

Name: Kingsley Chukwueke Ebuochukwu

Mat No: 19|ENIG04|060

Dept: Electrical

Lvl: 300

### Question 1

1)

Describe briefly with examples Sensors and Actuators for biomedical application.

An actuator is a component of a machine that is responsible for moving and controlling a mechanism or a system.

A sensor is a device that receives the input. It is a device that converts signals from one energy domain to electrical domain.

In biomedical field sensors and actuators are used mainly almost everytime when performing a surgery they are called smart actuators. They are defined as actuators which are fit for changing over different energy.

1) Piezo electrical actuator:

They are used to drive a motor for making cuts in surgery.

2) Micro grippers:

They are used in removing brain tumors.

3) Carbon Nanotube Based Sensors

4) Enzyme - Based Biosensor

Used to detect and measure physical and chemical quantities.

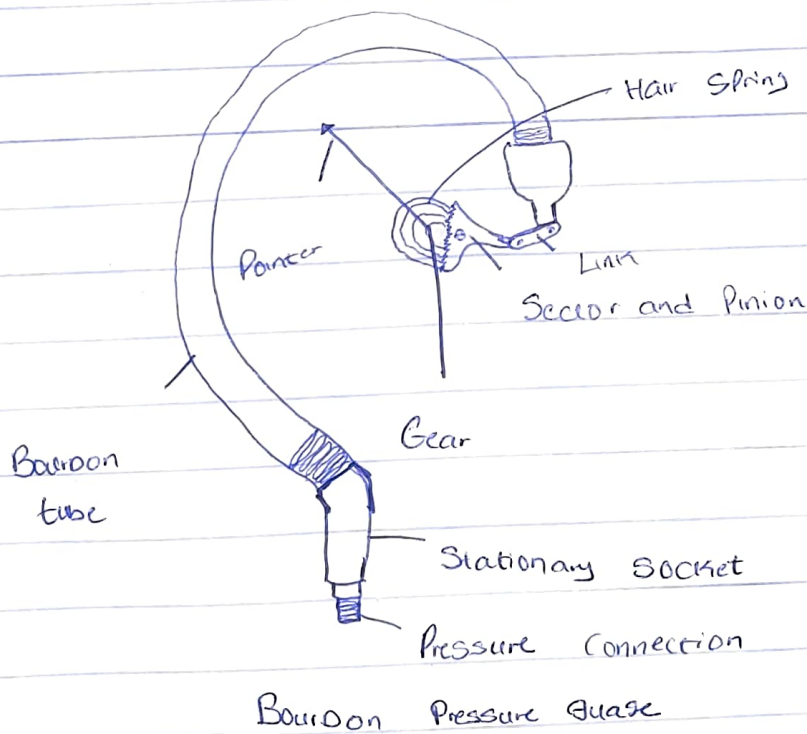
## Question 2

Describe briefly the Component of a basic measuring instrument

Answer

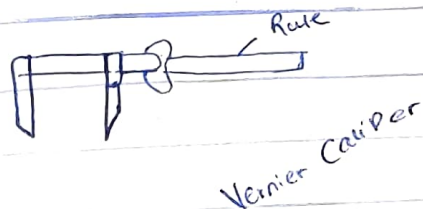
The main functional element of a measuring system are:

- 1) Primary Sensing element  $\rightarrow$  Elements to be measured e.g. Current / Voltage
- 2) Variable Conversion element
- 3) Variable manipulation element
- 4) Signal Conditioning element
- 5) Data transmission element
- 6) Data Presentation element  $\rightarrow$  What displays the element measured



Other examples

- 1) Vernier Caliper
- 2) Micro meter
- 3) Steel Scale



### Question 3

Case studies of two medical instruments

#### 1) Optical Stadiometer!

It is a piece of medical equipments used for measuring human height. It is usually constructed out of a ruler and a sliding horizontal piece.

#### 2) Sphygmomanometer

It is used to measure blood pressure of patients by medical practitioners. It consists of a inflatable cuff, a measuring unit and a mechanism for inflation which may be operated manually or by a pump electrically.