



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

UNITS AND STANDARDS

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Syllabus



UNIT-I

SCIENCE OF MEASUREMENT

9

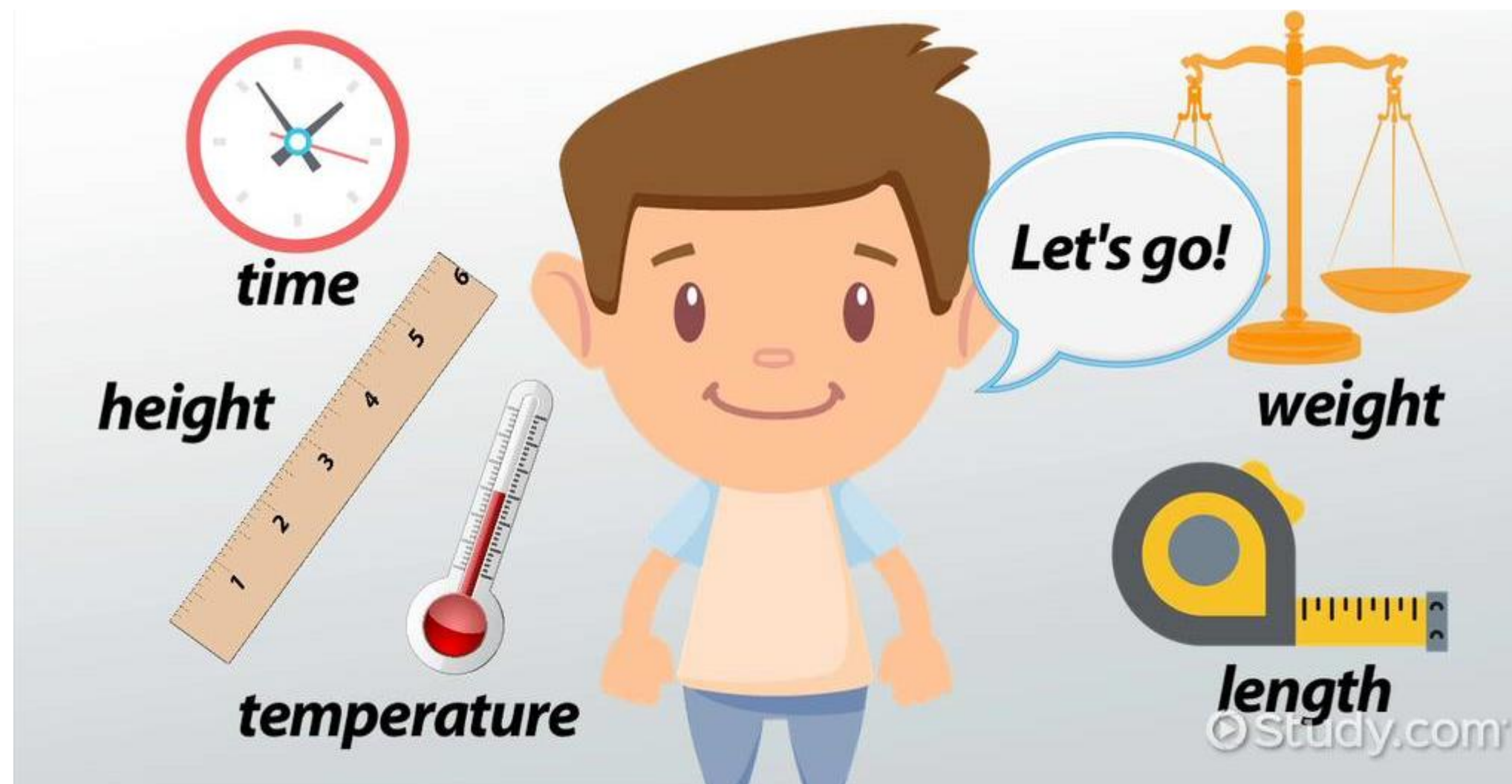
Units and Standards- Calibration techniques -Errors in Measurements- Generalized Measurement System-Static and dynamic characteristics of transducers- Generalized Performance of Zero Order and First Order Systems - Response of transducers to different time varying inputs - Classification of transducers-Introduction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





Measurement

- ❑ **Measurement** is the numerical quantitation of the attributes of an object or event, which can be used to compare with other objects or events.
- ❑ Measurement is defined as the act of measuring or the size of something.





Unit of Measurement

- A unit of measurement is a definite magnitude of a quantity, defined and adopted by convention or by law, that is used as a standard for measurement of the same kind of quantity.

| Quantity Measured Physical Property | Base SI Unit | Symbol |
|--|--------------|--------|
| Mass | kilogram | kg |
| Length | meter | m |
| Temperature | Kelvin | K |
| Amount of a substance | mole | mol |
| Electric current | ampere | A |
| Time | second | s |
| Luminous intensity | candela | cd |



Types of Unit

- Fundamental Unit
- Supplementary Unit
- Derived Unit

| SUPPLEMENTARY UNITS | | |
|---------------------|-----------|--------|
| Quantity | Unit | Symbol |
| 1. Plane Angle | Radian | rad |
| 2. Solid Angle | Steradian | Sr |

| FUNDAMENTAL UNITS | | |
|------------------------|----------|--------|
| Quantity | Unit | Symbol |
| 1. Length | meter | m |
| 2. Mass | kilogram | kg |
| 3. Time | second | s |
| 4. Electric Current | ampere | A |
| 5. Temperature | kelvin | k |
| 6. Luminous Intensity | candela | Cd |
| 7. Amount of substance | mole | mol |

Base quantity

| Base Quantity | SI units |
|-----------------------|--------------|
| Length, l | metres, m |
| Mass, m | kilogram, kg |
| Time, t | second, s |
| Temperature, T | Kelvin, k |
| Electrical current, I | Ampere, A |

Derived quantity

| Derived Quantity | Units |
|------------------|------------|
| Volume, V | m^3 |
| Density, ρ | kgm^{-3} |
| Velocity, v | ms^{-1} |
| Force, F | N |
| Acceleration, a | ms^{-2} |



Standard of Measurement



❑ A **standard of measurement** is accepted quantity or quality against which others are judged or measure.

❑ **Types**

1. International Standard
2. Primary Standard
3. Secondary Standard
4. Working Standard

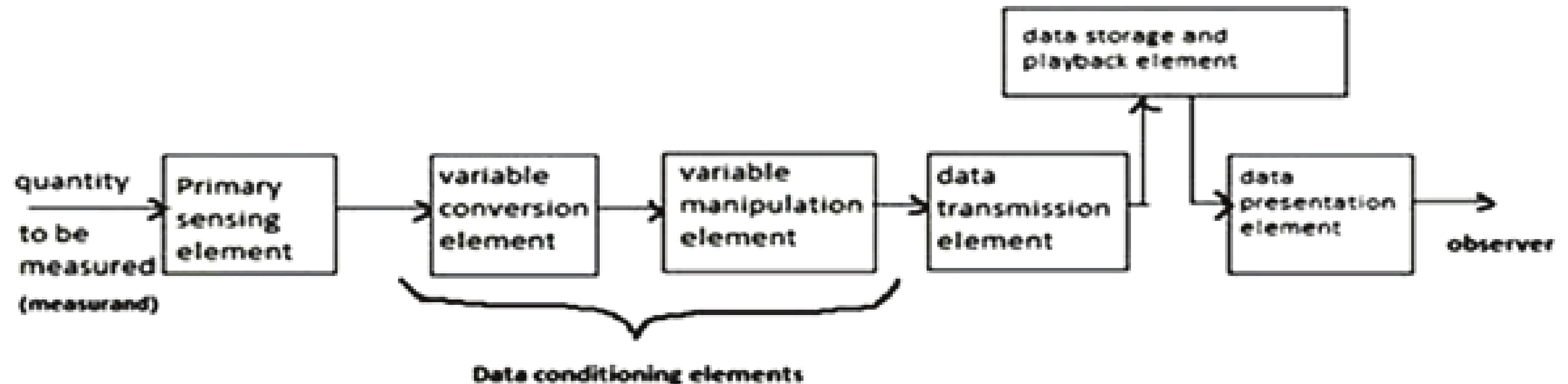


Generalized measurement system



□ Three main functional elements:

1. Primary Sensing Element
2. Variable Conversion Element
3. Data Presentation Element





Thank You