Module - 1 - SAT

1. Mention the basic requirements of measurement.

The basic requirements of measurement are

i. The standard used for comparison purpose must be accurately defined and should be commonly accepted.

ii. The apparatus used and the method adopted must be provable.

2. State the two methods for measurement.

The two methods of measurement are

i. Direct method and

ii. Indirect method.

3. State 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.

4. List the three types of instruments.

The three types of instruments are:

i. Mechanical Instruments

ii. Electrical Instruments and

iii. Electronic Instruments.

5. Classify the instrument based on their functions.

Instruments are classified into three types based on their functions. They are

i. Indicating instruments

ii. Integrating instruments

iii. Recording instruments

6. Give any three applications of measurement systems.

The applications of measurement systems are

i. Monitoring of processes and operations.

ii. Control of processes and operations.

iii. Experimental engineering analysis.

7. Why calibration of instrument is important?

The calibration of all instruments is important since it affords the opportunity to check the instrument against a known standard and subsequently to errors in accuracy.

8. List the calibration procedure.

Calibration procedure involves a comparison of the particular instrument with either.

A primary standard

A secondary standard with a higher accuracy than the instrument to be calibrated or An instrument of known accuracy.

9. Define: Calibration

Calibration is defined as the process by which comparing the instrument with a standard to correct the accuracy.

10. Mention the functions performed by the measurement system.

The functions performed by the measurement system are

i. Indicating function

ii. Recording function

iii. Controlling function

11. List the functional elements of the measurement systems.

The three main functional elements of the measurement systems are:

i. Primary sensing element

ii. Variable conversion element

iii. Data presentation element

12. Write the characteristics of the measurement system.

Characteristics of measurement system is divided into two categories:

i. Static characteristics

ii. Dynamic characteristics

13. Write the main static characteristics?

The main static characteristics are:

i. Accuracy

ii. Sensitivity

iii. Reproducibility

iv. Drift

v. Static error

vi. Dead zone

vii. Resolution

viii. Precision

ix. Repeatability

x. Stability

14. Define static error

Static error is defined as the difference between the true value and the measured value of the quantity. Static error

$= A_t - A_m$

where

A_m =measured value of quantity

A_t =true value of quantity.

15 Define resolution

Resolution is defined as the smallest increment of quantity being measured which can be detected with certainty being measured which can be detected with certainty by an instrument.

16 Define threshold

Threshold is defined as the minimum value of the input at which the output starts

changing/increasing from zero.

17. Define linearity

The linearity is defined as the ability to reproduce the input characteristics symmetrically and linearly.

18. Define reproducibility

Reproducibility is defined as the degree of closeness with which a given value may be repeatedly measured. It is specified in terms of scale readings over a given period of time.

19. Define drift

Drift is defined as slow variation of reading from a fixed value.

20 Define speed response

Speed response 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.

Module-02 - SAT

(1) List three source of possible error in Instrument ?

Ans:- (1) Gross Error.
(2) Systematic
(3) Random.

(2) Define Instrumental Error ?

Ans:- These are errors inherent in measuring Instrument because of their Mechanical Structure.

(3) Substract 628 ± 3 from 826 ± 5.

Ans:- $N_1 = 826 \pm 5 \ (= \pm 0.625\%)$

$N_2 = 628 \pm 3 \ (= \pm 0.477\%)$

Difference $= (198 \pm 8) = (= \pm 4.04\%)$

(4) what is Instrument

Ans:- It is a device for determining the value or Magnitude of a quantity or variable.

(5) Define Standards

Ans:- The physical embodiment of a Unit of Measurement. is a standard.

for Example, the fundamental Unit of mass in the International System is Kilogram.

~~& Example, the fundamental Unit of mass in the International System~~

(6) Draw the functional Block diagram of Measurement System.

Ans:-

(6) Mention the purpose of the measurement?

→ To Understand an event or an operation.
→ To monitor an event or an operation.
→ To Control an event or an operation.
→ To Collect data for future Analysis.
→ To validate an Engineer design.

(7) Classify standard?

→ International standard.
→ primary standard.
→ Secondary standard.
→ Working standard.

(8) Define transducer & give an Example.

Ans:- Transducer is a device which Convert one form of Energy into Electrical Energy

A thermocouple Convert heat energy in to Electrical voltage.

(9) Classify Transducer?

Ans:- on the Basis of Transduction form used

(1) primary Transducer - Active Transducer
& Secondary Transducer - passive Transducer.

(10) Define arithmatic mean.

The Best approximation Method will be. Made when the number of reading would give the best Result.

(11) Define average deviation.

Ans:- By defination, avg deviation is the sum of absolute value of the value deviation divided by the number of reading.