Classification of solids.

① Polyhedra

② Solids of Revolution.

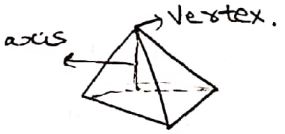
Solids

- Polyhedra → Regular polyhedra, Prisms, Pyramids.
- Solids of Revolution → Cylinders, Cones.
- Double Curved Surfaces → Sphere.

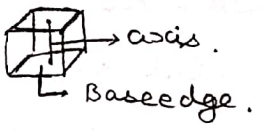
Polyhedra :- A polyhedra is said to be regular if all its faces are similar, equal & regular. All the angles formed b/w the faces are equal to one another.

Five regular polyhedra are described below :-

a) Tetrahedron :- Solid having four equal equi lateral Triangular faces.



b) Cube :- or Hexahedron. It is a solid having Six equal Square Faces.



c) Octahedron :- eight equal triangllar faces.

d) Dodecahedron :- Twelve equal & regular Pentagons.

e) Icosahedron :- Solid having twenty equal, equilateral Triangular Faces.

Unit-2 (4th part)

Projections of Solids :-

A solid is a three dimensional object having Length, breadth & thickness. It is completely bounded by a surface or surfaces, which may be curved or plane.

The shape of solid is described by drawing its two orthographic projections, usually, on the two principal planes of projection i.e. HP & VP.

To describe the shape of certain complicated solids, in addition to these two principal views, a third view projected on a profile Plane (PP) and called profile view or side view.

Important terms :-

1. Right solid :- A solid is said to be a right solid if its axis is perpendicular to its base or its end faces.
2. Oblique solid :- If the axis of the solid is inclined at an angle, other than 90° to its base or end faces is called oblique solid.
3. Regular solid :- If all the edges of the base or the end faces of solid are equal in length and from regular plane figures is called Regular solid.

Unless otherwise stated a geometric solid is considered as right regular.

Prisms:-

A prism is a polyhedron having two equal and similar end Faces Called bases, parallel to each other and joined by other side Faces which are rectangles or parallelograms.

A prism is regular or irregular according as the bases are regular or irregular polygons respectively.

They are named acc. to the shape of their bases as triangular, Square, pentagonal, hexagonal, etc.

PYRAMIDS:-

A Pyramid is a polyhedron, having a polygon as its base and a no. of triangular Faces, equal to number of sides of base polygon, meeting at a common point called apex or Vertex.

The Imaginary line Joining the Vertex to the centre of area of the base is called its axis.

If the base is regular polygon, pyramid is called Regular Pyramid Pyramids are named according to the shape of their bases as triangular, Square, pentagonal, hexagonal etc.

Solids of Revolution :-

The solids like cylinders, cones, spheres etc. which are formed by the revolution of plane geometrical figures are known as solids of Revolution.

1. Cylinder :- A right circular cylinder is a solid generated by the revolution of a rectangle about one of its sides which remains fixed. It has two circular bases. The imaginary line joining the centres of the bases is called its axis.

The revolution of a parallelogram about one of its sides, which remains fixed, generates an oblique cylinder.

2. Cone :- A right circular cone is a solid generated by the revolution of a right angle triangle about one of its perpendicular sides, which remains fixed

Positions of axis of a Right Solid:-

1. Axis perpendicular to HP & parallel to VP.
2. Axis perpendicular to VP & parallel to HP.
3. Axis parallel to both HP & VP, i.e. axis perpendicular to a Profile Plane.
4. Axis inclined to HP & parallel to VP.
5. Axis inclined to VP & parallel to HP.
6. Axis inclined to both HP & VP.

IMP. Note:-

a) WHEN axis is ⊥ ar. to HP, top view should be drawn first and then Corresponding FRONT VIEW be projected from it next.

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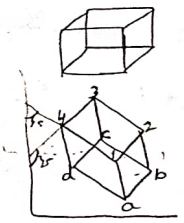
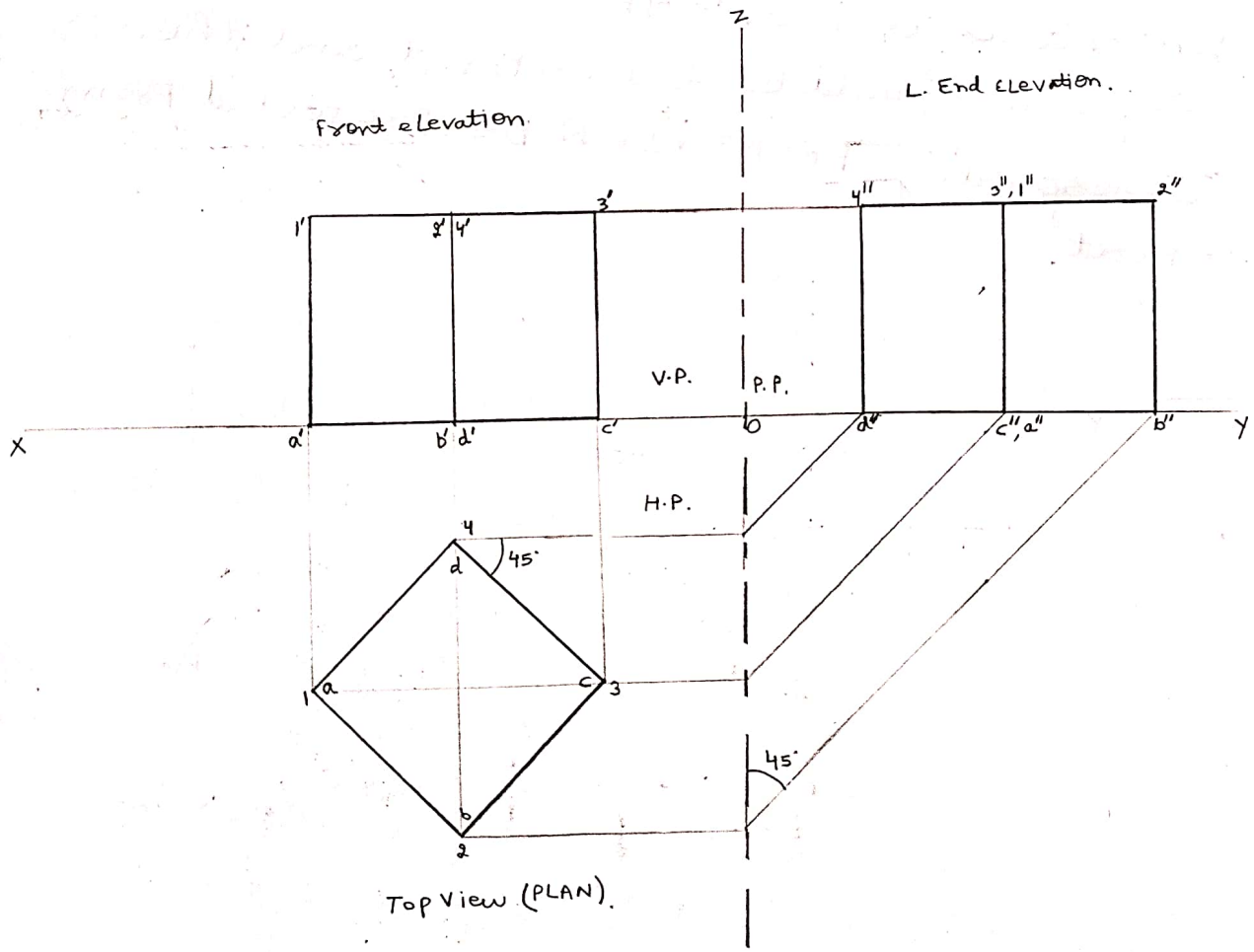
Q-1. Draw the projections of a Cube, edge 30mm, resting on one of its Faces in HP & with its Vertical Faces equally Inclined to VP.



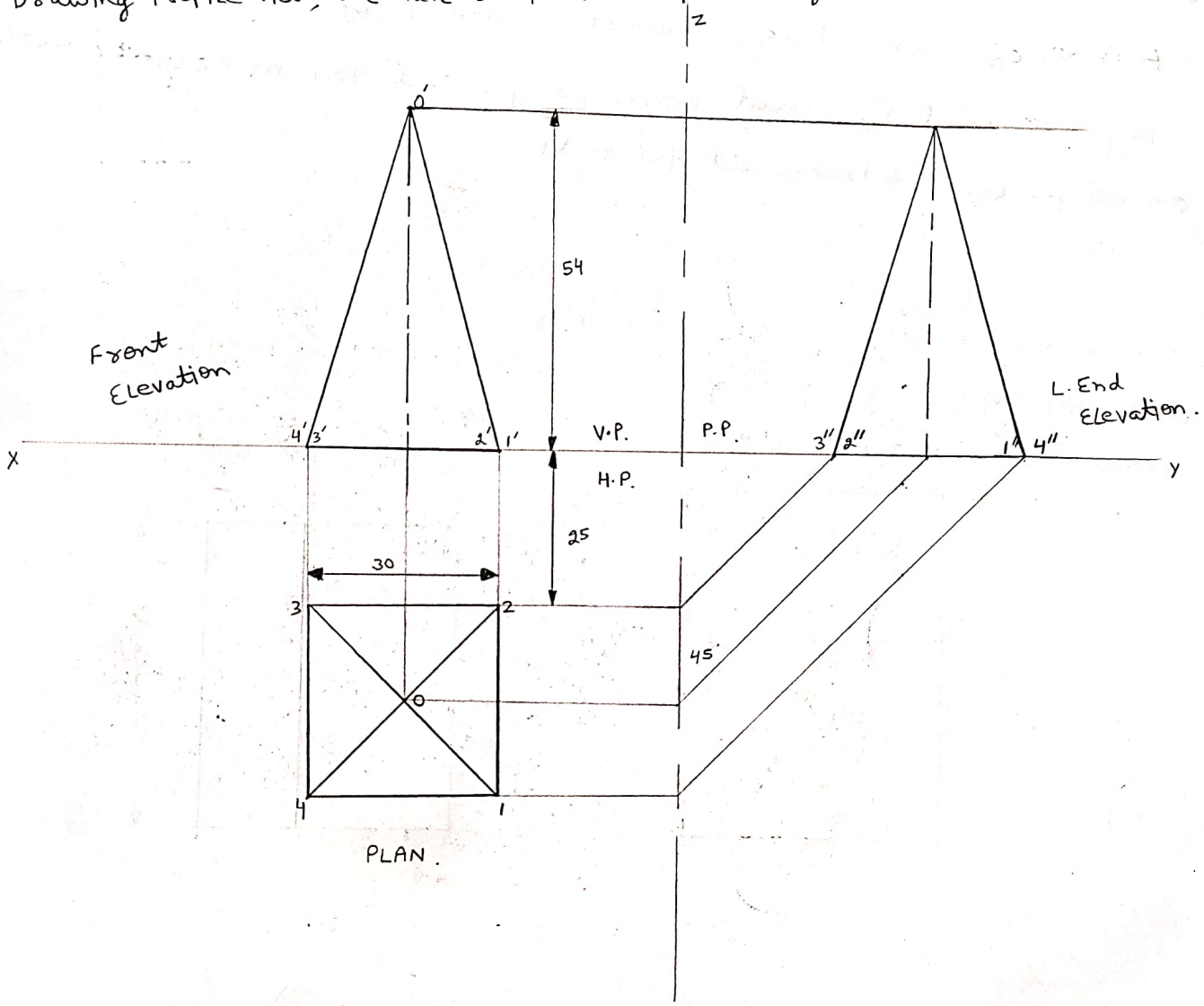
Top corner point
1, 2, 3, 4
Base corner point
a, b, C, d.

As Axis is perpendicular to HP, Draw Top View First we see rectangle.



Q-2. Draw the projections of a Square Pyramid, Side of base 30mm & height 54mm, resting on its base on ground with its base on ground with one of its edges parallel to VP.

As axis is ⊥ar to HP, Draw top view First. we see Square From top View and Locate Vertex point O. Then by projecting, Draw Front view as height 54 is given. For Drawing Profile View, we have to tilt the Top View by 45°



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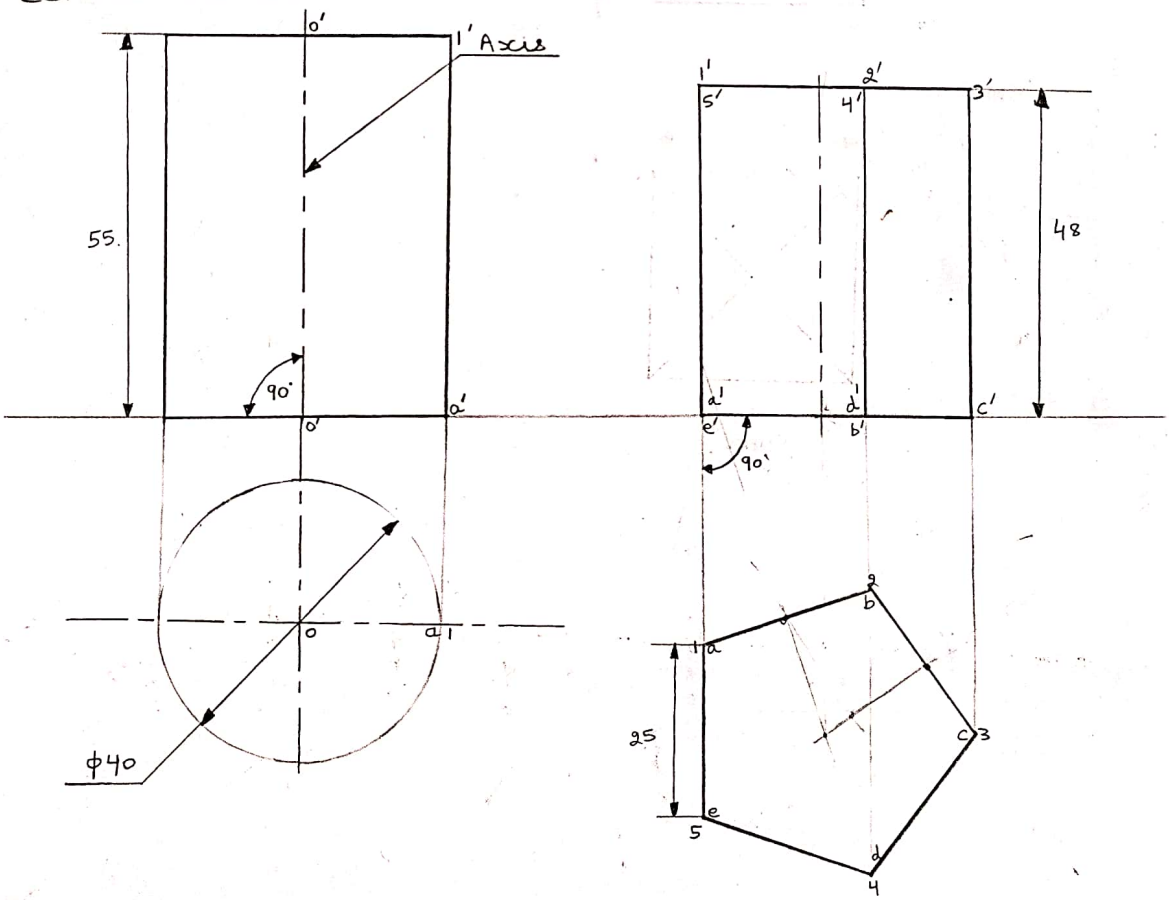
Q-3. Draw the projections of the following solids, resting in HP on their bases as given, using common reference line.

1. Cylinder having 40mm as base diameter and 55mm height.
2. A pentagonal prism, edge of base 25mm and 48 mm long having one of its base edges perpendicular to VP.
3. A cone of 40mm base diameter and height 55mm
4. A pentagonal Pyramid, 25mm edge and 48mm height, with an edge of its base at 90° to VP.

1. As its rests on HP, axis is ⊥ar to HP. Draw top view first.
From top view of cylinder, we see the circle of dia. 40mm.
Draw two centre line to locate centre.



edge AE is ⊥ar to VP.

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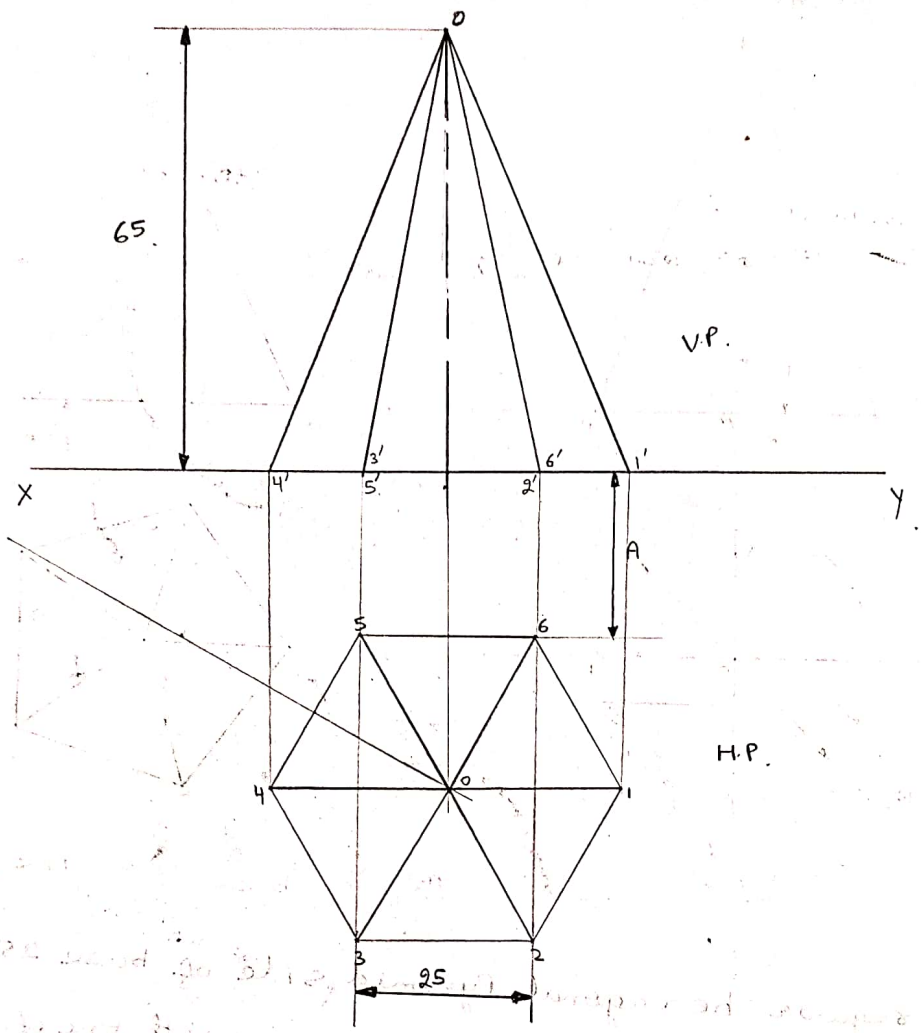
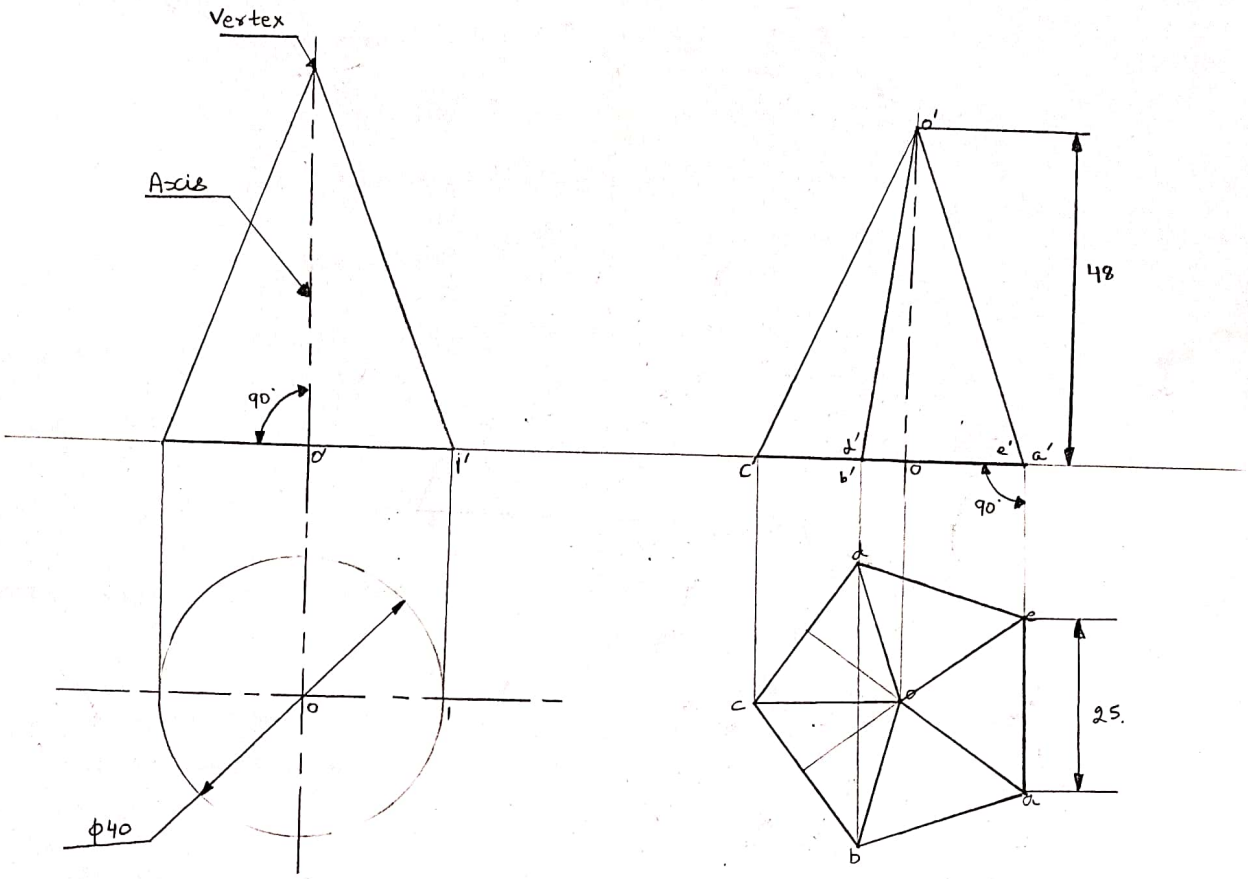
As the axis is Lar to HP, we should start with top view.





base edge AE ⊥ar to VP.

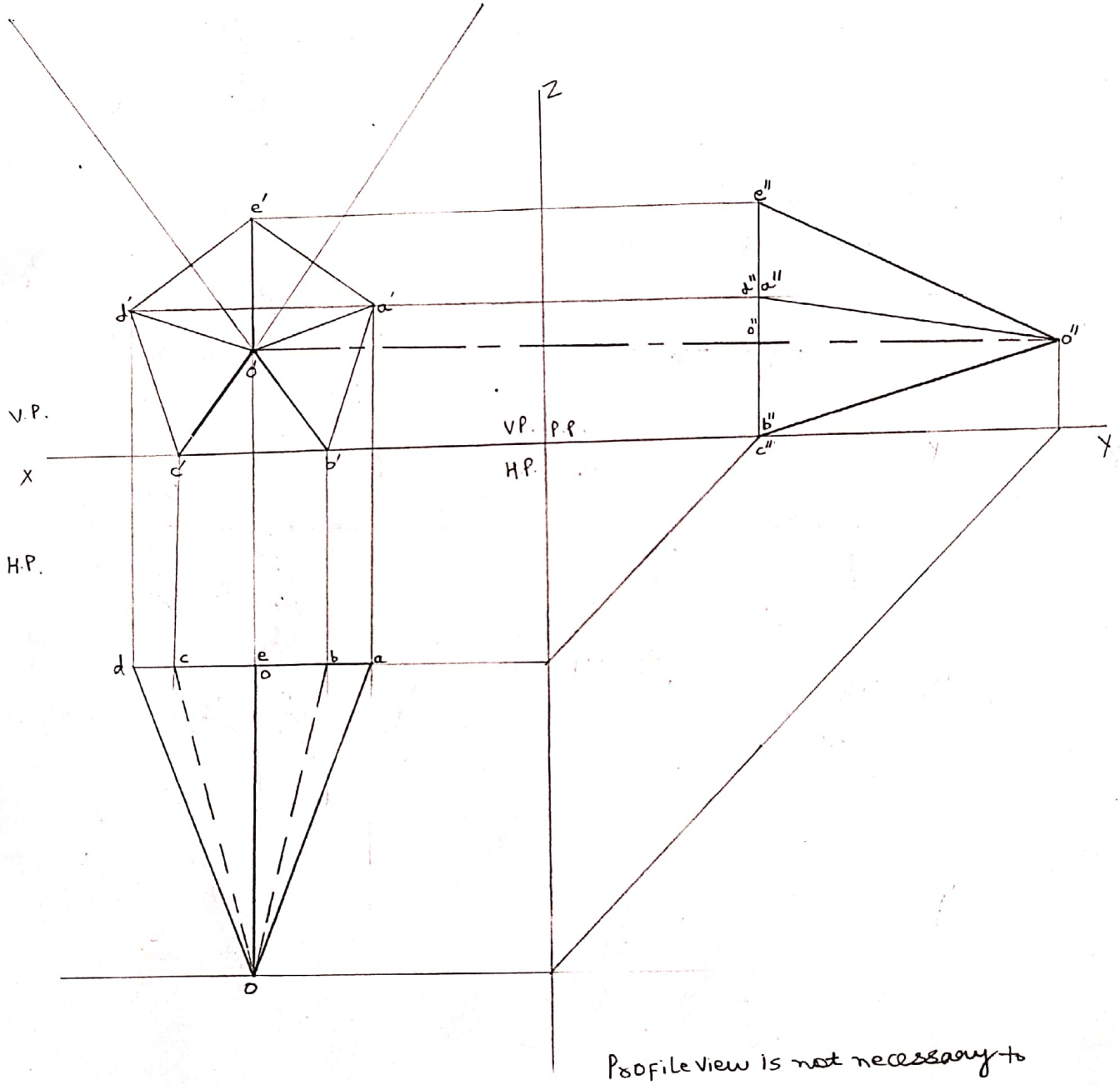
Q-4. A right regular hexagonal Pyramid side of base 25mm and height 65mm, rests on HP on its base ~~si~~ with one of its base sides parallel to VP and distance A in Front of it.

Draw its projections.

Case-2 Axis ⊥ar to VP.

Q-5. A right regular pentagonal Pyramid, edges of base 25mm and height 50mm, has its base parallel to VP with one of its base edges in HP. Draw its projections.

As Pentagonal Pyramid axis is ⊥ar to VP, or base ||el to VP.
We have to draw Front view, Pentagon is seen.



Profile View is not necessary to describe the Pyramid.

Case-3 Axis Parallel to both HP & VP.

Q-6 A Right regular hexagonal prism, edge of base 20mm and length 55mm, Lies on one of its rectangular faces such that axis is parallel to both HP & VP. Draw its projections when it is in First Quadrant.

As axis is parallel to both HP & VP, it is bar to Profile plane. We get true shape of Hexagonal, IF WE see the Side View, we talk about Right Side View. We draw this on left hand side.