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ELECT/ELECT ENG

1. A sensor is a device, module, machine, or subsystem whose purpose is to detect events or changes in its environment and send the information to other electronics. A sensor is always used with other electronics. Examples are:

a. Temperature sensor

b. Proximity sensor

c. Accelerator

d. IR sensor (infrared sensor)

e. Pressure sensor

f. Light sensor

2. An actuator is a component of a machine that is responsible for moving and controlling a mechanism or system; for example, by opening a valve. In simple terms, it is a "mover". An actuator receives a control signal and a source of energy. Examples are:

a. Comb drive

b. Digital micromirror device

c. Piezoelectric motor

d. Electroactive polymer

e. Hydraulic cylinder

f. Piezoelectric actuator

Q1 Strain gauges → These consist of a very fine metallic foil, etched in a grid pattern, which is bonded to a surface and used to measure the strain, or amount of deformation of the surface when weight or pressure is applied. The resulting electrical output is proportional to the strain.

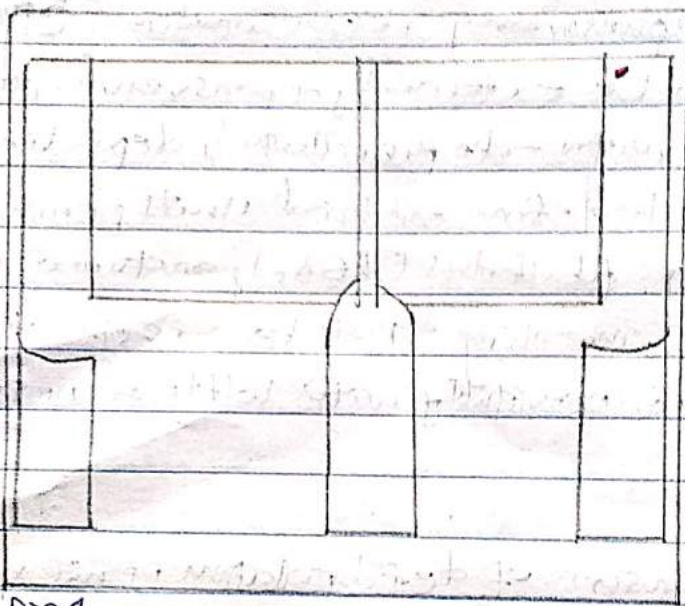
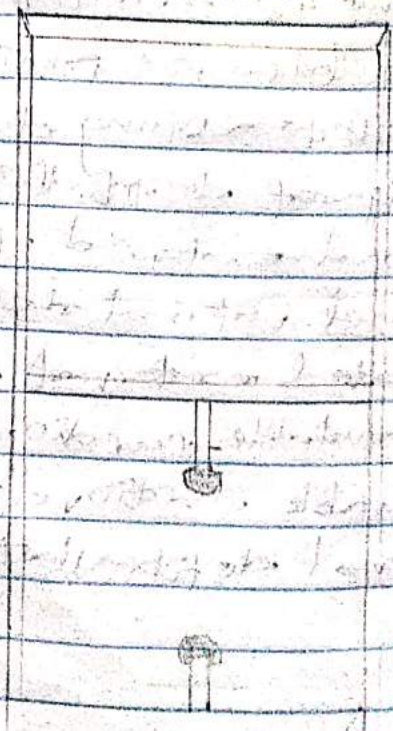


Fig 1 A strain gauge

Fig 2 A testing machine

Q2 Tensile and compression testing machine → Used to analyze the elastic and bearing rate and strength of the material and the products. Also used to evaluate the product breakdown test and the quality of the assembly in the process.



NO 1

Dialysis is the process of removing excess water, wastes and toxins from the blood where kidneys can no longer perform their functions. This is referred to as renal replacement therapy.

Dialysis may need to be initiated when there is a sudden rapid loss of kidney function, known as acute kidney injury, dialysis is used as a temporary measure in either acute kidney injury or while awaiting kidney transplant and as a permanent measure in those for whom a transplant is not indicated or not possible.

Principle

Dialysis works on the principle of the diffusion of solutes and ultrafiltration of fluid across a semi-permeable membrane.

Diffusion is a property of substance in water, substance in water tends to move from an area of high concentration to an area of low concentration. Blood flows by one side of a semi-permeable membrane, and a dialysate, or special dialyzer, flows by the opposite side. A semi-permeable membrane is a thin layer of material that contains holes of various sizes, or pores. Smaller solutes and fluid pass through the membrane but the membrane blocks the passage of larger substances such as red blood cells and large proteins. This replicates the filtering process that takes place in the kidneys when the blood enters the kidney and the larger substances are separated from the smaller ones in the glomerulus.

There are two main types of dialysis and three primary and secondary types of dialysis.

The main types are

1 Hemodialysis

2 Peritoneal dialysis.

Primary

1 Hemodialysis

2 Peritoneal dialysis

3 Hemofiltration.

Secondary

1 Hemodiafiltration

2 Hemofiltration

Defibrillation is a treatment for life-threatening cardiac dysrhythmias, specifically ventricular fibrillation (VF) and non-perfusing. This process depolarizes a large amount of the heart muscle, ending the dysrhythmia. Subsequently, the body's natural pacemaker in the sinoatrial node of the heart is able to re-establish normal sinus rhythm. A heart which is in asystole (flatlines) cannot be restarted by defibrillator, but must be treated by cardiopulmonary resuscitation (CPR).

Defibrillators can be external, transvenous, or implanted (implantable cardioverter-defibrillator), depending on the type of device used or needed. Some external units, known as automated external defibrillators (AEDs); automate the diagnosis of treatable rhythms, meaning that lay responders or bystanders are able to use them successfully with little or no training.

Principle

The exact mechanism of defibrillation is not well understood. One theory is that successful defibrillation affects most of the heart, resulting in insufficient remaining heart muscle to continue the arrhythmia. Recent mathematical models of defibrillation are providing new insight into cardiac tissue response to a strong electric shock.

Types of defibrillation:

- 1) Manual external defibrillator
- 2) Manual external defibrillator
- 3) Automated external defibrillator (AED)
- 4) Implantable cardioverter-defibrillator
- 5) Wearable cardioverter defibrillator
- 6) Internal defibrillator