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MEASUREMENT AND MEASURING INSTRUMENTS PART 1

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INTRODUCTION

- The measurement of a given quantity is the result of comparison between the quantity to be measured and a definite standard.
- The instruments which are used for such measurements are called measuring instruments.
- The three basic quantities in the electrical measurement are current, voltage and power

- The measurement of these quantities is important as it is used for obtaining measurement of some other quantity or used to test the performance of some electronic of some electronic circuits or components etc.

Classification of Measuring Instruments

The various electrical measuring instruments can be broadly divided into two classes

1. Absolute instruments
2. Secondary instruments.

Secondary instruments may be classified according to their functions as

- (*i*) indicating instruments
- (*ii*) integrating instruments
- (*iii*) recording instruments.

Absolute instruments

- instruments which gives the value of the quantity to be measured in terms of the constants of the instrument and its deflection are called *absolute instruments.*
- More accurate
- No previous calibration or comparison is necessary
- Mathematical calculations are required for the knowing the physical constant
- They are used only in standard laboratories as standardising instruments.
- Eg; tangent galvanometer, Religh's current balance, absolute electrometer

Secondary instruments

- Those instruments in which the electrical quantity being measured is given directly by the deflection of the instrument are called *secondary instruments*.
- provided with a calibrated scale.
- The calibration is done with the help of an absolute instrument or another calibrated instrument.
- secondary instruments are most generally used in everyday work.
- Less accurate than absolute instruments

Indicating instruments

Those instruments which directly indicate the value of the electrical quantity *at the time* when it is being measured are called *indicating instruments*

- ***e.g. ammeters, voltmeters and wattmeters.***
- **In such instruments, a pointer moving over a graduated scale directly gives the value of the electrical quantity being measured.**
- **For example, when an ammeter is connected in the circuit, the pointer of the meter directly indicates the value of current flowing in the circuit at that time.**

Integrating instruments

- Those instruments which measure the total quantity of electricity (in ampere-hours) or electrical energy (in watt-hours) in a given time are called *integrating instruments*
- *e.g. ampere-hour meter and watt-hour meter.*
- In such instruments, there are sets of dials and pointers which register the total quantity of electricity or electrical energy supplied to the load.

Recording instruments

- Those instruments which give a continuous record of the variations of the electrical quantity to be measured are called *recording instruments*.
- A recording instrument is merely an indicating instrument with a pen attached to its pointer.
- Used to observe load variations continuously
- *Recording voltmeter, recording wattmeter, storage oscilloscope, ECG, XY plotter*

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The instrument which give the value of quantity to be measured in terms of deflection and instrument constants are

- Secondary instruments
- Indicating instruments
- Integrating instruments
- Absolute instruments

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Which of the following is an absolute instrument

- Tangent galvanometer
- Ammeter
- Wattmeter
- voltmeter

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An instrument in which the value of electrical quantity to be measured can be determined from the deflection of the instrument when it has been precalibrated by comparison with an absolute instrument

- Absolute instruments
- Secondary instruments
- Recording instruments
- Integrating instruments

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Ammeter and voltmeter comes under the category of

- Recording type
- Indicating type
- Integrating type
- Standard type

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Energymeter can be classified as an

- Indicating instruments
- Deflecting instruments
- Recording instruments
- Integrating instruments

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THANK YOU