

Engineering Metrology and Measurements

TWO MARK QUESTION AND ANSWERS - UNIT 5

What are load cells?

Its are devices for the measurement of force through indirect methods.

Give the principle of hot wire anemometer

When a fluid flows over a heated surface heat is transferred from the surface and so the temperature reduces. The rate of reduction of temperature is related to flow rate.

State any four inferential type of flowmeters.

Venturi meter, orificemeter, rotameter, pitot tube.

What is the principle involved in fluid expansion thermometer?

Change in pressure in the bulb is taken as an indication of the temperature.

Mention the principle involved in bimetallic strip.

Is based on change in dimension

What is thermocouple?

When two metals are joined together it will create an emf and it is primarily a function of the junction temperature.

What is a Kentometer?

It is a device for measurement of absolute pressure.

What is thermopile?

When thermocouples are connected in series it is called thermopile.

Discuss about bimetallic thermometer.

It is used to convert a temperature change into mechanical displacement. The strip consists of two strips of different metals which expand at different rates as they are heated,

usually steel and copper, or in some cases steel and brass. The strips are joined together throughout their length by riveting, brazing or welding.

Identify the requirements of bourdon pressure gauge.

Brass restrictor Stainless steel front or rear flange Liquid filled case: No (use Model 233.50) U-clamp panel mounting Integral alarm contacts

Special connections limited to wrench flat area
 Custom dial layout Other pressure scales available bar, kPa, MPa, kg/cm² and dual scales.

What is rota meter.

A rota meter is a device that measures the flow rate of liquid or gas in a closed tube. It belongs to a class of meters called variable area meters, which measure flow rate by allowing the cross-sectional area the fluid travels through, to vary, causing some measurable effect.

What is venturimeter.

Venturi meter there is first a converging section in which the cross sectional area for flow is reduced. Then there is a short section at the reduced diameter, known as the throat of the meter.

Then there is a diverging section in which the cross sectional area for flow is gradually increased to the original diameter. The velocity entering the converging section is where the pressure is P_1 .

In the converging section the velocity increases and the pressure decreases. The maximum velocity is at the throat of the meter where the minimum pressure P_2 is reached. The velocity decreases and the pressure increases in the diverging section.

There is a considerable recovery of pressure in the diverging section. However, because of frictional effects in the fluid, the pressure leaving the diverging section is always less than P_1 , the pressure entering the meter.

What is hydraulic load cell.

The cell uses conventional piston and cylinder arrangement. The piston is placed in a thin elastic diaphragm. The piston doesn't actually come in contact with the load cell. Mechanical stops are placed to prevent over strain of the diaphragm when the loads exceed certain limit. The load cell is completely filled with oil.

When the load is applied on the piston, the movement of the piston and the diaphragm arrangement in an increase of oil pressure which in turn produces a change in the pressure on a Bourdon tube connected with the load cells.

Because this sensor has no electrical components, it is ideal for use in hazardous areas. Typical hydraulic load cell applications include t result tank, bin and hopper weighing.

What is function of strain gauge load cell.

A strain gauge is a device used to measure strain on an object. The gauge is attached to the object by a suitable adhesive. As the object is deformed, the foil is deformed, causing its electrical resistance to change. This resistance change, usually measured using a Wheatstone bridge, is related to the strain by the quantity known as the gauge factor.

State the thermocouple function.

To measure this voltage, one must use a second conductor material which generates a different voltage under the same temperature gradient.

Otherwise, if the same material was used for the measurement, the voltage generated by the measuring conductor would simply cancel that of the first conductor.

The voltage difference generated by the two materials can then be measured and related to the corresponding temperature gradient.

It is thus clear that, based on Seebeck's principle, thermocouples can only measure temperature differences and need a known reference temperature to yield the absolute readings. There are three major effects involved in a thermocouple circuit: the Seebeck, Peltier, and Thomson effects.

Name any four measuring instruments for measure temperature.

- Thermocouple,
- Thermistors,
- Electrical thermal resistance and Pyrometer.

Name any four methods for torque measurement.

- Torque reaction method,
- Proney brake,
- Strain gauges and Torsion methods for torque measurement.

Distinguish between force and torque.

FORCE	TORQUE
Force is any interaction which tends to change the motion of an object. In other words, a force can cause an object with mass to change its velocity i.e., to accelerate. Force can also be described by intuitive concepts such as a push or a pull.	Torque is the tendency of a force to rotate an object about an axis, fulcrum, or pivot. Just as a force is a push or a pull, a torque can be thought of as a twist to an object.

Give the composition of thermocouple.

<u>Ingredients</u>	<u>Percent by weight of composition</u>
purified water	65.20
Aristoflex® AVC (Ammonium Acrylodimethyltaurate/VP Copolymer)	1.00
glycerine	2.00
phenoxyethanol	0.70