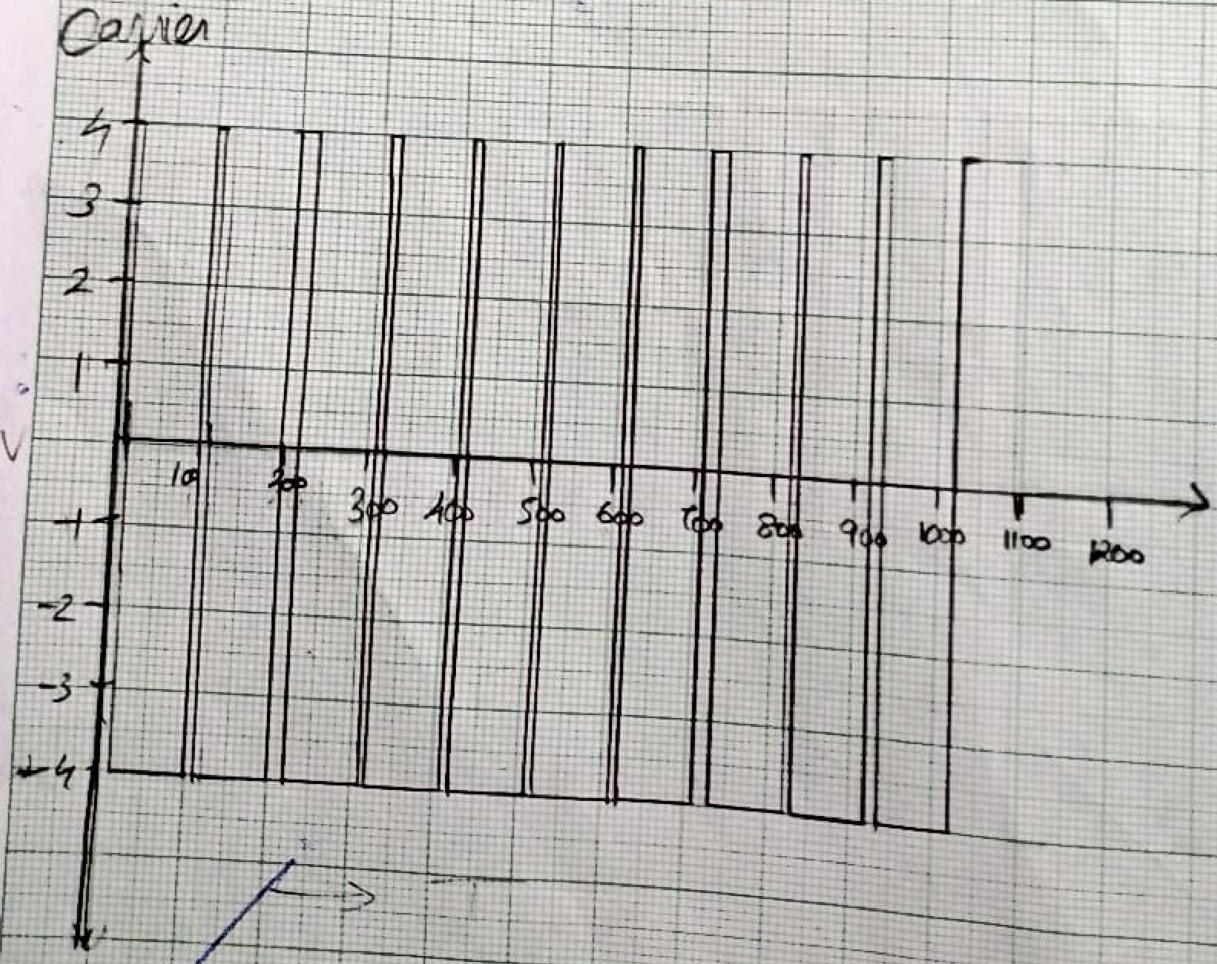
Observation Table:-

Name of the Signal	Amplitude (V)	frequency (Hz).
Message Signal	2.2V	1.0081 KHz
Carrier Signal	3.94V	TON: 12 µs TOFF: 90 µs Freq: 9.803 KHz
PAM Signal.	PAM1 = ~~3~~362.5 mv PAM2 = 475 mv PAM3 = 725 mv PAM4 = 988.5 mv PAM5 = 1.175V PAM6 = 1.181V PAM7 = 1.05 V PAM8 = 806.25 mv PAM9 = 556.25 mv PAM10 = 381.5 mv	TON: 12 µs TOFF: 90 µs Frequency: 9.803 kHz

Exp:4 PAM.

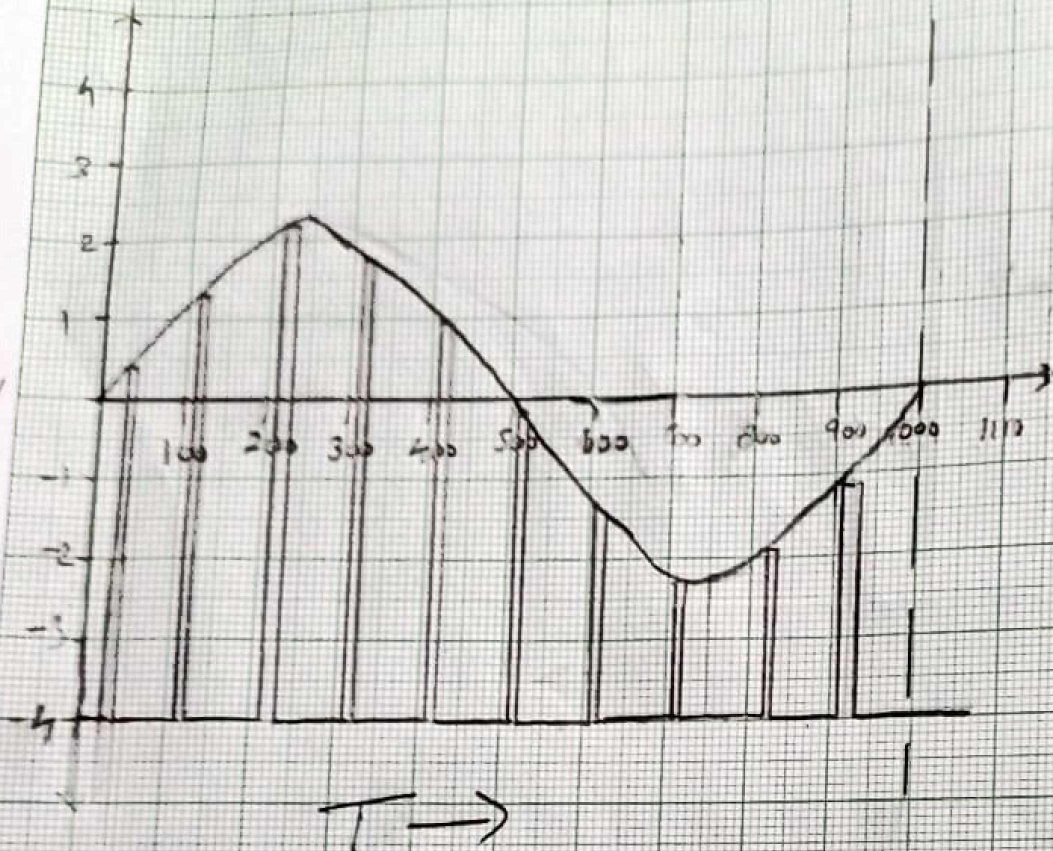
Scale
X axis 1 cm = 100μs
Y axis 1 cm = 1V





PAM output

Scale:
x axis: 1cm = 100µs
y axis: 1cm = 1V



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Pulse Width Modulation

Aim:

To construct and generate Pulse Width modulation and Plot the output Waveform.

Components Required:

1. IC 555 - 1 No
2. Resistor - 1KΩ - 2Nos
3. CRO - 30MHz - 1Nos
4. Function generator - (0-10 Mhz) - 1 Nos
5. Power Supply - (0-30V) - 1 Nos
6. Bread Board - 1Nos
7. Capacitor ~~s~~ - 0.01μF, 10μF - 1Nos.

Theory:

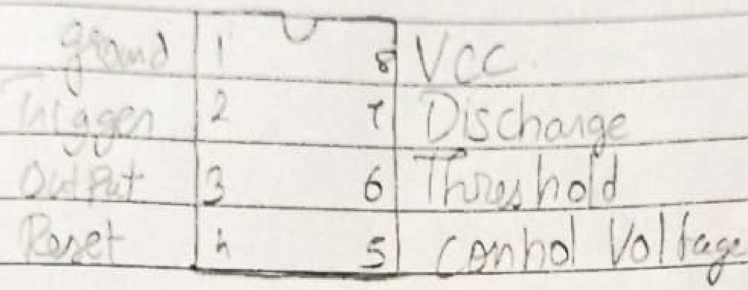
In Pulse width modulation, the width of individual Pulses in the pulse Train is Varied from its default Value in accordance with the Instantaneous amplitude of the modulating Signal at Sampling intervals.

The amplitude and Position of the Pulse is kept constant. Pulse width modulation is also called as Pulse length modulation (PLM) or Pulse duration modulation (PDM).

Pulse width modulation is mostly used in control applicants

Such as motor control and light control system.

Pin diagram:



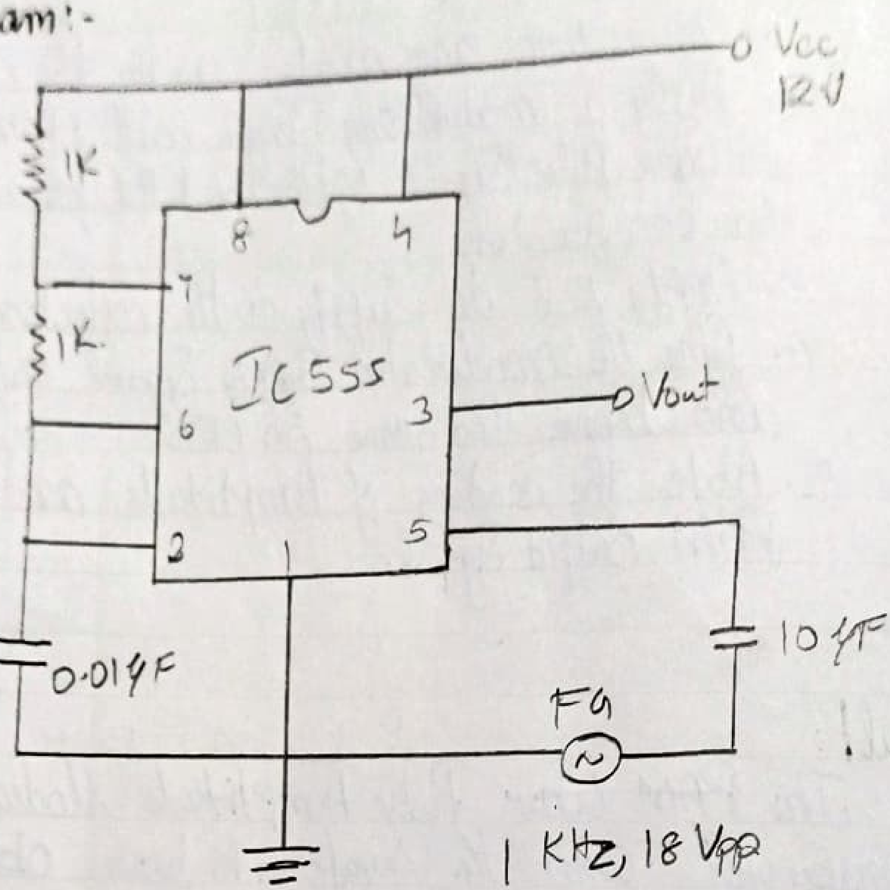
Procedure:

1. Connect the circuit as per shown in the diagram
2. Set the amplitude of the input Signal 5V
3. observe the PWM output at Pin no.3
4. Plot the graph for both input and output Signal.

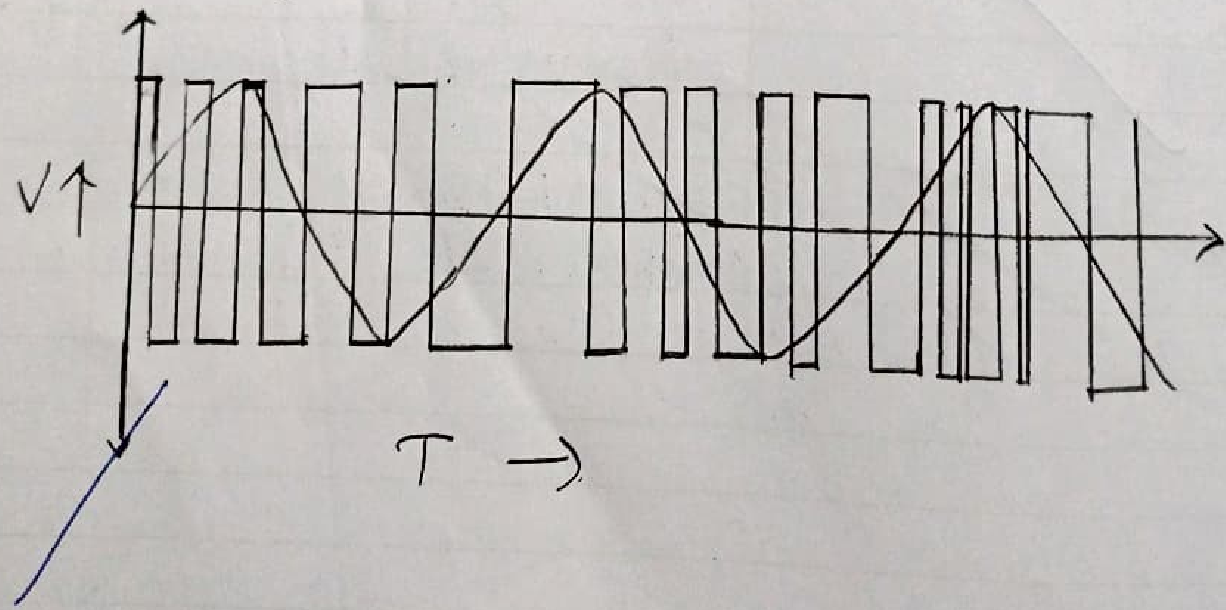
Result:

We have generated the Pulse width modulation and the graph has been Plotted.

Circuit Diagram:-



Model graph:



Observation Table:

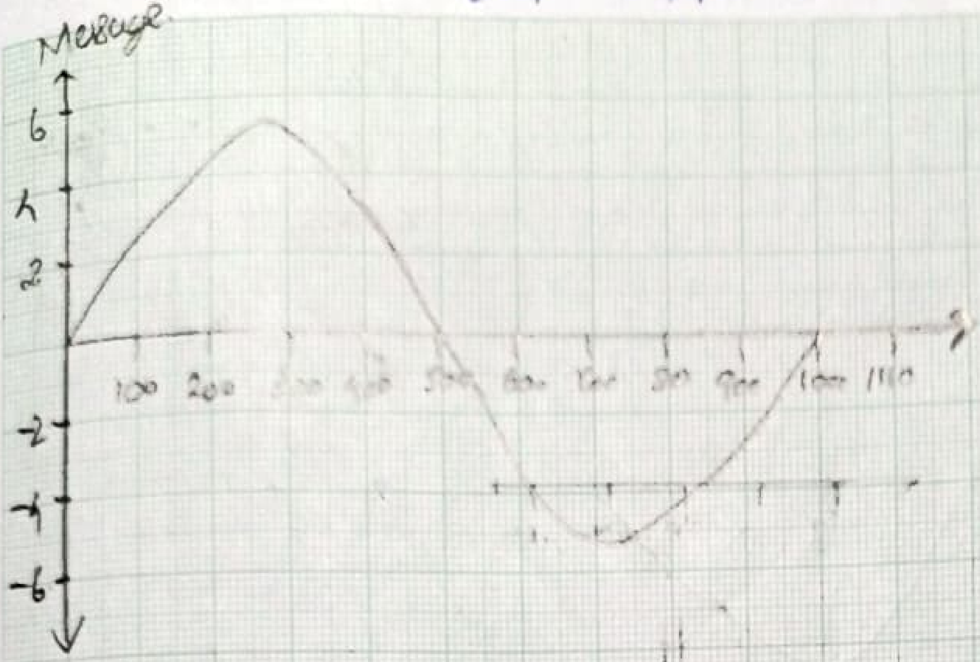
Name of the Signal.	Amplitude (V)	Time period / Frequency (Hz)
Message	5.5V	T: 1.006 ms F = 999.36 HZ
Carrier Signal.	5.4V	TON: 92 µs TOFF: 48 µs F = 7.1KHZ
PWM Output	5.2V	TON = 25µs TOFF = 60µs TON = 30µs TOFF = 34µs TON = 400µs TOFF = 52µs TOFF = 70µs TON = 78µs TOFF = 24µ TON : 80µs TON: 566µs TOFF: 458µs T: 1024 µs F: 976.5625.

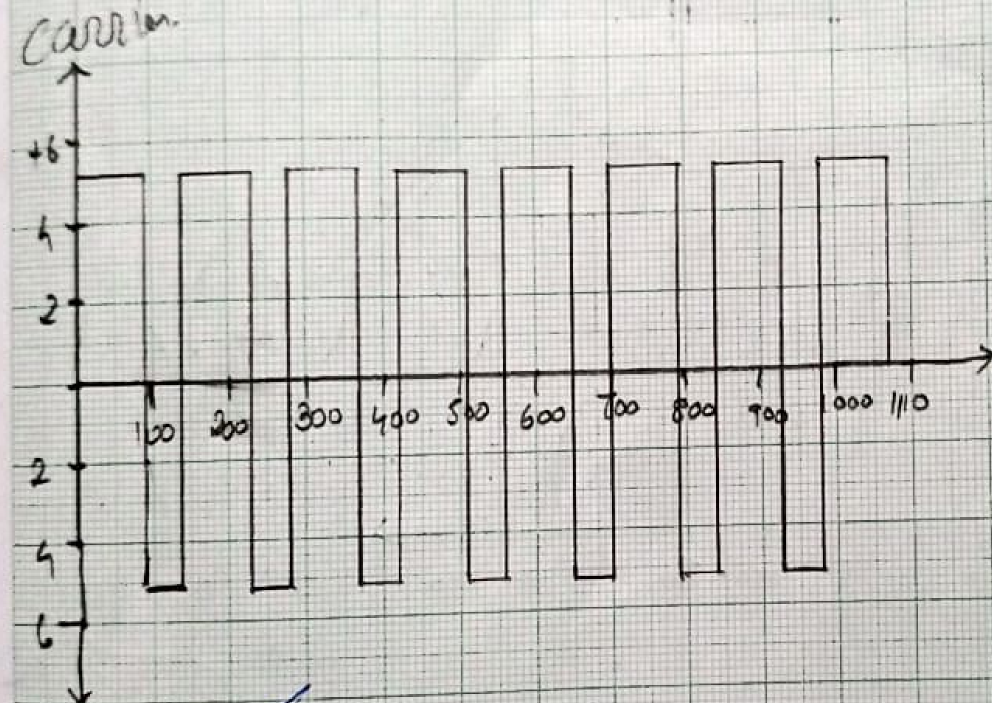
Exp 5 : PAM PWM.

Scale.

X : 1 cm = 100 µs

Y : 1 cm = 2V.





Scale
x axis : 1cm = 100μs
y axis : 1cm = 2V