5.1 TRANSDUCERS

The input quantity for most instrumentation systems is nonelectrical. In order to use electrical methods and techniques for measurement, the nonelectrical quantity is converted into a proportional electrical signal by a device called transducer.

- Another definition states that transducer is a device which when actuated by energy in one system, supplies energy in the same form or in another form to a second system.
- When transducer gives output in electrical form it is known as electrical transducer. Actually, electrical transducer consists of two parts which are very closely related to Each other.
- These two parts are sensing or detecting element and transduction element. The sensing or detecting element is commonly known as sensor.
- Definition states that sensor is a device that produces a measurable response to a Change in a physical condition.
- The transduction element transforms the output of the sensor to an electrical output, as shown in the Fig 5.1.

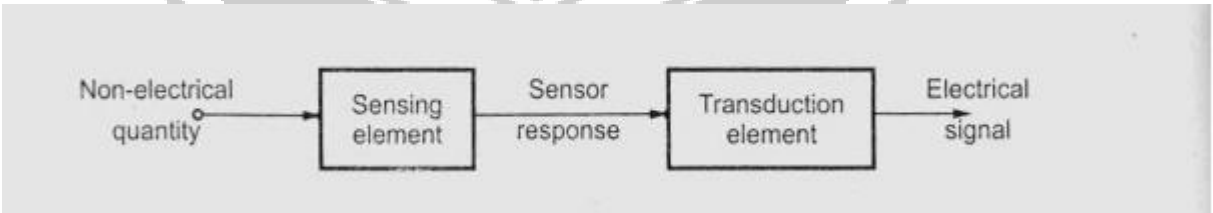

Fig 5.1.1 Transducer elements in cascade

Classification of Electrical Transducers

Transducers may be classified according to their structure, method of energy conversion and application.

Thus, we can say that transducers are classified

- As active and passive transducer
- According to transduction principle
- As analog and digital transducer
- As primary and secondary transducer

- As transducer and inverse transducer

Active and Passive Transducer Active Transducers

- Active transducers are self-generating type of transducers.
- These transducers develop an electrical parameter (i.e. voltage or current) which is proportional to the quantity under measurement.
- These transducers do not require any external source or power for their operation.
- They can be subdivided into the following commonly used types

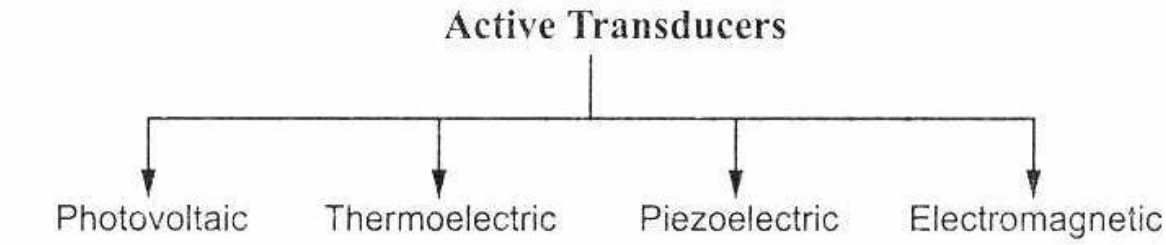

Fig 5.1.2 Active Transducers

Passive Transducers

- Passive transducers do not generate any electrical signal by themselves.
- To obtain an electrical signal from such transducers, an external source of power is essential.
- Passive transducers depend upon the change in an electrical parameter (R, L, C).
- They are also known as externally power-driven transducers.
- They can be subdivided into the following commonly used types.

According to Transduction Principle

The transducers can be classified according to principle used in transduction.

- Capacitive transduction
- Electromagnetic transduction
- Inductive transduction
- Piezoelectric transduction
- Photovoltaic transduction
- Photoconductive transduction

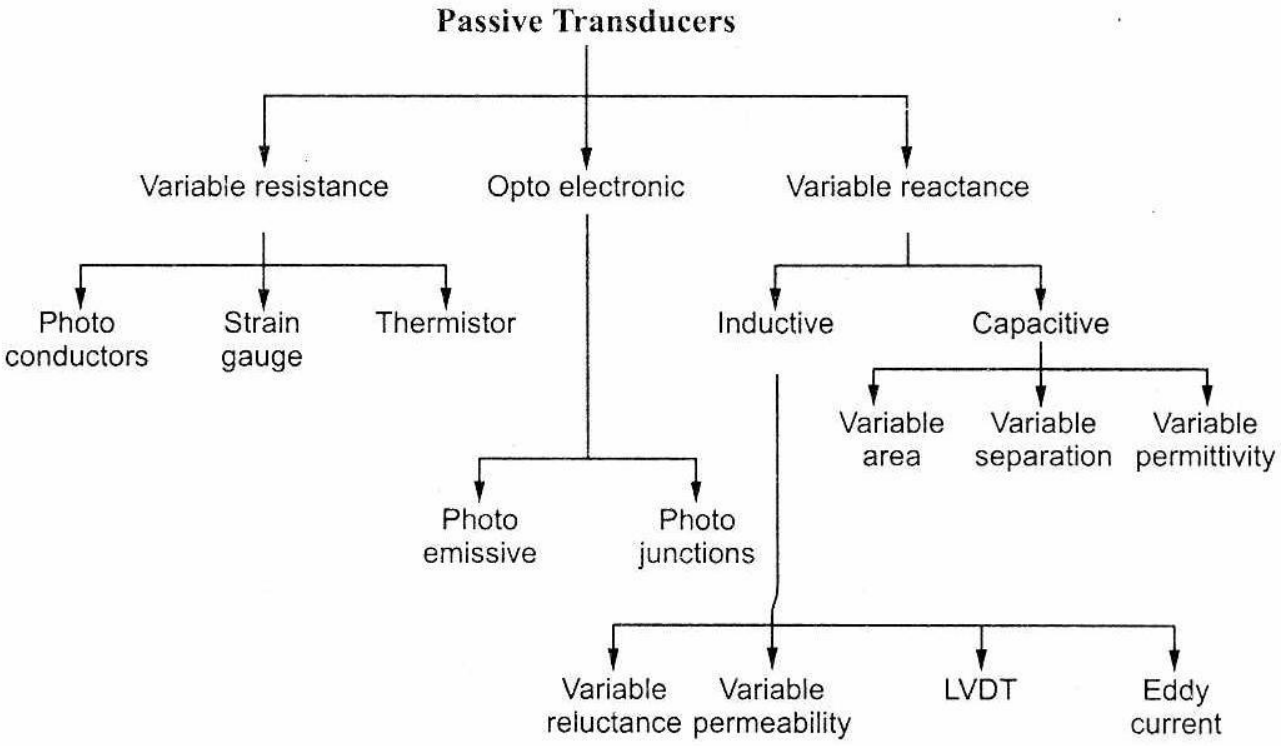

Fig 5.1.3 Passive Transducers