



# SNS COLLEGE OF TECHNOLOGY

Coimbatore-35

An Autonomous Institution

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A+' Grade

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

## *DEPARTMENT OF MECHATRONICS*

# 19MCB303 – SENSORS AND SIGNAL PROCESSING

## UNIT 1 – SCIENCE OF MEASUREMENT

### ERRORS ANALYSIS

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# Syllabus



## UNIT-I

## SCIENCE OF MEASUREMENT

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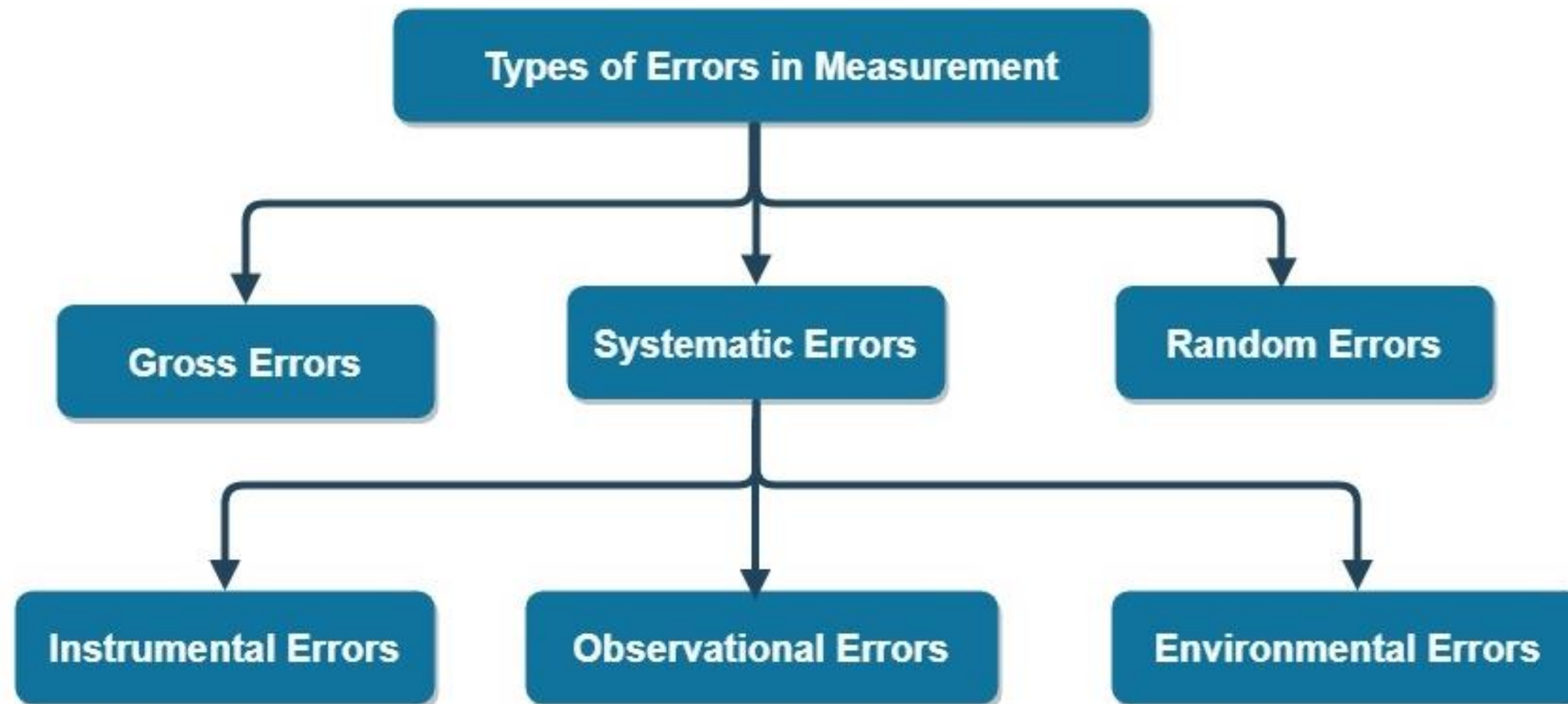
**Units and Standards- Calibration techniques -Errors in Measurements- Generalized Measurement System-Static and dynamic characteristics of transducers- Generalized Performance of Zero Order and First Order Systems - Response of transducers to different time varying inputs - Classification of transducers-Introduction to second order systems.**





# *Errors in Measurement and Types*

- ❑ Measurement Error is the difference between a measured quantity and its true value.





# Errors Analysis



❑ The process to obtaining the probable true value of the measured quantity is called as Error Analysis.

❑ Statistical Method:

1. Arithmetic Mean  $A = \frac{1}{n} \sum_{i=1}^n a_i$

2. Deviation  $SD = \sqrt{\frac{\sum |x - \bar{x}|^2}{n}}$

3. Variance  $s^2 = \frac{\sum_{i=1}^n (x_i - \bar{X})^2}{n - 1}$

4. Mode – Most frequent value

4. Median – Middle value



## *Errors Analysis Problem*

The following 10 observations were recorded when measuring a voltage 41.7, 42.0, 41.8, 42.0, 42.1, 41.9, 42.5, 42.0, 41.9, 41.8. Find (i) Mean, (ii) Average Deviation, (iii) Standard deviation, (iv) Mode, (v) Median

**Solution: Home Work**





*Thank You*