Adm No. - U20CS110

Date

Expt. No. 01

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Experiment No - 1

Spectrum Analyser and observe spectrum

Aim: To study spectrum analyser and observe spectrum of sinusoidal signal and square wave. Draw the input waveforms in time domain and their output spectra for 5 different set of frequencies and amplitudes for each input.

Apparatus: Spectrum Analyser (9KHz - 3GHz) function Generator.

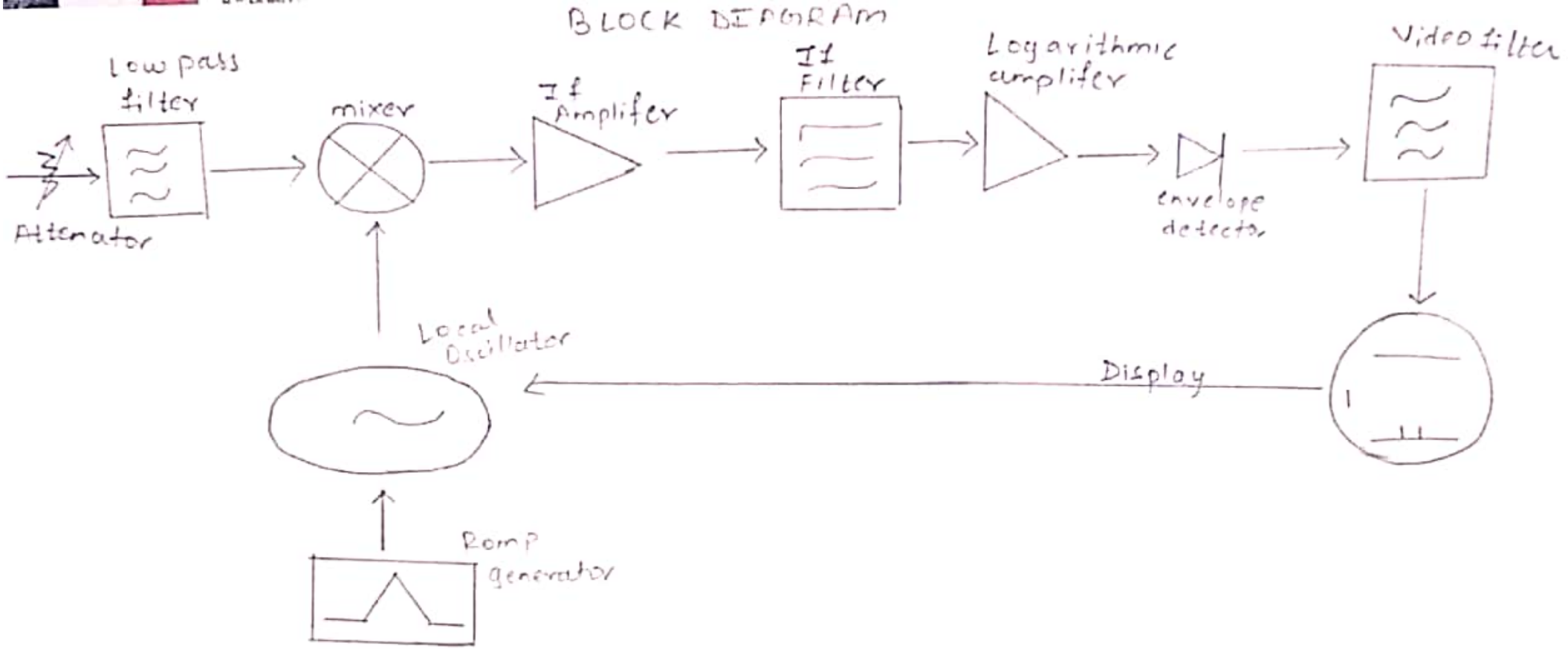
Theory: A spectrum analyzer is a laboratory instruments that displays signal amplitude (strength) as it varies by signal frequency. The frequency appears on horizontal axis and the amplitude is displayed on vertical axis.

A spectrum analyser can be used to determine wheather a wireless transmitter is working according to the federally defined standards for purity of emissions. Output signals at frequencies other than the intended communications frequency appears as vertical line (pips) on the display.

A spectrum analyser interface is a device that can be connected to a wireless reciever or a personal computer to allow visual detection and analysis of electromagnetic

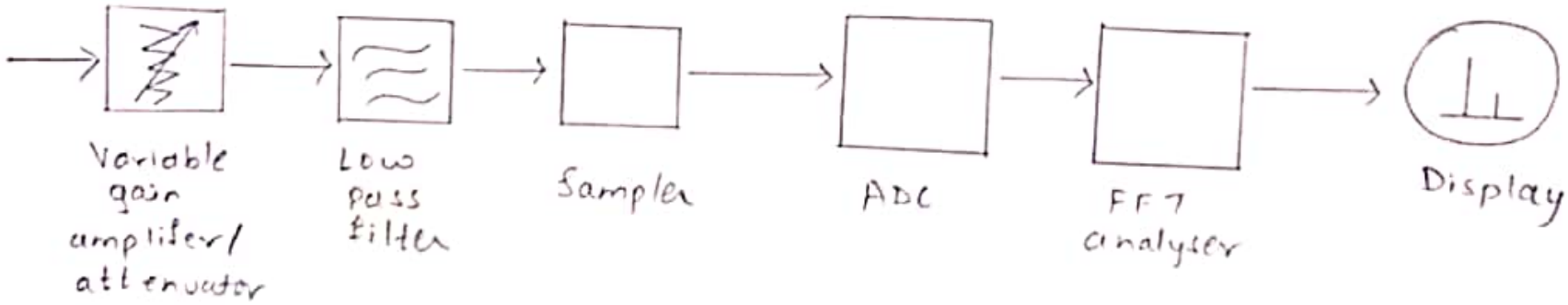
Teacher's Signature :

BLOCK DIAGRAM



(superheterodyne or swept frequency spectrum analyzer)

Block diagram



signals over the defined band of frequencies.

Features of LAB INSTRUMENT GSP-830 (GWINSTEK)
- 5 markers with delta markers and peak function
- 3 traces
- split windows with separate setting
- 6.4" TFT Color LCD, 640X480 resolution
- AC/DC/battery multi-mode power operation
- Autoset
- 9 KHz - 3 GHz frequency range.

Frequency selection and their selection method

(1) Frequency
- Frequency/span: The frequency key together with span key sets the frequency together
- View Signal (Center & span) center and span methods defines the center frequency and the left right bandwidth (span) to locate the signal.
- Setting frequency adjustment step: Frequency adjustment step defines arrow key resolution for center, start and stop frequency

2) Range: 9 KHz to 3 GHz

3) Set Center frequency Panel operation:
- Press frequency key
- Press F1 Center
- Enter the values using numerical and unit keys

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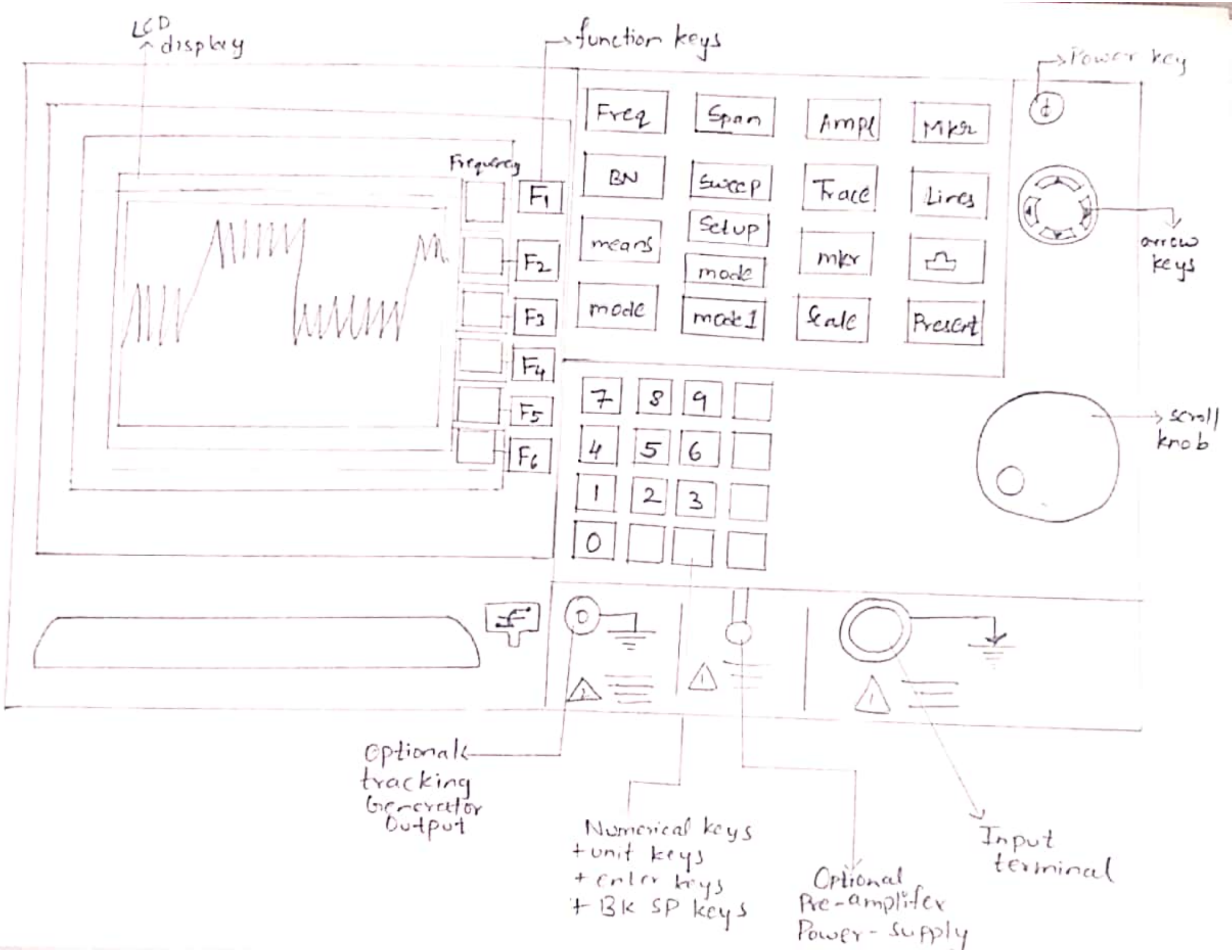

4) Set frequency Span Panel operation:
- Press span key
- Press F1 span
- Enter the value using num. key and unit keys. arrow keys and scroll nope.

5) View Signal (Start and stop)
- Start and Stop method defines the begin & end of frequency range.

6) Set start frequency (Panel operation:)
- Press frequency key, Press F2 key and Enter the value.

7) Set stop frequency Panel operation:
Press frequency key, Press F3 (stop) and Enter the value.

8) Full or Zero span: It sets the span to extreme values (3 GHz full) or 0KHz (Zero).

9) Display full frequency span. Panel operation:
- Press span key and then press F2 (full span)
- Range 3GHz (fixed) and centre frequency 1.5GHz
- Start frequency 0KHz to Stop frequency 3GHz

10) Zero span display
Zero span key can be obtained by pressing F3 key

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Observations

Waveform : SINE

S.NO.	Frequency (KHz)	Amplitude (mV)
1	2	1
2	2.5	1.1
3	3	1.5
4	4	2
5	5	2.4

Waveform Square

S.NO	Frequency (KHz)	Amplitude (mV)
1	2	1
2	2.5	1.2
3	3	1.5
4	4	1.6
5	5	2

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Amplitude Selection and settings Method

① Amplitude Amplitude key sets vertical attribute of the display, including the upper limit, vertical range and compensation for gain and loss

② Set vertical scale: It is defined by reference amplitude, amplitude range, measurement unit and external gain / loss.

③ Set reference amplitude It defines the amplitude at the top of displayed range

④ Select amplitude scale Panel operation:

- Press amplitude key and F2 (Scale dB/div)

Range: 10, 5, 2, 1 dB/div

Panel operation:

- Press amplitude key
- Press F3 (unit)
- Select and press the unit from F1 (dBm), F2 (dBmV) and F3 dB(μV)
- Press F6 (return to go back to previous menu)
- dBmV - 110 to +20 dBm, 0.1 dB resolution

Background The external offset Compensates the amplitude gain or loss caused by an external network or device.

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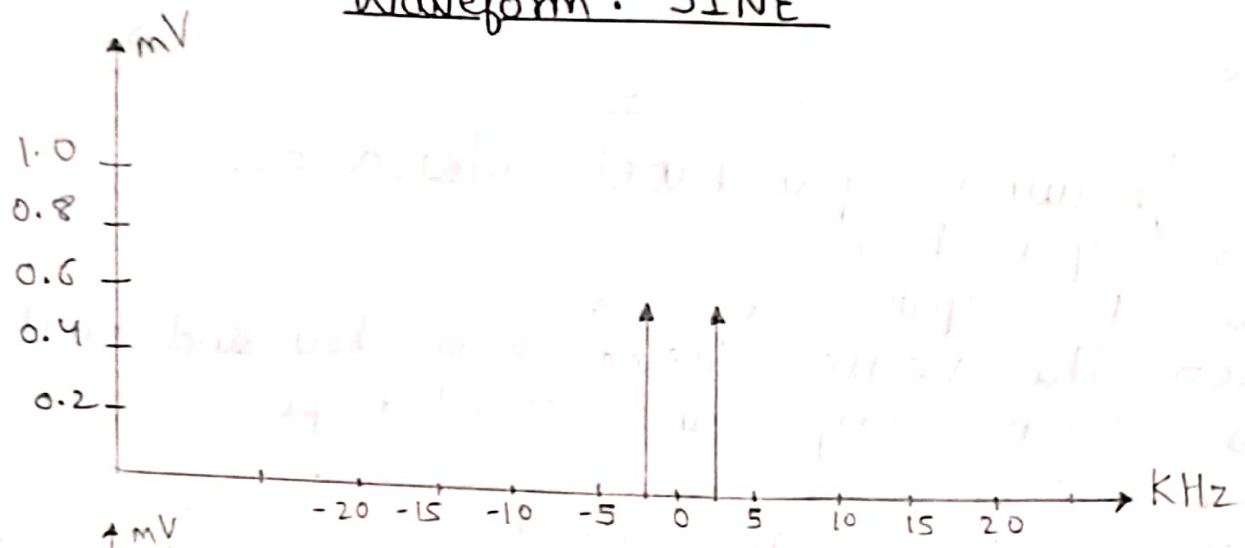
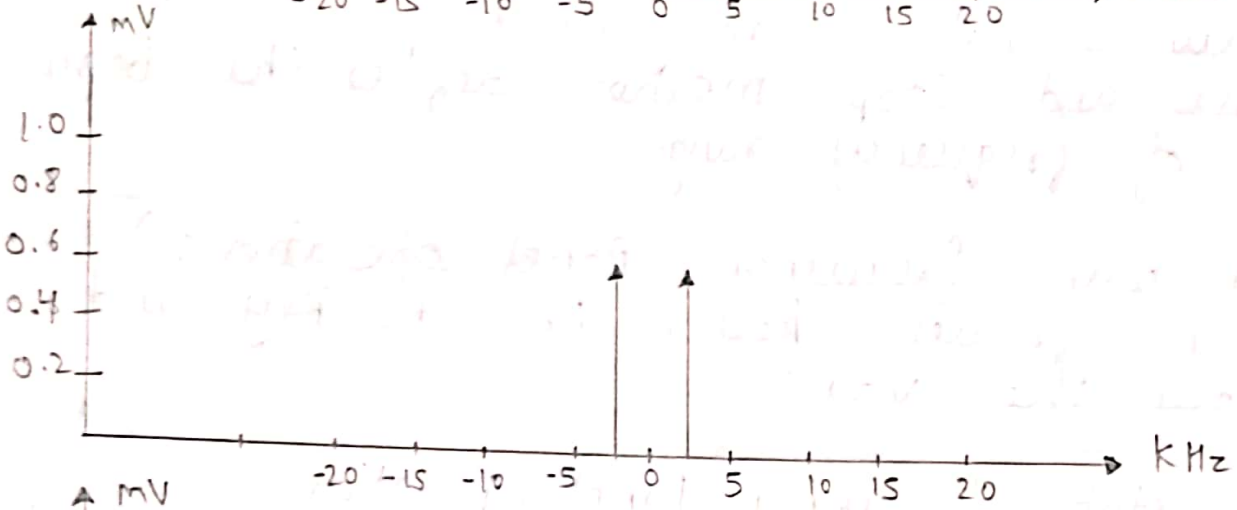
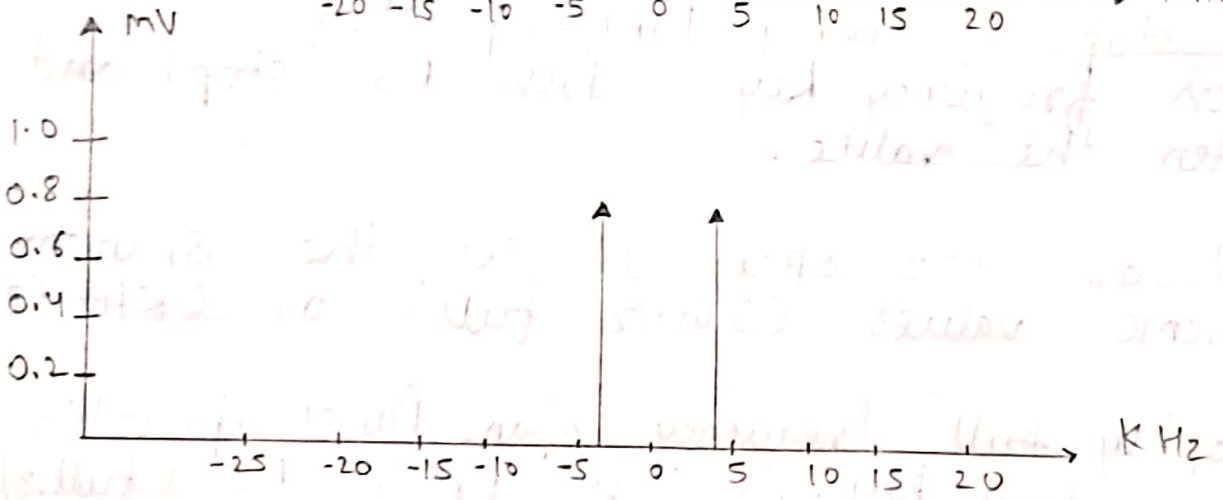
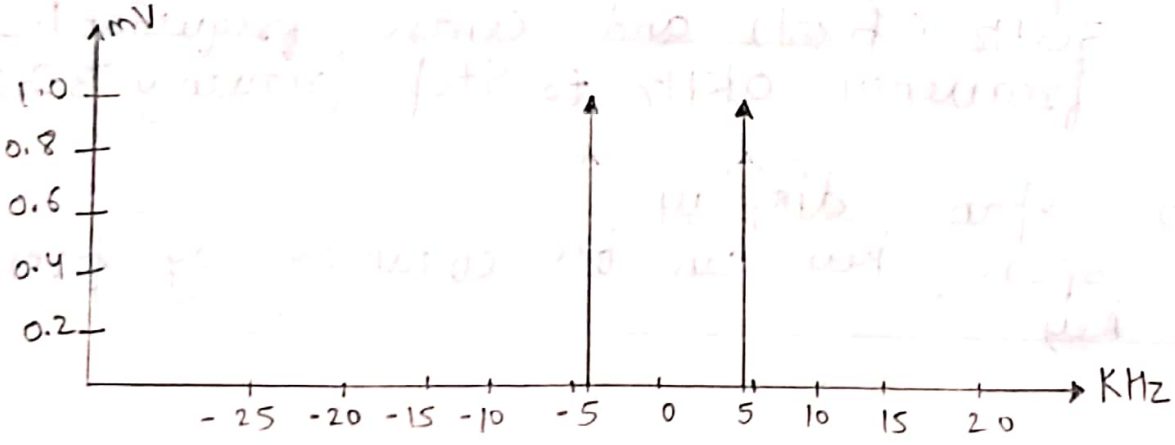
Waveform : SINE









Icon:

→ The amplitude Icon appears at the bottom of the display when the external offset changes.

- To check whether external spectrum analyser working properly
- To generate auxillary signal: press system key, press auxially signal, select an option from given menu, following signal will generate. It generates 10 MHz signal with 10 dB amplitude

Safety Guidelines

- Measurement input power
- Static charge protection
- Proper grounding
- Cooling measures

Types of Connectors

- SMA
- SMB
- BNC
- N-type
- UFL

Conclusion

In this experiment, we have verified and analysed the spectrum of sine and square waveform for different frequencies & amplitudes

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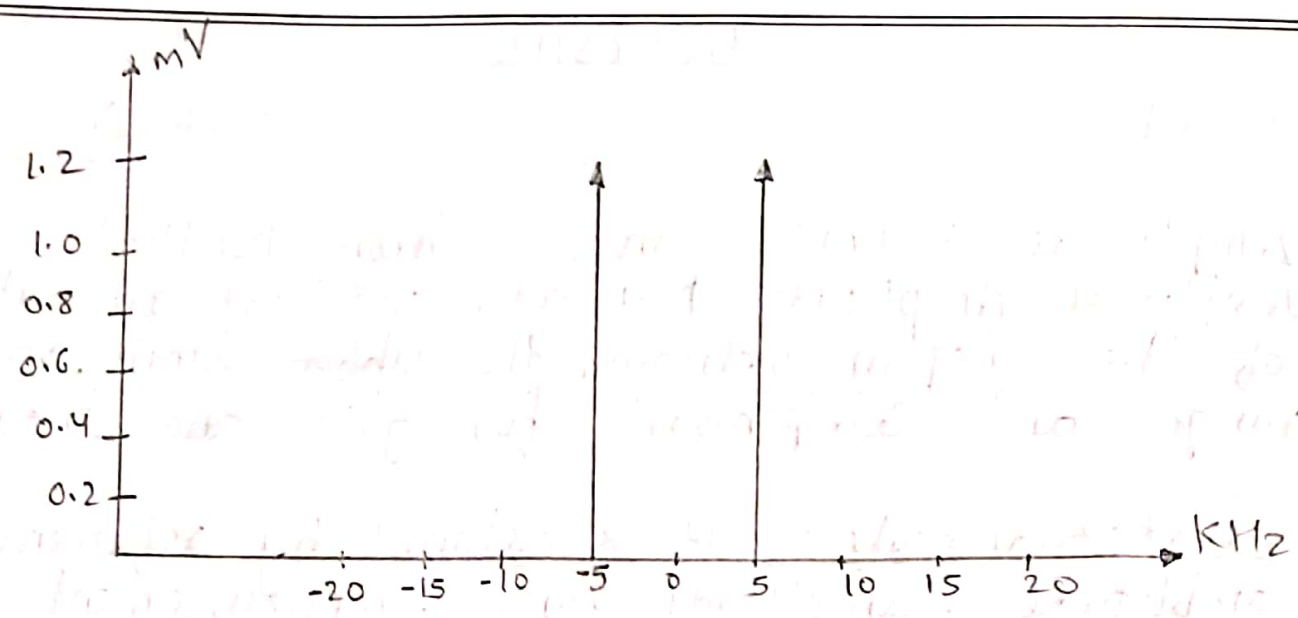
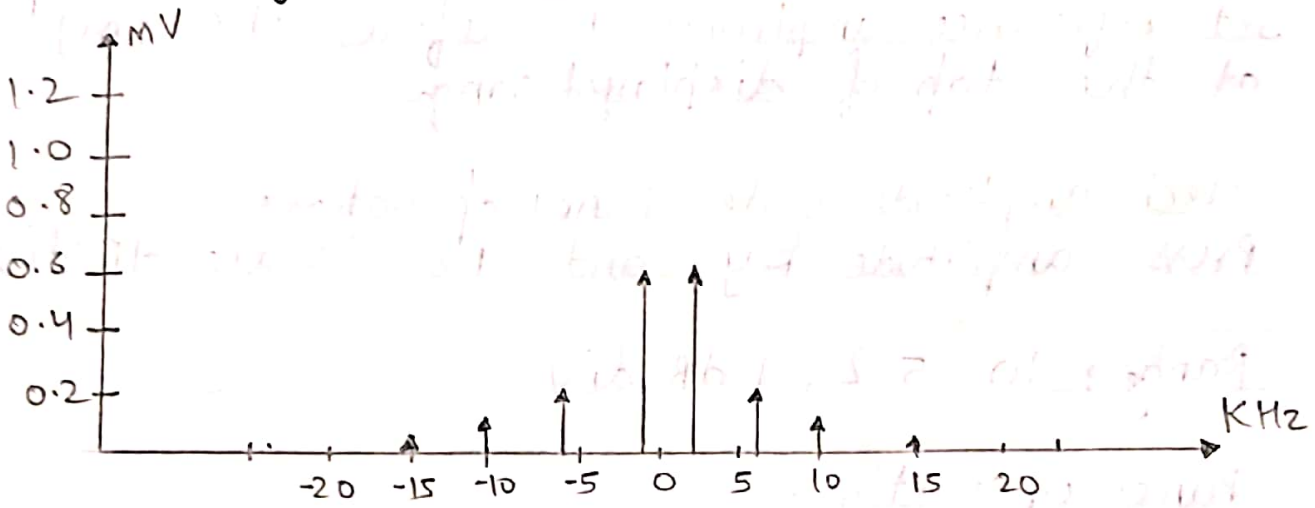
5)



Waveform (Square)

1)



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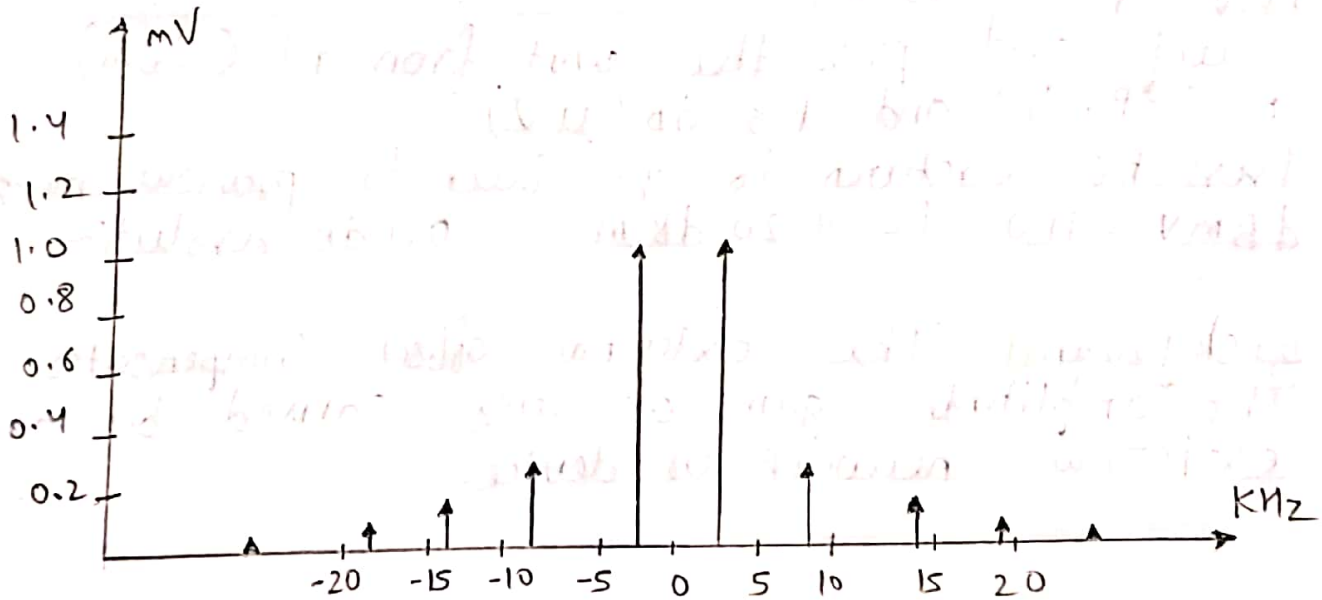

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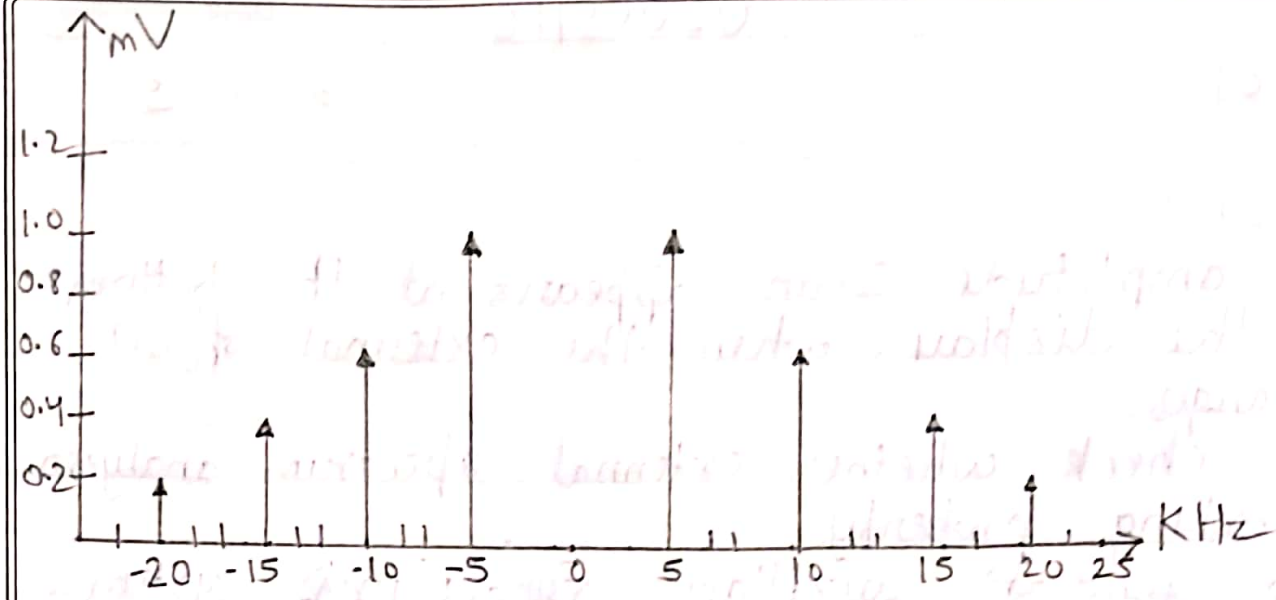
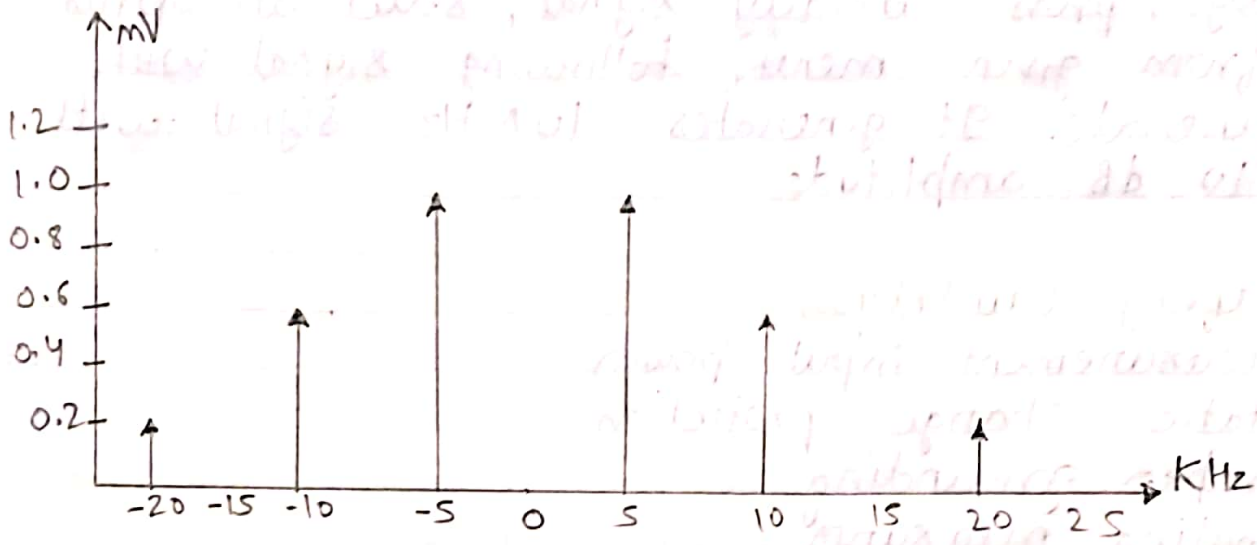


1)



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