31/08/2023

Engineering Drawing, Design and Safety

Syllabus:

(30 hrs)

I) Engineering Drawing

1. Introduction to engineering drawing
2. Scales
3. Conic section
4. Engg. curves
5. Theory of projection
6. Projection of points
7. Projection of lines
8. Projection of planes
9. Projection of solids
10. Section of solids
11. Development of surfaces

II) General principles of design

III) Safety

i. Work study and ergonomics
ii. Fire safety
iii. Safety in industries

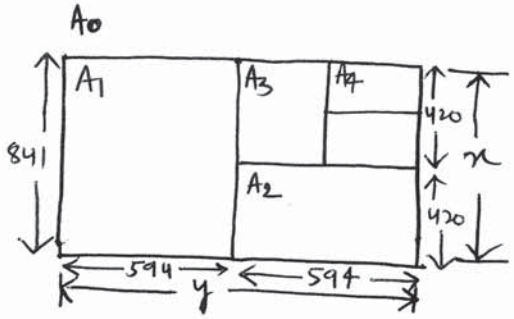
Engineering Drawing

Chapter-1 Introduction to Engg. drawing

I) Drawing sheet [IS 10711 : 2001]

BIS → Bureau of Indian Standard

Sheet size : $A_0 > A_1 > A_2 > A_3 > A_4$



A_0 Sheet size

Condition: $x : y = 1 : \sqrt{2}$

$$xy = 1\ m^2$$

on solving we get

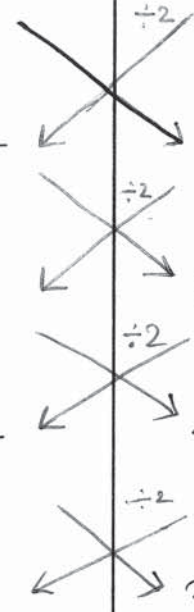
$$x = 0.841\,m = 841\,mm$$
$$y = 1.189\,m = 1189\,mm$$

- Successive sheet size is found by taking half of the longest length of previous sheet size and maintaining the ratio $1 : \sqrt{2}$.

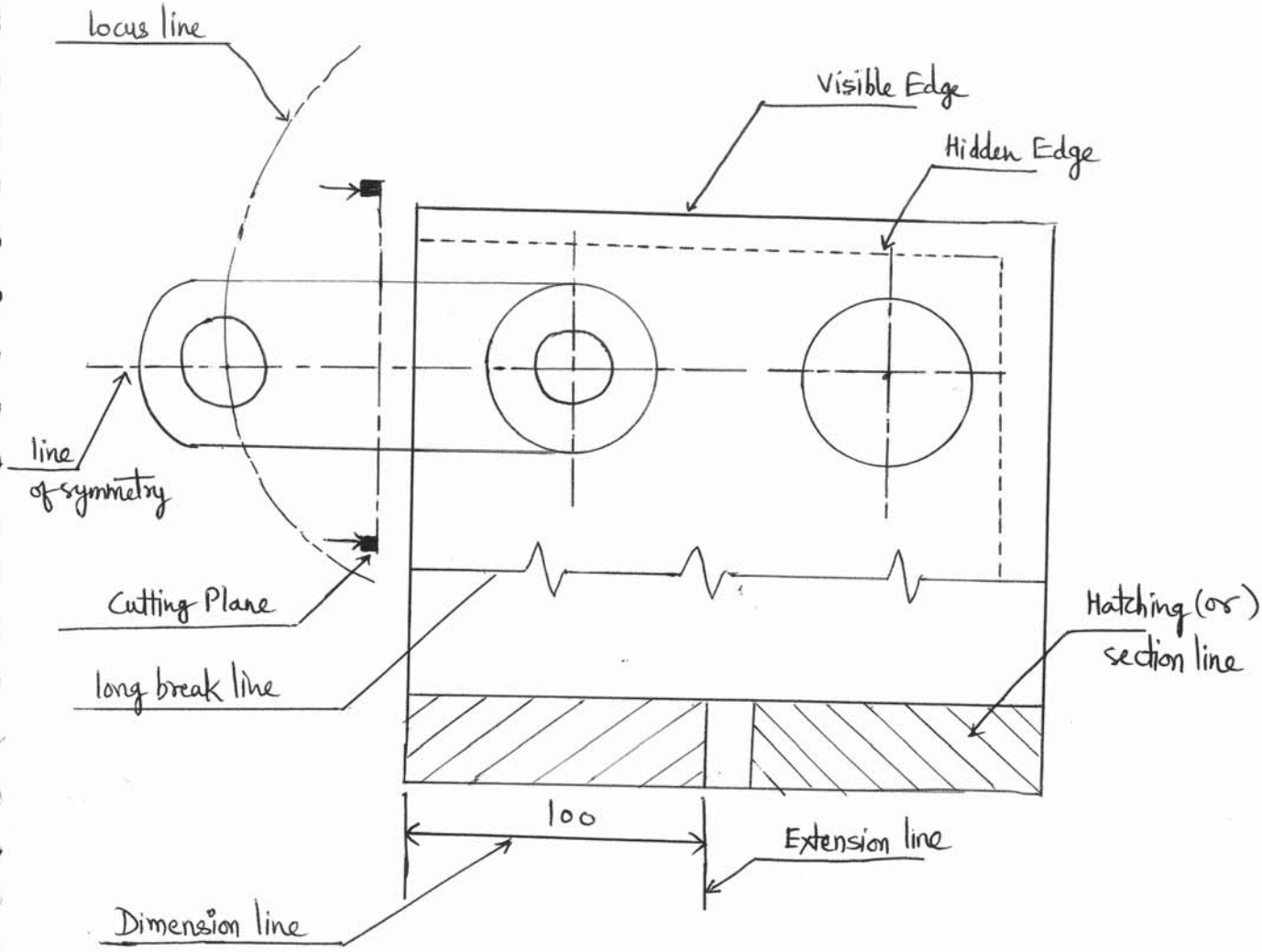
Reason for $1 : \sqrt{2}$ Ratio

Printers, scanners, photocopy machines are designed in the ratio of $1 : \sqrt{2}$.

Sheet size	x	y	$x : y$	Area $(m^2) = \frac{1}{2^n}$
A_0	841	1189	$1 : \sqrt{2}$	$1 = \frac{1}{2^0}$
A_1	594	841	$1 : \sqrt{2}$	$\frac{1}{2} = \frac{1}{2^1}$
A_2	420	594	$1 : \sqrt{2}$	$\frac{1}{4} = \frac{1}{2^2}$
Classroom A_3	297	420	$1 : \sqrt{2}$	$\frac{1}{8} = \frac{1}{2^3}$
A_4	210	297	$1 : \sqrt{2}$	$\frac{1}{16} = \frac{1}{2^4}$



II) lines (IS 10714: 2001]



Note:

(i) I) Continuous narrow line : Dimension line, Extension line, Hatching line and leader line (——↘)

II) Continuous wide line : Visible edge / visible outline

III) Dashed narrow line : Hidden edge

IV) long dash dotted line : Cutting plane, line of symmetry, centre line.

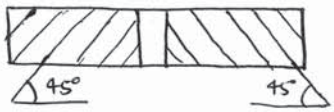
V) long dash double line (or) Phantom line : locus line.

VI) Continuous narrow line with zig-zag : long break line (ESE 2022)

(ii) leader line () is used to refer outline, dimension value (or) feature of an object.

(iii). Hatching line (or) sectioning line of adjacent part of an object is drawn in opposite direction preferably at 45°.

Ex:



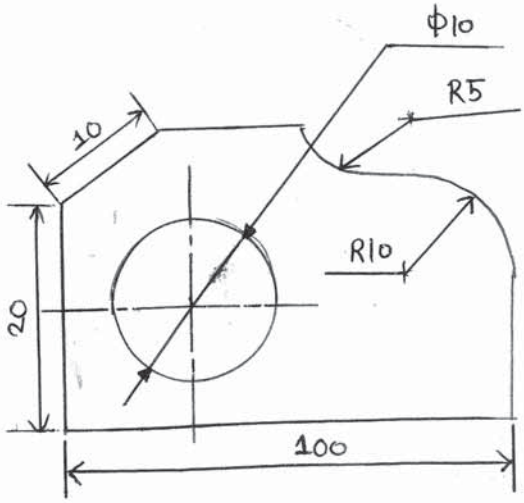
(iv) Priority of lines in case of overlapping

① Visible line
② Hidden line
③ Cutting plane
④ Centre line (or) line of symmetry
⑤ Projection line

III). Dimensioning (IS 11669 : 1986)

- Method of dimensioning

Aligned method



Unidirectional Method