



ENGINEERING DRAWING FOR CIVIL ENGINEERS (LAB)

LECTURE # 1

INSTRUMENTS USED IN ENGINEERING DRAWING

DEPARTMENT OF CIVIL ENGINEERING



WHAT IS ENGINEERING DRAWING?

- In engineering drawing, engineering related objects like buildings, walls, electrical fittings, pipes, machines etc. are represented with specifications like size, shape, materials etc.
- Several engineering drawing software with more accuracy are available. But, drawing on paper is still being used in some areas and for small constructions.



IMPORTANCE OF ENGINEERING DRAWING

- Drawing plays vital role in the engineering and construction works. The drawing requires no language any one can read it. So, drawings of other countries structures can also be studied easily.
- The drawing improves the imagination and new inventions can be developed. The estimate for the project can be done using the details provided in the drawing.
- The structure can be analyzed completely before construction by using drawing. So, every engineering construction department especially civil engineering requires drawing to start a project.



LIST INSTRUMENTS

Following instruments are used in engineering drawing:

- Drawing sheet
- Drawing board
- T square
- Compass
- Divider
- Stencil
- Set squares
- Protractor
- French curves
- Templates
- Pencils
- Eraser



DRAWING BOARD

- Drawing board is generally made of soft wood and it is in rectangular shape. It is used to support drawing sheet, so, the size of board is made according the size of the drawing sheet.
- The wood portions are joined by tongue and grove type joint to prevent cracks. At the edge of board, straight ebony edge is provided for the T-square usage.



DRAWING BOARD





DRAWING BOARD

In our Drawing lab we will use **D0** drawing Board

D: Represent Designation

0: Represent Dimensions

DESIGNATION	DIMENSIONS	AREA
D0	1500 mm x 1000 mm	1500000 mm ²
D1	1000 mm x 700 mm	700000 mm ²
D2	700 mm x 500 mm	350000 mm ²
D3	500 mm x 350mm	175000 mm ²



DRAWING SHEET

- Drawing sheet is a white paper on which an object is drawn which is available in various sizes. The sheet used for engineering should be of good quality. It should be white in color with uniform thickness with must resist the easy torn of paper. The surface of sheet must be smooth.



DRAWING SHEET





DRAWING SHEET

In our Drawing lab we will use **A0** drawing Board

A: Represent Designation

0: Represent Dimensions

DESIGNATION	DIMENSIONS	AREA
A0	841mm x 1189mm	999949 mm ²
A1	594mm x 841mm	499554 mm ²
A2	420mm x 504mm	211680 mm ²
A3	297mm x 420mm	124740 mm ²
A4	210mm x 297mm	62370 mm ²



PENCIL

- Pencil is used to draw on the paper. Any type of pencil is not suitable for drawing. There are some limitations, the drawing appearance should be very neat and understandable.
- Every line of the drawing should indicate its importance. It depends upon the hardness of pencil.



PENCIL





PENCIL CONTD.....

Based on the hardness quality pencils are classified into 18 grades and they are:

GRADE OF PENCIL	HARDNESS OF PENCIL
9H	Hardest
6H, 5H, 4H	Extremely Hard
3H	Very hard
2H	Hard
H	Moderately hard
F	Firm
HB	Medium hard
B	Moderately soft and black
2B	Soft and black
3B	Very soft and black
4B, 5B, 6B	Very soft and very black
7B	Softest



PENCIL CONTD.....

Out of the above 18 grades of pencils, following grades are used in engineering drawings:

GRADE OF PENCIL	USED TO DRAW
3H	Construction lines
2H	Dimension lines, center lines, sectional lines, hidden lines
H	Object lines, lettering
HB	Dimensioning, boundary lines



ERASER

Eraser is used to remove the lines or spots which drawn by mistake or with wrong measurements. The eraser used should be of good quality and soft. It should not damage the paper while erasing.





T-SQUARE

- T square is used to draw horizontal and vertical lines on drawing sheet. It made of wood or plastic and in T shape. The vertical part of T is called as blade and horizontal part of T is called as head.
- The edge of head is uniform level and attached to the edge of the board. The working edge is used to draw lines anywhere on the sheet by moving the instrument top to bottom.



T-SQUARE





COMPASS

- Compass is used to draw an arc or circle with known dimensions on engineering drawing. It is generally made of steel and consists two legs. One leg contains needle at the bottom and other leg contains a ring in which a pencil is placed.
- The needle tip is placed at the respected point and pencil tip is adjusted to the height at least 1mm just above the tip of the needle. The gap is nothing but the paper thickness.



COMPASS



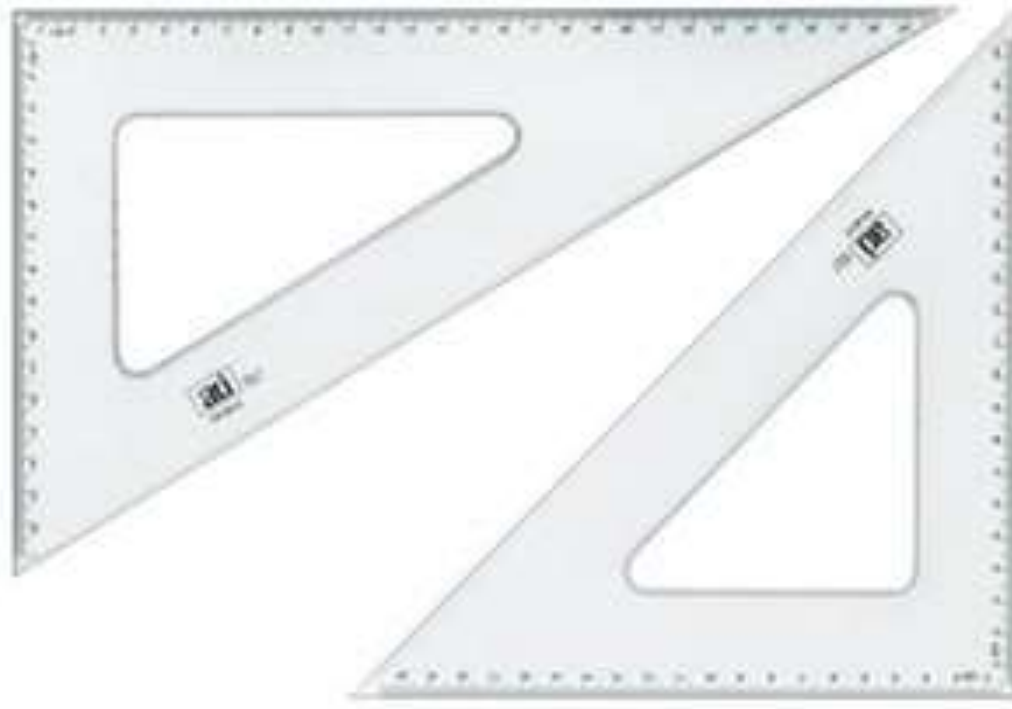


SET SQUARES

- Set squares are used to draw lines with an angle between them. In most of the structures, 30, 45, 60 and 90-degree lines are most common. So, set squares make the work easier for this type of drawings.
- Generally, set squares are of two types. One is 45 degree set square and another one is called as 30 – 60 degree set square. Both are required in the drawing. 45 set square has a side of 25 cm while 30-60 set square has 25 cm length on one side.



SET SQUARES



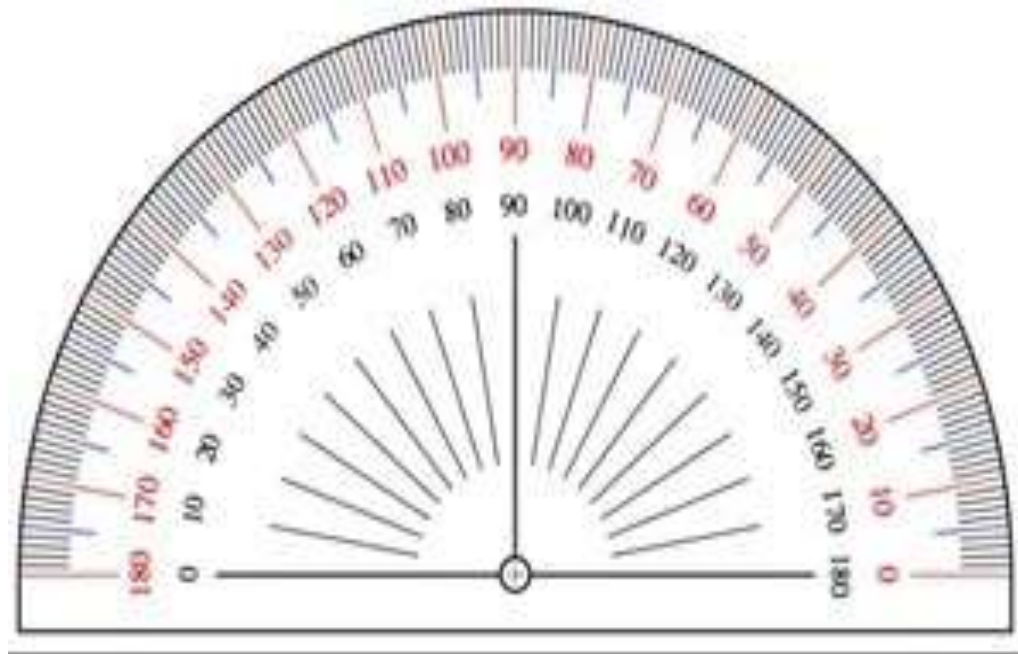


PROTRACTOR

- Protractor is used to draw and measure the angles of lines in the drawing. It is transparent and made of plastic. It is in the shape of semi-circle, and the edge of semi-circle part consists reading with one-degree accuracy.
- The bottom line joins the 0° to the 180° . The center of this bottom line is marked as “O” or “C” from which the angles are measured.



PROTRACTOR



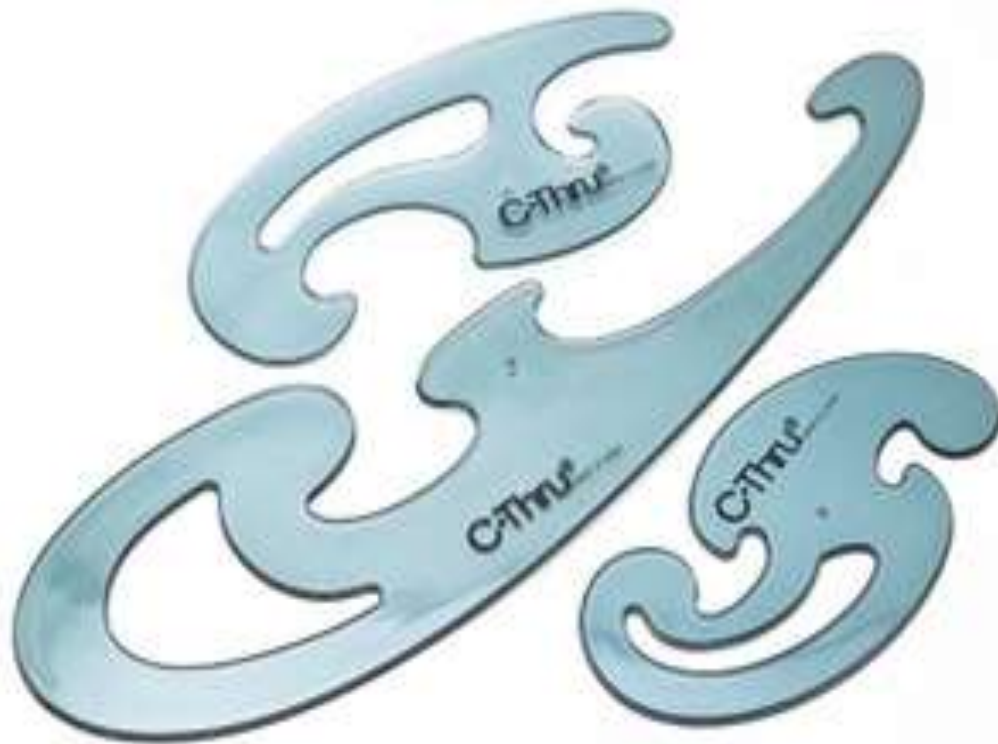


FRENCH CURVES

- French curves are made of plastic and they are in irregular shapes. Sometimes the drawing requires irregular curves or shapes or arcs which cannot be drawn using compass. In that case French curves are suitable.
- Generally French curves are more suitable for small curves and for long curves splines are used.



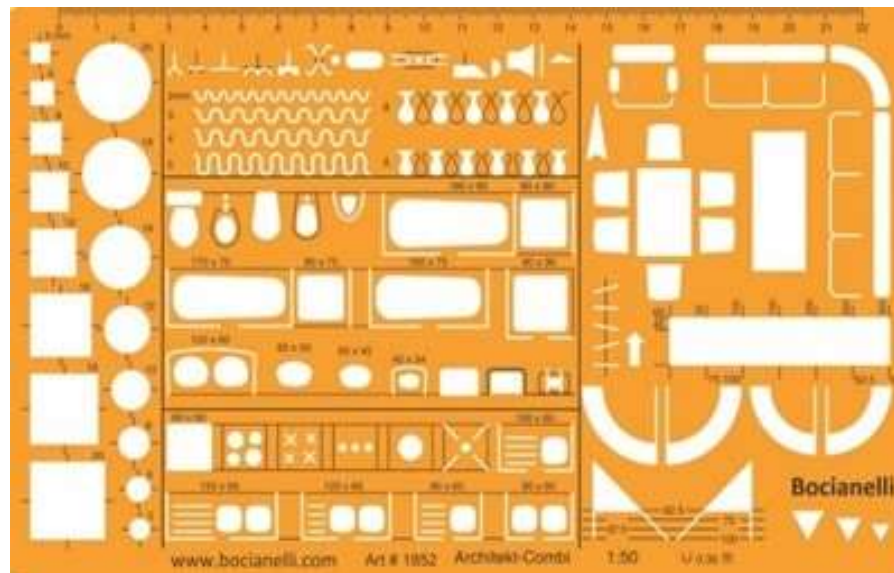
FRENCH CURVES





DRAWING TEMPLATES

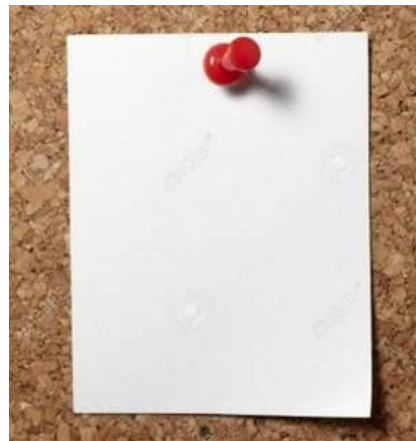
- Templates are nothing but plastic or wooden boards which contains spaces of several shapes or letters. Non-dimensional shapes or variety font letters are drawn by using templates which makes drawing easier and perfect.





PAPER HOLDERS

- When the drawing sheet is placed on the board it may not be in fixed position. To fix the drawing sheet to the board paper holders are used.
- Generally used paper holders are thumb pins, spring clips, stick tapes etc. Care should be taken while removing the clips or tapes otherwise the sheet may tore.





STENCIL

- It is used to describe, or provide detailed specifications for, an object. It is used for lettering



Thank
you!