

Applications

1. It can be used for measurement for non- electrical quantities such as acceleration, vibration, sound intensity and dynamic pressure.
2. It is widely used in aero dynamics, supersonic wind tunnels, bomb blast etc.
3. It is used in ultrasonic, non- destructive test, ultrasonic flow meters etc.
4. It is used in spark ignition engine and electrostatic dust filters.

TWO MARKS

1. What is meant by measurement?

Measurement is an act or the result of comparison between the quantity and a predefined standard.

2. Mention the basic requirements of measurement.

- The standard used for comparison purpose must be accurately defined and should be commonly accepted.
- The apparatus used and the method adopted must be provable.

3. What are the 2 methods for measurement?

- Direct method and
- Indirect method.

4. Explain the function of measurement system.

The measurement system consists of a transducing element which converts the quantity to be measured in an analogous form. The analogous signal is then processed by some intermediate means and is then fed to the end device which presents the results of the measurement.

5. Define Instrument.

Instrument is defined as a device for determining the value or magnitude of a quantity or variable.

6. List the types of instruments.

- The 3 types of instruments are

- Mechanical Instruments
- Electrical Instruments
- Electronic Instruments.

6. Give the applications of measurement systems.

- The instruments and measurement systems are used for
- Monitoring of processes and operations.
- Control of processes and operations.
- Experimental engineering analysis.

7. Define static characteristics?

Static characteristics are defined for the instrument which measure the quantities which do not vary with time

8. Define Dynamic characteristics?

When the quantity under measurement changes rapidly with time. It is called dynamic characteristics.

9. What are the various Dynamic characteristics?

Various Dynamic characteristics are

1. Speed of Response
2. Fidelity
3. Lag
4. Dynamic Error

10. What are the various Static characteristics?

Various Static characteristics are

1. Accuracy
2. Precision
3. Resolution
4. Error
5. Sensitivity

- 6. Threshold
- 7. Reproducibility
- 8. Zero drift
- 9. Stability
- 10. Linearity

11. What are the various units of measurements?

Units are the fundamental quantities of physics; various units of measurements are,

Fundamental Units e.g.: Length (m), Mass (kg), and time (S)

Supplementary

Derived Units

12. Define Calibration?

Calibration is the procedure for determining the correct value of measurand by comparison with the standard one.

13. Define Limiting Error?

The components like the resistor, inductor, capacitor are guaranteed to be within a certain percentage of rated value. This percentage indicates the deviations from the normal or specified value of the particular quantity. These deviations from the specified value are called limiting errors. These are also called Guarantee Error.

14. Define transducer?

A device which converts a physical quantity into the proportional electrical signal is called a transducer

15. Mention some advantages of electrical transducer?

- 1. Power requirement of the transducer is very small
- 2. Reduced effects of friction and other mechanical nonlinearities.
- 3. Less Weight and portable
- 4. The output of the transducer may be easily used transmitted and processed for the purpose of measurement

16. What are the classification of transducers?

(i) Capacitive Transduction

- (ii) Electromagnetic transduction
- (iii) Inductive Transduction
- (iv) Piezo electric Transduction
- (v) Photovoltaic Transduction
- (vi) Photo conductive Transduction

17. What is an inverse transducer?

Inverse transducer converts electrical quantity into non electrical quantity.

For example Loudspeaker converts an electrical signal into sound signal

18. Define Gauge factor?

Gauge factor is defined as the unit change in resistance per unit change in length. It is denoted by K or S. It is also called as sensitivity of strain gauge.

$$s = \frac{\Delta R/R}{\Delta l/l}$$

19. Mention some advantages of LVDT?

1. Linearity
2. Infinite Resolution
3. High Output
4. High sensitivity
5. Ruggedness

20. Mention the application of LVDT?

LVDTs are used to measure

1. Displacement
2. Force
3. Weight
4. Pressure

5. Position

21. Mention the applications of Capacitive transducer?

1. It is used for measurement of both linear and angular displacement.

2. It is used for measurement of force and pressure

3. It is used for measurement of humidity.

4. Capacitive transducers are commonly used in conjunction with mechanical modifiers for measurement of volume, density liquid level, weight etc.

22. What is piezoelectric effect?

When two opposite face of a thin slice of certain crystals are subjected to a mechanical force, then opposite charges are developed on the two faces of the slice. The magnitude of the electric potential between the two faces is proportional to the deformation produced.

REVIEW QUESTIONS

PART A

- 1 Define Standard deviation.
- 2 Why calibration of instrument is important?
- 3 What are the different calibration methodologies?
- 4 Define Calibration.
- 5 List the functional elements of the measurement systems.
- 6 What are the main static characteristics?
- 7 Define static error.
- 8 What are the types of errors in measurements?
- 9 Define variance.
10. What is standard? What are the different types of standards?