UNIVERSITY OF ENGINEERING & MANAGEMENT KOLKATA

DEPARTMENT OF MECHANICAL ENGINEERING

(WORKSHOP / MANUFACTURING PRACTICES)

B.TECH 1ST YEAR

MEASURING INSTRUMENTS

INTRODUCTION TO MECHANICAL WORKSHOP

A mechanical workshop is a shop floor or facility where user acquires knowledge about practical work on a particular subject. Workshop practice provides the basic working knowledge of the production and properties of different materials used in the industry. It also explains the use of different tools, equipment, machinery and techniques of manufacturing, which ultimately facilitate shaping of these materials into various usable forms.

SAFETY PRECAUTIONS AT MECHANICAL WORKSHOP:

- Don't wear loose clothing.
- Long hair must be tied back or covered.
- Always wear covered shoe.
- Check the power cords and plugs of the tools or portable machines before using them.
- Don't open any power operated tools while it is running.
- Proper protection should be taken for eyes.
- Don't try to remove foreign particle from the eye instead report to sir for medical treatment.
- Don't keep the sharp tools on the side of the working table.
- All machines must be operated with all required safety guard in place.
- Machine must be shut off when not in use or cleaning, repairing or oiling.
- Hard hammer should not be used to strike machine part.
- Always store oily rags in an approved metal container.
- Personal protective equipment (PPE) such as welding helmet, gloves, apron should be used at the time of welding.

2. **TITLE :** Introduction to measuring instruments and tools used in workshop.

3. **OBJECTIVE :** i) To be familiarize with different types of tools used.

4. **INTRODUCTION:** The instrument that is used for measurement of certain physical quantity is called as measuring instrument like length, height; width etc. can be measured by the measuring instruments.

Measuring instruments are categorized into two groups.

i) **Direct measuring instruments:** These instruments are used directly with the job piece to take measurement as well as the value. E.g. Steel rule, Micrometer, Vernier caliper etc.

ii) **Indirect measuring instruments:** These instruments are used directly with the job piece to take measurement and finally the value is obtained with the help of direct measuring instrument. E.g. Outside/inside caliper, Divider, Try square etc.

DIRECT MEASURING INSTRUMENT :

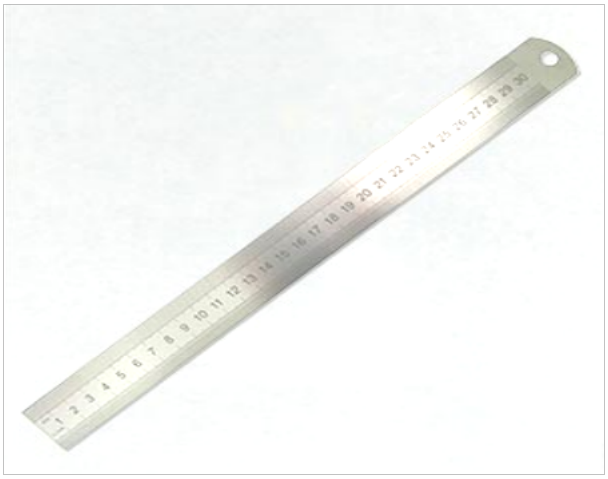 Fig : STEEL RULE	The steel rule is an easy and quickest means to measure the linear dimensions of a component with limited accuracy. It is direct measuring instrument.

 Fig : MEASURING TAPE	A measuring tape is a flexible ruler and used to measure distance. It consists of a ribbon of cloth, plastic, or metal strip with linear-measurement markings. It is a common measuring tool.

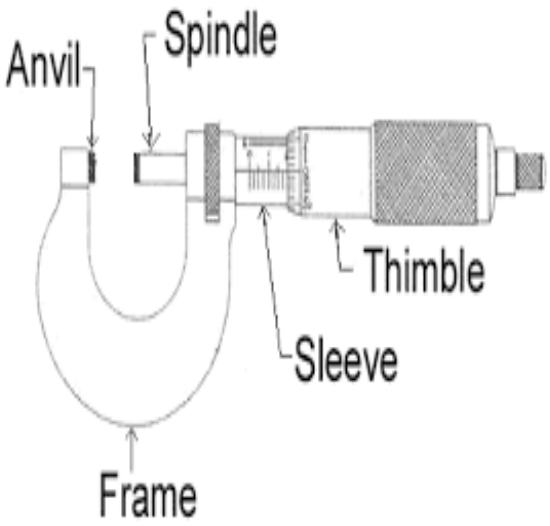

Fig : MICROMETER / SCREW GAUGE

A micrometer , sometimes known as a screw gauge, is a device incorporating a calibrated screw widely used for accurate measurement of depth, length and thickness of object.

Least count: It is defined as the ratio between the pitch of the screw and the number of division on the circular scale.

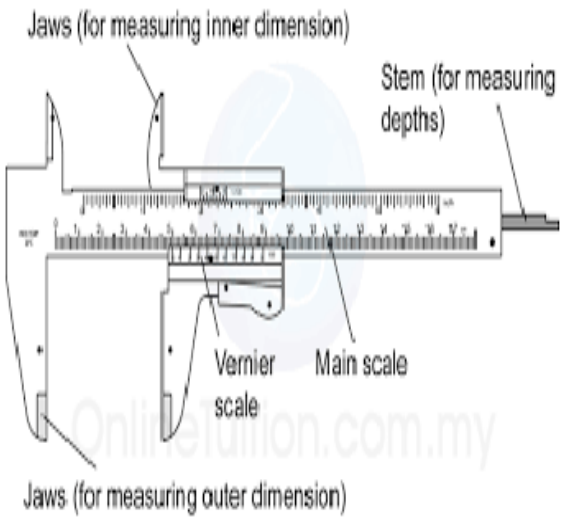

Fig : VERNIER CALIPER

A vernier caliper is a measuring device used to precisely measure linear dimensions. It is a very useful instrument to measure the inside dimension, outside dimension and depth of any object.

Least count = one main scale division - one vernier scale division.

Fig : THREAD GAUGE

A thread gauge is used to measure the pitch or lead of a screw thread. This is a direct measuring instrument.

Fig : FEELER GAUGE

Feeler gauge consists of a number of small lengths of steel of different thicknesses with measurements marked on each piece.

A feeler gauge is a tool used to measure gap widths.

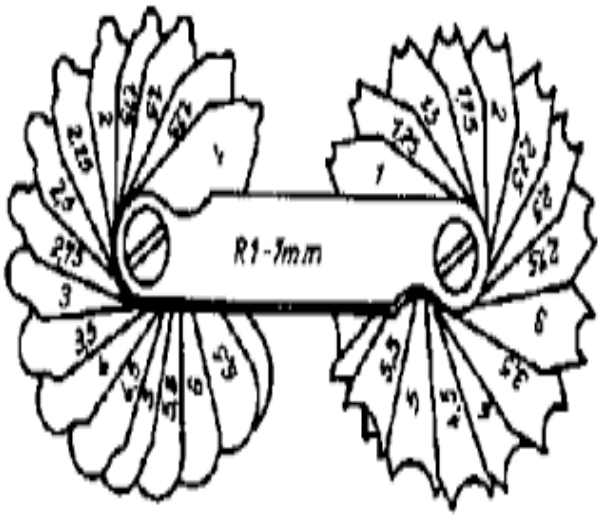

Fig : RADIUS GAUGE

A radius gauge is a tool used to measure the radius of an object. Every leaf has a different radius.

INDIRECT MEASURING INSTRUMENT :

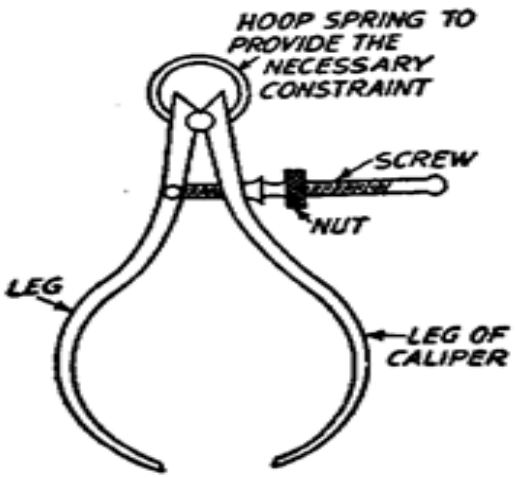

Fig : OUTSIDE CALIPER

Outside caliper is a indirect measuring instrument. Outside calipers measure thicknesses and outside diameters of objects.

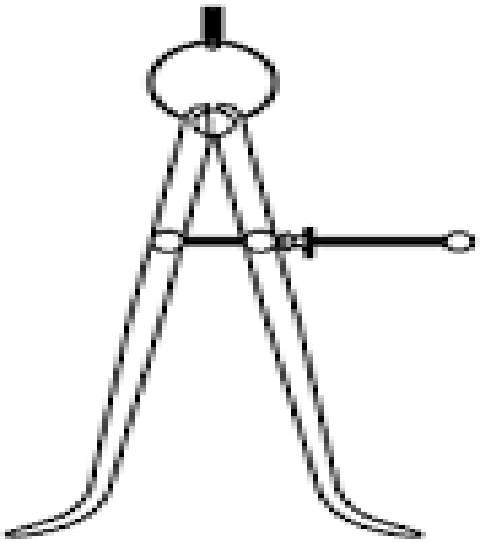

Fig : INSIDE CALIPER

Inside calipers have straight legs turned out at the bottom, and are used to measure inside dimensions such as the inside diameter of a hole or tube.

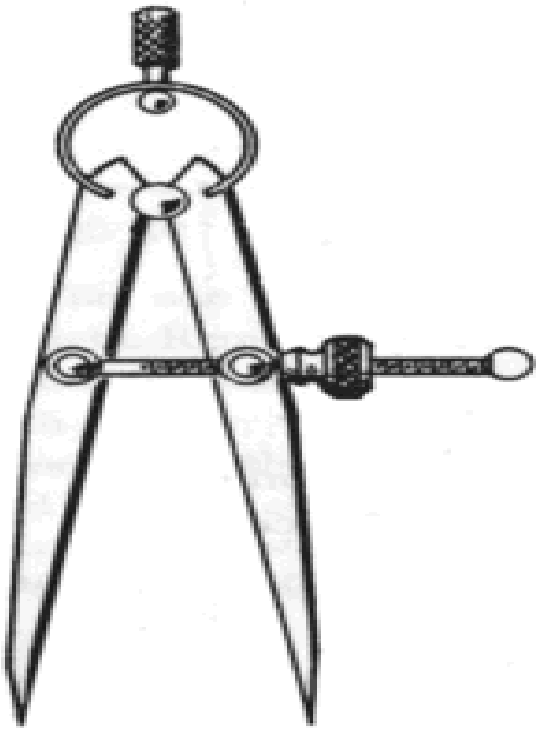

Fig : DIVIDER

Dividers are one of the earliest and most basic types of mathematical instrument. They can be used for geometrical operations such as scribing circles but also for taking off and transferring dimensions.

Fig : ODD LEG CALIPER

Odd leg caliper has one leg bent inward and one straight leg ending in a sharp point; this type of caliper is used for scribing lines at a specified distance from a flat or curved surface(parallel line) and to find the center of a cylindrical object.

Fig : TRY SQUARE

The try-square is composed of two parts, the stock and the blade.

It is used for measuring the accuracy of a right angle - (90 degrees) and is also used to check the straightness of a surface or correspondence to an adjoining surface.