



# FUNCTIONAL ELEMENTS OF AN INSTRUMENT



# REVIEW – CLASS-2



**Methods of  
Measurements**

**Types of  
Measurement  
Techniques**

**Classification  
of Measuring  
Instruments**



# CONTENTS-CLASS-3



**Review  
answers for  
worksheet-2**

**Functional  
Elements of  
an Instrument**

**Video show**

**Case Study**

**Summary**

**Worksheet-3**

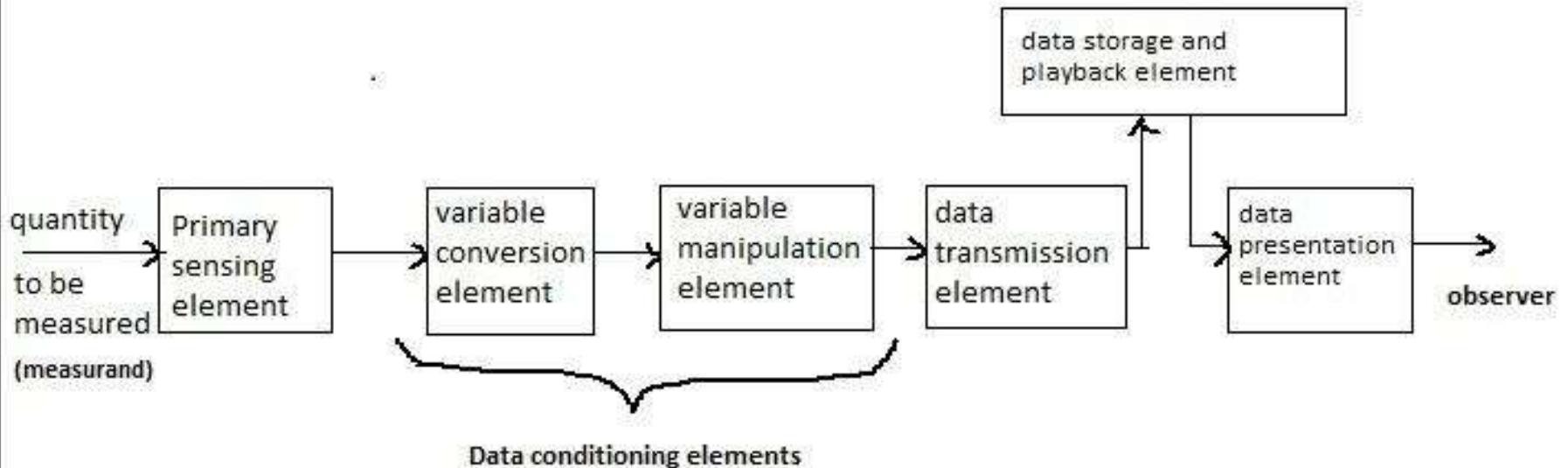


# FUNCTIONAL ELEMENTS OF AN INSTRUMENTS



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

Functional elements of an Instrument



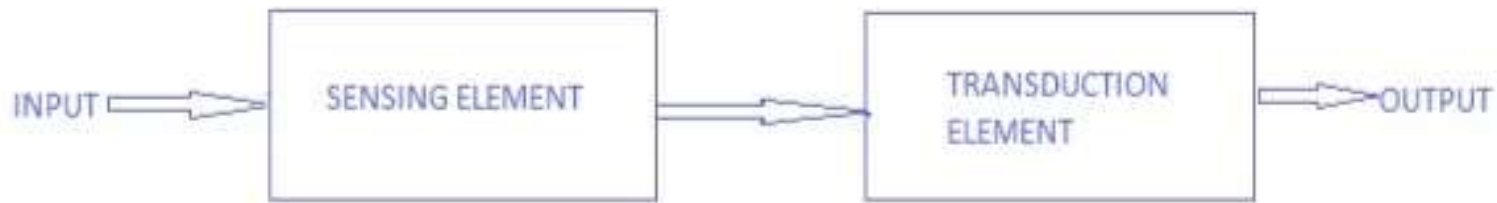


# PRIMARY SENSING ELEMENT



- Transducer
  - Converts measurand into an analogous electrical signal

TRANSDUCER BLOCK DIAGRAM



[www.InstrumentationToday.com](http://www.InstrumentationToday.com)

INPUT - Resistance, Capacitance, Inductance, Stress, Strain, Heat

OUTPUT - Force, Displacement, Pressure, Sound, Magnetic Flux, Voltage, Current

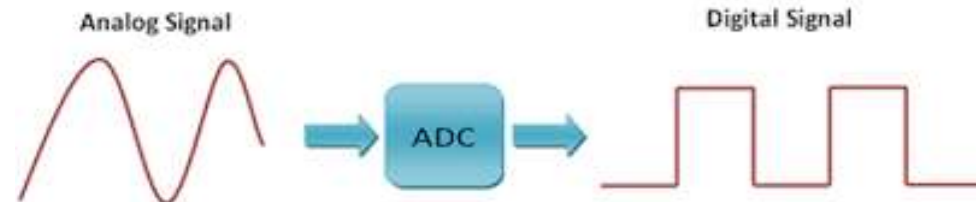
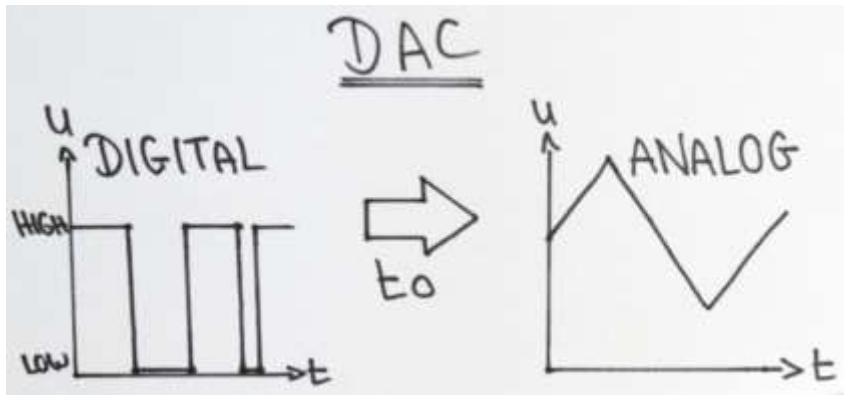


# VARIABLE CONVERSION ELEMENT



- The output electrical signal from Primary sensing element is to be converted to some other suitable form while retaining the original signal.

Example : ADC, DAC



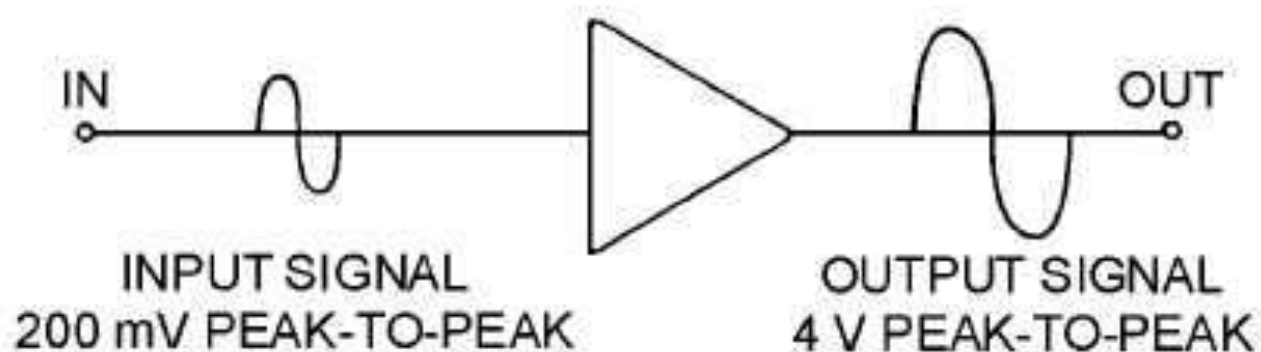


# VARIABLE MANIPULATION ELEMENT



- Manipulating the signal means changing the numerical value of the signal preserving its original nature.

Example : Voltage Amplifier





# DATA PRESENTATION ELEMENT



- Analog or Digital visual display devices.

Example : Ammeter, Voltmeter, Digital meters,  
Data recorders, Computers





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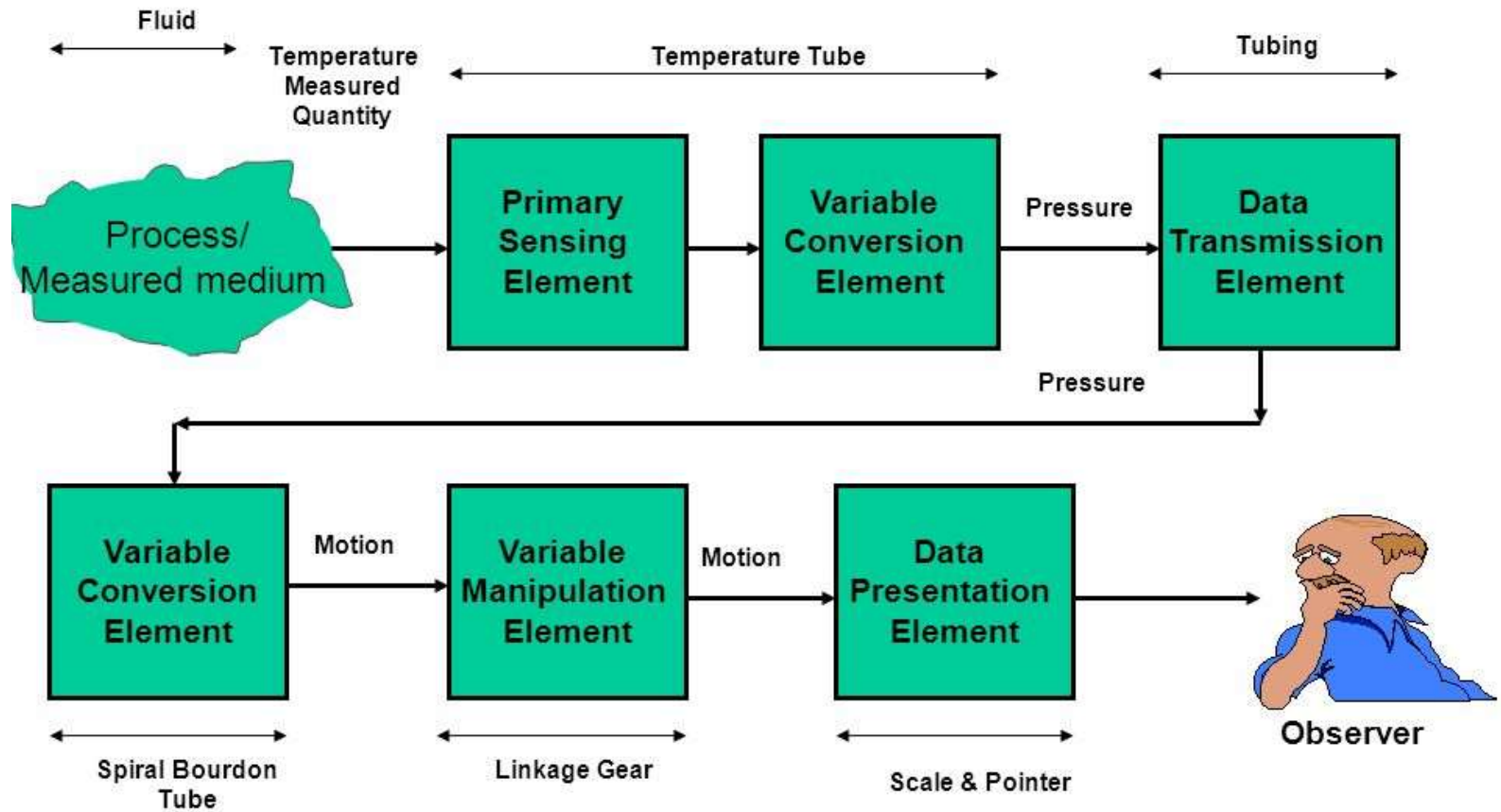


# FUNCTIONAL ELEMENTS OF AN INSTRUMENTS



- **Terminating Stage**
- **Signal Conditioning Stage** (The element follows the primary sensing element)
  - **Linear** : Amplification, Attenuation, Integration, Differentiation, Addition and Subtraction
  - **Non-linear** : Modulation, Detection, Sampling, Filtering, Chopping, Clipping, etc.,
- **Transmission Stage**
  - When the element of an instrument is physically separated, it is necessary to transmit data from one to other.
- Signal conditioning & Transmission Stage together called **Intermediate stage**.

## Functional Elements of an Instrument (Cont'd)





Cartoon – Popeye the Sailor man  
(<https://www.youtube.com/watch?v=WIF6l1JmzhM>)



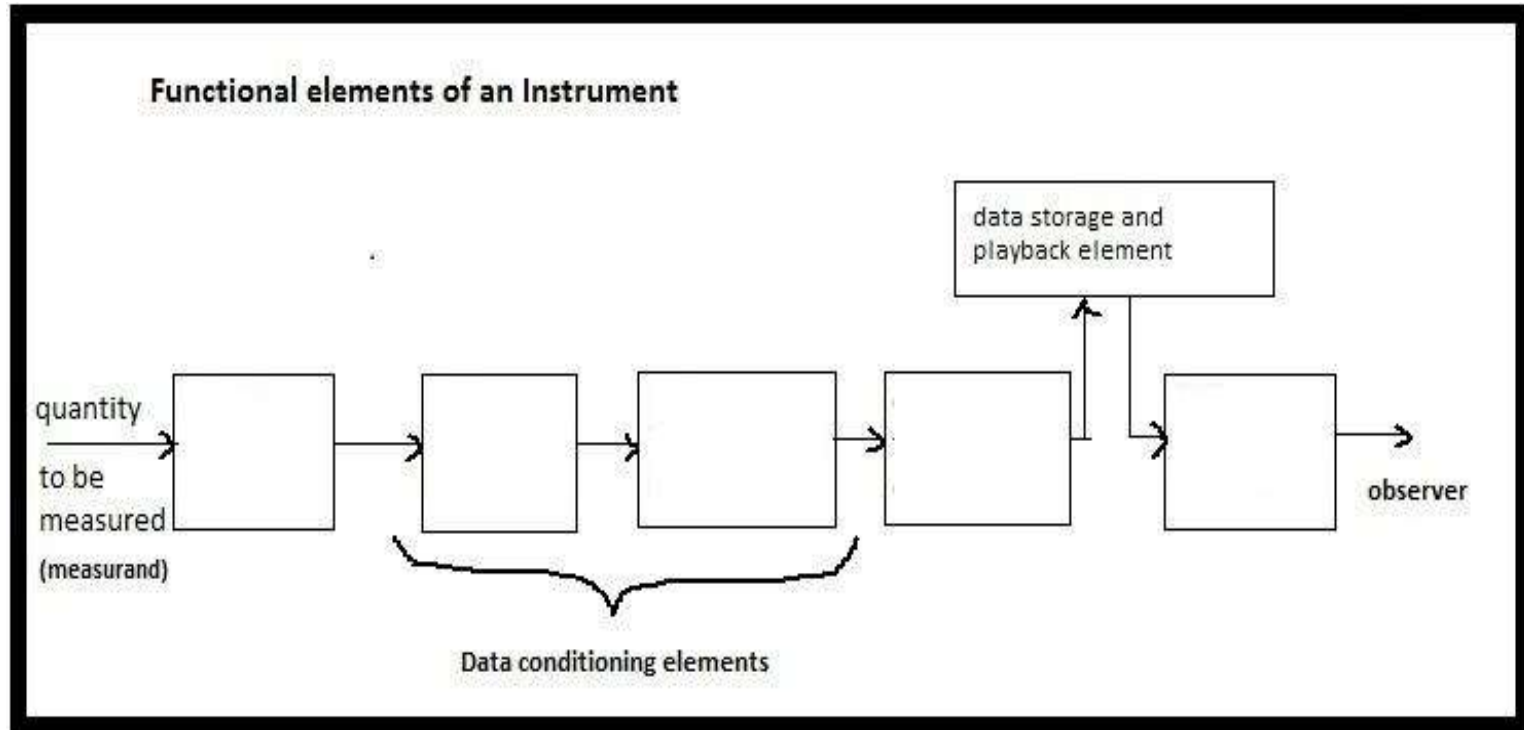
# SUMMARY

## STUDENT'S CORNER



# Work sheet

## 1.Fill the blocks





# Work sheet

1. Example for primary sensing element is \_\_\_\_\_
2. Example for data presentation element is \_\_\_\_\_
3. Voltage amplifier acts as a \_\_\_\_\_



THANK YOU