QUAID -E- AWAM UNIVERSITY OF ENGINEERING SCIENCE & TECHNOLOGY NAWABSHAH

Department of Electronic Engineering

Subject: Instrumentation and Measurement 2nd term, 2nd Year 08ES Batch

Roll No _____Date_____

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Measurement of Frequency and Amplitude using

- **OSCILLOSCOPE**

Apparatus:

- Oscilloscope.
- Function Generator
- Connecting Leads

Oscilloscope

Oscilloscope is an Electronic equipment with CRT (Cathode ray tube) used to observe output from all kinds of electronic circuits with AC, DC, Analog, or Digital output. Oscilloscope is especially used to observe the time varying signals. Mostly Oscilloscope has two inputs called channels. Two different signals (as they vary against time in Normal mode) can be observed through two different channels or one signal in X and another in Y mode. Both input and output of the circuit can also be observed.

Usually channel 1 is used to observe input and channel 2 is used to observe output. The two channels can also be used to observe the sum and difference of the two signals. Probe of Oscilloscope is used in two ways: One is x1 mode and other is x10 mode.

Probe Calibration is carried out first on both channels, for this purpose Oscilloscope generates a calibration signal (square wave) with a frequency of 1 kHz, Time period of 1ms.Standard probes are two types X1 and X10.Signal attenuated by X10 cable is ten times of the original signal.

Function generator

Function generator is a device that generates periodically varying electric signals which vary with the time. There are four characteristics of a periodic wave form.

1. Wave shape 2. Time period or frequency 3. Amplitude 4. DC level.

Function generator can produce three basic wave shapes as shown in Fig.2.1

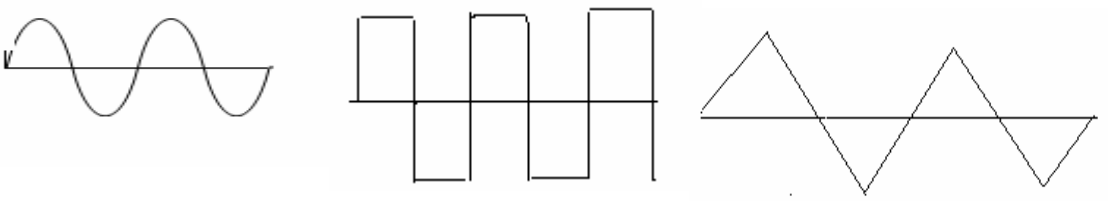
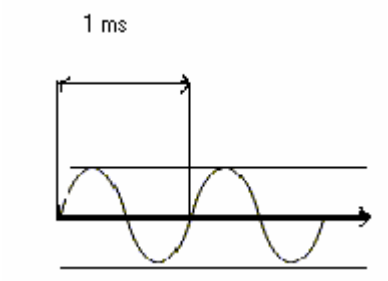
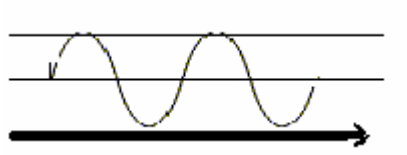


Fig.2.1: Sinusoidal, Rectangular and Triangular

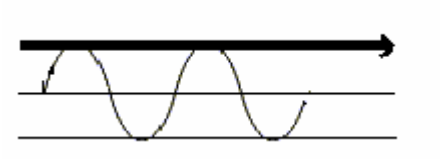
The function generator can produce these wave shapes with high frequencies as 10 MHz, with maximum amplitude of 11 volts i.e. 22 volts peak to peak. The function generator also helps to change DC level of the signal as shown in Fig.2.2.



Zero dc level



+1 volt dc level



- 1 volt dc level

Fig.2.2: Zero, +1,-1 dc level,

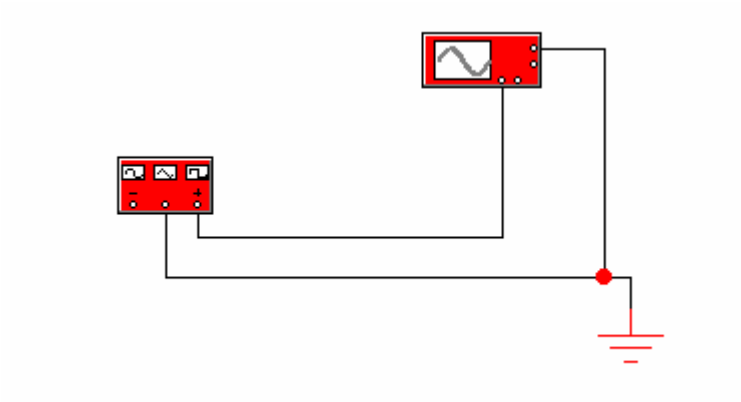


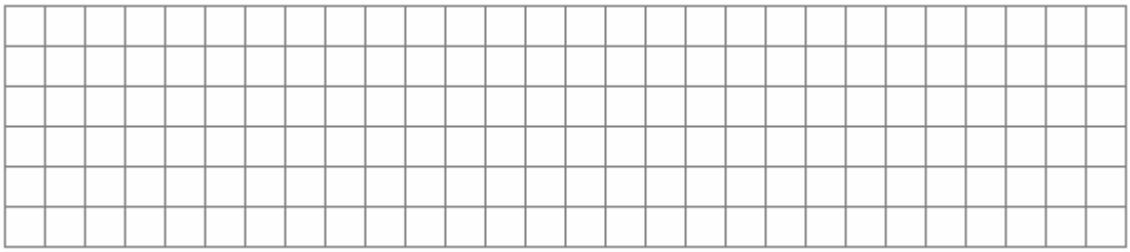
Fig 2.3. Oscilloscope connected with Function Generator

PROCEDURE

- Turn ON the power supplies of Oscilloscope and function generator.
- Set the dc/ac/Gnd switch to the Gnd position and adjust the Y position control until the zero volt reference is a line centered vertically on the screen.
- Once the zero volt level is established, move the dc/ac/Gnd switch to the dc position
- Press 'Sin; Key from function generator
- Set 1KHz frequency from function generator
- Use attenuation switch to set the signal amplitude at 1V.
- Connect the probe of function Generator to the Oscilloscope as shown in fig 2.3.
- Press CH: 1 to observe the wave on Channel 1.
- Set Volt/Div switch at 0.5 V/div, and time/div switch at 0.5ms/div.
- Calculate Amplitude of the signal by multiplying the number of vertical division covered by the signal with 0.5V.
- Calculate frequency = $\frac{1}{no:ofHorizontaldivisions * Tim/div}$

- Also calculate the percent error $\frac{selectedfrequency - Observedfrequency}{Selectedfrequency} x100$
- Repeat the procedure with different frequency, V/div and Time /div
- Connect CH: 2 of oscilloscope to other circuit to observe two waveform simultaneously

- Draw the waveform and clearly mark the horizontal and vertical divisions



Observations.

S.No	Wave shape	Selected frequency	Observed frequency	Percent Error
1.	Sin			
2.	Square			
3.	Sin			
4.	Triangle			
5.				

1. Write the model Numbers and ranges of Oscilloscope and Function Generator used in this experiment?

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2. Write the name of display used in Osciloscope

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Conclusion:

Write, what did you learn from this practical?

