Practical No. 2: Measure frequency, Time period, Peak value, RMS value of sinusoidal AC waveform for resistive and inductive circuit 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):

Calculate and measure basic electrical quantities and parameters.

IV Laboratory Learning Outcome(s):

LLO Interpret the AC waveform for resistive and inductive circuit displayed 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 instantaneous 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 value of an alternating voltage or current is represented by ***Vm*** or ***Im***.

XI Required Resources/apparatus/equipment with specification:

S. No.	Name of Resource	Suggested Broad Specification	Quantity
1	Rheostat	Suitable Rheostat	1
2	Inductor	Suitable Inductor	1
3	Voltmeter	Suitable Voltmeter	1
4	Ammeter	Suitable Ammeter	1
5	CRO	With 2 attenuator probes	1

XII Actual Procedure Followed:

1. Connect the circuit as per circuit diagram.
2. Connect the CRO for observing current and voltage waveform.
3. Repeat step 2 for different input voltages.

XIII Observations:

1. Time period of AC waveform (T)= 3.2 division
2. Time per division= 0.5 m/s
3. Peak value of ac waveform= 2 Division
4. Volt per division= 1 V

XIV Calculations:

1. Time period of ac waveform (T)= 3.2 division X ..... Time per division = 0.5 Seconds
2. Peak value of ac waveform= ..... division X ..... volt per division = ... volts
3. R.M.S. value of ac waveform = Peak value X 0.707= 1.414 Volts
4. Average value of ac waveform = Peak value X 0.637= 1.27 Volts

XV Results:

1. Time period : ....1.6.....seconds
2. Peak value: .....2.....volts
3. R.M.S. value: ...1.4.1.4.....volts
4. Average value: ..1.2.7.4.... volts

XVI Interpretation of results:

measure frequency, time period, rms value, peak value of a sinusoidal Ac waveform using C.R.O.

XVII Conclusion and recommendation:

Hence we studied that calculate & measure basic electrical quantities and parameters.

XVIII 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

* waveform : graical representation of Ac quamtity plated against time.
* Instamtaneous value: the value of that quamtity at a particular instant of time.
* Cycle : it consists of half positive and half negative point of Ac quamtity is called as cycle.
* amplitude : the maximum value or peak value of an Ac quantity is called amplitude.
* time period : the time taken is second by the wave form of an Ac quamtity to complete cycle is called time period
* frequency : the number of cycle completed by an alternating quamtity in one second is called as frequency.
* angular frequency : the rate of change of angle w.r.t time.
* R.M.S. value : it defined as 0.707 time of its maximum value called as RMS value.

* Average value : it defined as 0.637 times of its maximum value called as average value.

* peak value : the voltage measured from base line of an AC waveform to its maximum value is called peak value.

XVIII References/Suggestions for further reading:

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