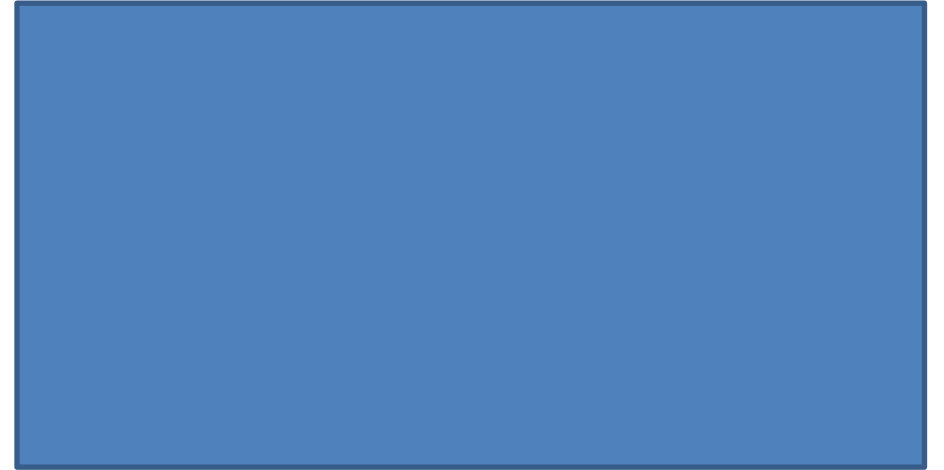# 18MES101L – Engineering Graphics and Design

Exercise – 9

Section of Solids

Plane

- A plane is a two dimensional object having length and breadth only. Its thickness is always neglected.
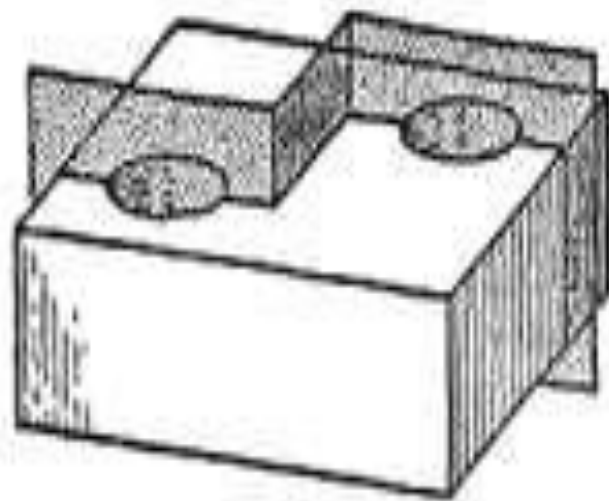
Cutting Plane Lines

- The cutting plane line is **an imaginary plane** passing through an object at the place where a section is to be made.

- This imaginary line is identified with **reference letters along with arrows to show the direction in** which the sectional view is taken.

- The beginning and end styles of cutting plane lines are **made bold. This is also done at the** portions where the cutting plane is offset.
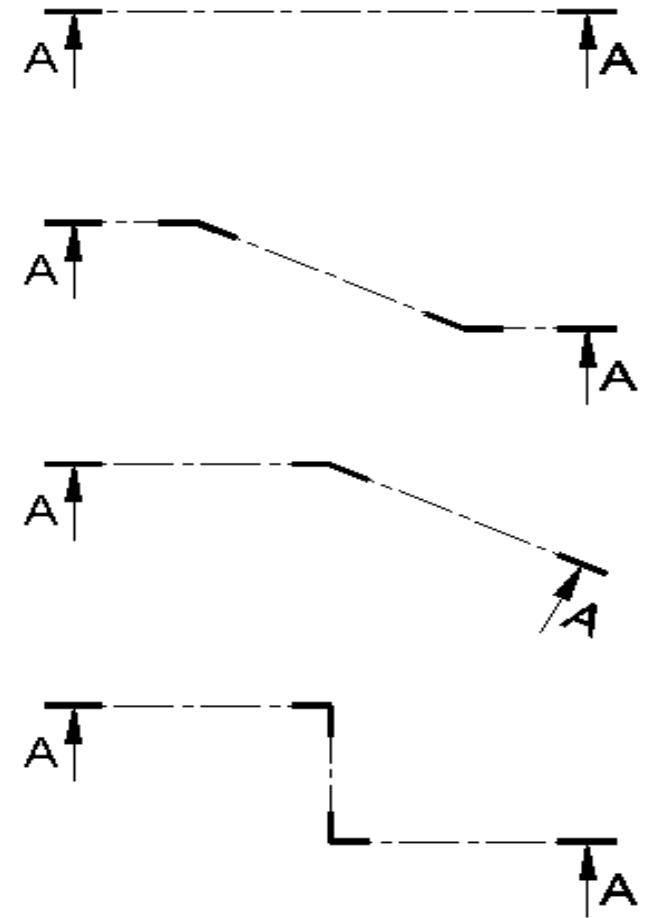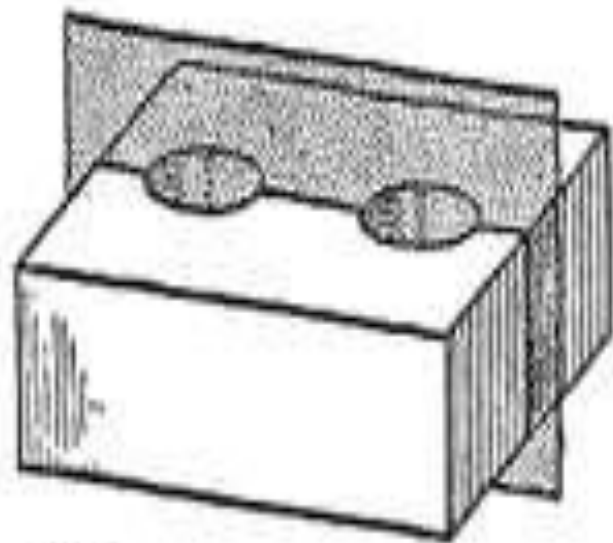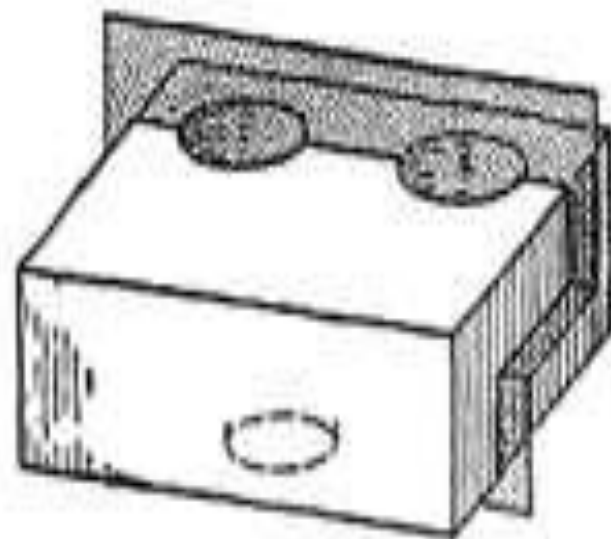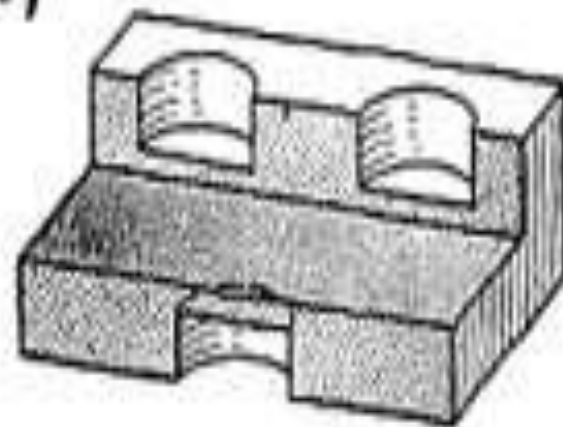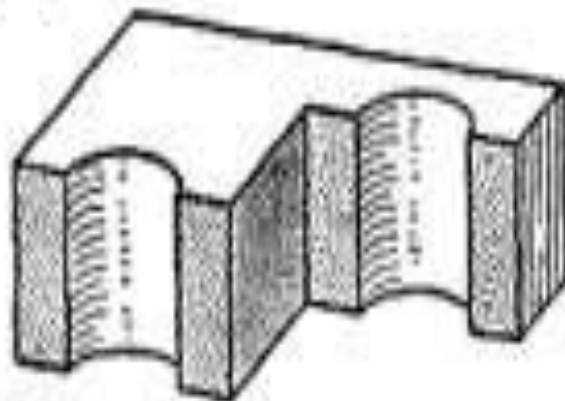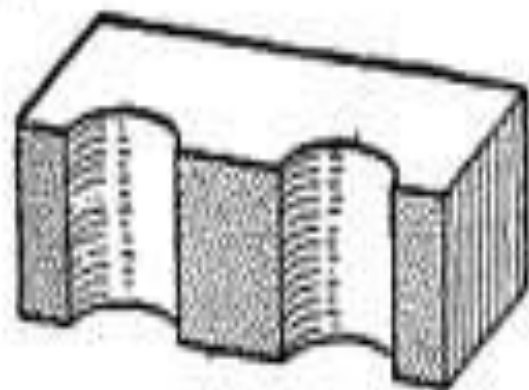
(a)

(b)

(c)

Cutting Plane Position

1. Cutting Plane Perpendicular to Ground and Parallel to Wall

2. Cutting Plane Perpendicular to Wall and Parallel to Ground

3. Cutting Plane Perpendicular to both Ground and Wall

4. Cutting Inclined to Ground and Perpendicular to Wall

5. Cutting Inclined to Wall and Perpendicular to Ground

SECTION

- A **section** is an imaginary cut taken through an object to expose the shape or interior
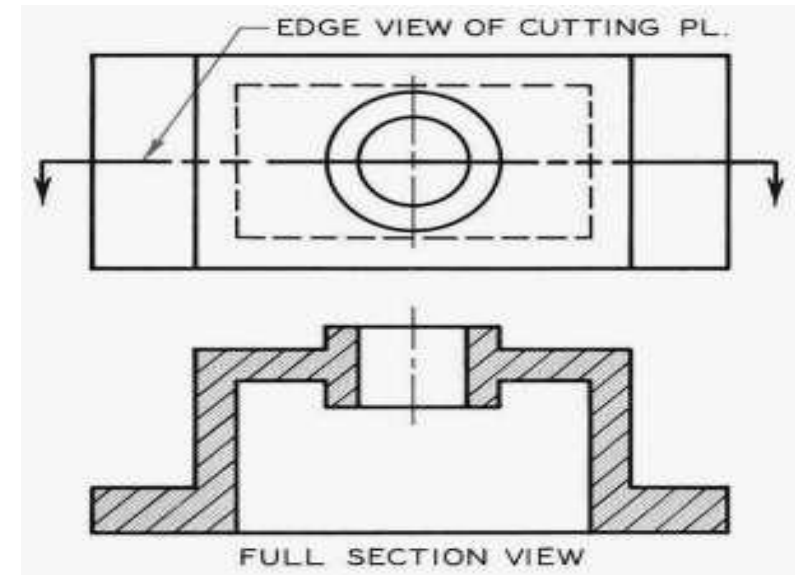

CUTTING PLANE

PICTORIAL VIEW
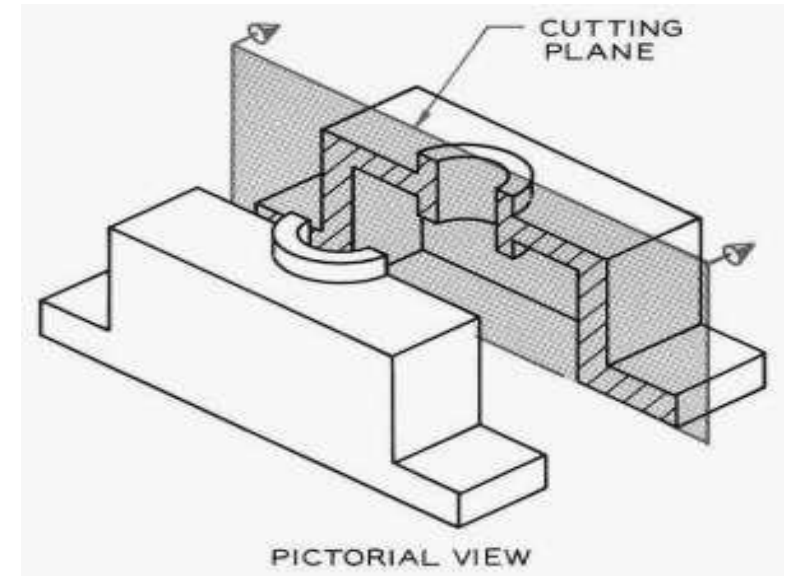
Section

- In order to show the inner details of a machine component, the object is imagined to be cut by a cutting plane and the section is viewed after the removal of cut portion.

- Sections are made by at cutting planes and are designated by capital letters and the direction of viewing is indicated by arrow marks.

Sectional View

- A sectional view must show which portions of the object are solid material and which are spaces.

- This is done by **section lining (cross-hatching) the solid parts** with uniformly spaced thin lines generally at 45^0.

EDGE VIEW OF CUTTING PL.

FULL SECTION VIEW
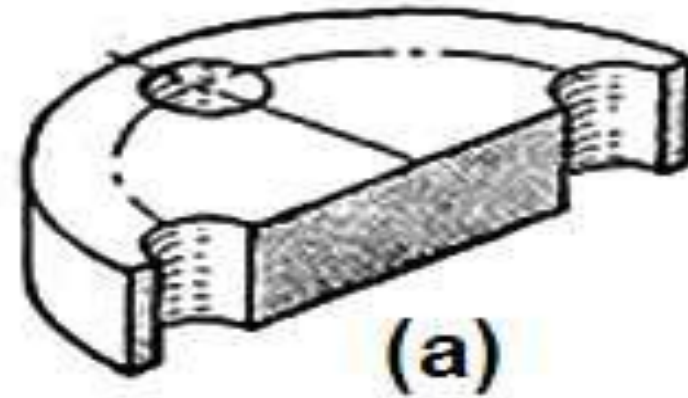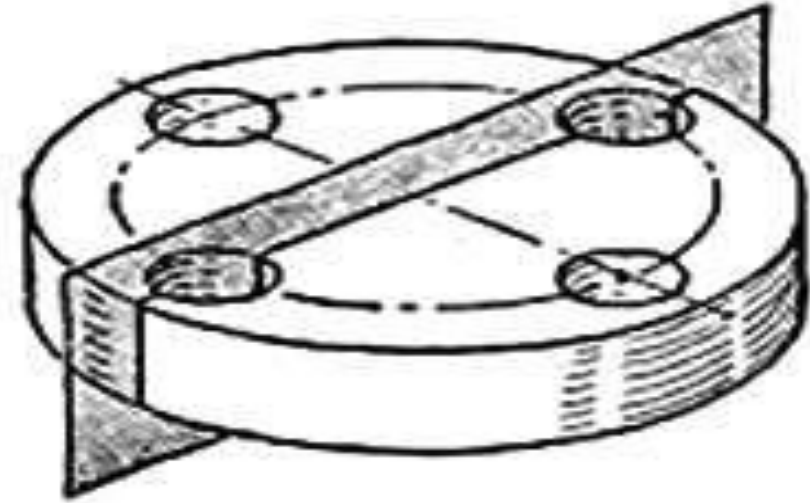
Elements of Sectional View

1, Cutting Plane   2. Portion of the part to be removed
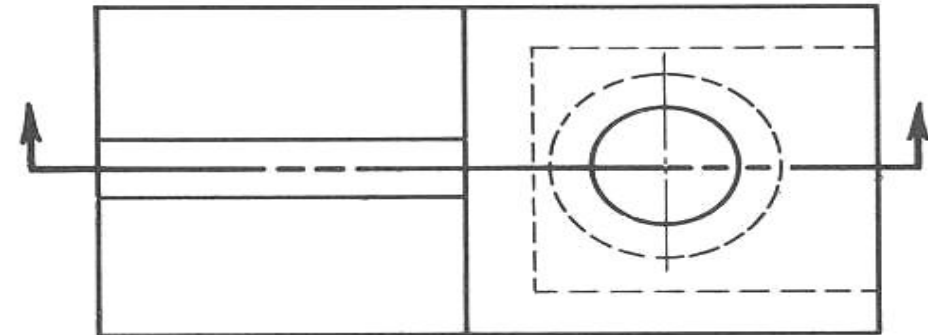3. Sectioned pat   4. Sectional Lines   5. Direction of Viewing
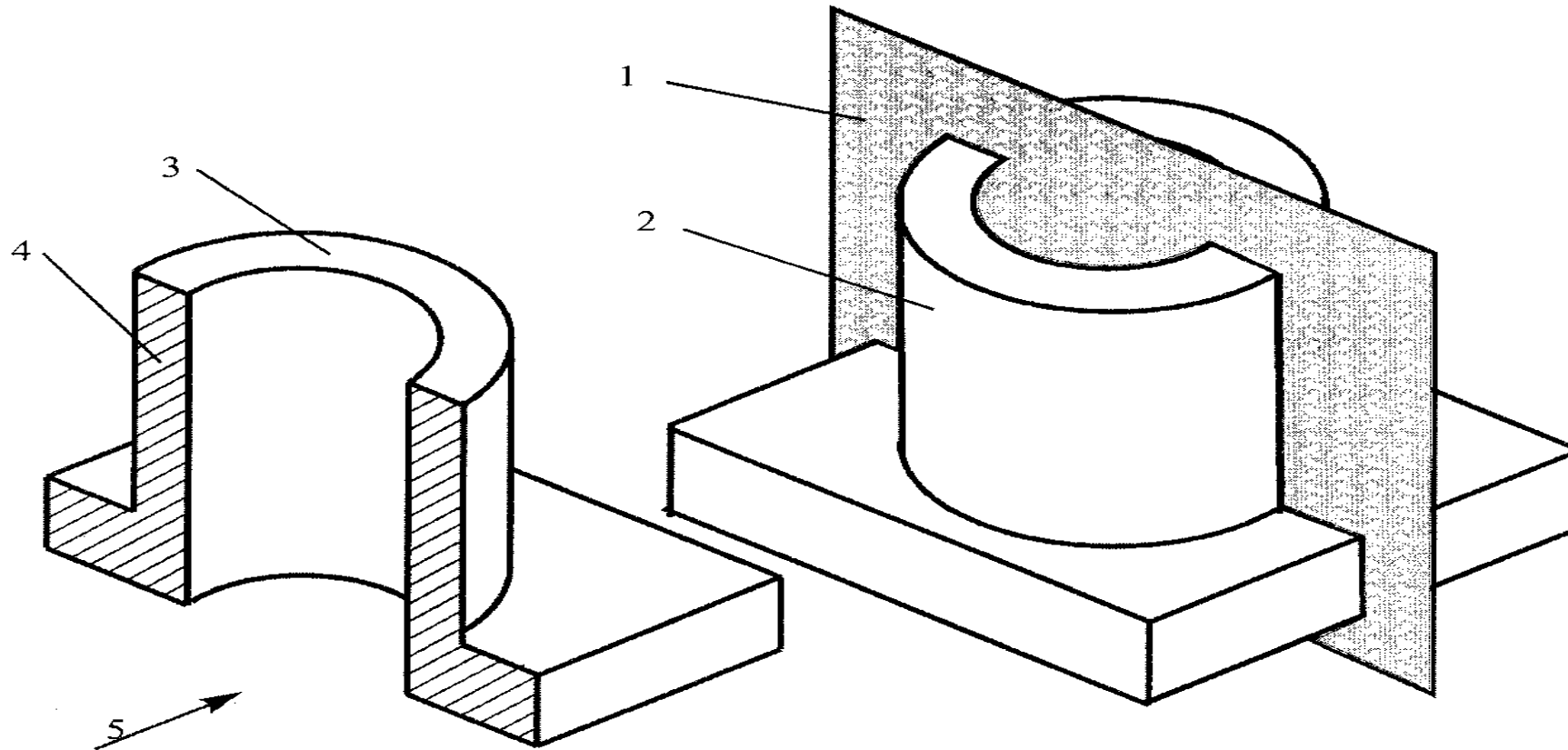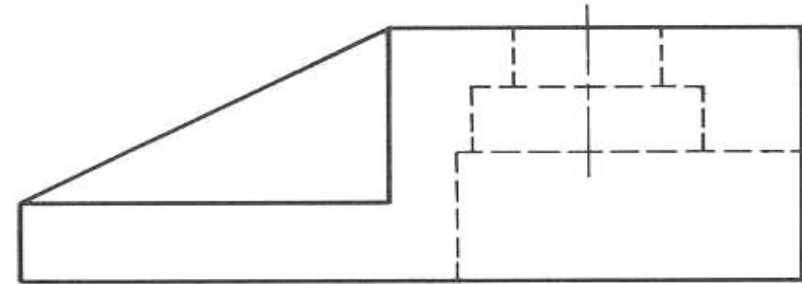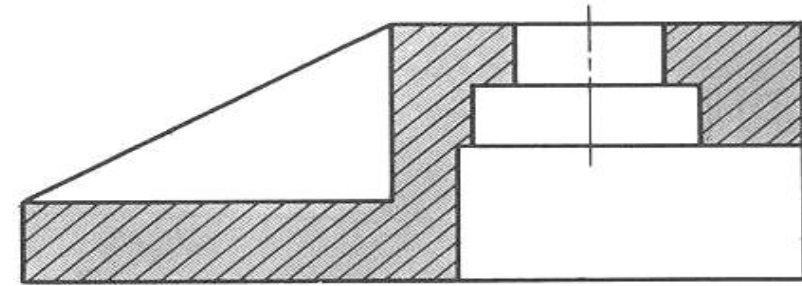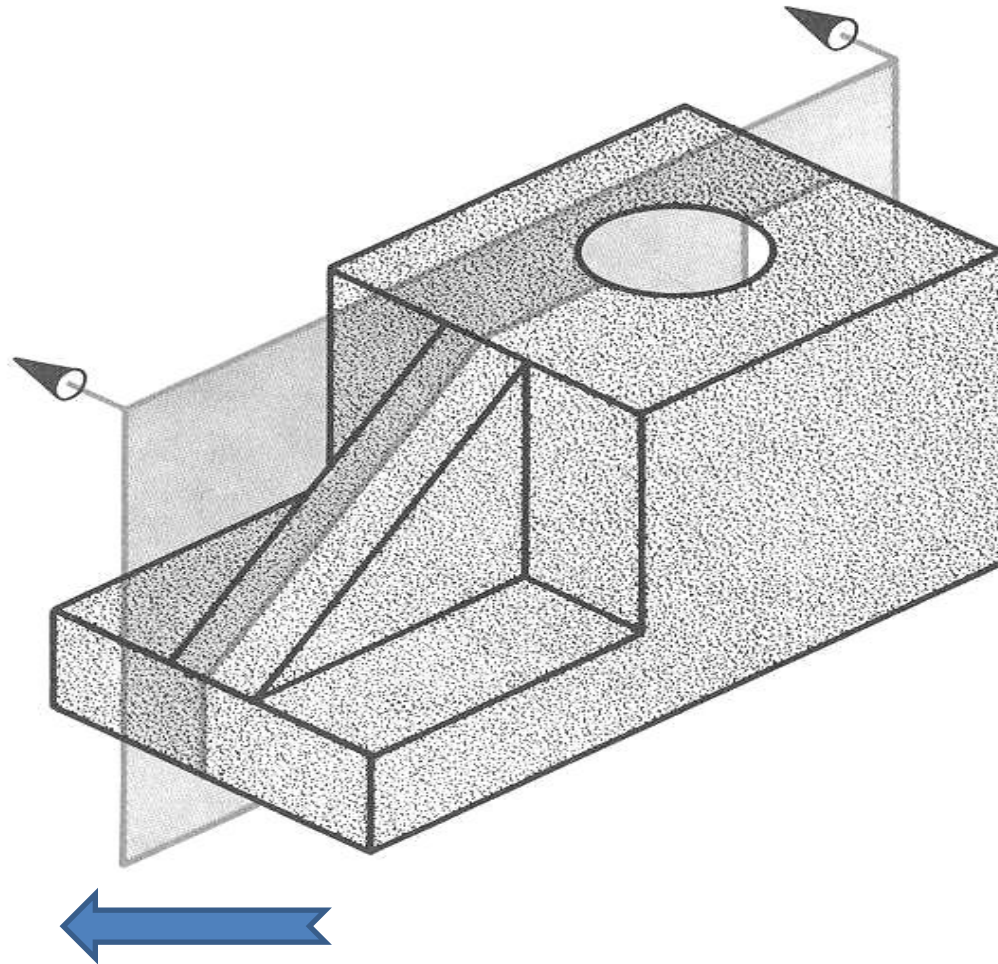
Types of Section
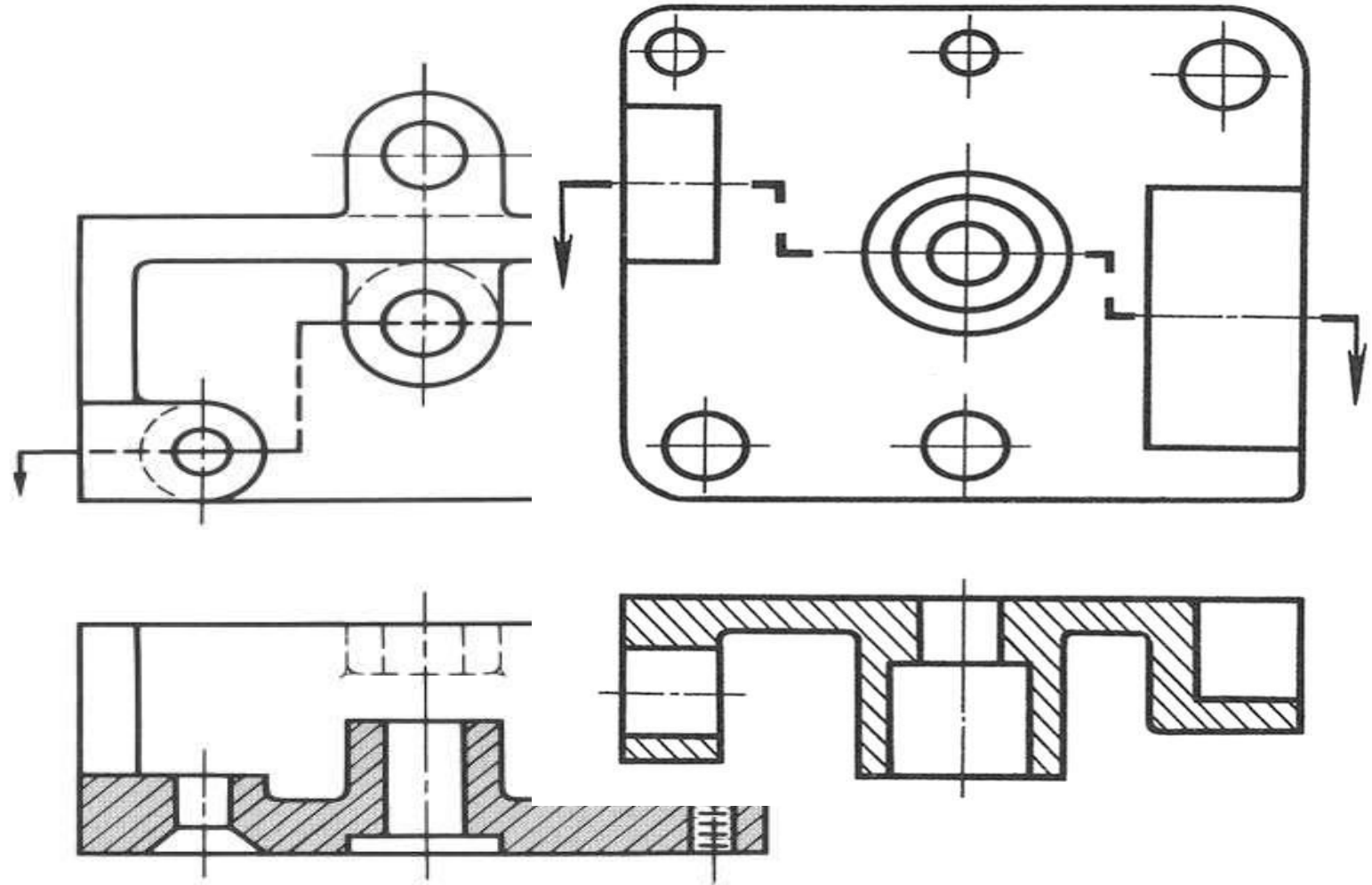
Full Section

The cutting plane-line cuts entirely across the object.

(a)

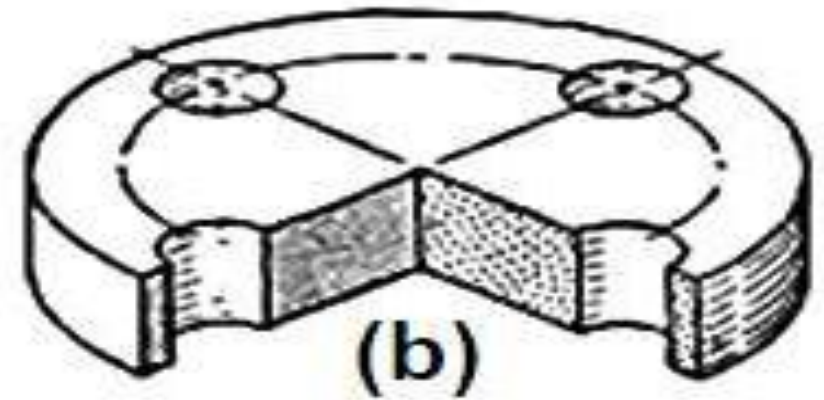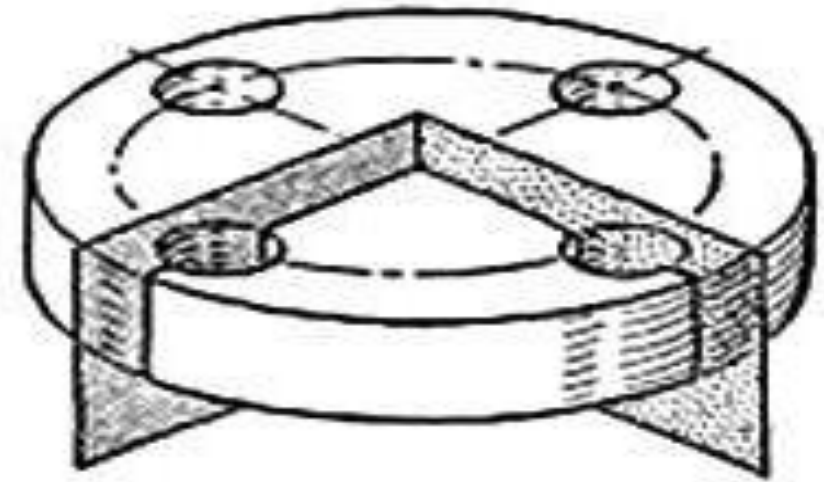# Full Section

-

Full Section with offset Plane

Half Section

- A half section is made by **cutting halfway through an object.**

- Thus, **one half is drawn in section and the other half is an outside view.**

- Usually, **hidden lines are not used (inside details are visible on the section view).**

Types of Section

Half Section

The cutting plane cuts halfway through the object.

(b)

Section lining

- Section lining – a cut surface is indicated by **fine lines, which are drawn as** continuous lines usually at **an angle of 45º with uniform distance (about 2 mm).**

- For smaller or larger areas, distance between lines can be from 1 mm to 4 mm.

- Section lining or cross-hatching lines should not be parallel or perpendicular to any main visible line bounding the sectioned area.
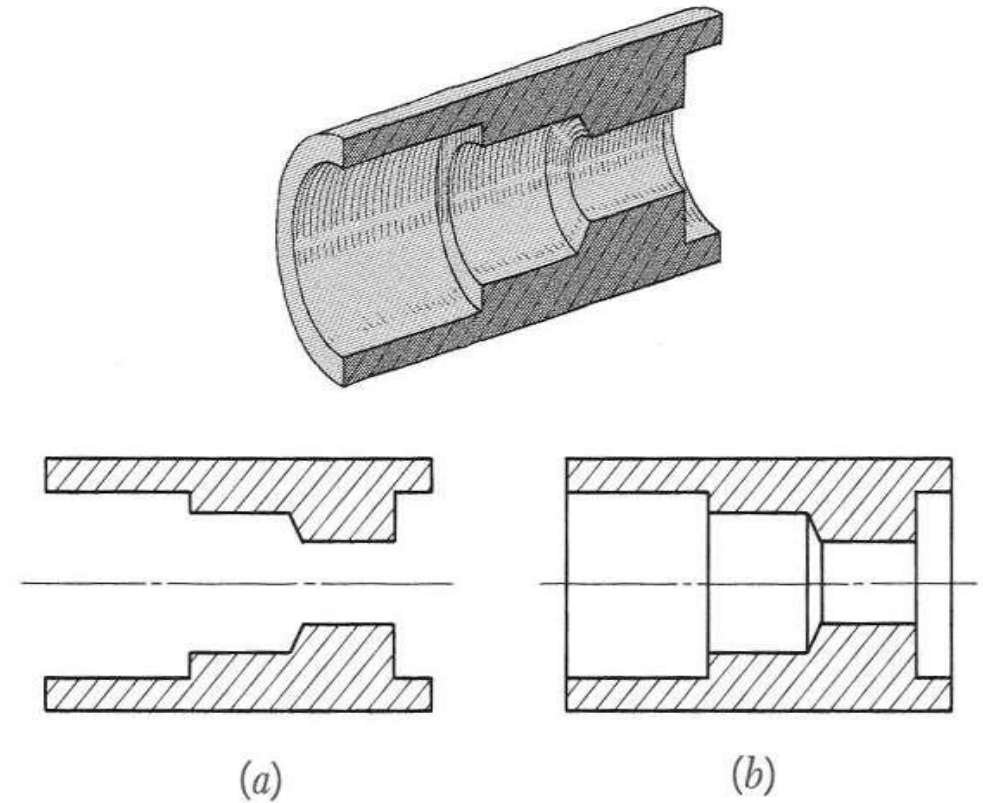

correct
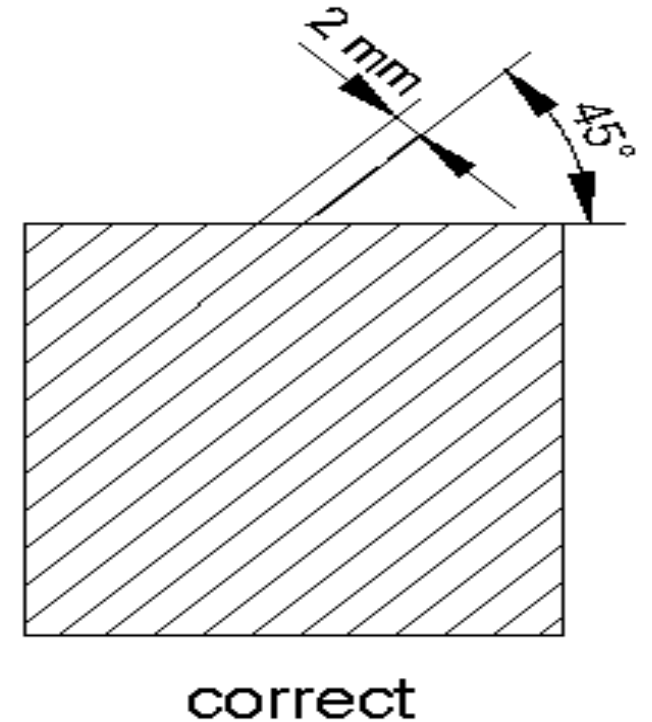
Cross-Hatching of Adjacent Parts

- Section lines on two adjacent pieces should slope at **45^0 in opposite directions. If** a third or fourth piece adjoins the other pieces, **they ordinarily are** cross-hatched at **30^0 and 60^0.**

- An alternate use would be to **vary the spacing without changing the angle.**
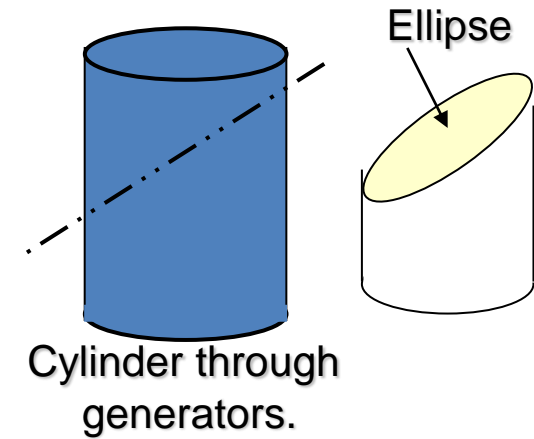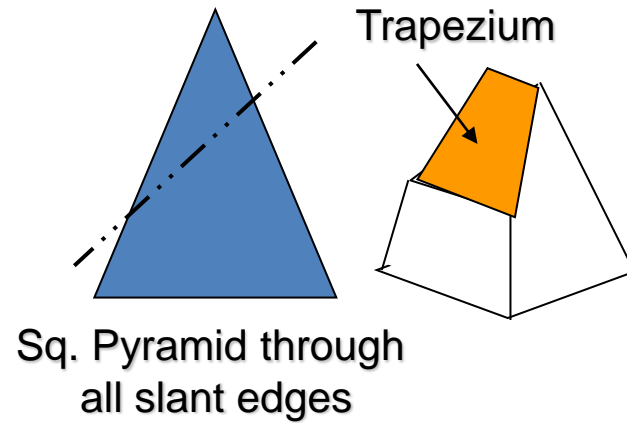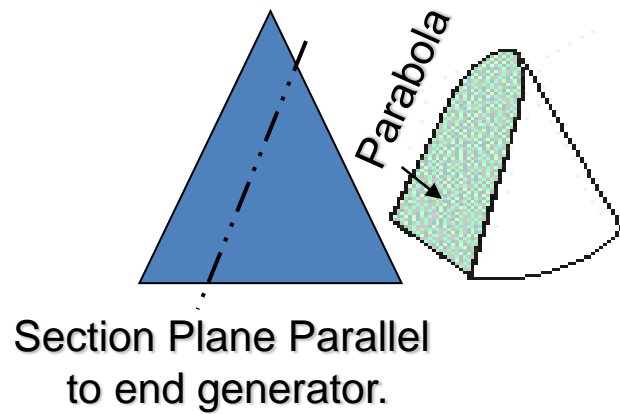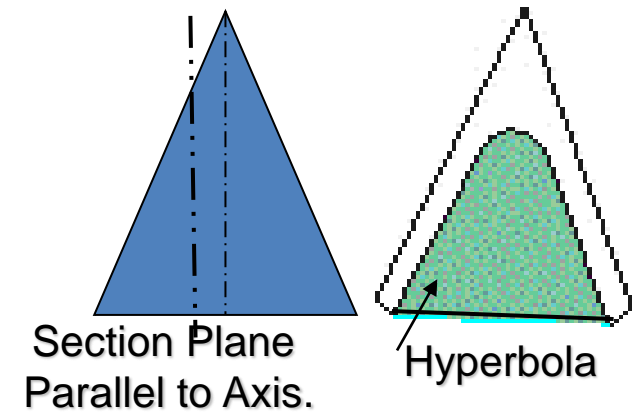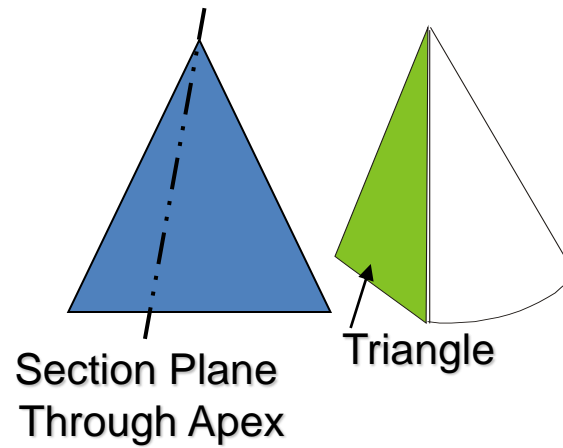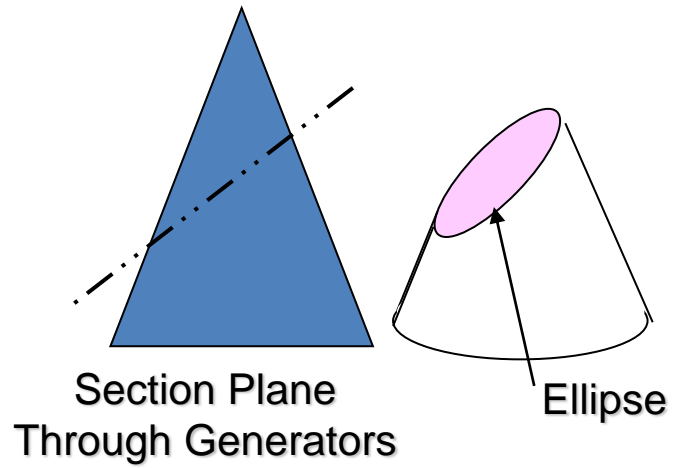
Cross-Hatching of Adjacent Parts
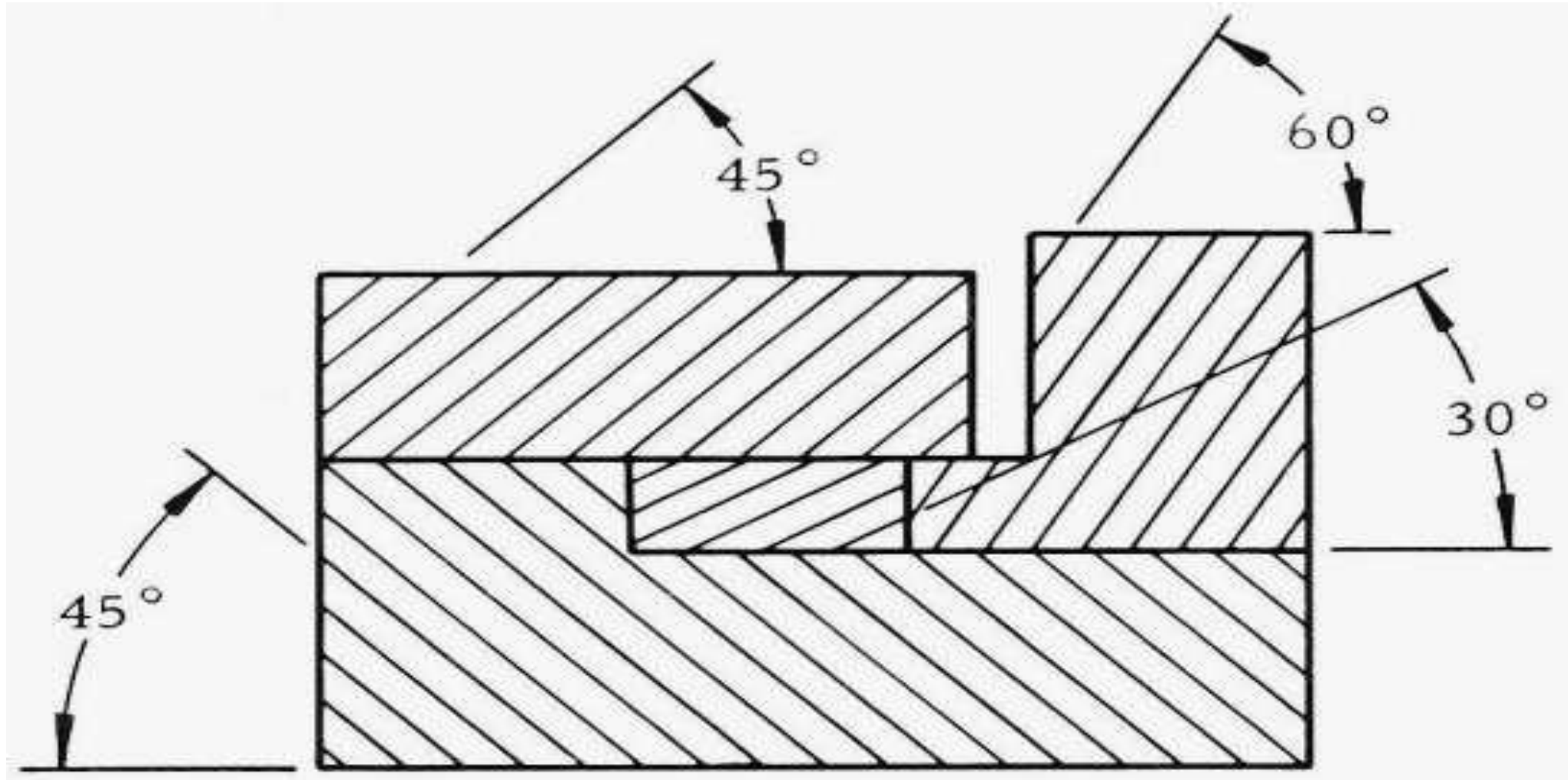
Visible Edges in Section

• A section-lined area is **always completely bounded by a visible outline, never by** a hidden line or edge.

•Therefore, all visible edges and contours behind the cutting plane must be shown in sectional view

•Otherwise, a section will appear to be made up of disconnected and unrelated parts**.**

(a)   (b)

Typical Section Planes & Typical Shapes of Sections

Section Plane
Through Generators

Ellipse

Section Plane
Through Apex

Triangle

Section Plane
Parallel to Axis.

Hyperbola

Section Plane Parallel
to end generator.

Parabola

Sq. Pyramid through
all slant edges

Trapezium

Cylinder through
generators.

Ellipse

A Cone base 75 mm diameter and axis 80 mm long is resting on its base on H.P. It is cut by a section plane perpendicular to the V.P., inclined at 45º to the H.P. and cutting the axis at a point 35 mm from the apex. Draw the front view, sectional top view, sectional side view and true shape of the section.
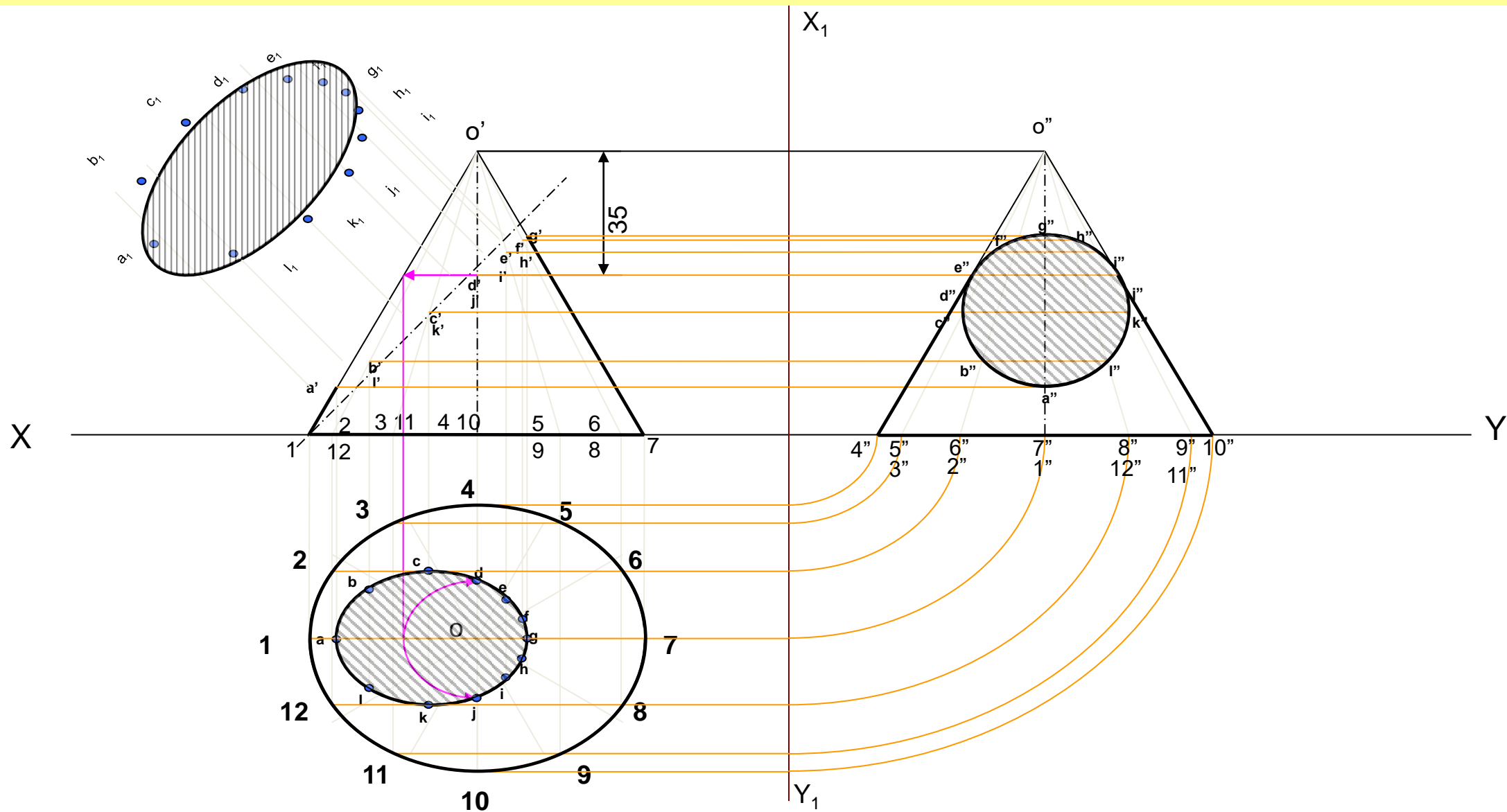
A square pyramid, base 40 mm side and axis 65 mm long, has its base on the ground and all the edges of the base equally inclined to the wall. It is cut by a section plane, perpendicular to the wall, inclined at 45° to the ground and bisecting the axis. Draw its sectional top view, sectional side view and true shape of the section.