SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

COIMBATORE-35

Accredited by NBA-AICTE and Accredited by NAAC – UGC with A+ Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

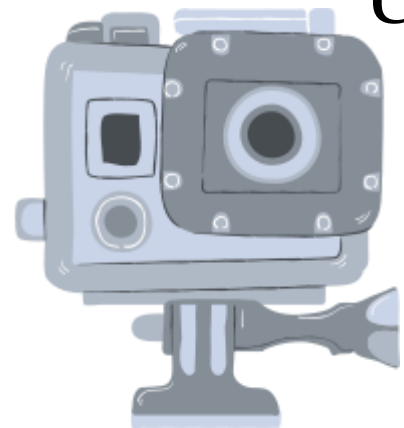# DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE NAME: 19EET205/ MEASUREMENTS AND INSTRUMENTATION

II YEAR / IV SEMESTER

Unit 1 –**MEASUREMENT OF VOLTAGE AND CURRENT**

Topic 6: Static and Dynamic Characteristics

01/12

19EET205/M&I/Mrs.B.CHRISTYJULIET/ AP/EEE

Static Characteristics Of Instruments And Measurement Systems

- Application involved measurement of quantity that are either constant or varies slowly with time is known as static.

➢ Accuracy

➢ Drift

➢ Dead Zone

➢ Static Error

➢ Sensitivity

➢ Reproducibility

19EET205/M&I/Mrs.B.CHRISTYJULIET/ AP/EEE

Static Characteristics

➢Static correction

➢Scale range

➢Scale span

➢Noise

➢Dead Time

➢Hysteresis.

➢Linearity

- ACCURACY: It is the closeness with an instrument reading approaches the true value of the quantity being measured.

- TRUE VALUE: True value of quantity may be defined as the average of an infinite no. of measured value.

- SENSITIVITY is defined as the ratio of the magnitude of the output response to that of input response.

- STATIC ERROR: It is defined as the difference between the measured value and true value of the quantity.

A=Am-At

Where   Am =measured value of quantity

At =true value of quantity.

It is also called as the absolute static error.

- SCALE RANGE: The scale range of an instrument is defined as the difference between the largest and the smallest reading of the instrument.

  Suppose highest point of calibration is X_{max} units while the lowest is X_{min} units, then the instrument range is between X_{min} and X_{max}.

- SCALE SPAN: Scale span or instrument span is given as Scale span= $X_{max} - X_{min}$

  It is the difference between highest and lowest point of calibration.

- Reproducibility is specified in terms of scale readings over a given period of time.

- Drift is an undesirable quality in industrial instruments because it is rarely apparent and cannot be maintained.

It is classified as

a) Zero drift

b) Span drift or sensitivity drift

c) Zonal drift.

Dynamic Characteristics of Measurement System

- Speed of response

- Measuring lag

- Fidelity

- Dynamic error

- SPEED OF RESPONSE :It is defined as the rapidity with which a measurement system responds to changes in measured quantity. It is one of the dynamic characteristics of a measurement system.

- FIDELITY: It is defined as the degree to which a measurement system indicates changes in the measured quantity without any dynamic error.

Dynamic Error

- It is the difference between the true value of the quantity changing with time and the value indicated by the measurement system if no static error is assumed. It is also called measurement error. It is one the dynamic characteristics.

Measuring Lag

- It is the retardation delay in the response of a measurement system to changes in the measured quantity. It is of 2 types:

- Retardation type: The response begins immediately after a change in measured quantity has occurred.

- Time delay: The response of the measurement system begins after a dead zone after the application of the input.