

Number 3

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## Thermometer

As another example of Measurement System the thermometer bulb containing mercury act as variable Conversion element. It senses the input quantity, the temperature. On account of the increase in temperature the mercury in the bulb expands and its volume increases. The temperature signal is converted into volume displacement. As the mercury expands it moves through a capillary tube in thermometer stem integrated bulb. The cross section area of the capillary thus has the role of signal manipulation and data transportation. The final data. A restriction bend is provided in the clinical thermometer at the junction of the bulb and the capillary which does not allow flow back. Thus restriction acts as data storage.

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### QUESTION 3

#### Stethoscope

When a doctor or nurse places a stethoscope diaphragm on a patient's chest sound waves traveling through the patient's body cause the flat surface of the diaphragm to vibrate. These vibrations would travel outwards if the diaphragm were a stand alone device but because it is attached to a tube sound waves are channeled in a particular direction. Each sound wave bounces off the inside walls of the rubber tube a process called multiple reflection. In this way each wave in succession reaches the ear tip or rubber tubing and into the listener's ear.

## QUESTION 2

- ① Primary Sensing Element
- ② Variable Conversion Element
- ③ Manipulation Element
- ④ Data transmission Element

## Primary Sensing Element

It is an element that is sensitive to the measured device. The physical quantity of measurement makes contact with primary sensing measurement part of good measurement system. The primary sensing element may have non electrical output such as spring, manometer. A transducer is sometimes used to convert energy.

## Variable Conversion Element

After passing through the primary sensing element the output in form of electrical or mechanical signal may be voltage current, frequency wave may or may not be accepted to the system.

# QUESTION 1

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A sensor tends to convert physical attributes to an electrical signal

Biomedical sensors are used to gain information on body and pathology  
Which is branch of biomedical engineering

Biomedical sensors are classified into physical sensor, chemical sensor or biosensor

An actuator does the opposite it may be an electrical signal to physical action, actuator are used in manufacturing application such as switches, pumps, motor

Application of sensor

Hydrogen based sensor  
Fiber optic sensor

Application of actuator

Electro active smart polymer  
Super magnetic twist actuator