

Sections of Solids

①

Section plane:- Section plane is also called cutting plane which is used to

- cut the object completely or partially.

The Section planes are assumed to be thin, transparent, perpendicular to one of the reference planes and either parallel or inclined or perpendicular to the other.

2) Section Lines:-
The cut surface of the object is shown by a series of thin, inclined and parallel lines (using 2H pencil) - called Section lines. This process is called hatching.

Note:-) The Section lines are usually drawn at 45° to the horizontal.
2) Section lines should be equally spaced. Depending on the area to be hatched, spacing normally varies from 1.5 to 3.5 mm.

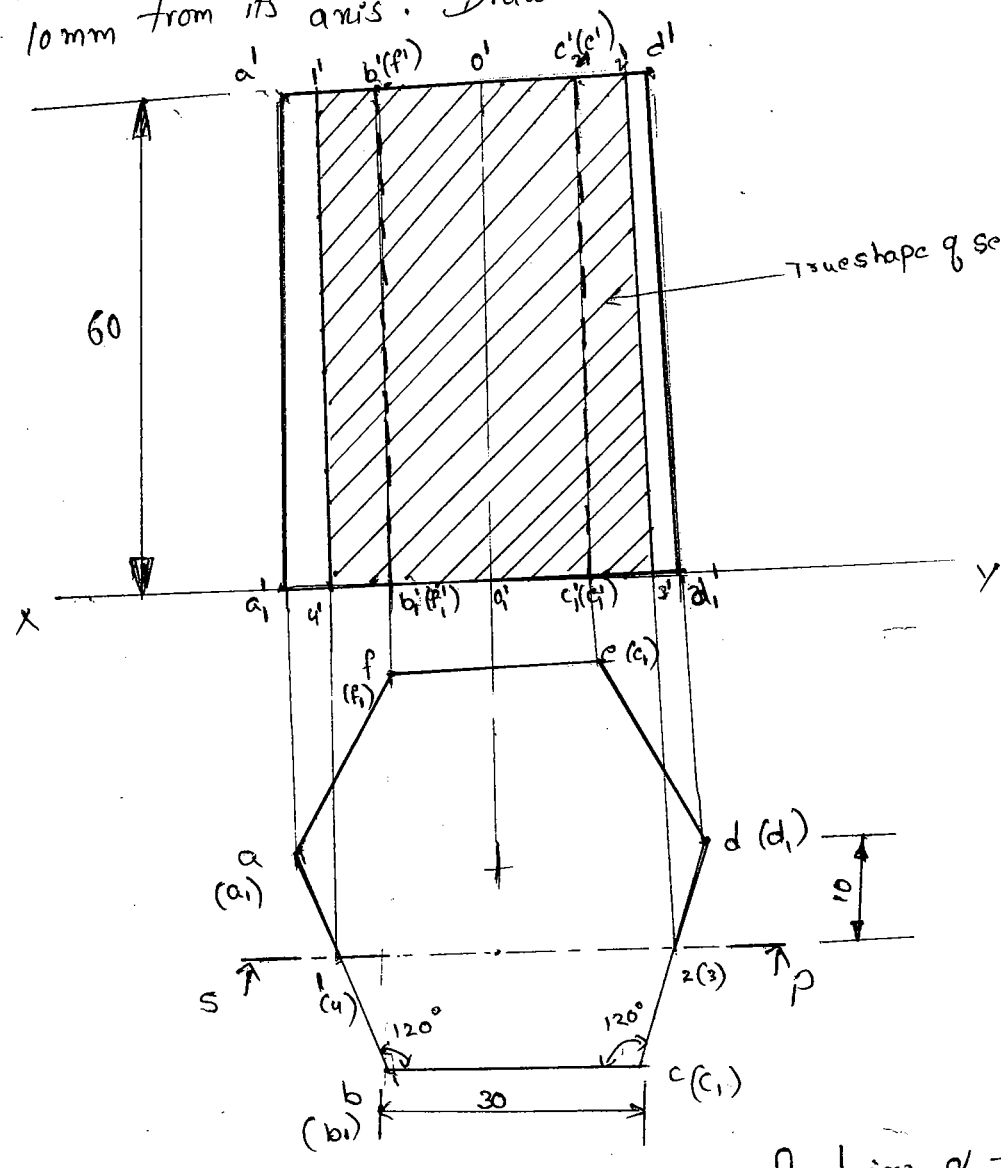
3. Position of Section planes:-

- i) Section plane perpendicular to H.P and parallel to V.P
- ii) Section plane perpendicular to V.P and parallel to H.P
- iii) Section plane perpendicular to V.P and inclined to H.P
- iv) Section plane perpendicular to H.P and inclined to V.P.
- v) Section plane perpendicular to both H.P and V.P.

Section plane \perp to H.P and parallel to V.P :-

1) A Hexagonal prism, side of base 30mm and axis 60mm long rests with its base on H.P. Such that one of its rectangular faces is parallel to V.P. A Section plane perpendicular to H.P and parallel to V.P cuts the prism at a distance of 10mm from its axis. Draw its top and Sectional front views.

sol:-



True shape of section.

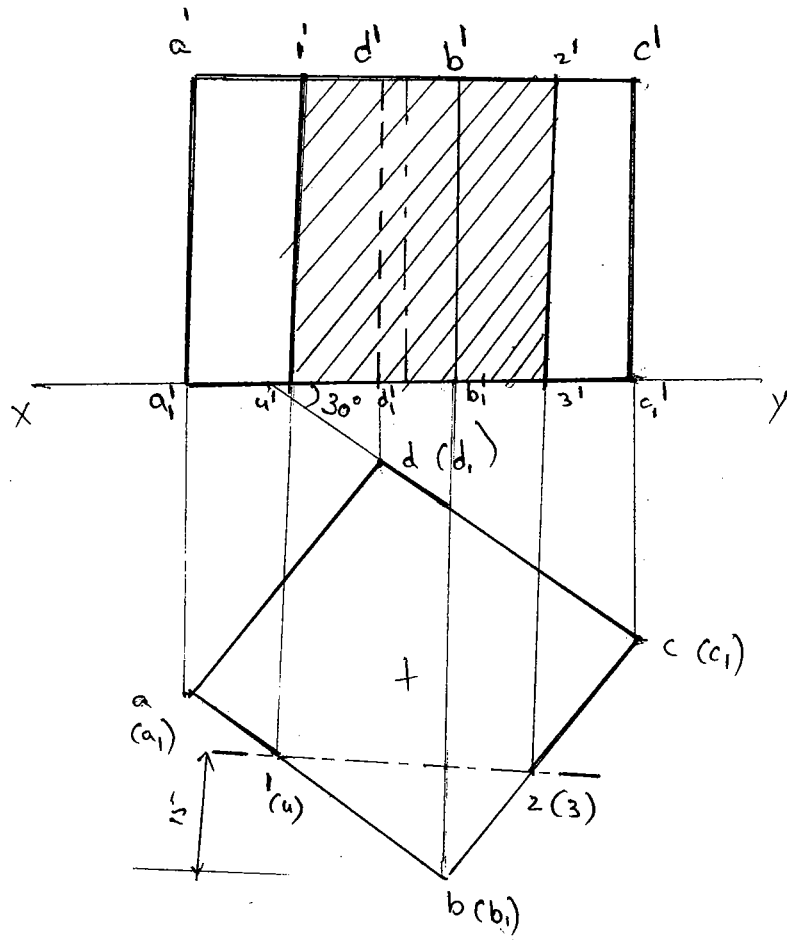
→ Hatching - 2H thinning

(Long chain thick at end and thin at other)

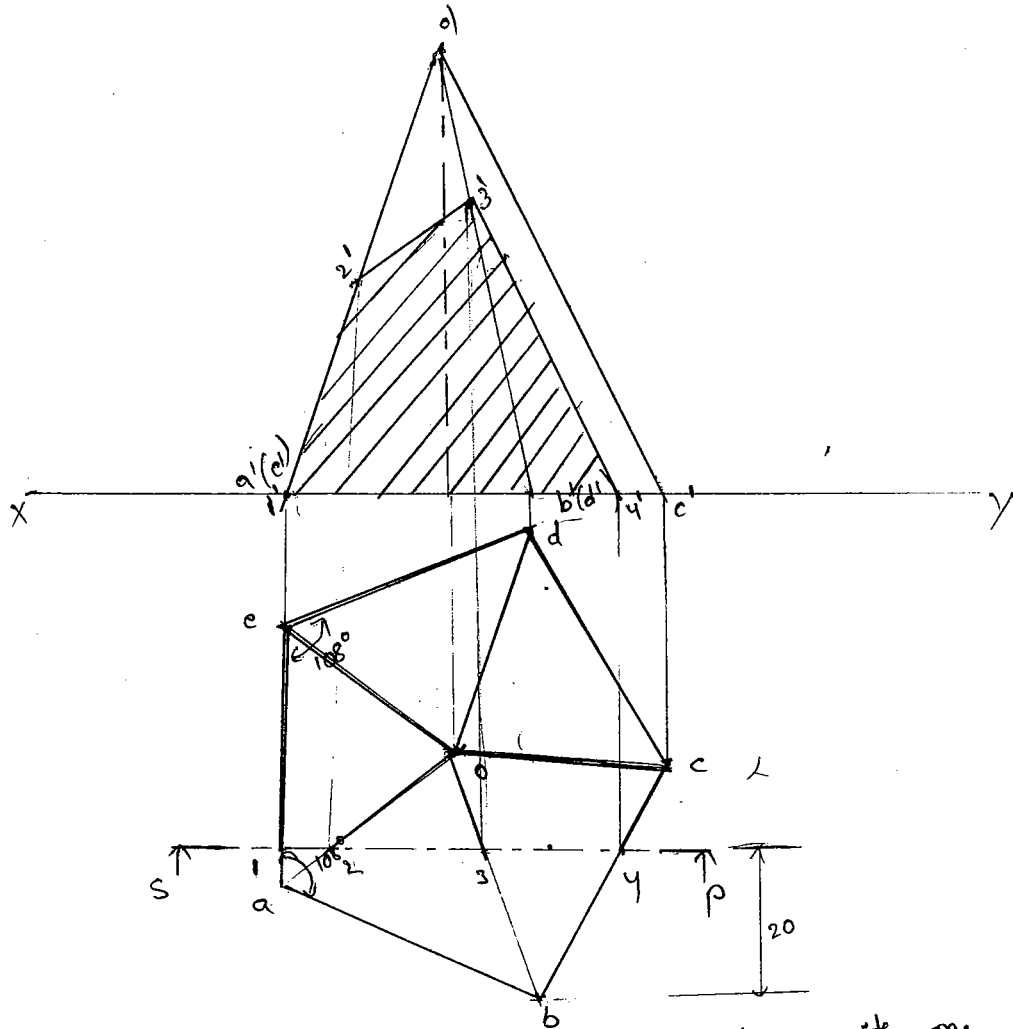
Ans:- when Section plane is parallel to V.P, the front view of the cut surface itself shows the true shape of section.

12/21, 12/26, 12/33, 12/31

1) A pentagonal prism, side of base
 A cube of 45mm side rests with a face on H.P. Such that one of its vertical faces is inclined at 30° to V.P. A section plane, parallel to V.P. cuts the cube at a distance of 15mm from the vertical edge nearest to the observer. Draw its top and sectional front views.

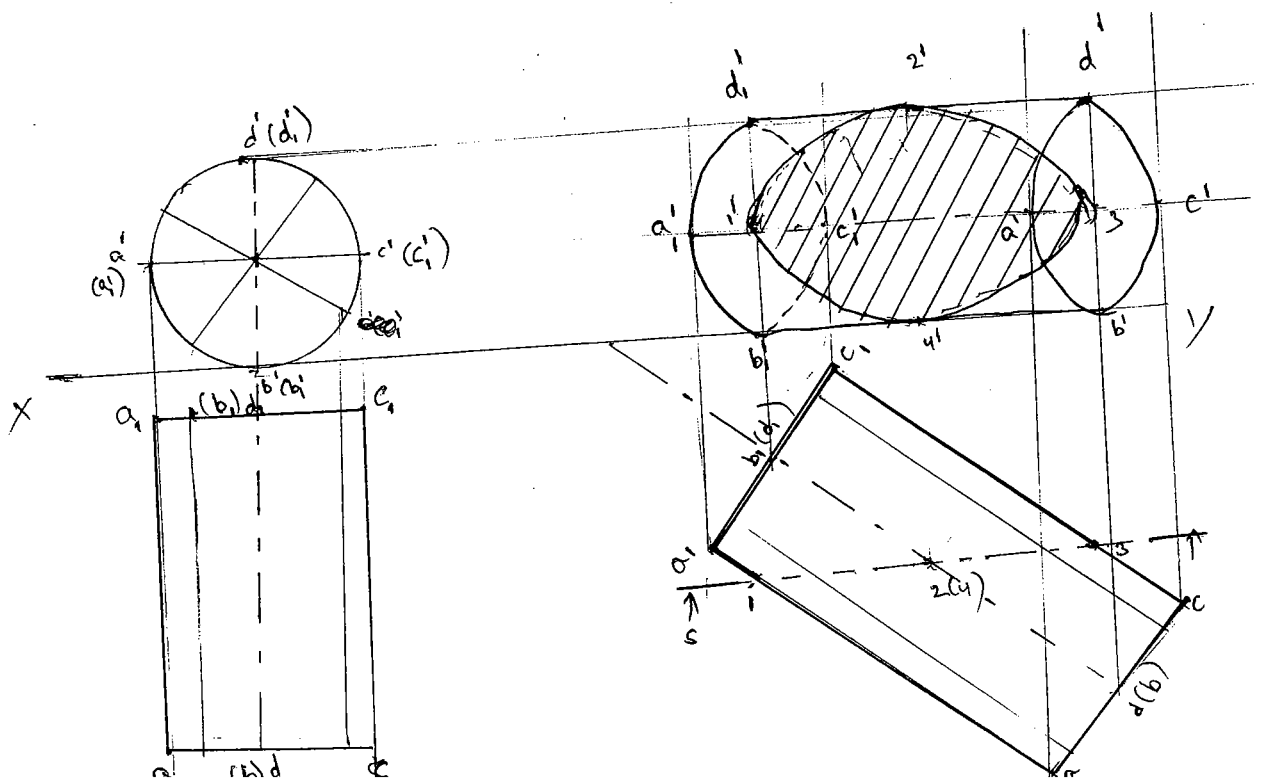


2) A pentagonal pyramid side of base 35mm and axis 60mm long, rest with its base on H.P. Such that one of the edges of the base is \perp to V.P. A section plane, \perp to H.P. and parallel to V.P., cuts the pyramid at a distance of 20mm from the corner of the base nearest to the observer. Draw its top and sectional front views.



Q. A cylinder of 50mm dia and axis 80mm long lies with one of its generators in H.P. Such that its axis is inclined at 45° to V.P. A section plane, parallel to V.P. bisects the axis of the cylinder. Draw the top and sectional front views.

Sol:-

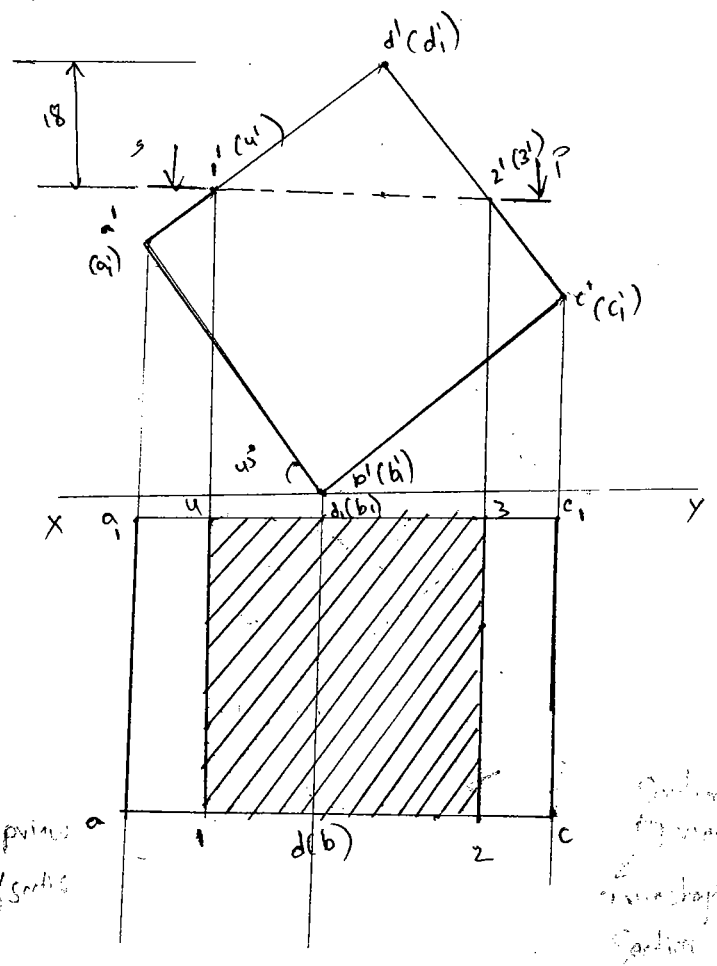
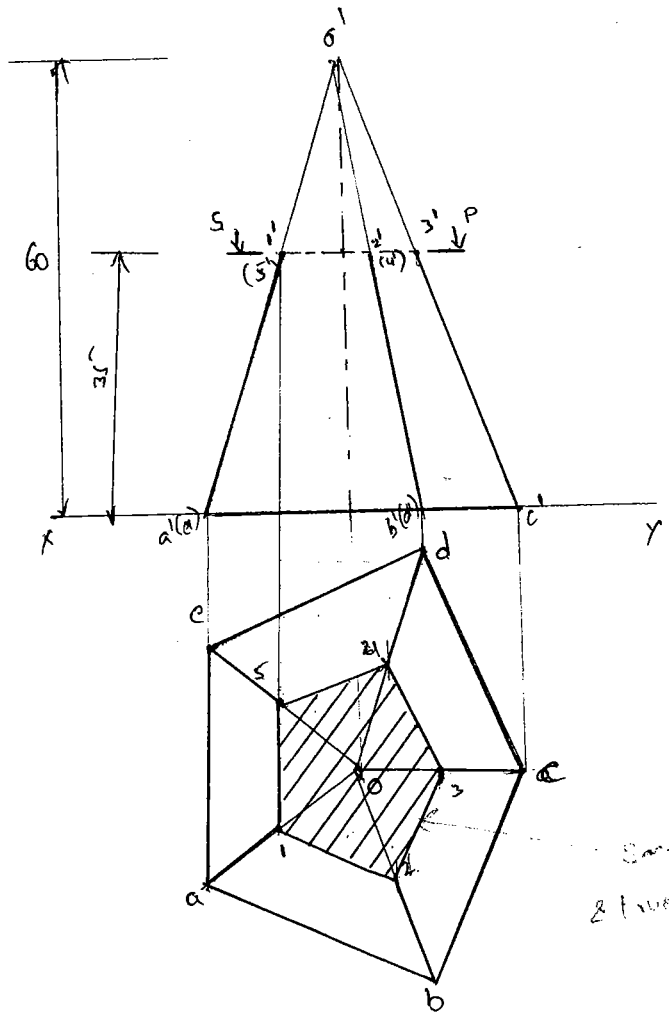


Section plane perpendicular to v.p and parallel to H.P:-

1) A Hexagonal pyramid, side of base 30mm and axis 60mm long, rests with its base on H.P and one of the edges of its base its base parallel to v.p. It is cut by horizontal Section plane at a distance of 38mm above the base. Draw the front and Sectional top views.

A pentagonal pyramid, side of base 30mm and axis 60mm long, rests with its base on H.P and one of the edges of its base is \perp to v.p. It is cut by a Section plane \perp to v.p and parallel to H.P and passing through the axis at a point 35mm above the base. Draw the front and Sectional top views.

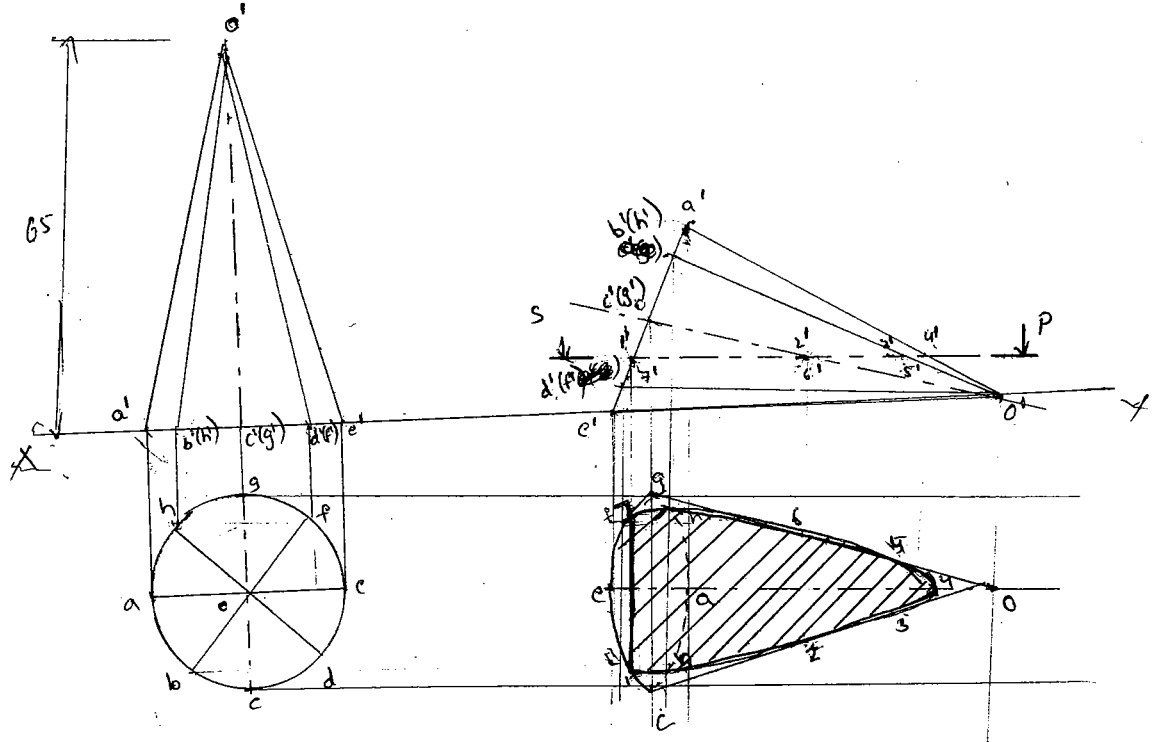
2) A cube of 50mm side rests with one of its edges on H.P. Such that the square faces containing that edge are making equal inclination with H.P. A Horizontal Section plane cuts the cube at a distance of 18mm below the horizontal edge nearer to the observer. obtain the front and Sectional top views.
 Note:- Since the Section plane is parallel to H.P, the cut surface obtained in the top view itself is the true shape of section.



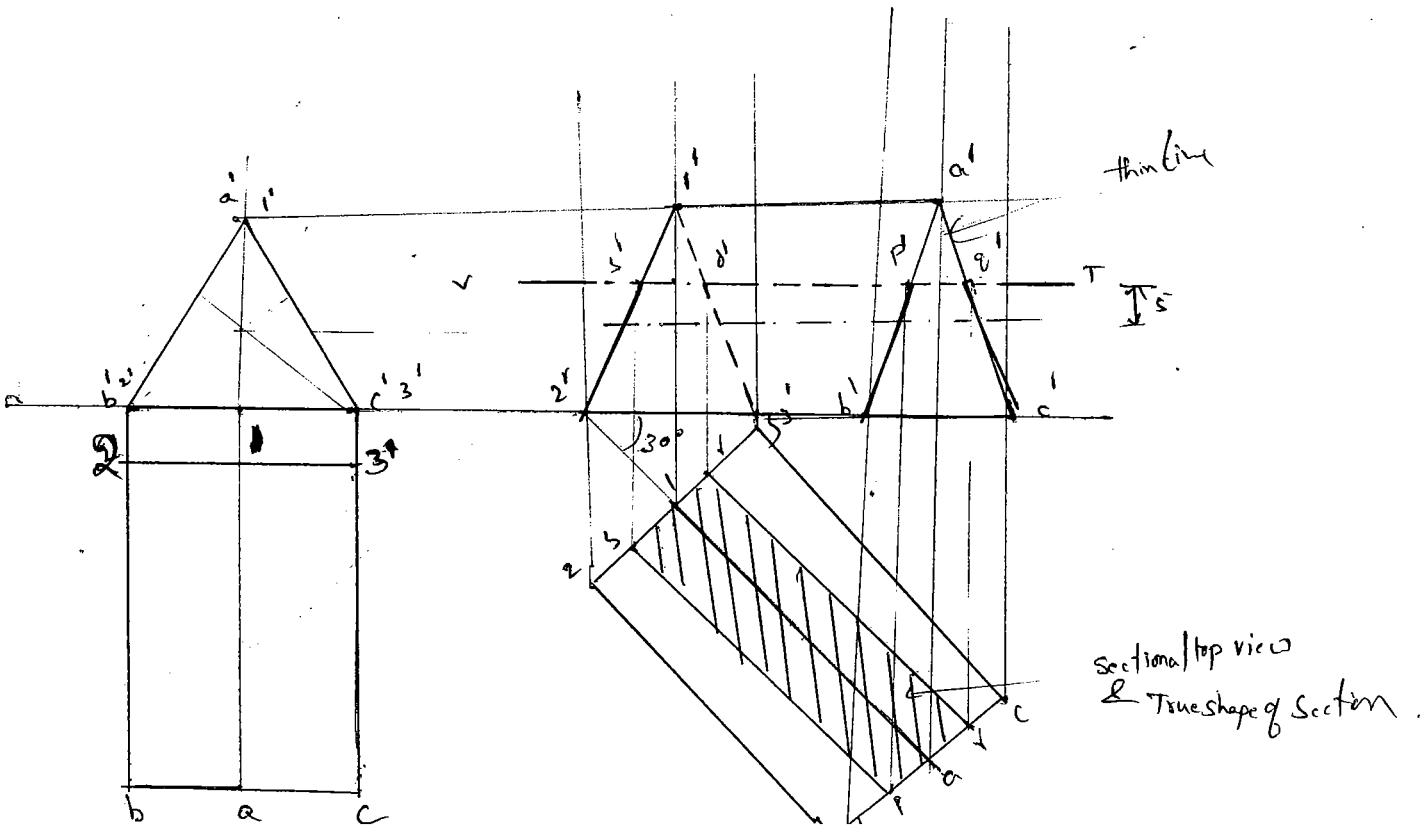
Sectional top views & true shape of section

Sectional top view & true shape of section

3) A cone of base 50mm dia and axis 65mm long, lies on H.P. on one of its generators with its axis parallel to V.P. A Horizontal Section plane bisects the axis of the cone. Draw the front and Sectional top views.

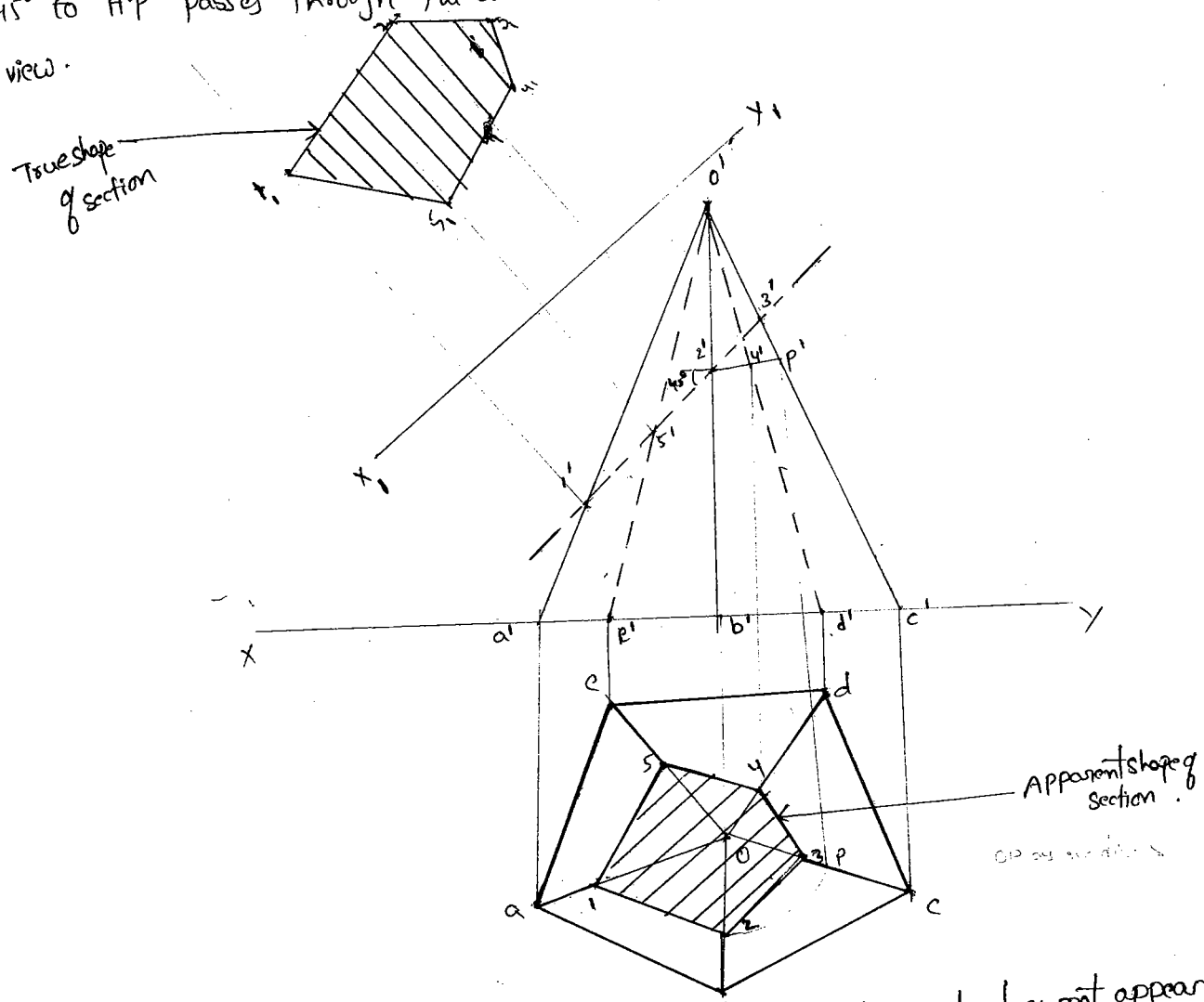


4) A triangular prism of base side 30mm and axis 50mm lies on one of its rectangular face on H.P. with its axis inclined at 30° to the V.P. It is cut by horizontal section plane at a distance of 5mm from the axis. Draw its front view and Sectional top view.



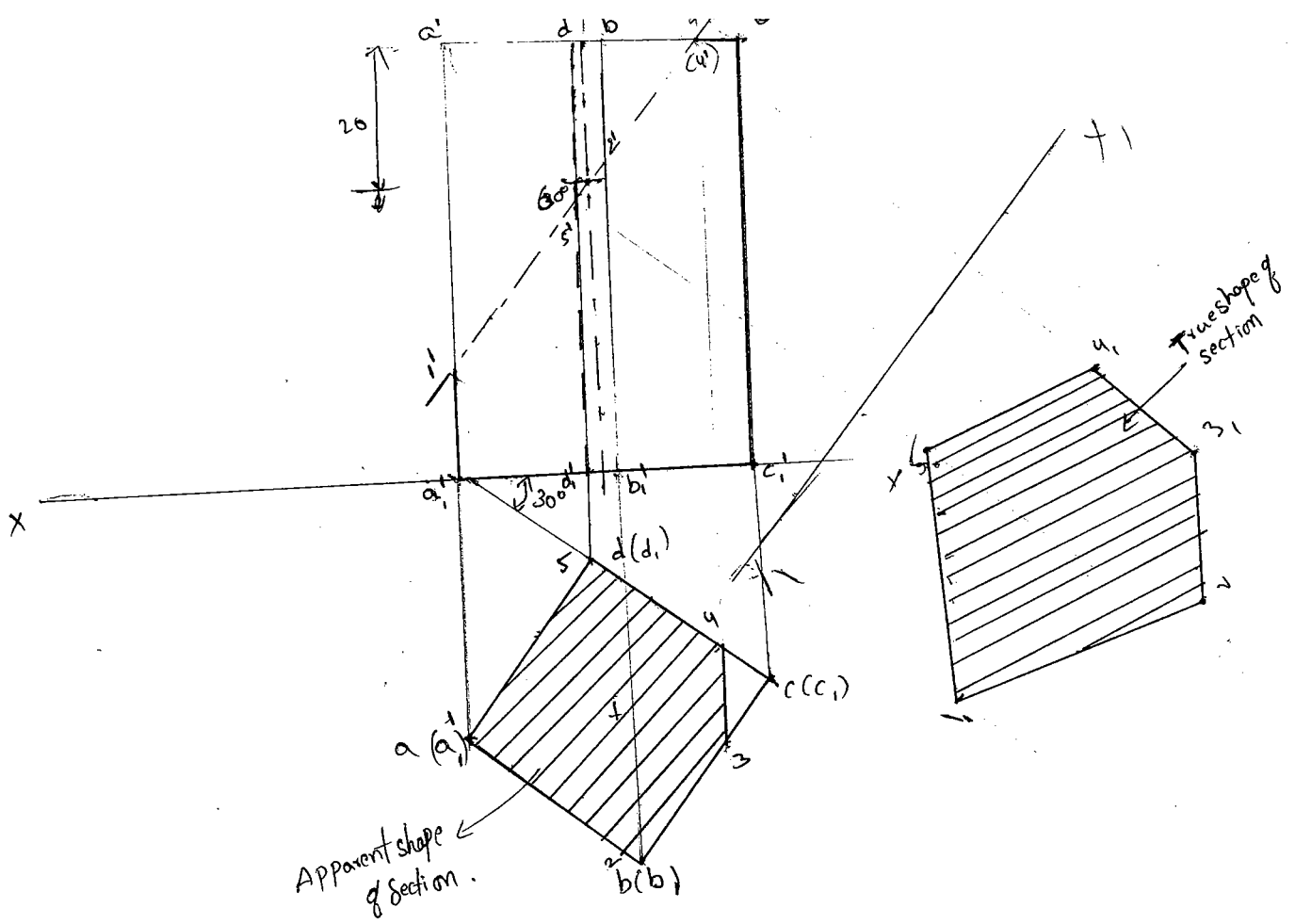
Section plane inclined to H.P. and \perp to V.P.

2) A ~~hexagonal~~ pentagonal pyramid, side of base 30mm and axis 60mm long, rests with its base on H.P. and an edge of its base is parallel to V.P. A section plane \perp to V.P. and inclined at 45° to H.P. passes through the axis at a point 35mm above the base. Draw the Sectional top view.

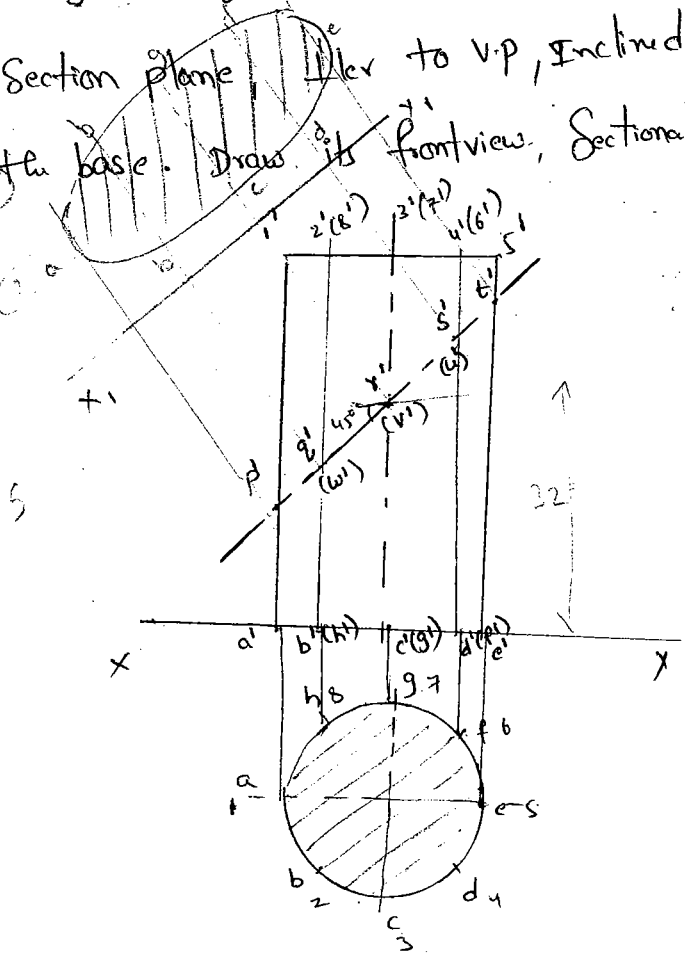


Note:- Since the Sp is inclined to H.P., the cut surface obtained does not appear in true shape and is called apparent shape of section.
 > The true shape of section is obtained by viewing the object normal to the cut surface and projecting it on another plane parallel to the section plane.

3) A square prism, side of base 30mm and axis 60mm long, rests with its base on H.P. and one of its rectangular face is inclined at 30° to V.P. A section plane \perp to V.P. and inclined at 60° to H.P., cuts the axis of the prism at a point 20mm from its top end. Draw the Sectional top view and true shape of section.



3) A cylinder of 40mm dia, 60mm height and having its axis vertical, is cut by section plane \perp to V.P, inclined at 45° to H.P and intersecting the axis 32mm above the base. Draw its front view, sectional top view, & true shape of section.

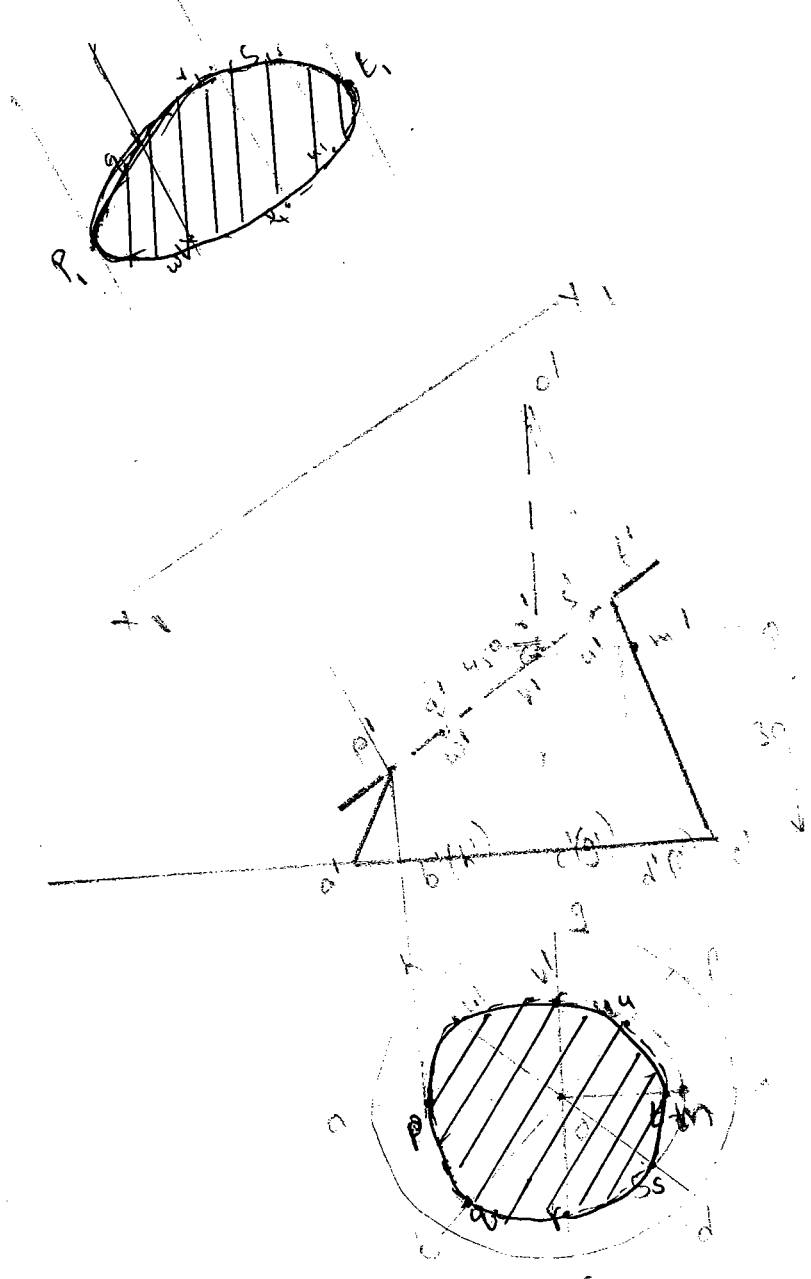


Assignment

1) A pentagonal pyramid of base side 30mm and axis 60mm is resting on its base on the H.P. with an edge of the base || to V.P. It is cut by a Section plane \perp to V.P., inclined at 60° to the H.P. and bisecting the axis. Draw its front view and Sectional top view.

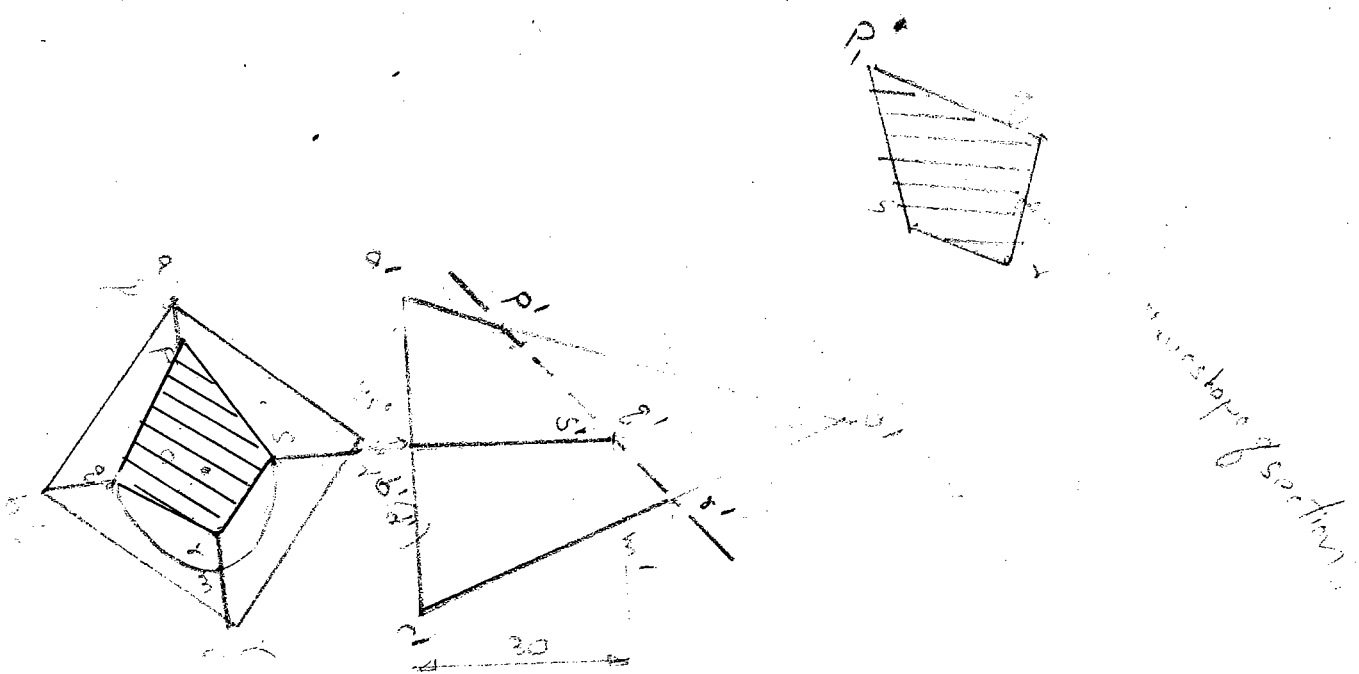
2) A cylinder of base diameter 50 and axis 60mm is resting on its base on the H.P. It is cut by a Section plane \perp to V.P., the V.T of which cuts the axis at a point 40mm from the bottom face and inclined at 45° to the reference line. Draw its front view, Sectional top view and true shape of section.

3) A cone of base dia 50mm and axis 60mm long is resting on its base on the H.P. It is cut by an A.P. bisecting the axis inclined at 45° to H.P. Draw its Sectional top view and true shape of section.

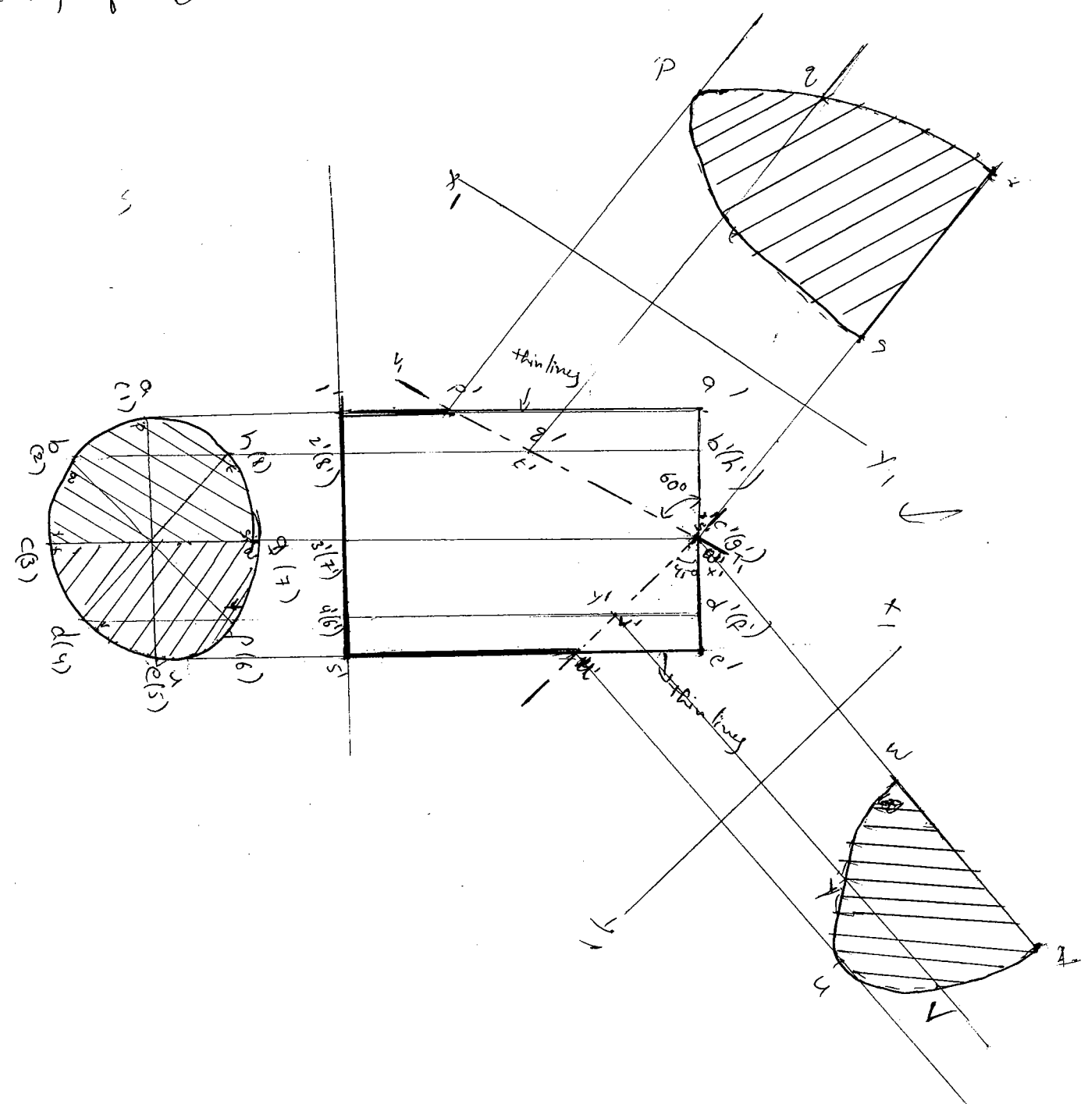


1) A square pyramid of base side 40mm and axis 60mm is resting on its base on the HP with all the sides of the base equally inclined to V.P. Draw its Sectional views and true shape of the Section, if it is cut by a Section plane \perp to V.P., bisecting the axis and a) inclined at 45° to H.P. c) inclined at 60° to the H.P.

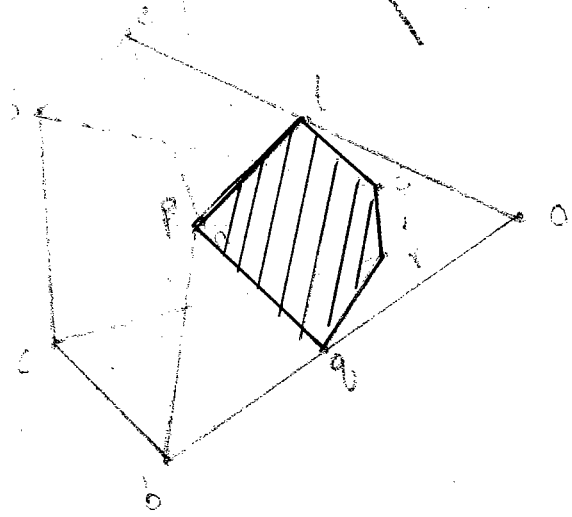
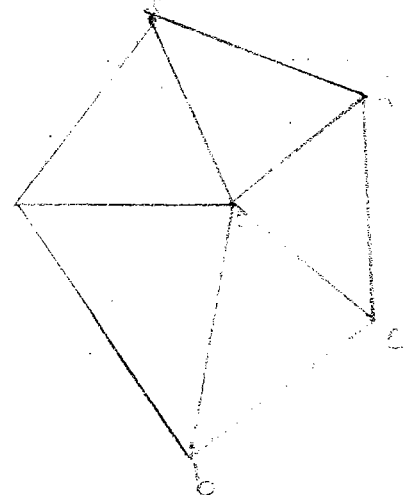
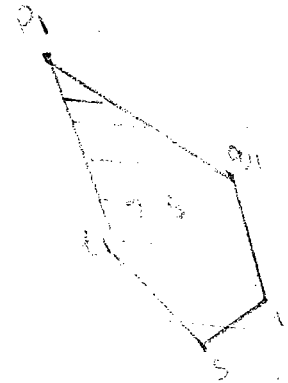
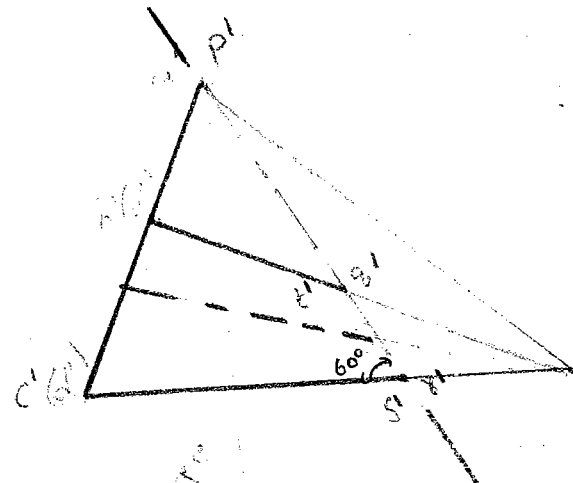
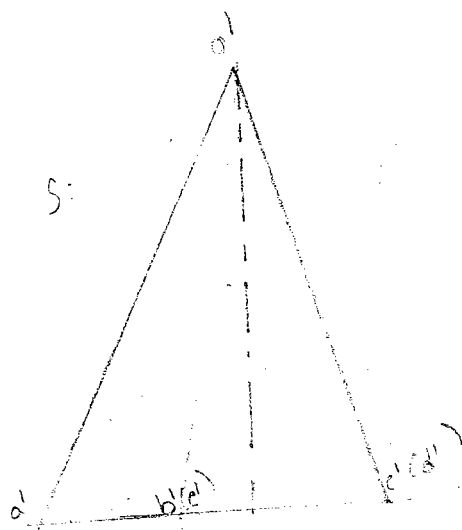
Assignment



D) A cylinder of base dia 60mm and axis 70mm long is resting on its base in the HP. It is cut by two auxiliary inclined planes which make angles of 60° and 45° to the HP and pass through the top end of the axis. Draw its Sectional top view and true shape of the section.

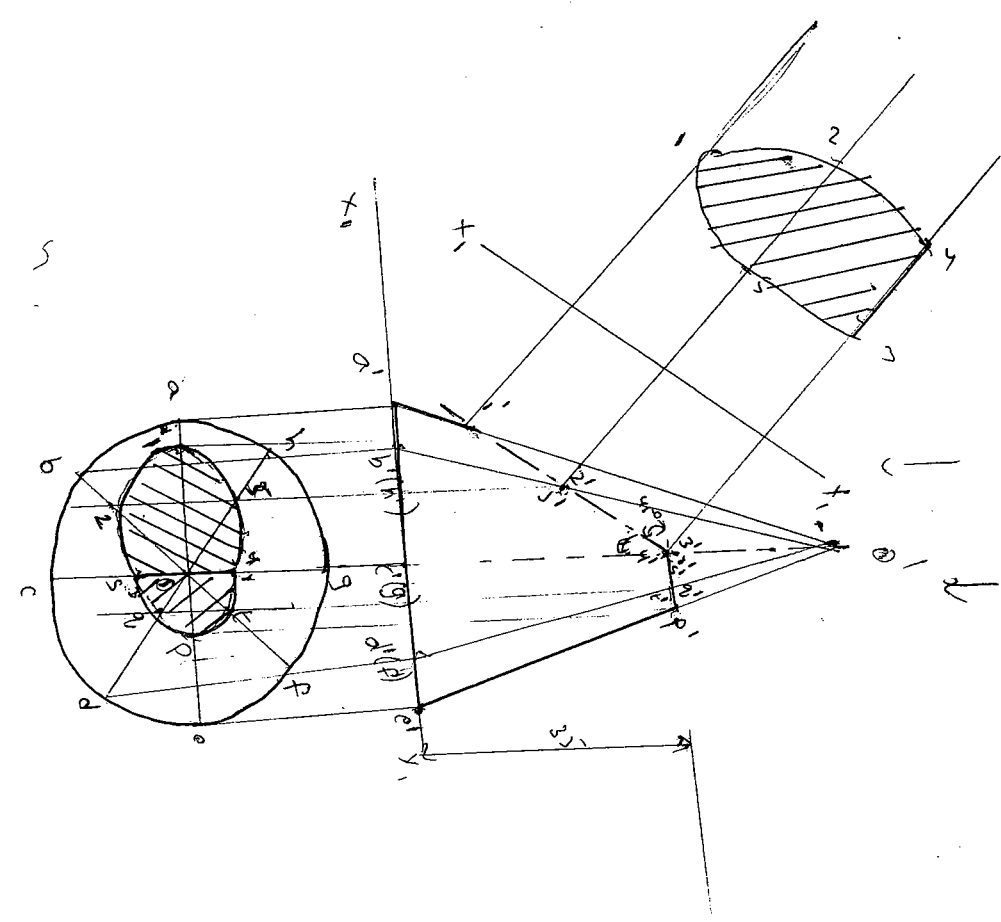


① A pentagonal pyramid of base side 30mm and axis 60mm, is on a triangular surface in the H.P with its axis parallel to the V.P. It is cut by an A.I.P. inclined at 60° to the H.P and passing through the highest point of the base. Draw its sectional top view and true shape of the section.



Q) A cone of base dia 50 mm and axis 60 mm is resting on its base in the H.P. It is cut by a horizontal plane and an A.I.P inclined at 45° to the H.P. Both the planes meet at a point on the axis 35 mm above the base. Draw its Sectional top view and obtain true shape of the Section?

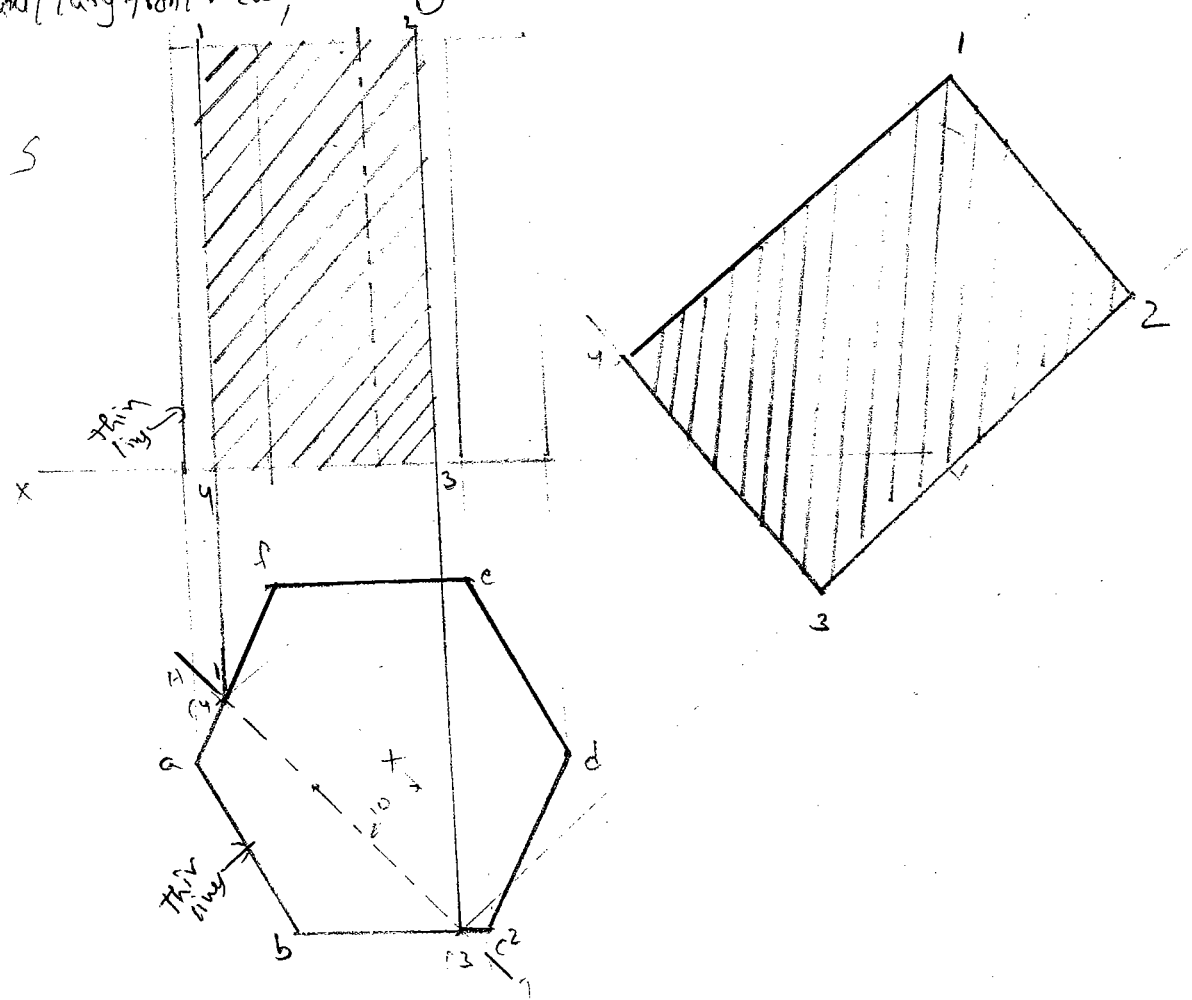
sol:-



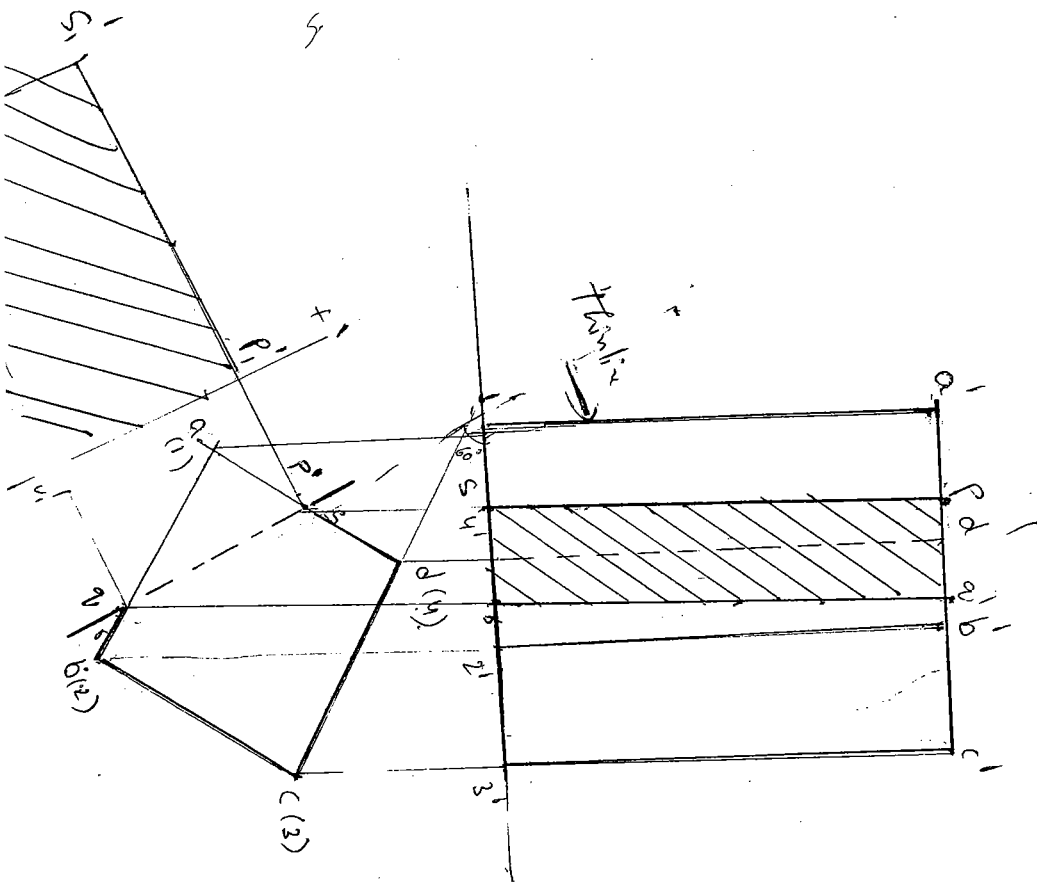
Section plane inclined to v.p and \perp to H.P:-

When Section plane passing through the solid is inclined to v.p and \perp to H.P, its H.T is inclined to XY. The true shape of the section may be obtained on an A.P., parallel to the given Section plane.

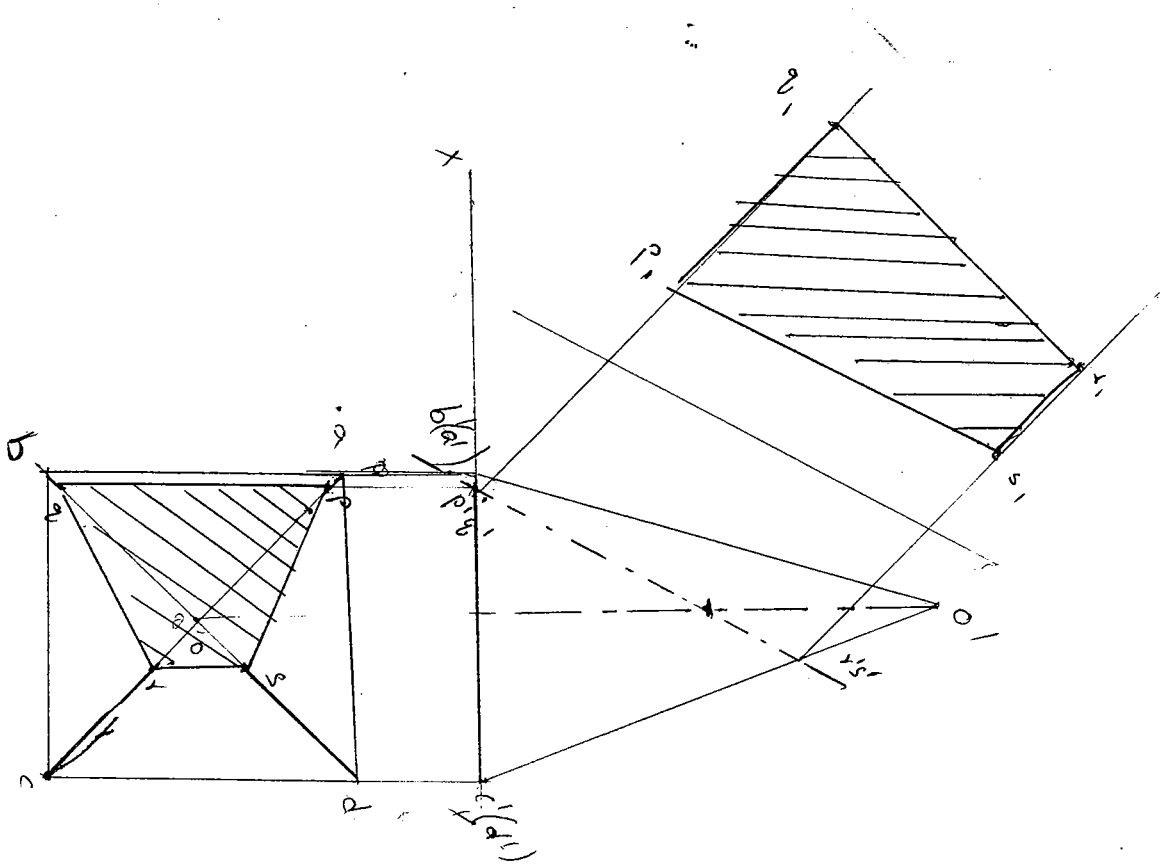
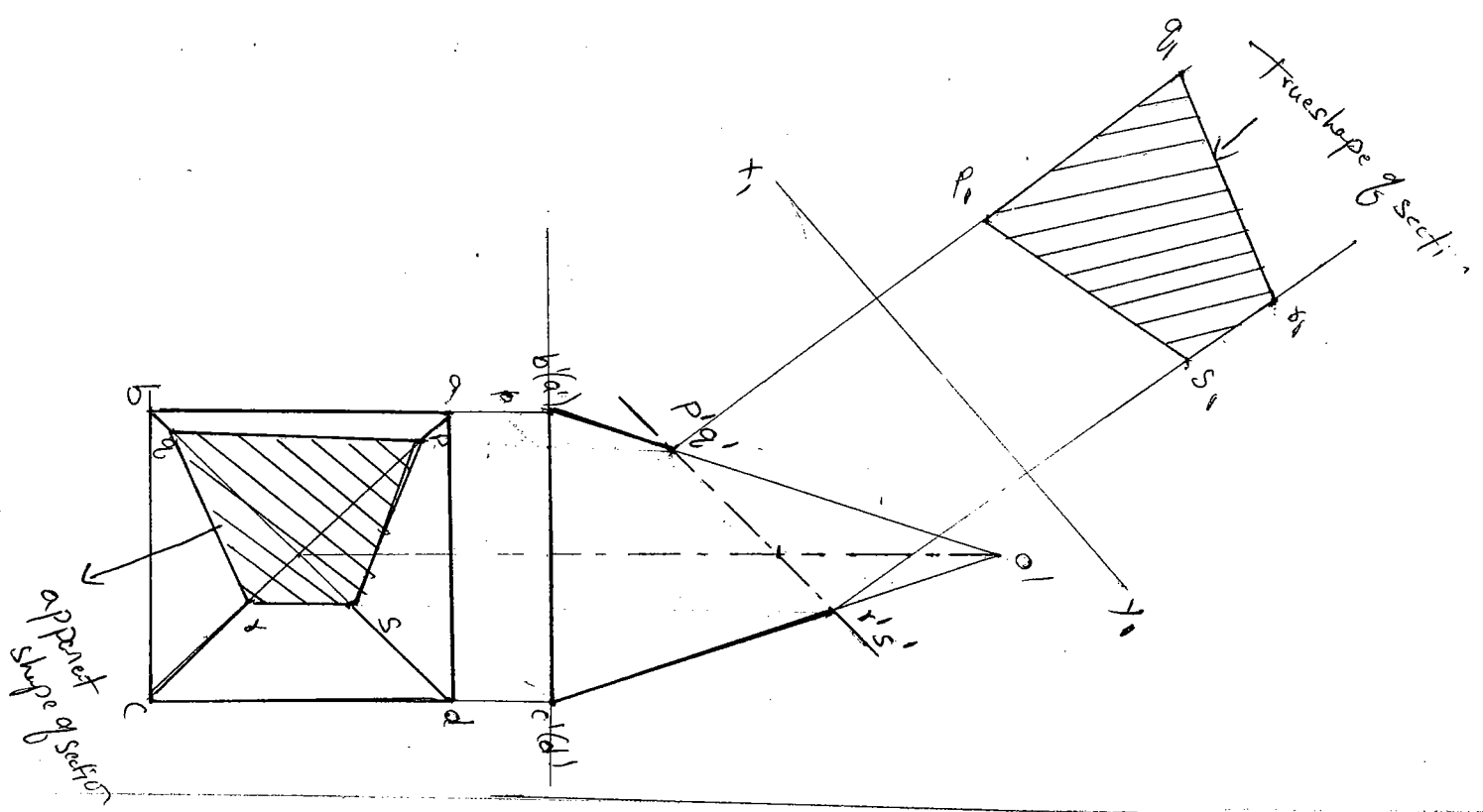
1) A Hexagonal prism of side of base 25mm and 60mm long is resting on its base on H.P. Such that an edge of the base is parallel to v.p. It is cut by a section plane, inclined at 45° to v.p and 10mm away from the axis. Draw the projections of the solid. Also obtain an auxiliary front view, showing the true shape of section.



30



A Square pyramid of base 40mm and axis 60mm is resting on its base on the H.P with a side of base parallel to V.P. Draw its sectional views and true shape of the section, if it cut by a section plane \perp to V.P, bisecting the axis a) inclined at 45° to the H.P b) inclined at 60° to the H.P



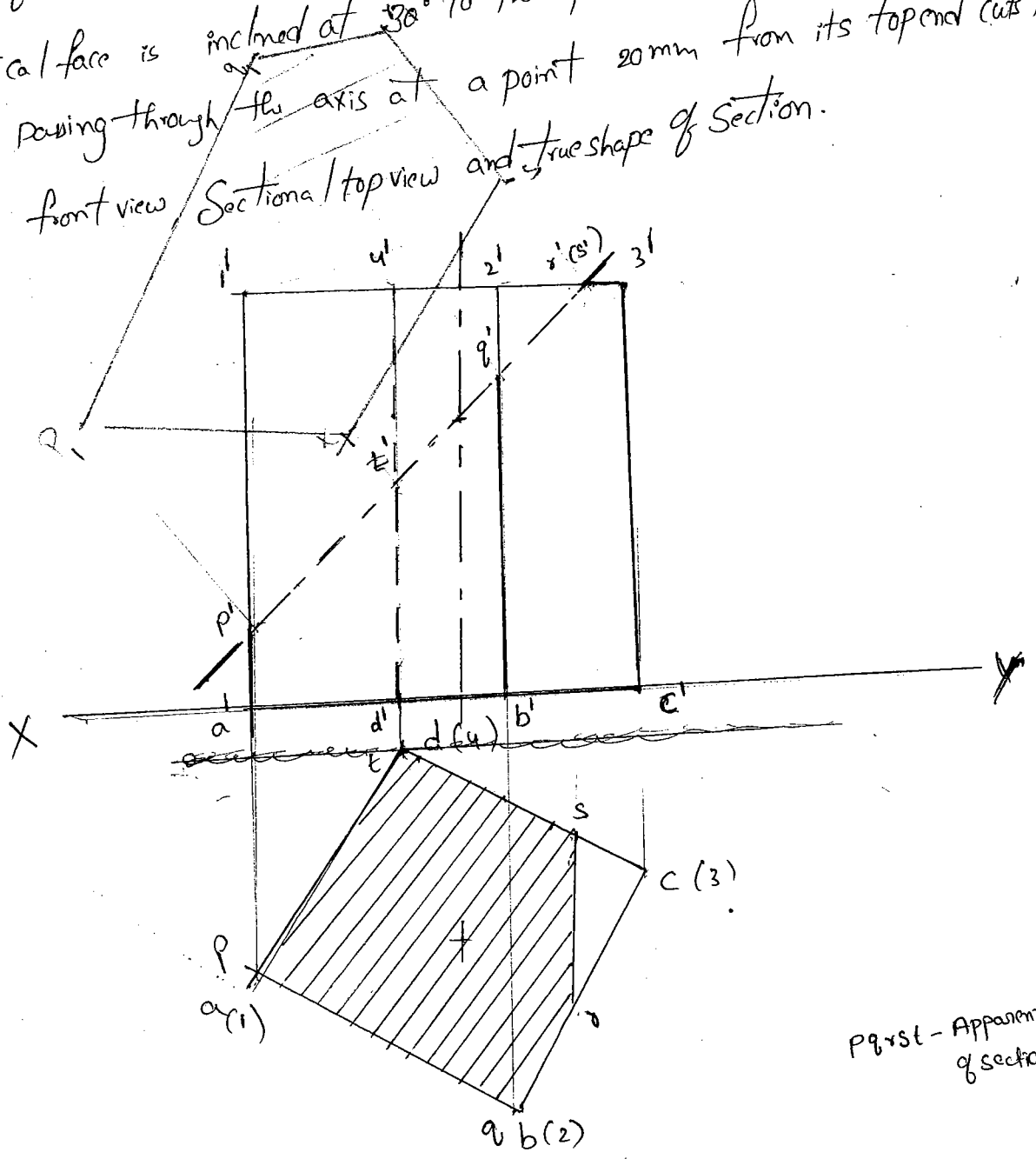
Section plane Inclined to H.P & \perp to V.P (A.I.P) :-

When an object is cut by an auxiliary inclined plane, the true shape of section is obtained by projecting the apparent section of the object on another plane parallel to the section plane.

- Front view - Cutting line symbol inclined at θ to XY.
- Top view - Apparent shape of section.

i) A square prism of base side 40mm and axis 60mm rests on its base on H.P. Such that one of the vertical face is inclined at 30° to the V.P. A section plane \perp to V.P, inclined at 45° to H.P, passing through the axis at a point 20mm from its top end cuts the prism. Draw its front view sectional/top view and true shape of section.

Sol:-

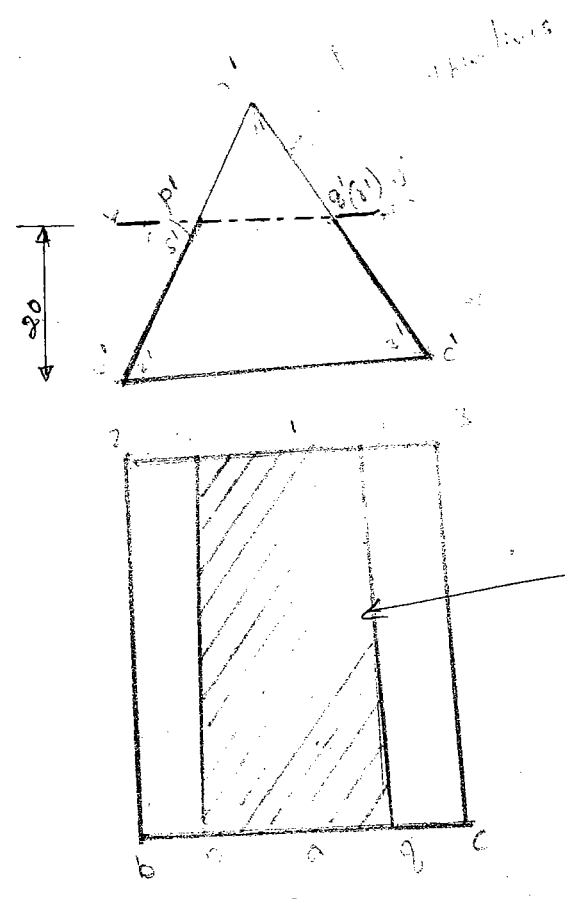


PQRST - Apparent shape of section

Section plane parallel to H.P. & \perp to V.P.:-

When an object is cut by Horizontal Section plane, the Sectional top view of the object gives the true shape of section.

~~Q1~~ A triangular prism of base side 50mm and axis 50mm is lying on one of its rectangular faces on the H.P. with its axis \perp to V.P. It is cut by a Section plane parallel to and 20mm above H.P. Draw its front view and Sectional top view.



Sectional top view & true shape of section

Matching - 2H thin lines 45° to reference line
Long chain line thick at end and thin elsewhere

Q2) A cylinder of base dia 50mm and axis 60mm is resting on its base on the H.P. It is cut by a Section plane parallel to and 40mm above H.P. Draw its front view and Sectional top view.

~~Q3~~ A pentagonal pyramid of base side 30mm and axis 60mm is resting on its base in the H.P. with an edge of the base \parallel to V.P. A Horizontal Section plane cuts the pyramid bisecting the axis. Draw its front view and Sectional top view.

HOD

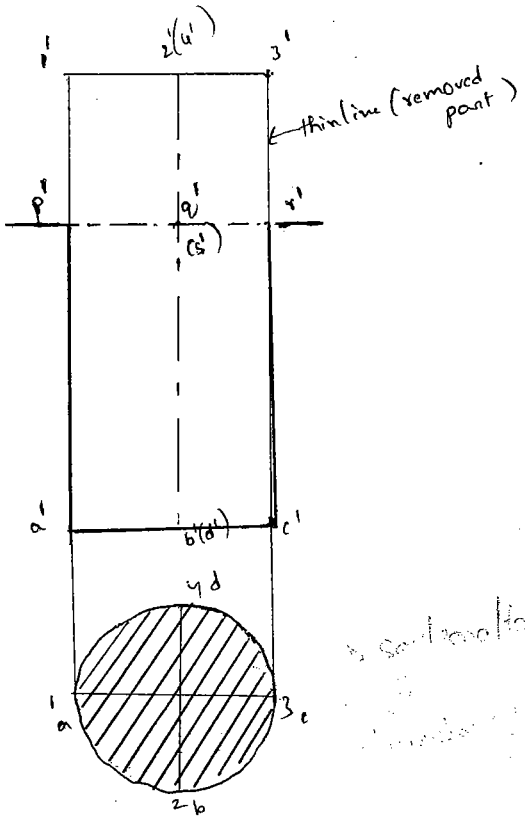


Fig 2

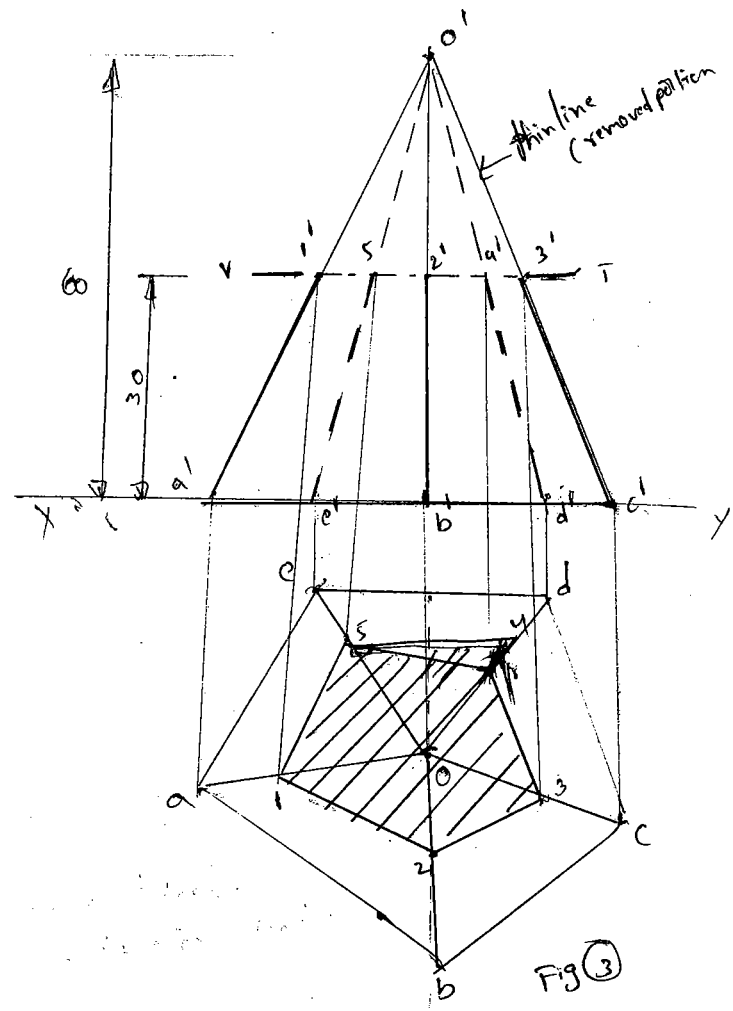
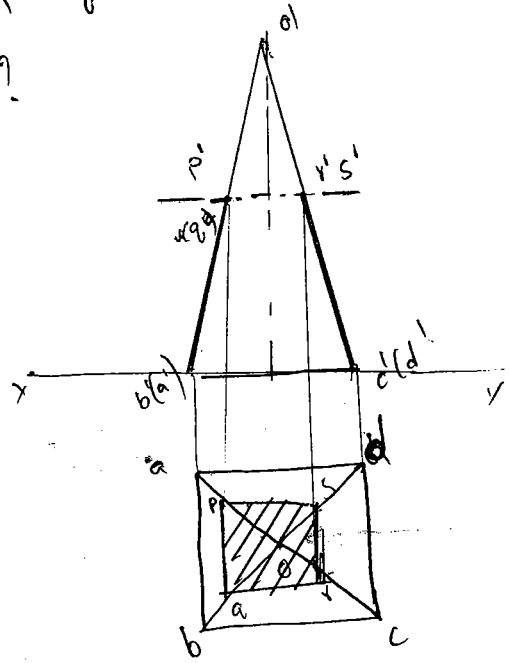


Fig 3

Q. A square pyramid of base side 40mm and axis 60mm is resting on its base on H.P. with a side of base parallel to V.P. Draw its sectional views and true shape of section if it is cut by a section plane \perp to V.P., bisecting the axis is a) parallel to H.P.



sectional views
true shape of section