Practical No. 3: Measure frequency, Time period, Peak value, RMS value of sinusoidal AC waveform using CRO.

I Practical Significance:

An alternating ac waveform is one that varies in both magnitude and direction in more or less an even manner with respect to time. An AC function can mathematically represent either a power source or a single source with the shape of an AC waveform

II Industry/Employer Expected Outcome(s)

Use electrical equipment efficiently for different electronic engineering application.

Use single phase AC supply for Electrical and electronic equipments

III Course Level Learning Outcome(s)

Analyze A.C. circuits for single phase and polyphase supply.

IV Laboratory Learning Outcome(s)

LLO 1 Use cathode ray oscilloscope.

LLO 2 Identify different parameters on CRO.

V Relevant Affective Domain related outcome(s)

Follow safety electrical rules for safe practices.

VI Relevant Theoretical Background

Waveform: The shape of the curve obtained by plotting the instantaneous values of voltage or current as ordinate against time is called its waveform.

Time period (T): The time taken in seconds to complete one cycle of an alternating quantity is called its time period. It is generally represented by *T*. Unit of time period is seconds.

$$T = \frac{1}{f}$$

Frequency (F): The number of cycles that occur in one second is called the frequency (*f*) of the alternating quantity.

$$F = \frac{1}{T}$$

Amplitude. The maximum value (positive or negative) attained by an alternating quantity is called its amplitude or peak value. The amplitude of an alternating voltage or current is designated by ***Vm*** or ***Im*** respectively.

Average Value: The average value of a alternating quantity is equal to the average of all its instantane values over a period of time.

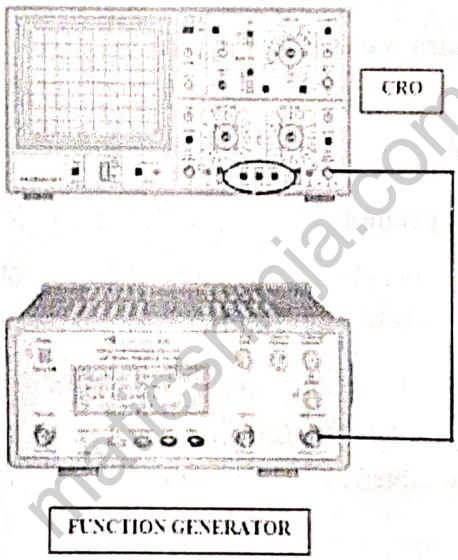
$$Vavg = 0.637 * Vmax$$

Peak Value: It is the maximum value attained by an alternating quantity. The peak or maximum valu an alternating voltage or current is represented by ***Vm* or *Im*.**

R.M.S Value: The effective or R.M.S. value of an alternating current is that steady current (d.c.) w when flowing through a given resistance for a given time produces the same amount of heat as prod by the alternating current when flowing through the same resistance for the same time.

$$Vrms = 0.707 * Vmax$$

VII Actual Circuit diagram used in laboratory with equipment Specifications:



VIII Required Resources/apparatus/equipment with specification:

S. No.	Name of Resource	Suggested Broad Specification	Quanti
1	CRO with probe	10 Hz- 30 MHz	1 N
2	Function Generator	0.1 Hz – 11 MHz	1 N

IX Precautions to be followed:

Connect the function generator output to the CRO's channel using CRO probe properly.

X Procedure

1. Connect the function generator output to the CRO's channel using CRO probe.
2. Adjust the volt per division and time per division of CRO such that the waveform of the current or voltage can be observed properly.
3. Adjust the peak to peak value of voltage
4. Measure and note down the time period and peak value of sine wave
5. Switch of the supply

XI Required Resources/apparatus/equipment with specification:

S. No.	Name of Resource	Suggested Broad Specification	Quantity
1	CRO with probe	10 Hz – 30Hz	1 No
2	function Generator	0.1 Hz – 11 MHz	1 No.

XII Actual Procedure Followed:

1. Connect the function generator output to the CRO's channel using CRO probe.
2. Adjust the volt per division and time per division of CRO such that the wave form of current or voltage can be observed properly
3. Adjust the peak to peak value of voltage
4. measure and note down time period and peak value of sine wave
5. Switch of the supply

XIII Observations:

1. Time period of AC waveform (T)= 4 division
2. Time per division= 2usec – division
3. Peak value of ac waveform= 6 Division
4. Volt per division= 6.0.5

Calculations:

1. Time period of ac waveform (T)= ....4.....division X ....2.... Time per divisio .....8 μ..... Seconds
2. Peak value of ac waveform= .....6..... division X .....0.5..... volt per division = ...3.... volts
3. R.M.S. value of ac waveform = Peak value X 0.707=.....2.121..... Volts
4. Average value of ac waveform = Peak value X 0.637=.....1.91..... Volts

XIV Results:

1. **Time period**.....8.....**seconds**
2. **Peak value** .....3..... **volts**
3. **R.M.S. value**.....2.121.....**volts**
4. **Average value**.....1.91.....**volts**

XV Interpretation of results

Hence from this practical studed that measurment of vario AC quality detaerment CRO.

XVI Conclusion and recommendation

Hence from this practical studed that measurment of vario AC quality detaerment CRO

XVII Practical related questions (Provide space for answers)

Define waveform, instantaneous value, cycle, amplitude, time period, frequency, angular frequency, R.M.S. value, average value, peak value

1. Wave form : The shape of the curve obtained by ploting the instanteneous value or current as ordinate againt time is called at waveform.

2. Time period(T) : The time is seconds to complete one cycle of an alternating quantity is called as Time period.

3. Amplitude :- The maximum value (positive or negative) attained by alternating quantity is called amplitud or peak value.

- Frequency: The number of cycles that occur in one second is called the frequency.
- Average value: The average value of alternating quantity is equal to the average of all instantaneous value over a period of time.
- Peak value: It the maximum value attained by alternating quantity. The peak or maximum an alternating voltage or current is represented by Vm or Im
- RMS value: The effective or RMS value of an alternating current is that steady current (d.c) which when flowing through a given resistance for a given time produces the same amount of heat a produce by the alternating current when flowing through the same resistance for the same time

XVIII References/Suggestions for further reading:

1. www.electrical4u.com
2. www.howstuffworks.com
3. www.electricaltechnology.org