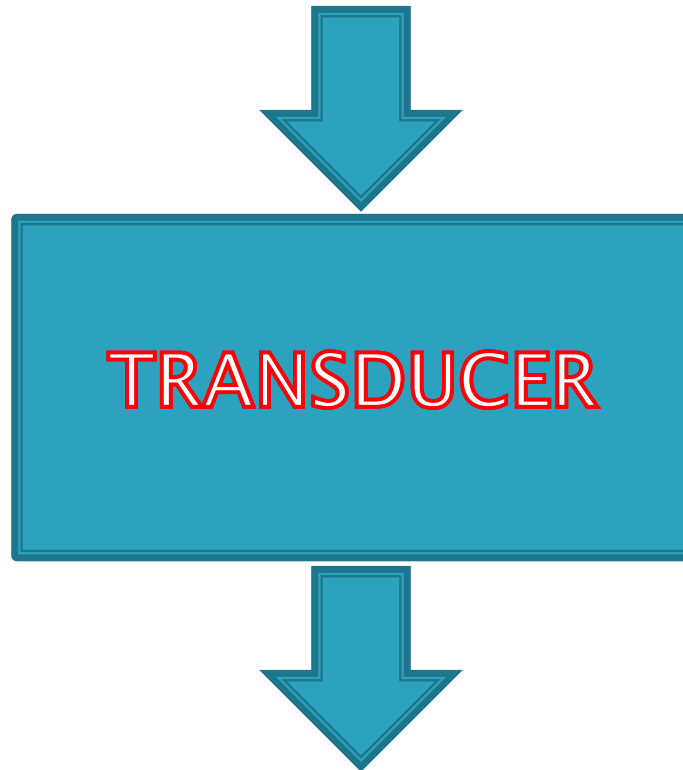


SECTION-D

TRANSDUCERS & SIGNAL CONDITIONING


What is transducer?

Non-electrical physical quantity: temperature, sound or light



Electrical signal

Introduction

- ▶ A transducer is an electronic device that converts energy from one form to another for various purposes like measurement or Information transfer eg., Pressure sensors.
 - ▶ Common examples include microphones, loudspeakers, thermometers, position and pressure sensors, and antenna.
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Transducer efficiency

- ▶ Efficiency is an important consideration in any transducer. Transducer efficiency is defined as the ratio of the power output in the desired form to the total power input. Mathematically, if P represents the total power input and Q represents the power output in the desired form, then the efficiency E is given by:
 - ▶ $E = Q/P$

Contd..

- ▶ No transducer is 100-percent efficient; some power is always lost in the conversion process. Usually this loss is manifested in the form of heat. Some antennas approach 100-percent efficiency.
- ▶ The worst transducers, in terms of efficiency, are incandescent lamps. A 100-watt bulb radiates only a few watts in the form of visible light. Most of the power is dissipated as heat

Significance of transducer in measurement & instrumentation system

- ▶ First stage(sensing device): – If the quantity under measurement i.e. the non–electrical quantity should be into electrical signal by the device transducer

Note: Here it is imp. to discuss the term **sensor**. The sensor is a part of transducer which senses or responds to a physical quantity or measurand. The response of sensor is converted to electrical signals by the transduction stage.

Significance of transducer in measurement & instrumentation system

- ▶ Second stage(Signal conditioning):-

Function of this stage is amplification, filtration, conversion etc of the o/p of transducer so that it can be compatible with the o/p device or stage.

- ▶ Third stage(output):- The o/p of Signal conditioning stage is displayed or monitored on display devices, recorders. These devices are CRO, magnetic tape, printer, computer etc.