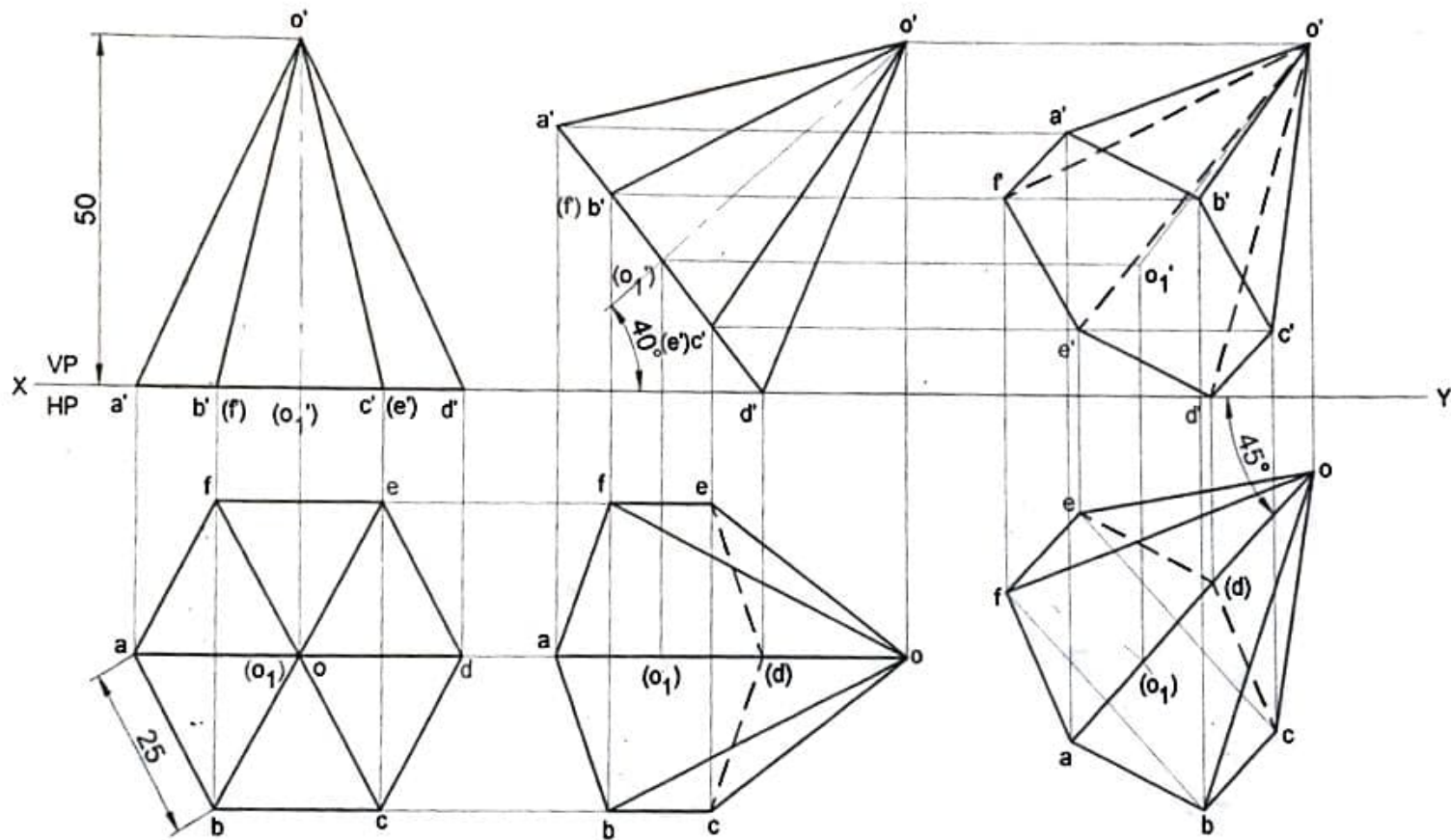26. A hexagonal pyramid 25 mm sides of base and 50 mm axis length rests on HP on one of its corners of the base such that the two base edges containing the corner on which it rests make equal inclinations with HP. Draw the projections of the pyramid when the axis of the pyramid is inclined to HP at 40 deg. and appears to be inclined to VP at 45 deg.
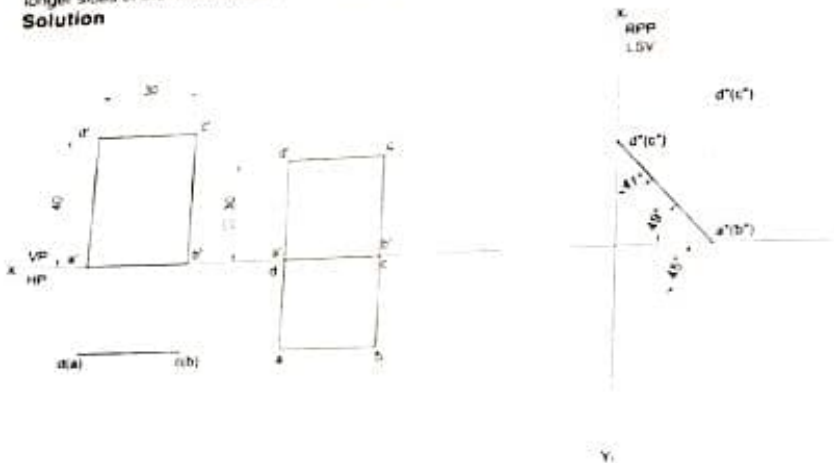
SOLUTION:

Problem 16 The front view of a rectangular lamina of sides 30mm × 20mm is square of 20mm sides. Draw its projections and determine the inclinations of the surface of the lamina with HP and VP.
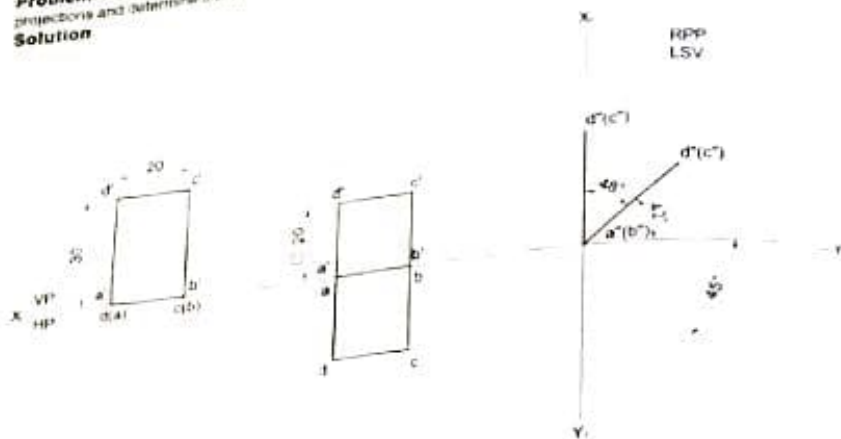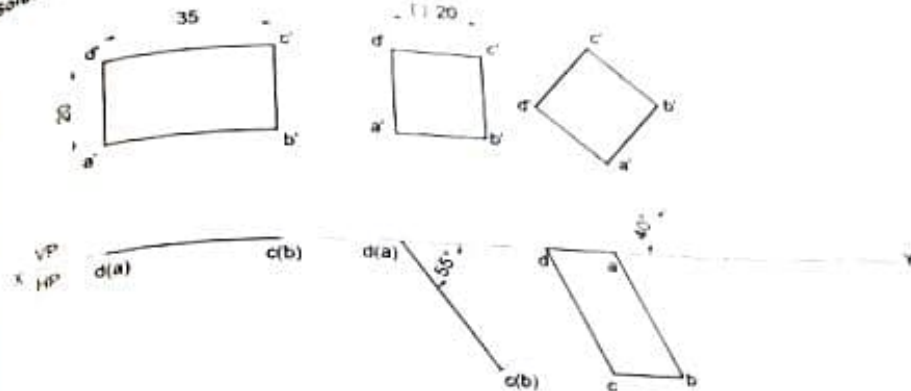
Solution

Problem 17 A mirror 30mm × 40mm is inclined to the wall such that its front view is a square of 30mm side. The longer sides of the mirror appear perpendicular to both HP and VP. Find the inclination of the mirror with the wall.

Solution

Problem 18 A rectangular plate of negligible thickness of size 35x20mm has one of its shorter edges in VP with that edge inclined at 40° to HP. Draw the top view it its front view is a square of side 20mm

Solution

Problem 19 A pentagonal lamina of edges 25mm is resting on HP with one of its sides such that the surface makes an angle of 60° with HP. The edge on which it rests is inclined at 45° to VP. Draw its projections.
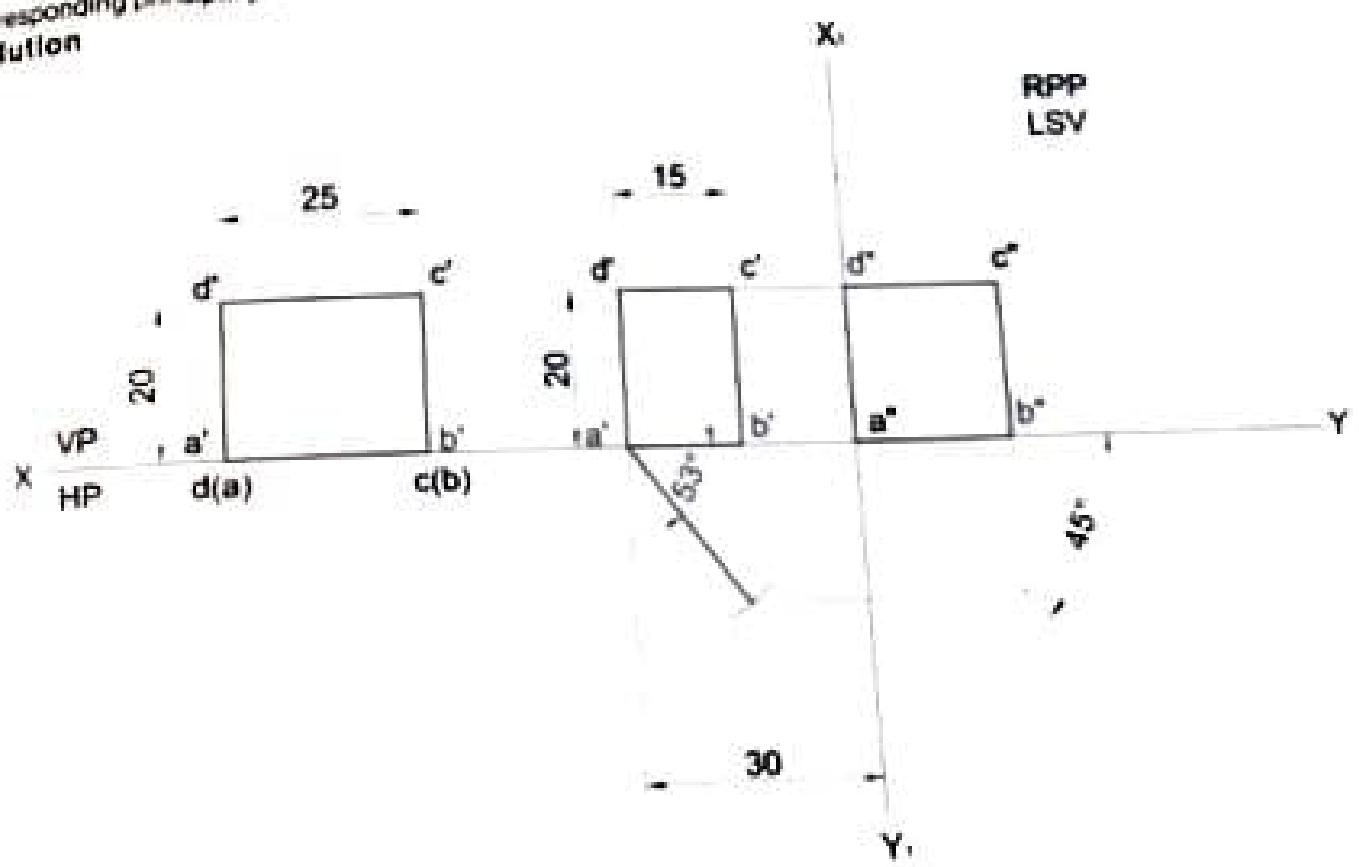
Solution
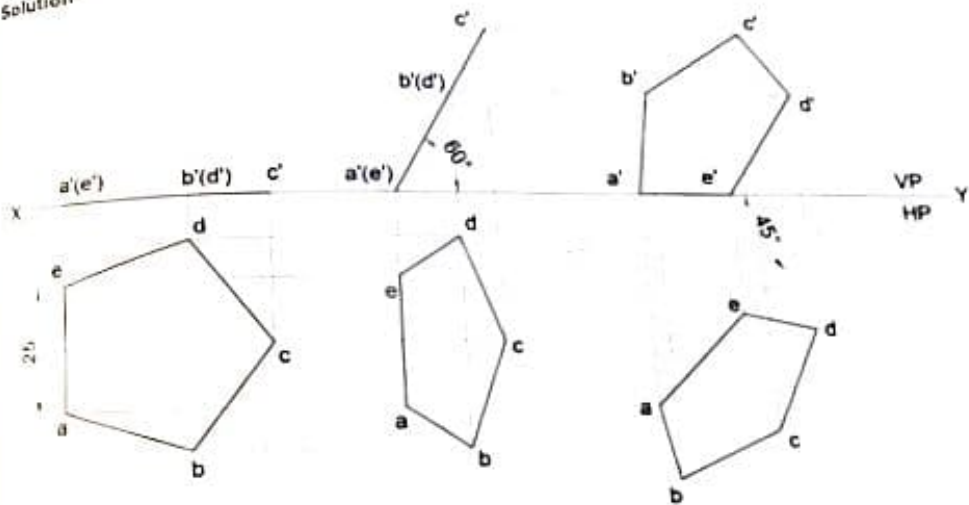
Problem 14 A rectangular lamina of 35mm x 20mm rests on HP on one of its shorter edges. The lamina is rotated about the edge on which it rests till it appears as a square in the top view. The edge on which the lamina rests is inclined 45° to VP. Draw its projections and find its inclination to HP.
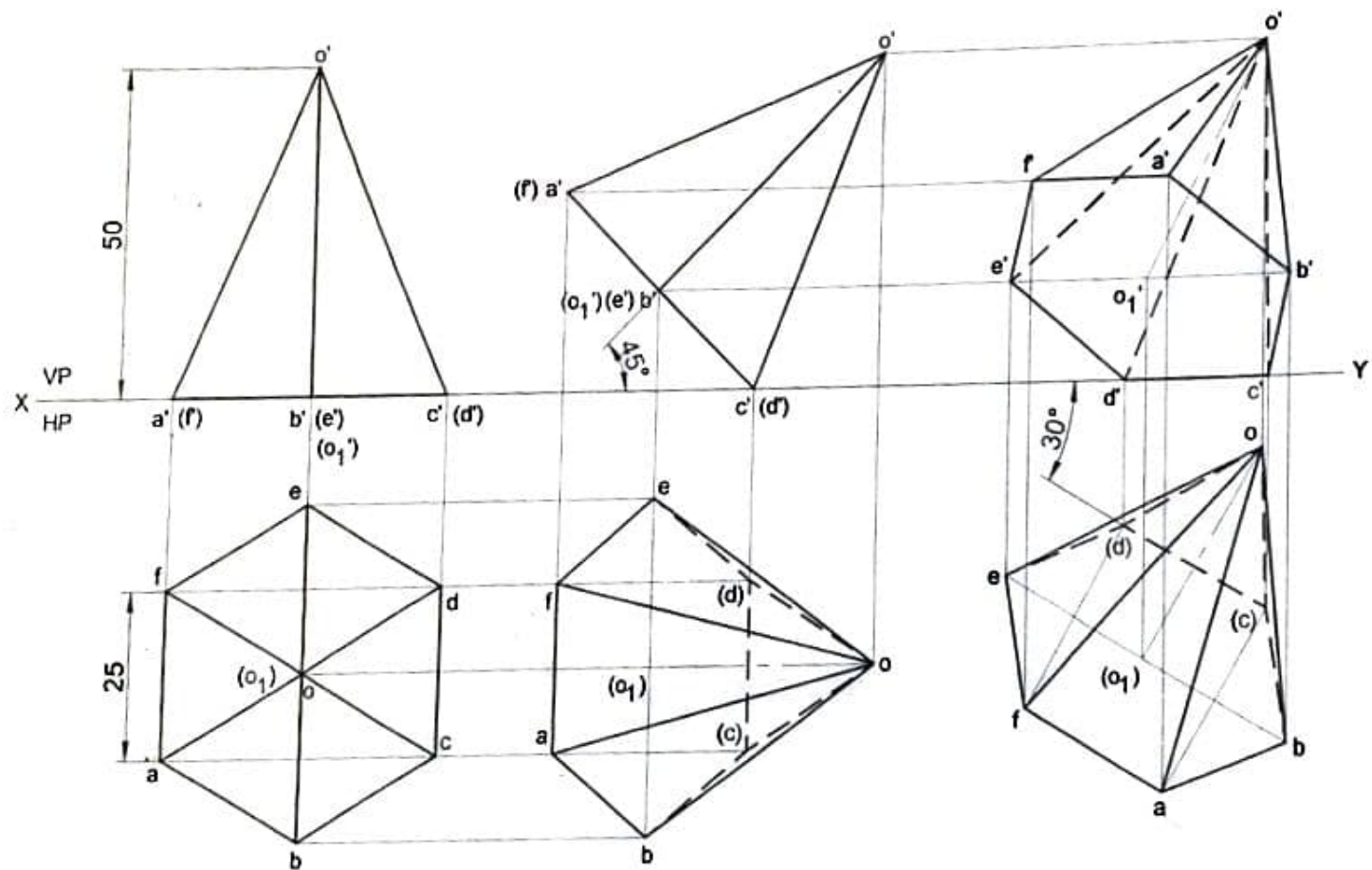
Solution
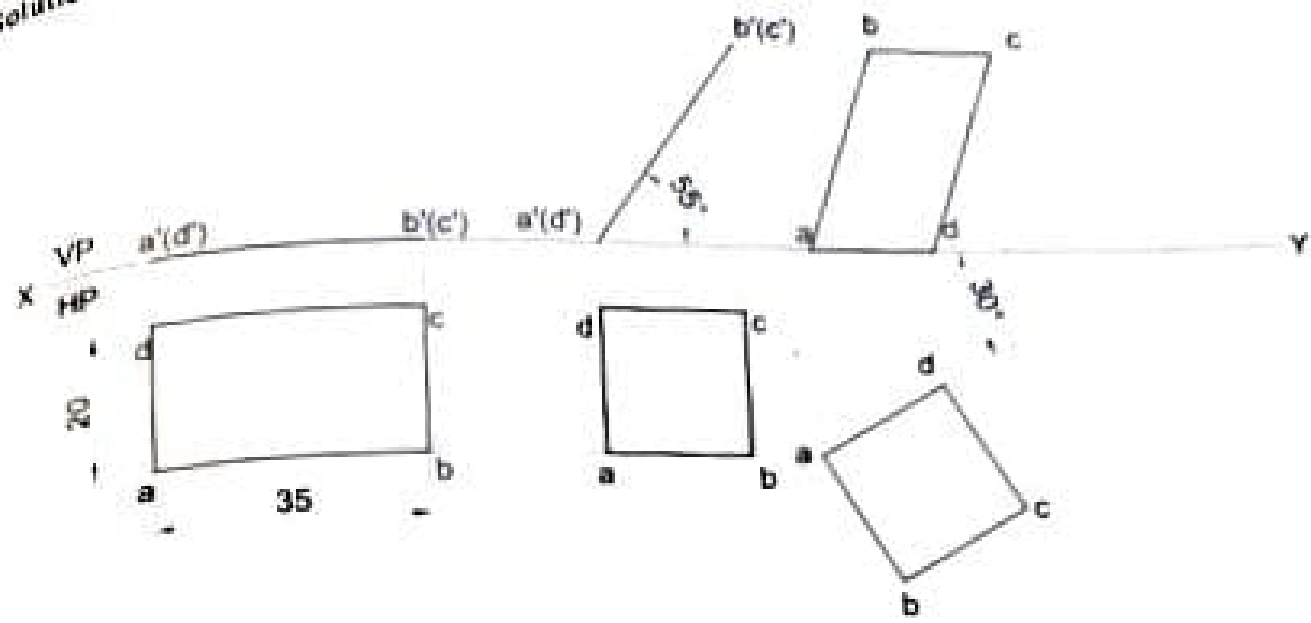
Problem 15 A rectangular lamina of sides 20mm x 25mm has an edge in HP and adjoining edge in VP, is tilted such that the front view appears as a rectangle of 20mm x 15mm. The edge, which is in VP, is 30mm from the right profile plane. (a) Draw the top view, front view and the left profile view in this position. (b) Find its inclinations with the corresponding principal planes.

Solution

59

24. A hexagonal pyramid 25 mm sides of base and 50 mm axis length rests on HP on one of its edges of the base which is inclined to VP at 30 deg. Draw the projections of the pyramid when the axis is inclined to HP at 45 deg.
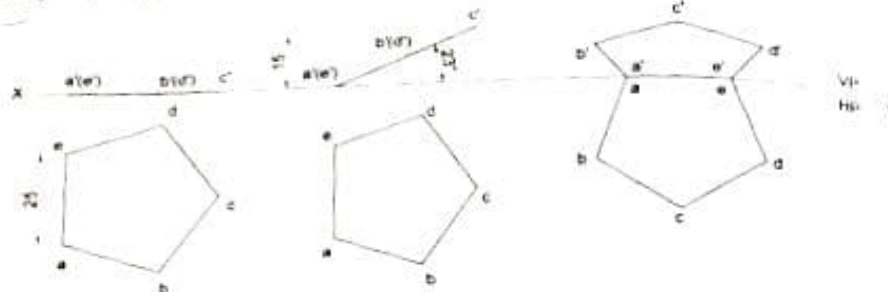
SOLUTION:

Problem 25 A pentagonal lamina of sides 25mm is having a side both on HP and VP. The surface of the lamina inclined at an angle of 60° with HP. Draw the top and front views of the lamina.
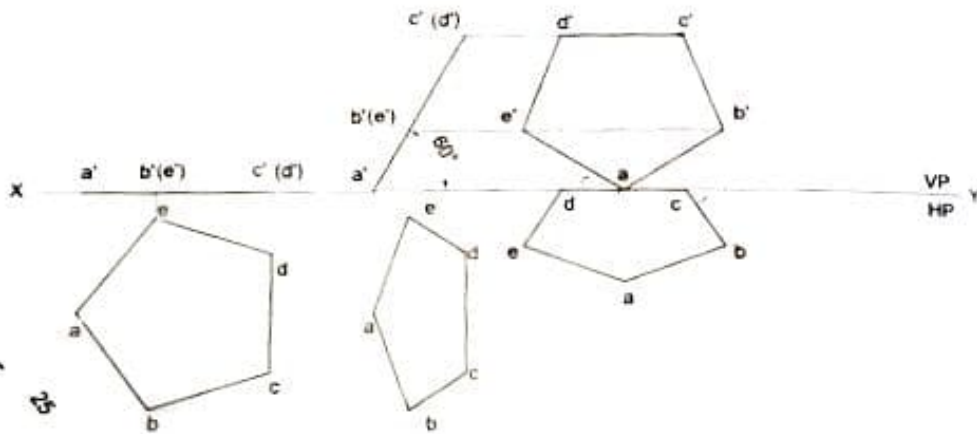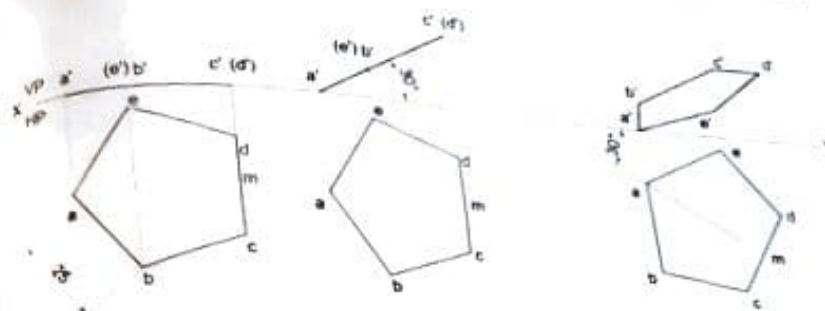
Solution

(a) - Right...

Problem 26 A regular pentagonal lamina of 25mm side is resting on one of its corners on HP while the side opposite to this corner touches VP. If the lamina makes an angle of 60° with HP and 30° with VP, draw the projections of the lamina.
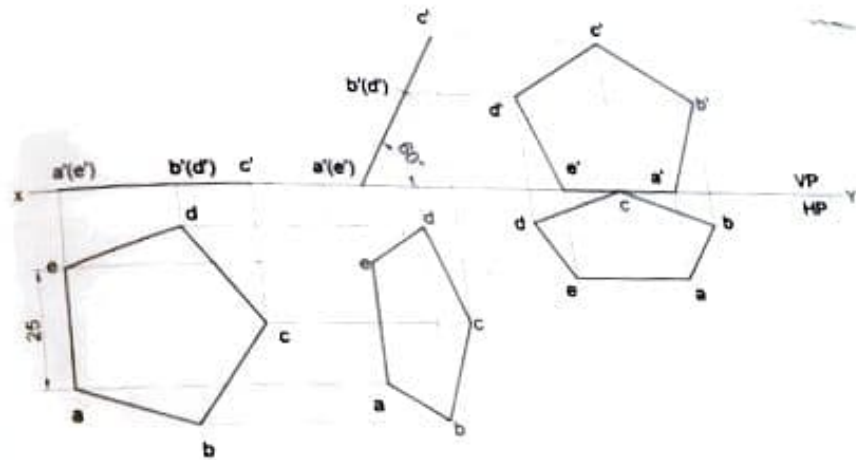
Solution

Problem 27 A pentagonal lamina having edges 25mm is placed on one of its corners on HP such that the surface makes an angle 30° with HP and perpendicular bisector of the edge passing through the corner on which the lamina appears to be inclined at 30° to VP. Draw the top and front views of the lamina.

Solution

Problem 28 A regular pentagonal lamina of 25mm side is resting on one of its sides on HP while the corner opposite to this side touches VP. If the lamina makes an angle of 60° with HP and 30° with VP, draw the projections of the lamina.

Solution

5. A pentagonal pyramid 25 mm sides of base and 50 mm axis length rests on HP on one of its slant edges. Draw the projections of the pyramid when the axis appears to be inclined to VP at 45 deg.
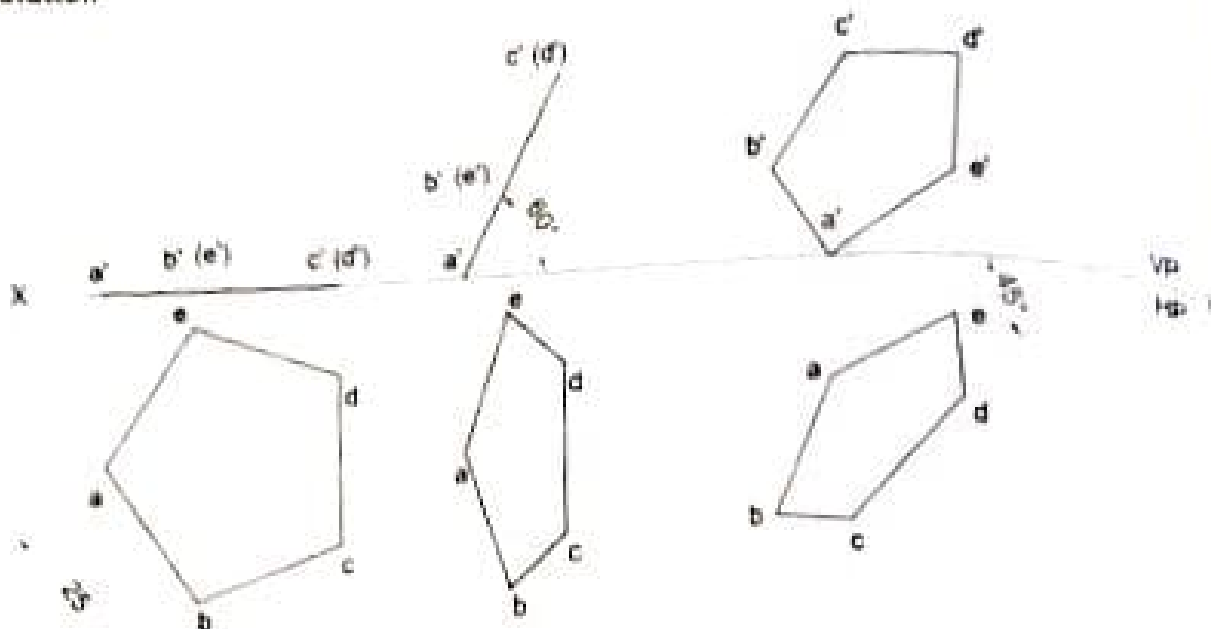
SOLUTION:
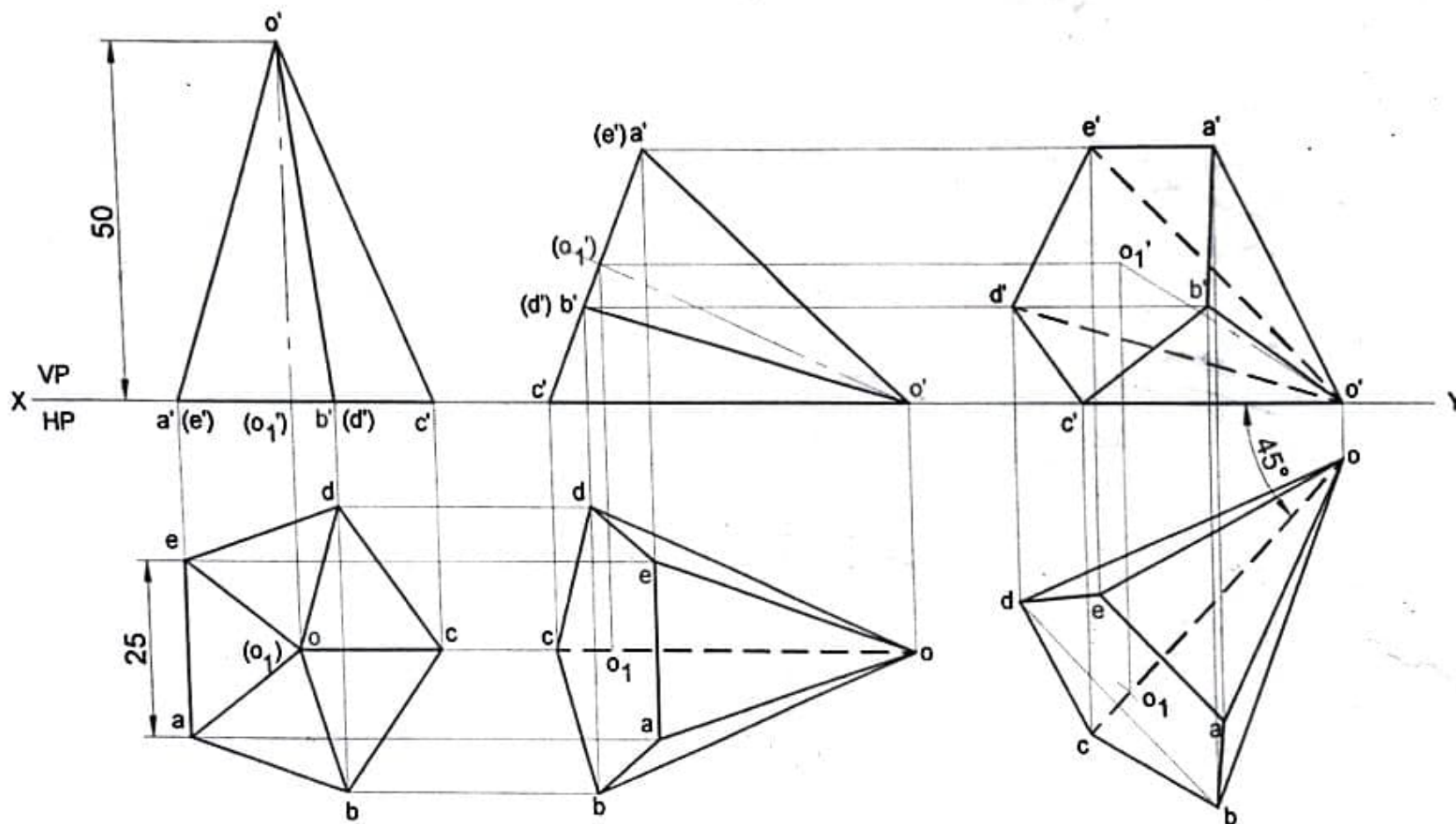
Note: Make the slant edge parallel to VP in the top view.

Problem 20 A pentagonal lamina of edges 25mm is resting on HP with one of its corners such that the plane surface makes an angle of 60° with HP. The two of the edges containing the corner on which the lamina rests make equal inclinations with HP. When the edge opposite to this corner make an angle of 45° with VP and nearer to the observer, draw the top and front views of the plane lamina in this position.

Solution

Problem 21 A pentagonal lamina of edges 25mm is resting on HP with one of its corners such that the edge opposite to this corner is 20mm above HP & makes an angle of 45° with VP. Draw the top and front views of the plane lamina in this position. Determine the inclination of the lamina with HP.

Solution
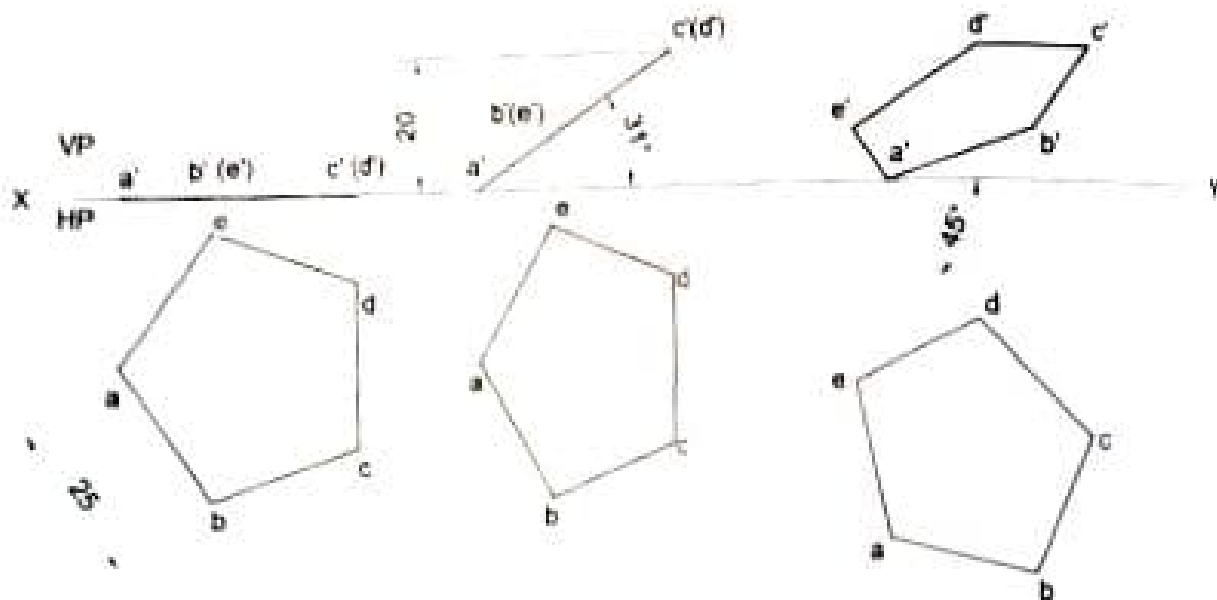
33. A square pyramid 35 mm sides of base and 60 mm axis length rests on HP on one of its slant triangular faces. Draw the projections of the pyramid when the axis appears to be inclined to VP at 45 deg.
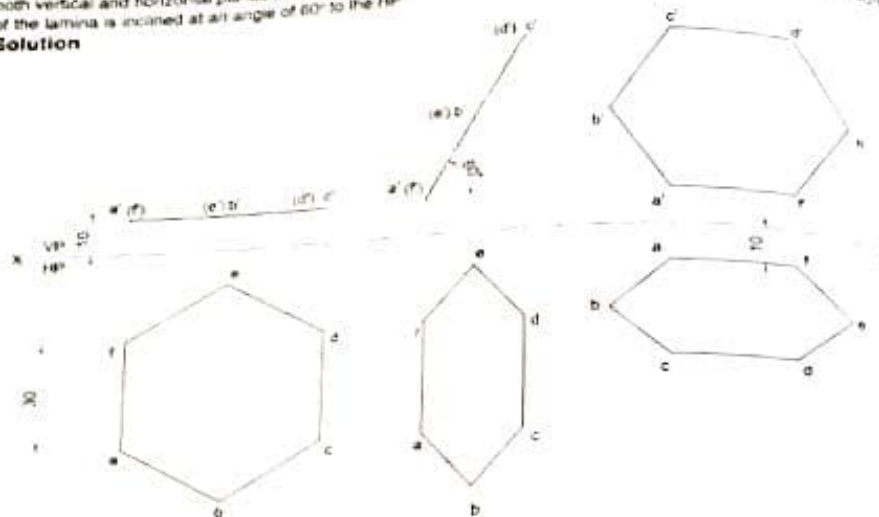
SOLUTION:
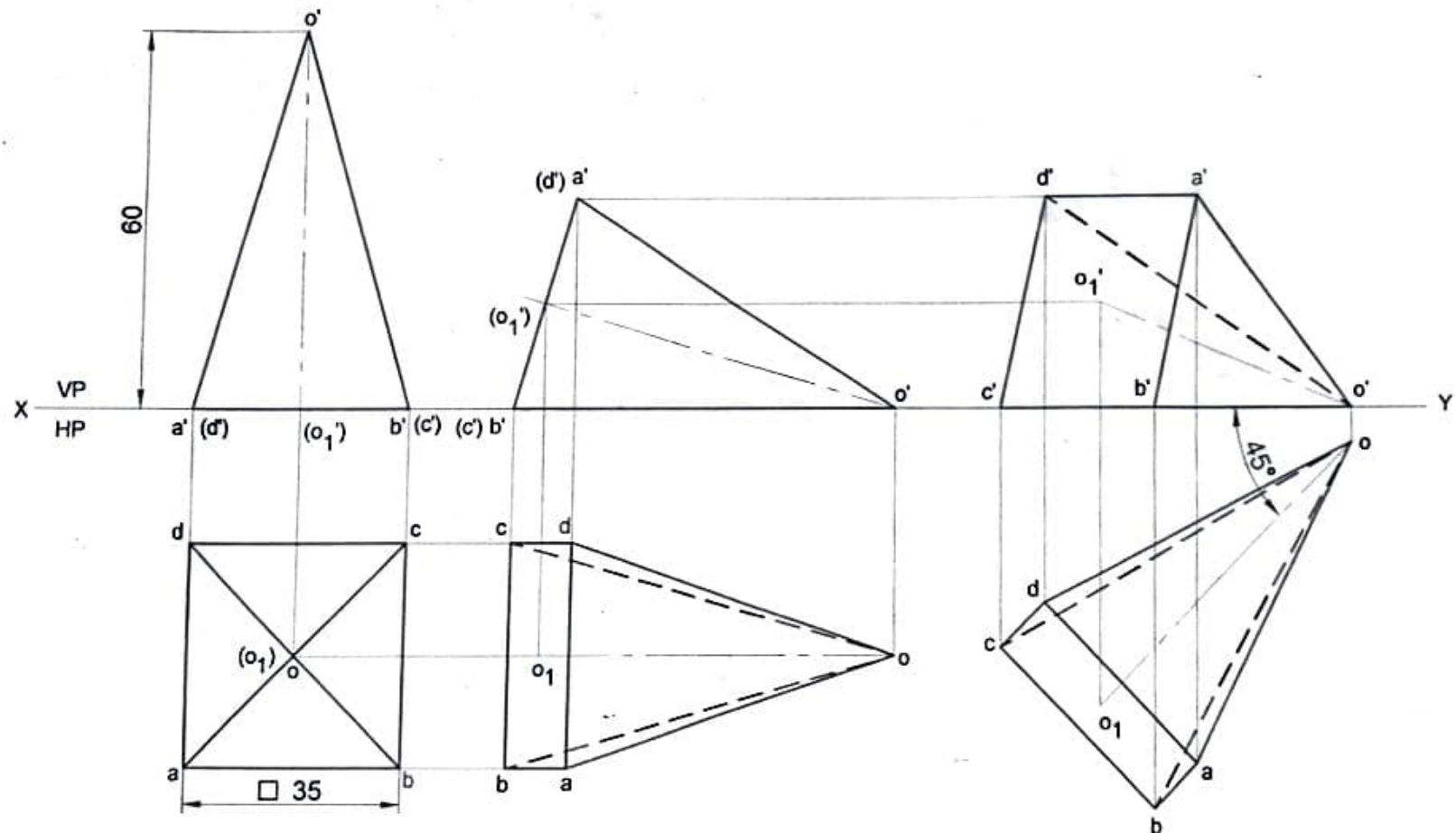
Note: Make the slant triangular face inclined to HP and perpendicular to VP.

Problem 33 Draw the top and front views of a hexagonal lamina of 30mm sides having two of its edges parallel to both vertical and horizontal planes and one of its edges is 10mm from each of the planes of projection. The surface of the lamina is inclined at an angle of 60° to the HP
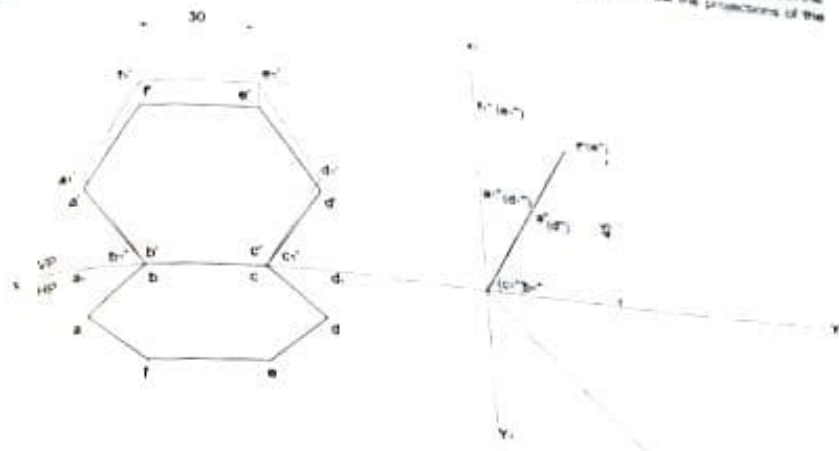
Solution

Problem 34 A regular hexagonal lamina of sides 30mm is lying in such a way that one of its sides touches both the reference planes. If the lamina makes 60° with HP, draw the projections of the lamina.
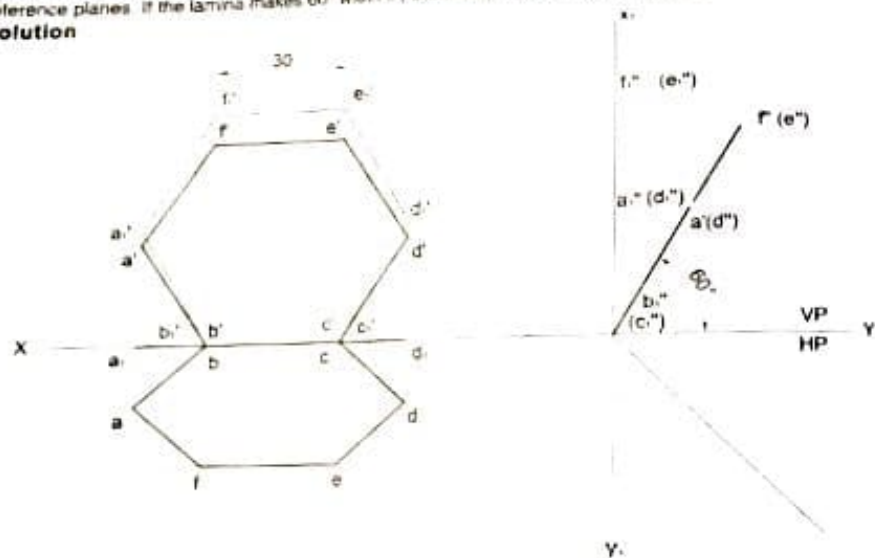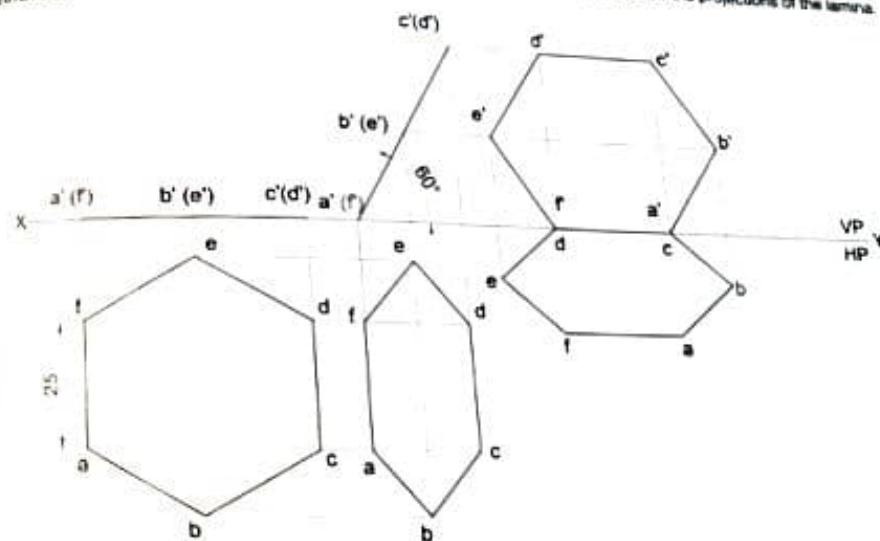
Solution

Problem 35 A regular hexagonal lamina of side 30mm is lying in such a way that one of its sides touches both the reference planes. If the side opposite to the side on which it rests is 45mm above HP, draw the projections of the lamina.

Solution

Problem 35 A regular hexagonal lamina of sides 25mm is lying in such a way that one of its sides on HP while the side opposite to the side on which it rests is on VP. If the lamina makes 60° to HP. Draw the projections of the lamina.

Solution

Problem 29 A pentagonal lamina of edges 25mm is resting on VP with one of its sides such that the surface makes an angle of 60° with VP. The edge on which it rests is inclined at 45° to HP. Draw its projections.
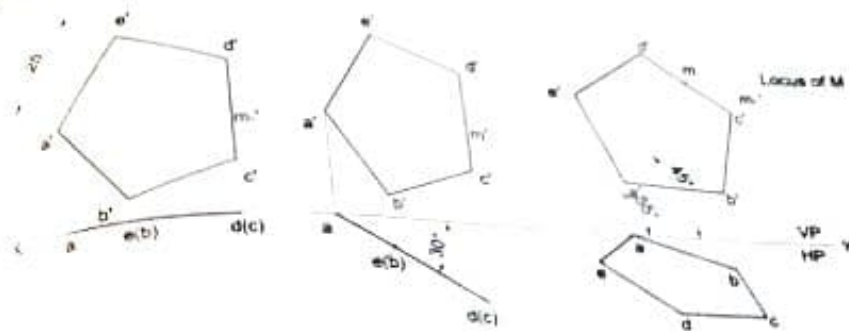
Solution
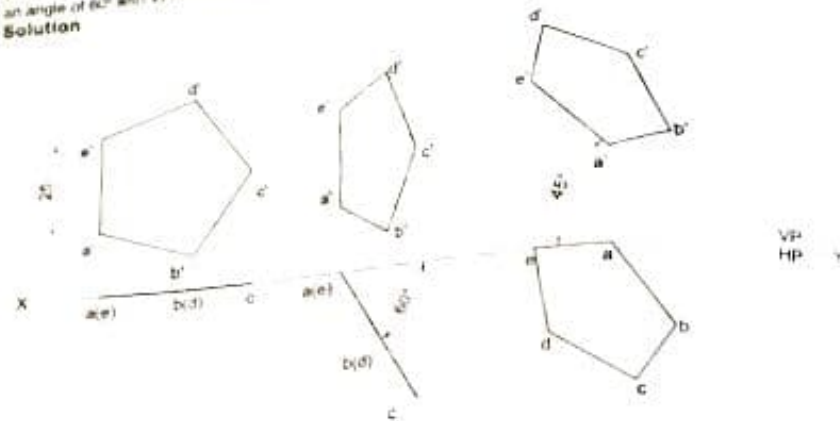
Problem 30 A pentagonal lamina having edges 25mm is placed on one of its corners on VP such that the surface makes an angle 30° with VP and perpendicular bisector of the edge passing through the corner on which the lamina rests appears to be inclined at 30° to HP. Draw the top and front views of the lamina.
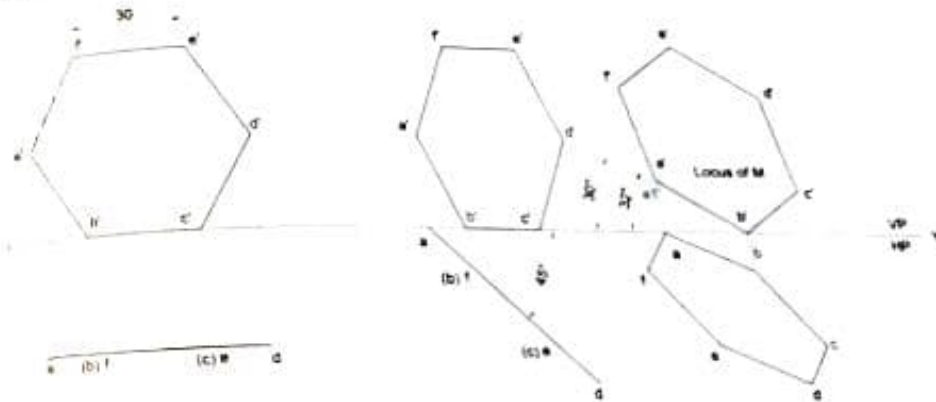
Solution
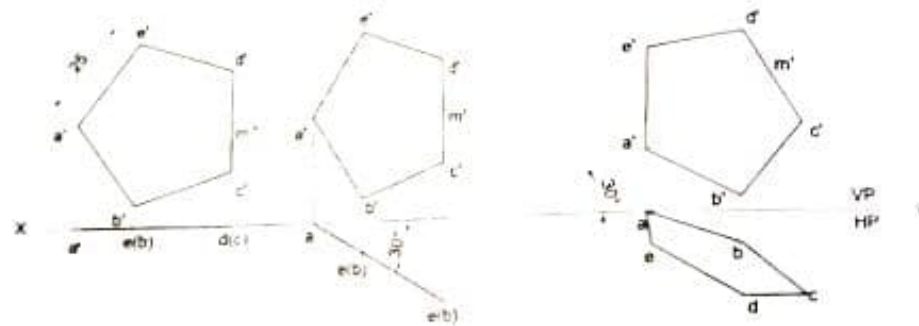
Problem 31 A pentagonal lamina having edges 25mm is placed on one of its corners on VP such that the surface makes an angle 30° with VP and perpendicular bisector of the edge passing through the corner on which the lamina rests is inclined at 45° to HP. Draw the top and front views of the lamina.

Solution

Problem 32 A hexagonal lamina of 30mm sides rests on HP with one of its corners touching VP and surface inclined at 45° to it. One of its edges is inclined to HP at 30°. Draw the front and top views of the lamina in its final position.

Solution

31. A square pyramid 35 mm sides of base and 60 mm axis length rests on HP on one of its slant edges. Draw the projections of the pyramid when the axis appears to be inclined to VP at 45 deg.
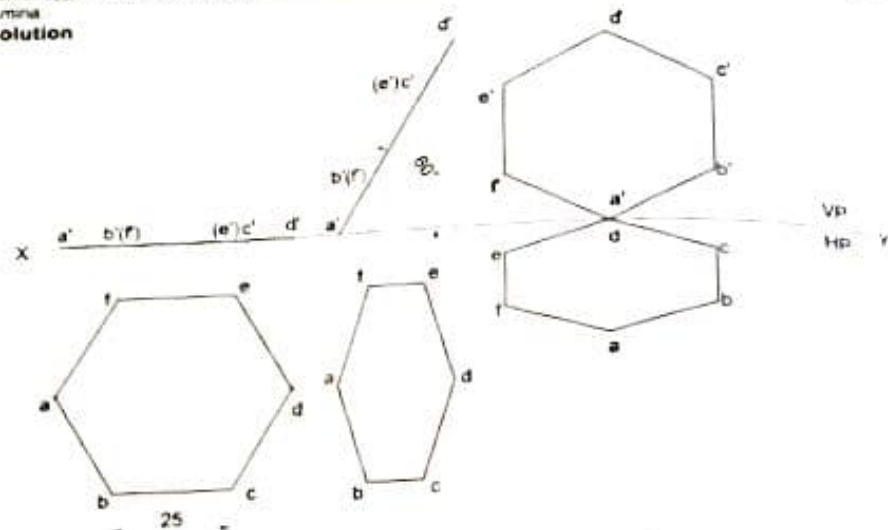
SOLUTION:
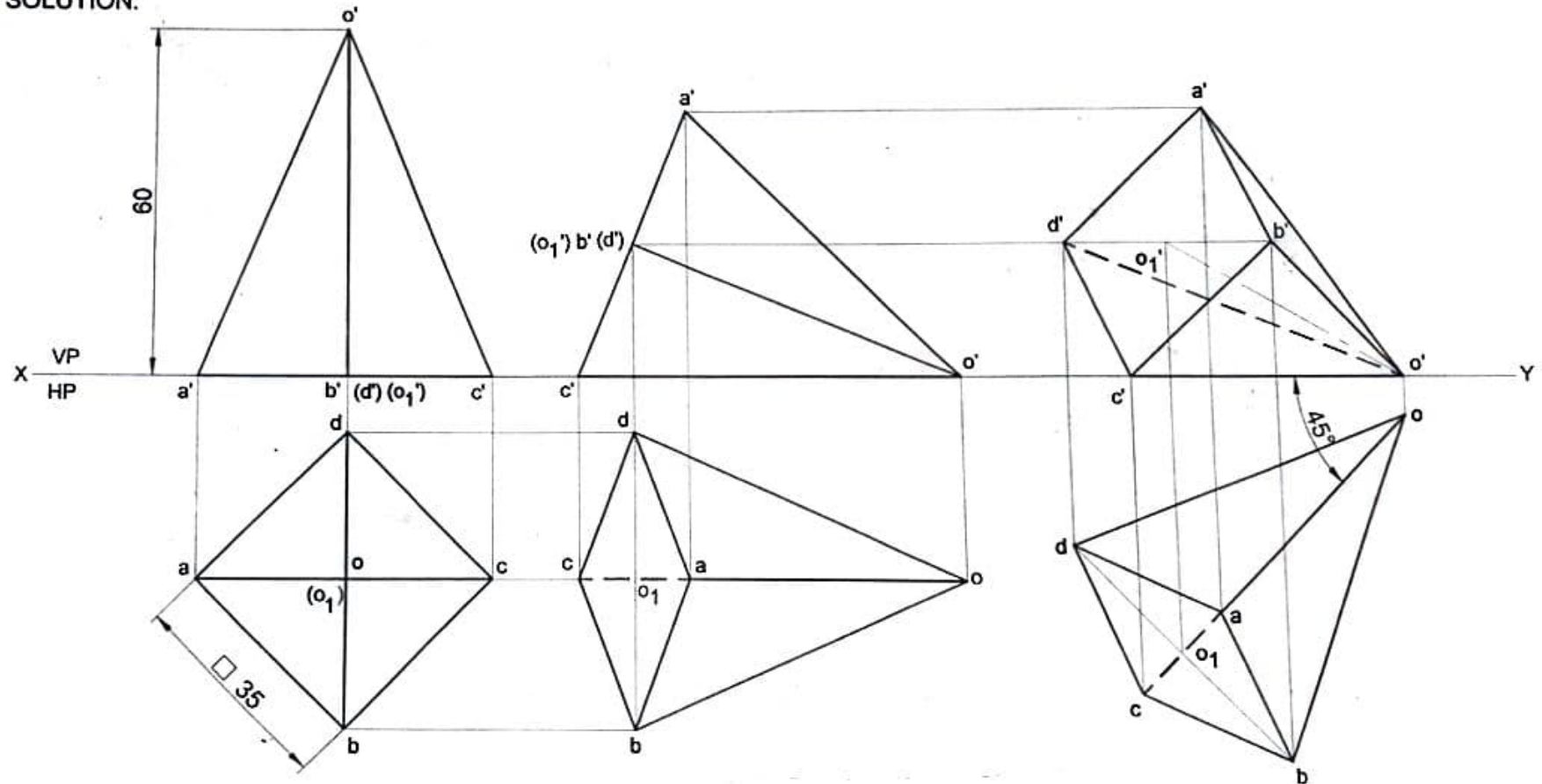
Note: Make the slant edge parallel to VP in the top view.

Problem 37 A regular hexagonal lamina of side 25mm is lying in such a way that one of its corners on HP while the corner opposite to the corner on which it rests is on VP. If the lamina makes 60° to HP. Draw the projections of the lamina.
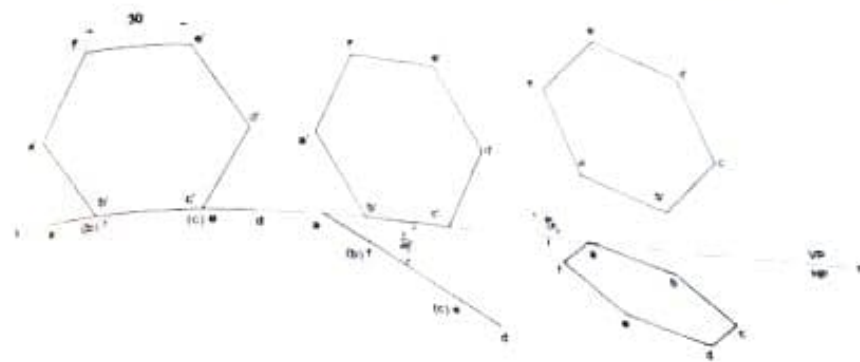
Solution

Problem 38 A hexagonal lamina of sides 30mm is resting on HP with one of its corners in VP and its surface inclined at an angle of 30° with VP. The diagonal passing through that corner which is in VP is inclined at 45° to HP. Draw the projections of the lamina.
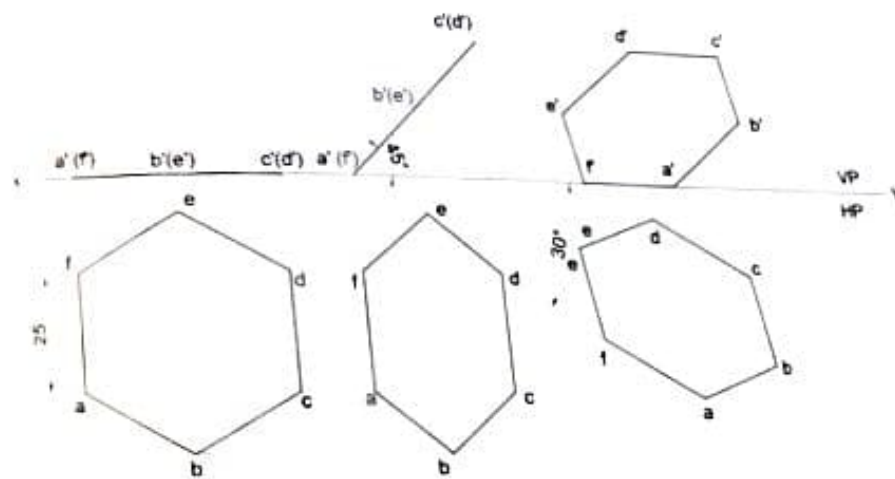
Solution
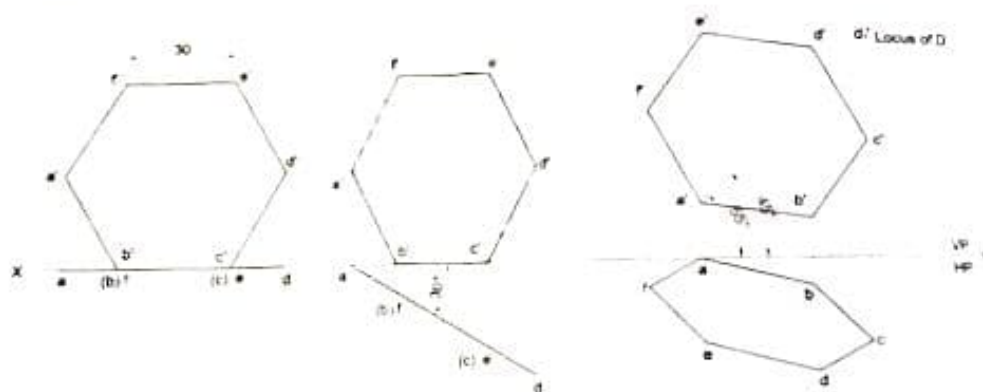
Problem 39 A hexagonal lamina of sides 30mm is resting on HP with one of its corners in VP and its surface inclined at an angle of 30° with VP. The diagonal passing through that corner which is in VP appears to be inclined at 40° to HP. Draw the projections of the lamina.
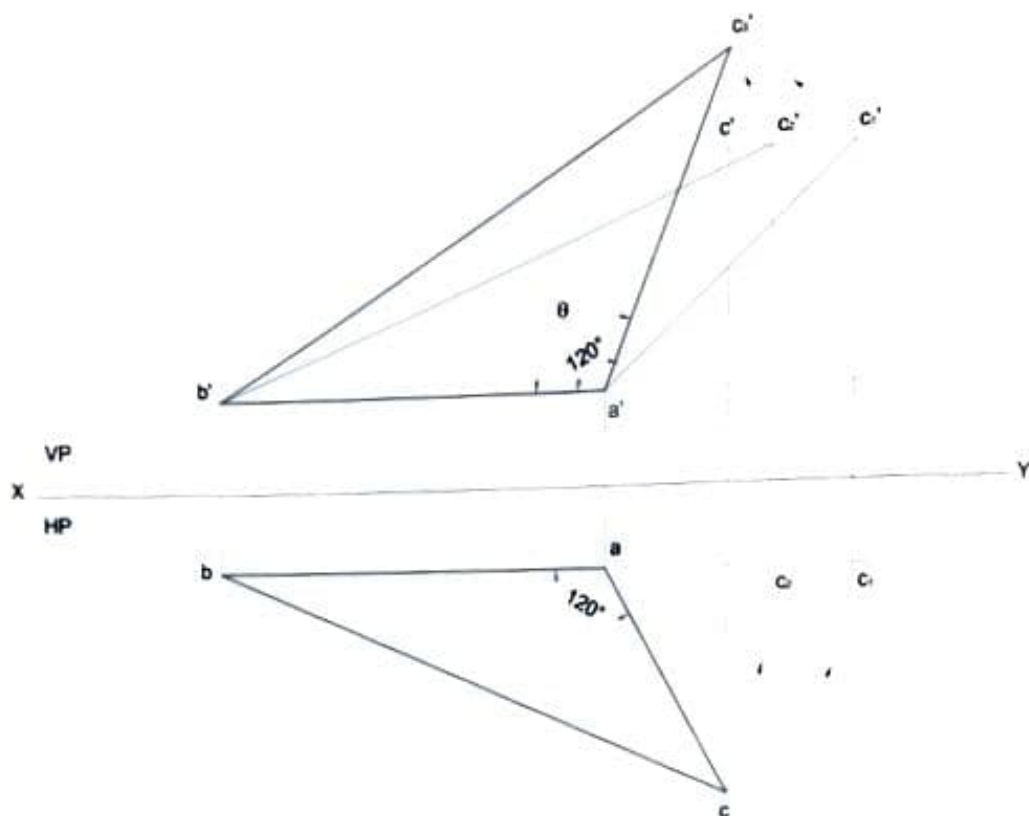
Solution

Problem 40 A hexagonal lamina of sides 25mm rests on one of its sides on HP. The lamina makes 45° to HP and the side on which it rests makes 30° to VP. Draw its projections.

Solution

70

71

Problem 39 Two lines AB and AC make an angle of 120° between them in their front view and top view. AB is parallel to both the HP and the VP. Determine the real angle between AB and AC.
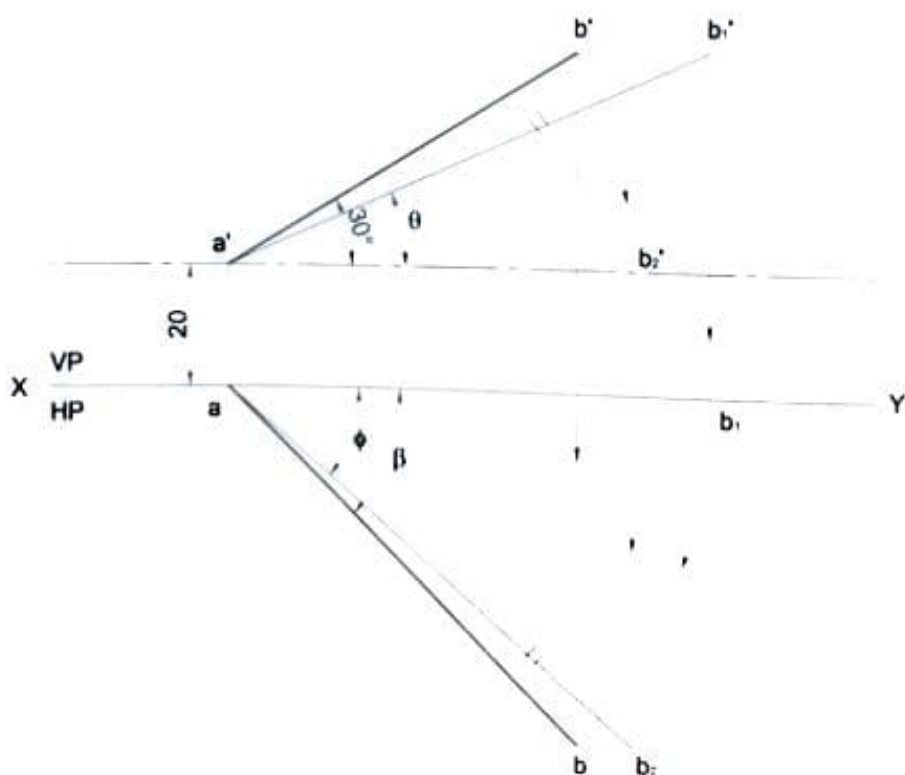
Solution

ANSWER :
$\theta = 112°$

Problem 40 The elevation of a line AB 90 mm long, is inclined at 30° to HP and measures 70 mm. The end A is 20 mm above HP and is in VP. Draw the projections of the line and find its inclination with VP.
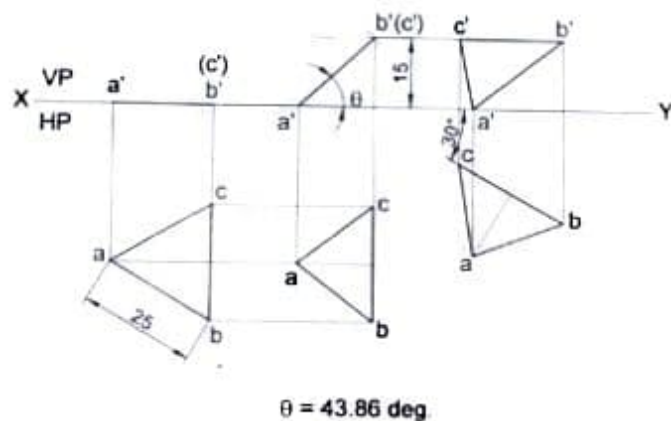
Solution

ANSWERS :
$\theta = 23°$
$\phi = 39°$
$\beta = 43°$

5. A Triangular plane lamina of sides 25 mm is resting on HP with one of its corners touching it, such that the side opposite to the corner on which it rests is 15 mm above HP and makes an angle of 30 deg. with VP. Draw the top and front views in this position. Also determine the inclination of the lamina to the reference plane.

SOLUTION:

$\theta = 43.86$ deg.

6. A 30 - 60 deg. set square of 60 mm longest side is so kept such that the longest side is in HP making an angle of 30 deg. with VP. The set square itself is inclined at 45 deg. to HP. Draw the projections of the set square.
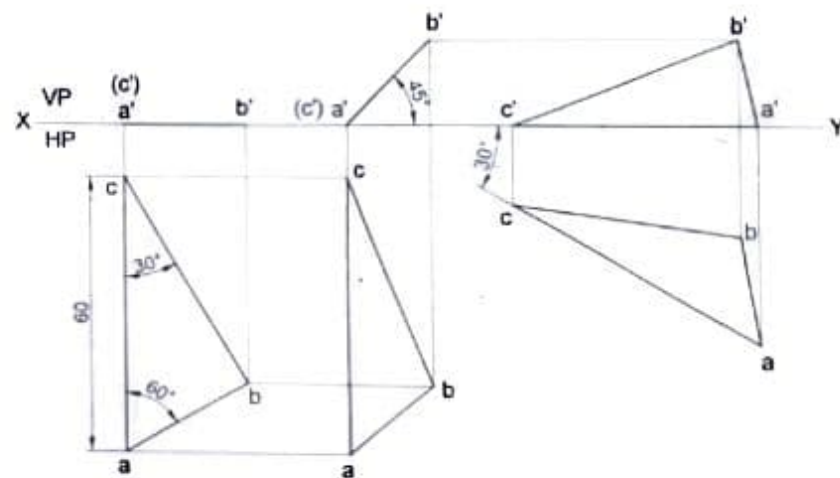
SOLUTION:

16. A square pyramid 35 mm sides of base and 65 mm axis length rests on HP on one of its edges of the base which is inclined to VP at 30 deg. Draw the projections of the pyramid when the axis is inclined to HP at 45 deg.

SOLUTION:
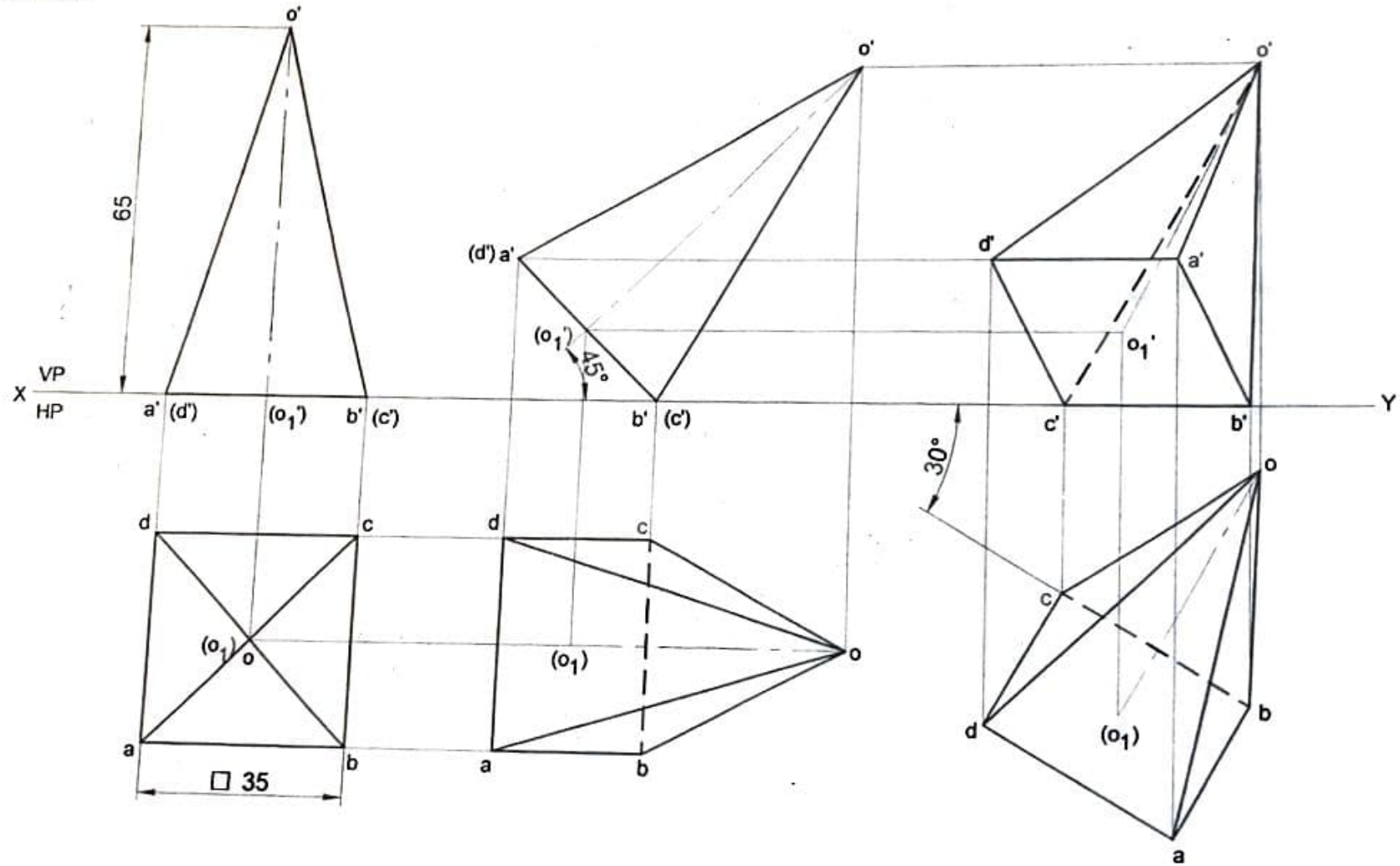
Problem 27 The top view of line PQ 75 mm long measures 50 mm. The end P is 30 mm in front of VP and 15 mm above HP. The end Q is 15 mm in front of VP and above HP. Draw the Projections of the line and find its true inclinations with HP and VP. Find the length of front view and distance between the end Projectors.
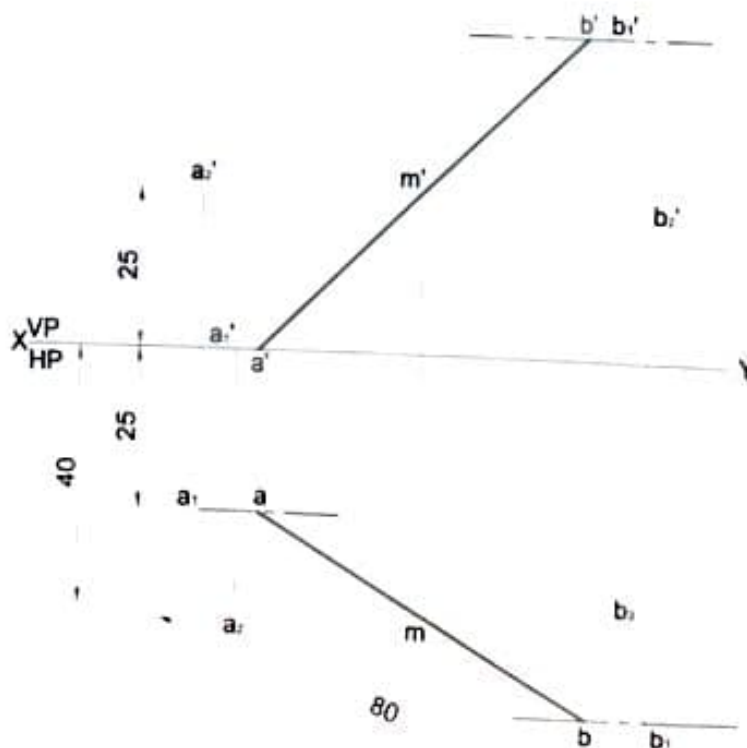
Solution
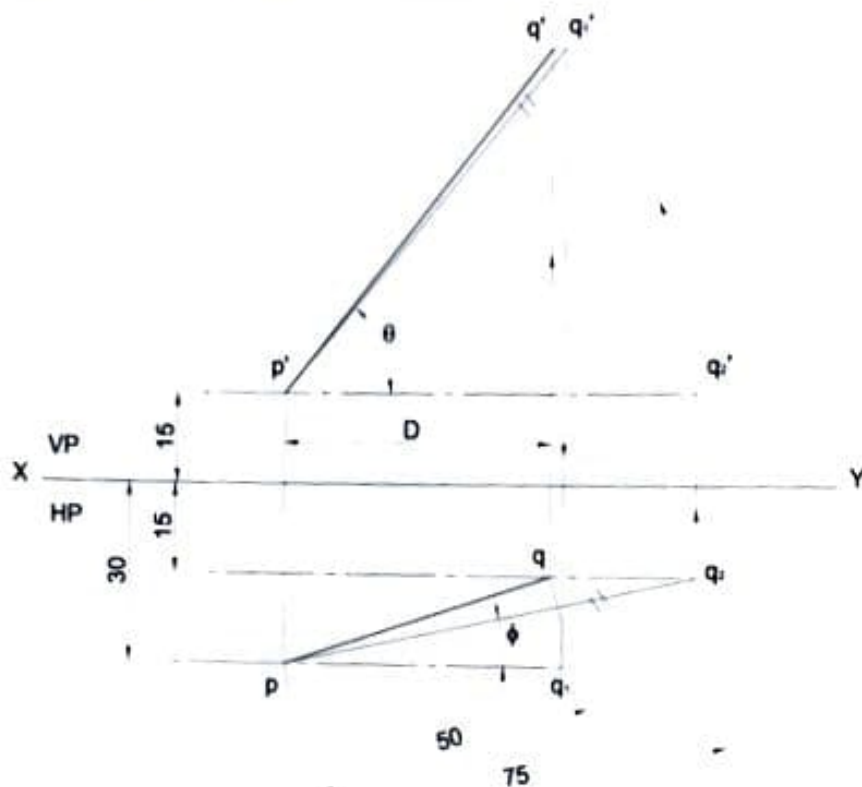
ANSWERS :
$\theta = 12°$
$\phi = 48°$
$D = 48$
$p'q' = 73$

Problem 28 A straight line AB measuring 80 mm long has the end A in the HP and 25 mm in front of the VP. Its mid point M is 25 mm above the HP and 40 mm in front of the VP. Draw the projections of the line and determine the inclination of the line with HP and VP.

Solution

Problem 3 A triangular lamina of 25mm sides rests on one of its corners on VP such that the median passing through the corner on which it rests is inclined at 30° to HP and 45° to VP. Draw its projections.
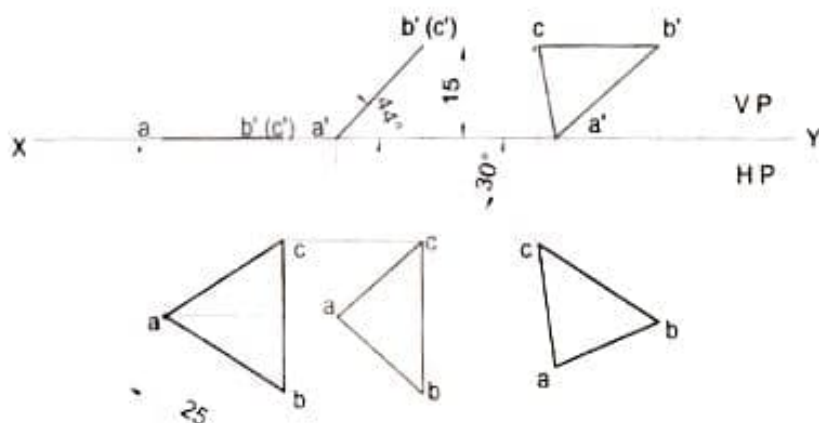
Solution
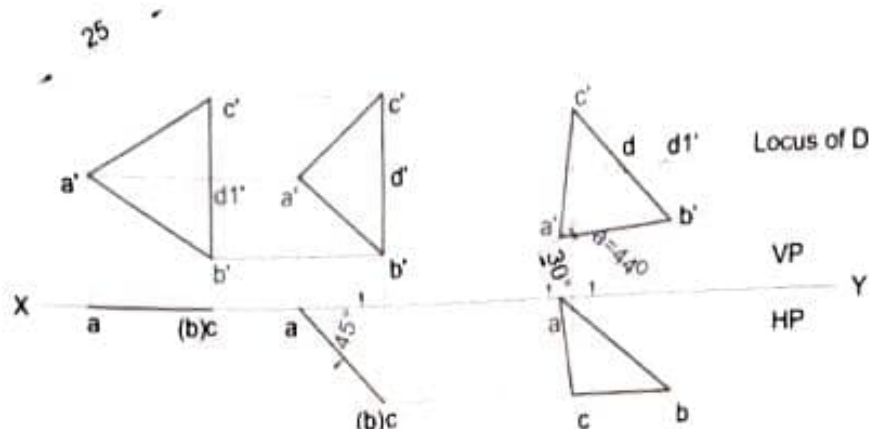
Problem 4 A triangular plane figure of sides 25mm is resting on HP with one of its corners, such that the surface of the lamina makes an angle of 60° with HP. If the side opposite to the corner on which the lamina rests makes an angle of 30° with VP, draw the top and front views in this position.
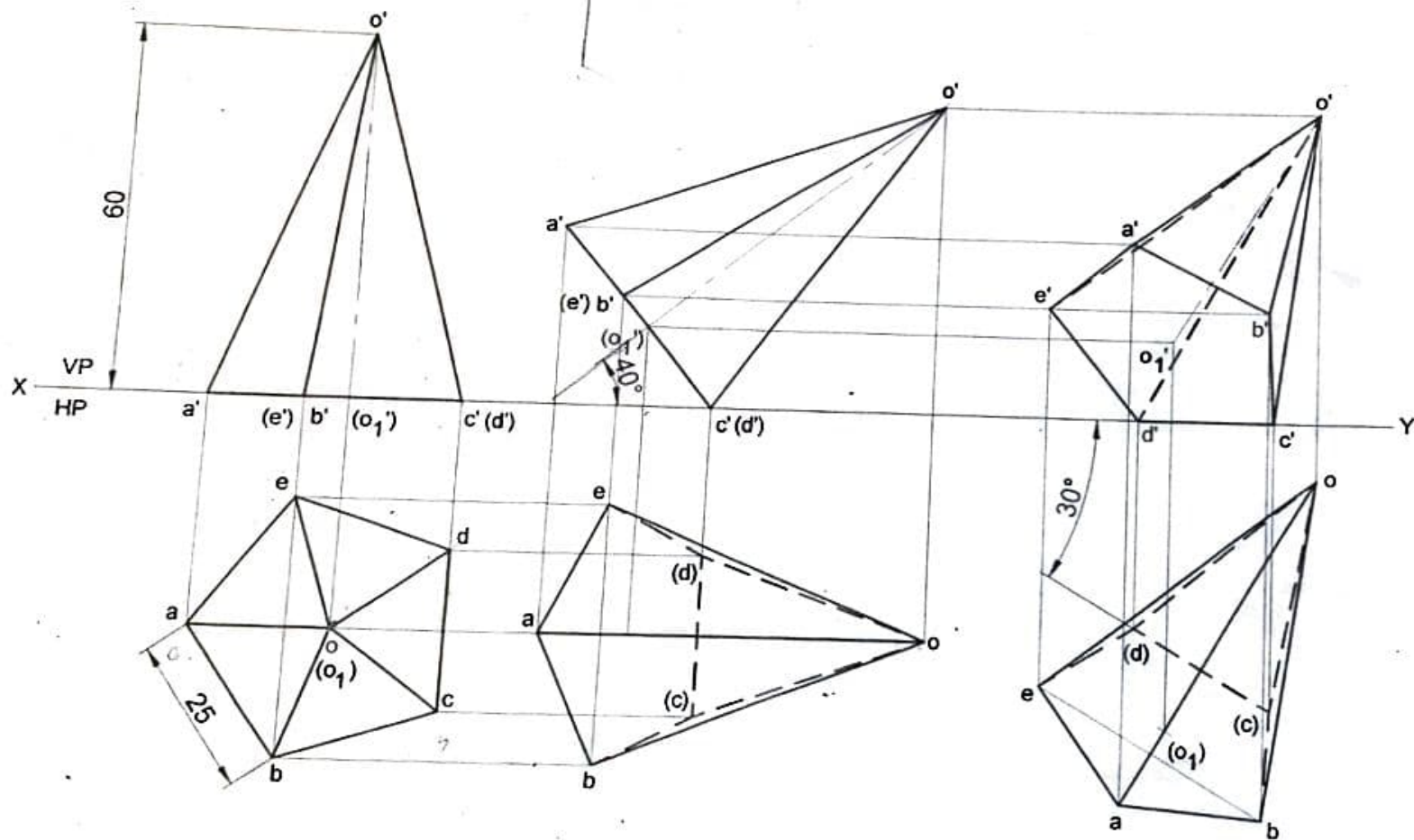
Solution
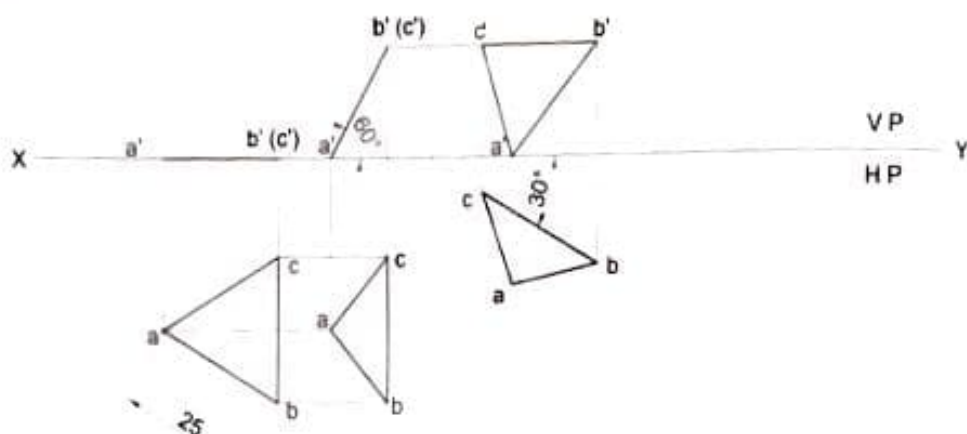
Problem 5 A triangular plane lamina of sides 25mm is resting on HP with one of its corners touching it, such that the side opposite to the corner on which it rests is 15mm above HP and makes an angle of 30° with VP. Draw the top and front views in this position. Also determine the inclination of the lamina to the reference plane.
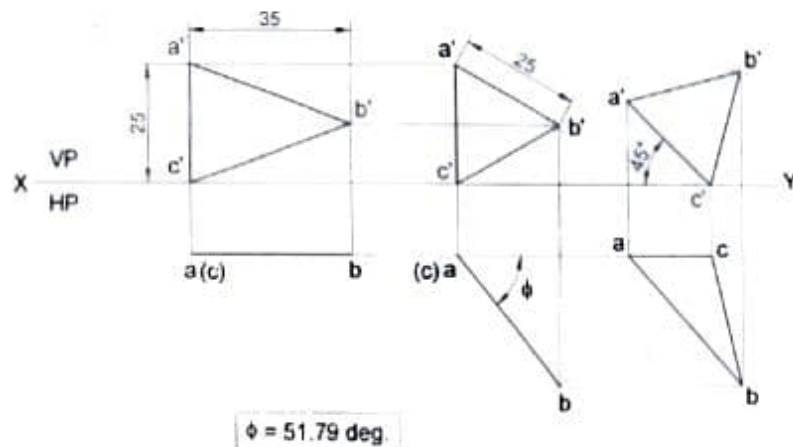
Solution

20. A pentagonal pyramid 25 mm sides of base and 60 mm axis length rests on HP on one of its edges of the base which is inclined to VP at 30 deg. Draw the projections of the pyramid when the axis is inclined to HP at 40 deg.
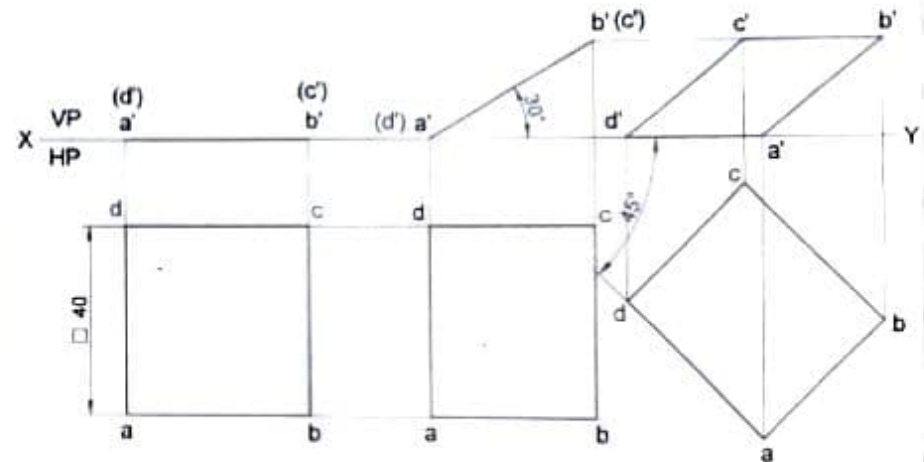
SOLUTION:

7. An isosceles triangular plate of negligible thickness has base 25 mm long and altitude 35 mm it is placed on HP such that in the front view is seen as an equilateral triangle of 25 mm sides with the side that is parallel to VP is inclined at 45 deg. to HP. Draw its top and front views. Also determine the inclination of the plate with the reference plane.

SOLUTION:

ϕ = 51.79 deg.

8. A square lamina of 40 mm side rests on one of its sides on HP. The lamina makes 30 deg. to HP and the side on which it rests makes 45 deg. to VP. Draw its projections.

SOLUTION

9. A hexagonal prism 25 mm sides of base and 50 mm axis length rests on HP on one of its edges. Draw the projections of the prism when the axis is inclined to HP at 45 deg. and appears to be inclined to VP at 40 deg.

SOLUTION:

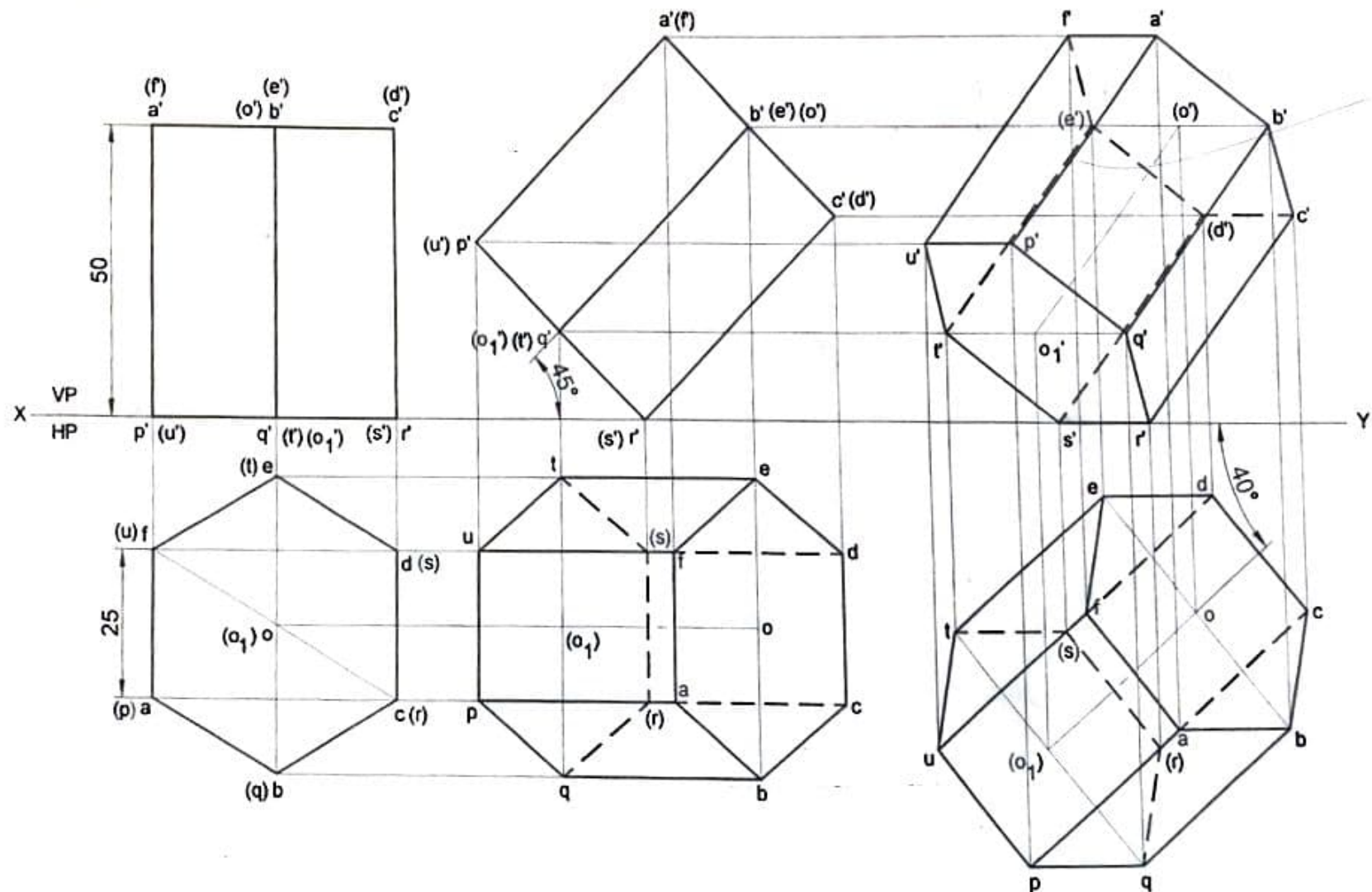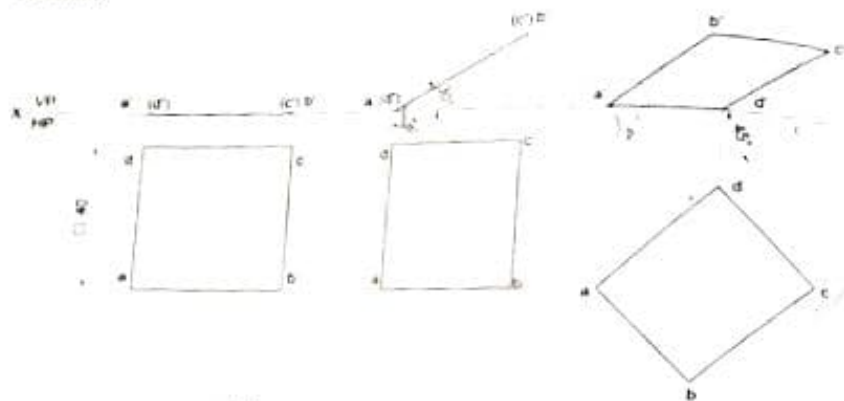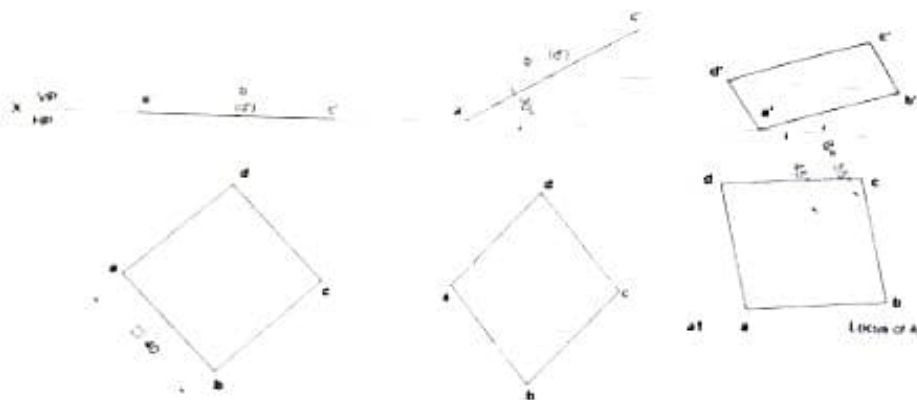**Problem 8** A square lamina of 40mm side rests on one of its sides on HP. The lamina makes 30° to HP and the side on which it rests makes 45° to VP. Draw its projections.

Solution

Problem 9 A square plate of 20mm sides rests on HP such that one of the diagonals is inclined at 30° to HP and 45° to VP. Draw its projections.

Solution

Problem 10 A square lamia ABCD of 40mm side rests on corner C such that the diagonal AC appears to be at 45° to VP. The two sides BC and CD containing the corner C make equal inclinations with HP. The surface of the lamina makes 30° with HP. Draw its top and front views.

Solution
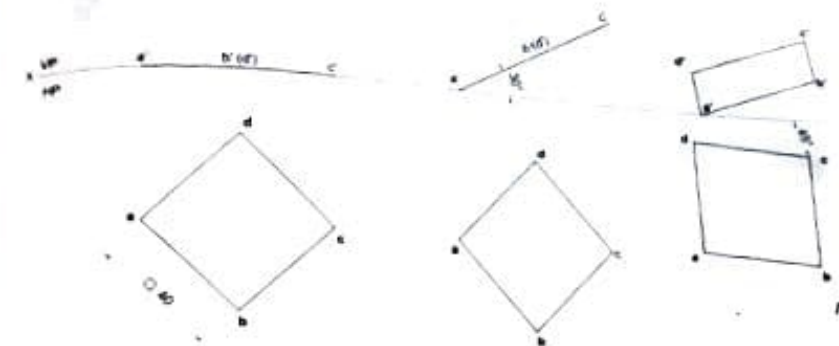
Problem 11 The top view of a square lamia of side 30mm is a rectangle of sides 30mm x 20mm with the longer side of the rectangle being parallel to both HP and VP. Draw the top and front views of the square lamina. What is the inclination of the surface of the lamina with HP and VP?
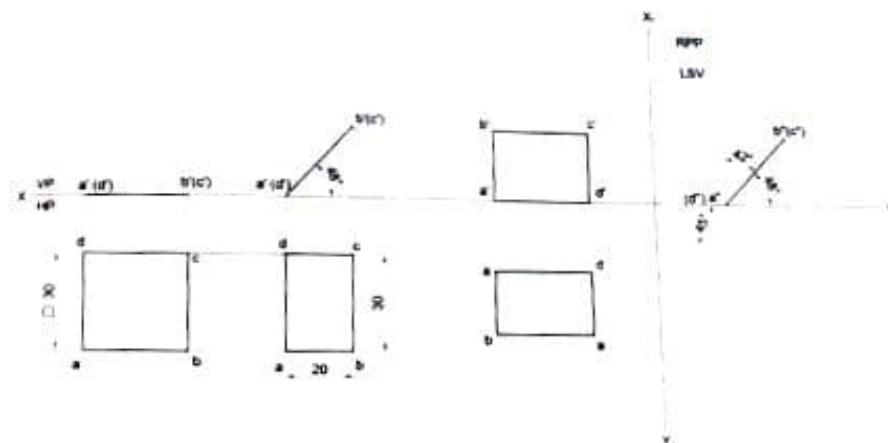
Solution

22. A pentagonal pyramid 25 mm sides of base and 50 mm axis length rests on HP on one of its corners of the base such that the two base edges containing the corner on which it rests make equal inclinations with HP. Draw the projections of the pyramid when the axis of the pyramid is inclined to HP at 40 deg. and appears to be inclined to VP at 45 deg.

SOLUTION:

Department of Mechanical Engineering

Projections of Solids
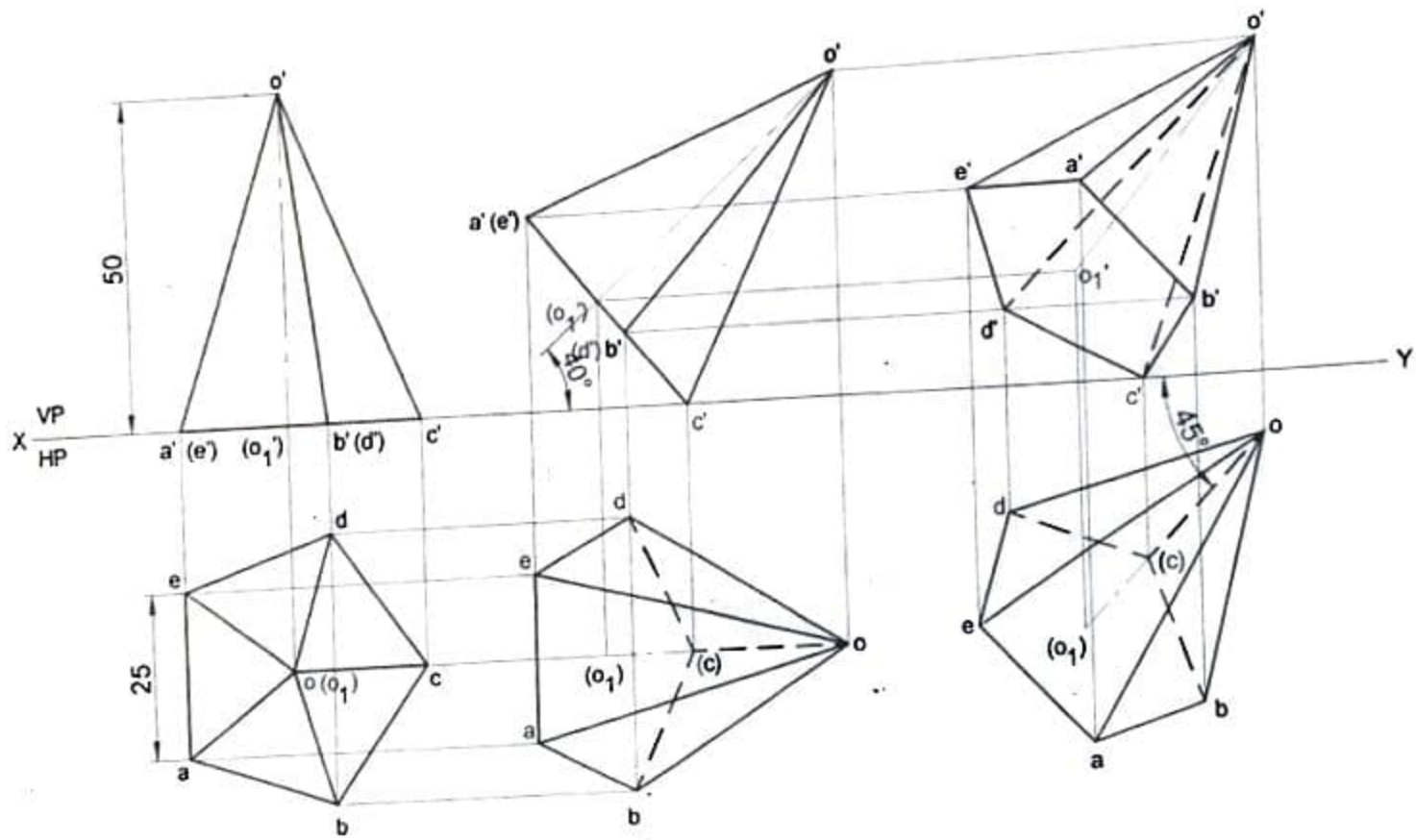
Problem 6 A 30°-60° setsquare of 60mm longest side is so kept such that the longest side is in HP, making an angle of 30° with VP. The set square itself is inclined at 45° to HP. Draw the projections of the setsquare.
Solution

Problem 7 An isosceles triangular plate of negligible thickness has base 25mm long and altitude 35mm. It is so placed on HP such that in the front view it is seen as an equilateral triangle of 25mm sides with the side that is parallel to VP is inclined at 45° to HP. Draw its top and front views. Also determine the inclination of the plate with the reference plane.
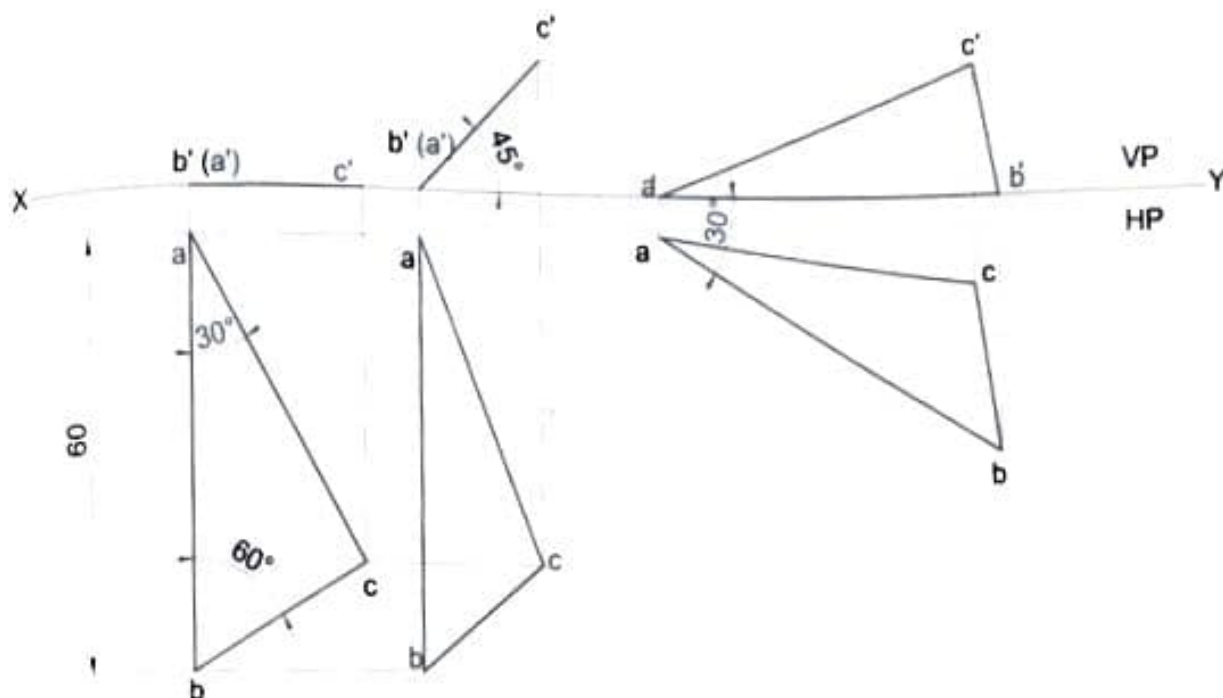**Solution**

55

17. A square pyramid 35 mm sides of base and 60 mm axis length rests on HP on one of its corners of the base such that the two base edges containing the corner on which it rests makes equal inclinations with HP. Draw the projections of the pyramid when the axis of the pyramid is inclined to HP at 40 deg. and appears to be inclined to VP at 45 deg.
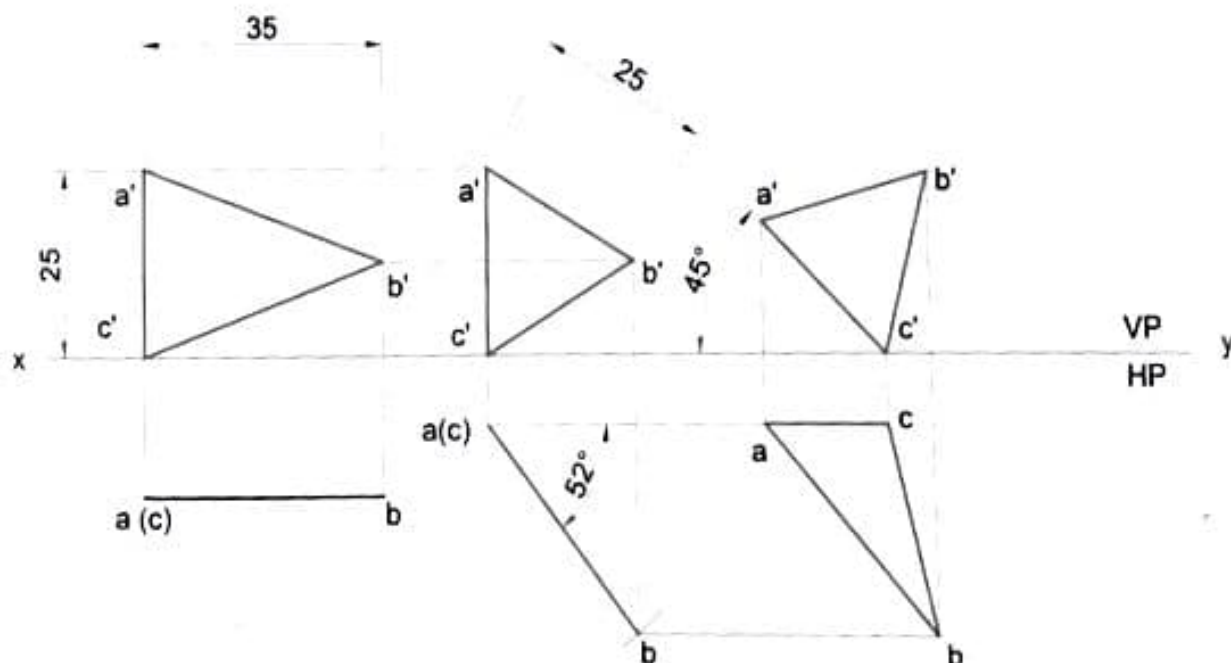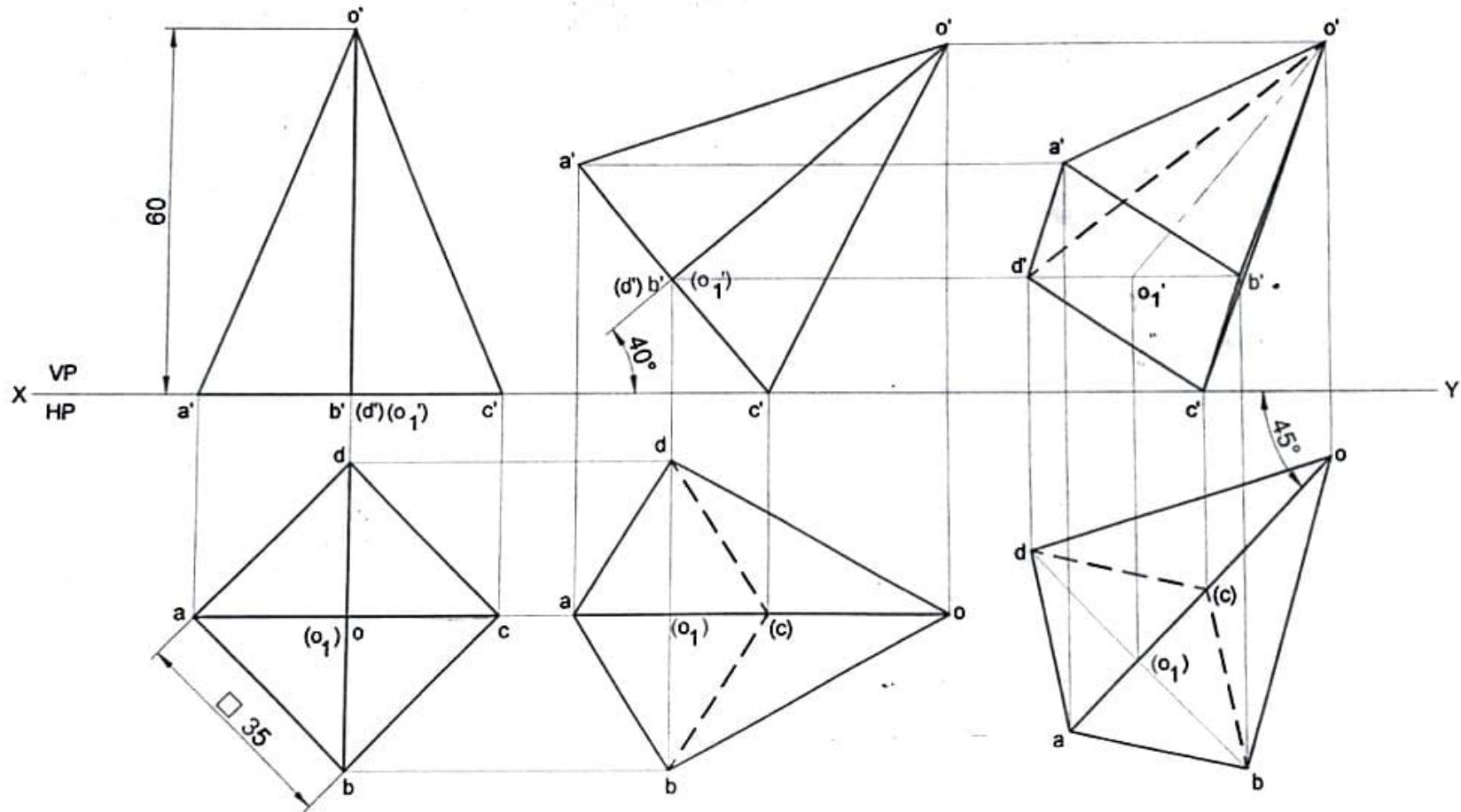
SOLUTION:

Projections of Solids

1. A square prism 35 mm sides of base and 65 mm axis length rests on HP on one of its edges of the base which is inclined to VP at 30 deg. Draw the projections of the prism when the axis is inclined to HP at 45 deg.

SOLUTION:

46. A tetrahedron of sides 40 mm is resting on one of its sides on HP. This side is parallel to VP and 40 mm away from it. It is tilted about resting side such that the base containing this edge is inclined at 30 deg. to HP. Draw the projections of the solid.
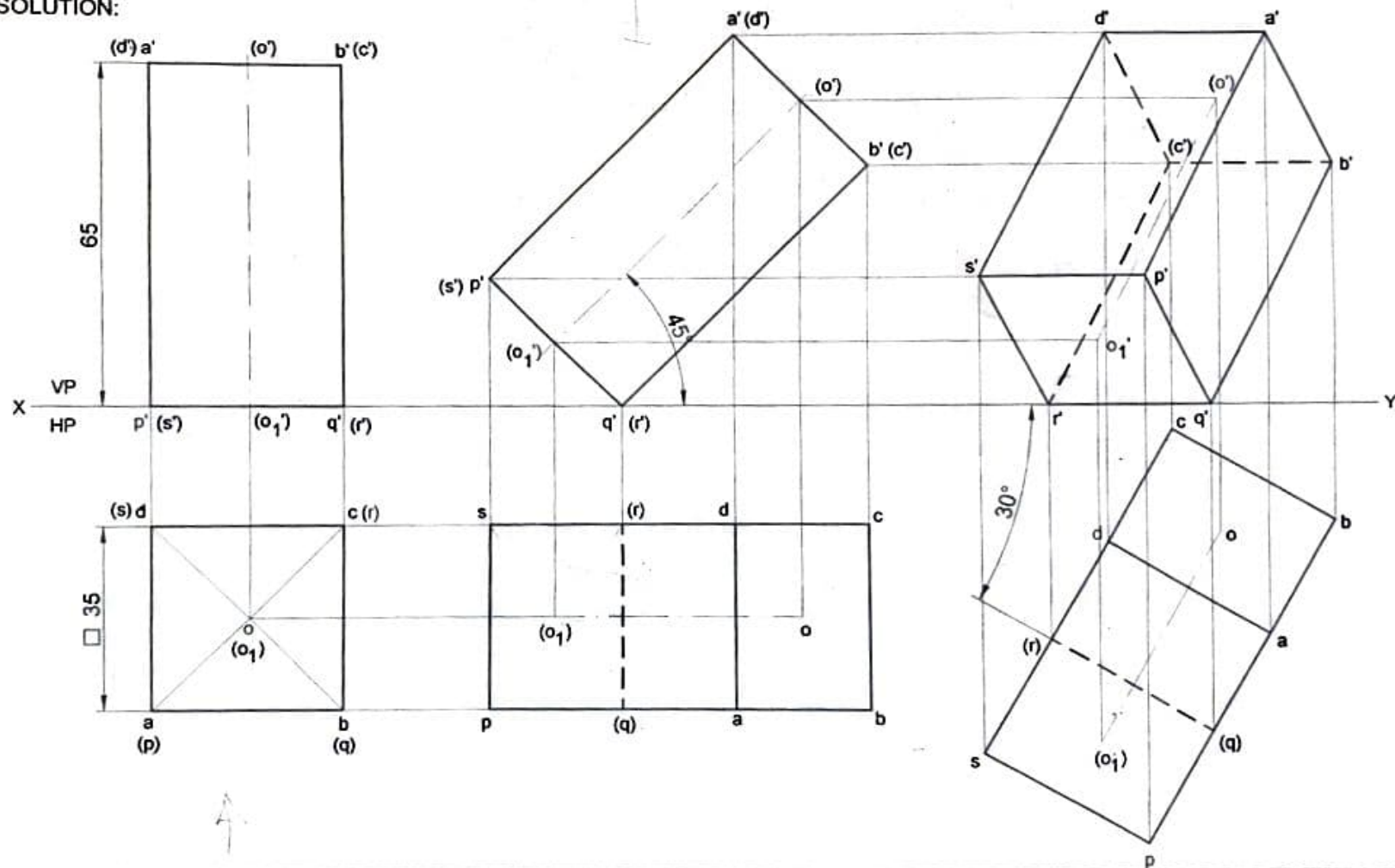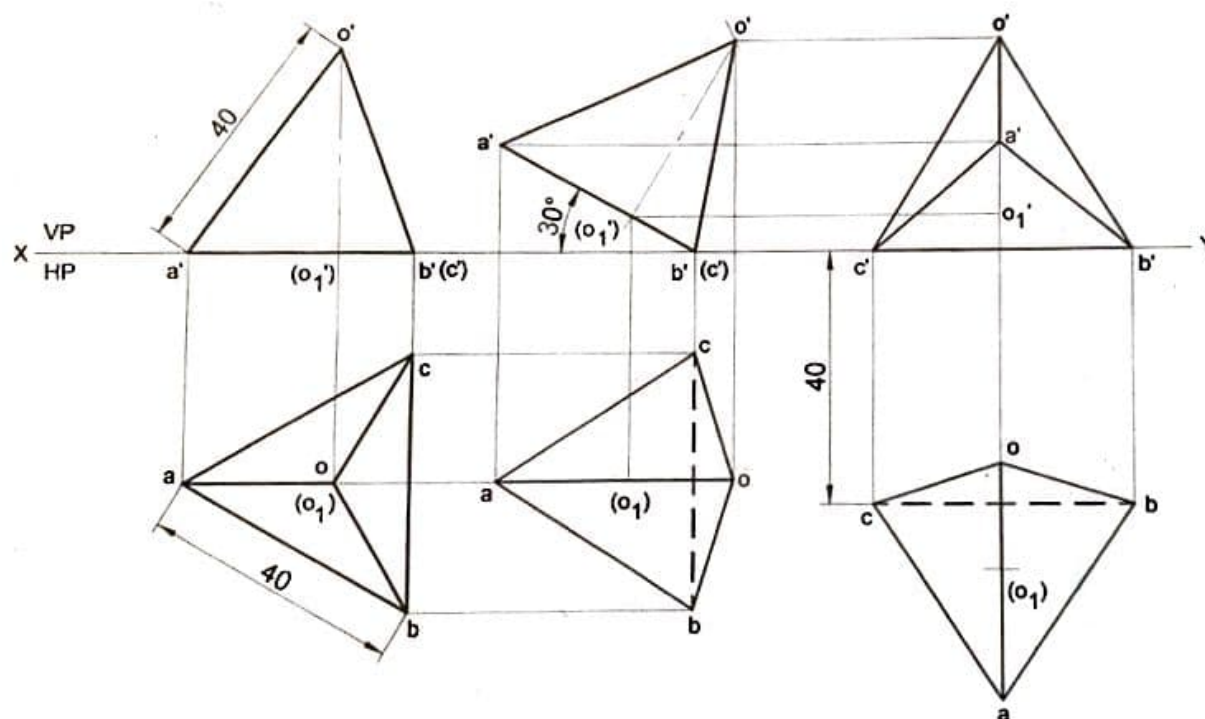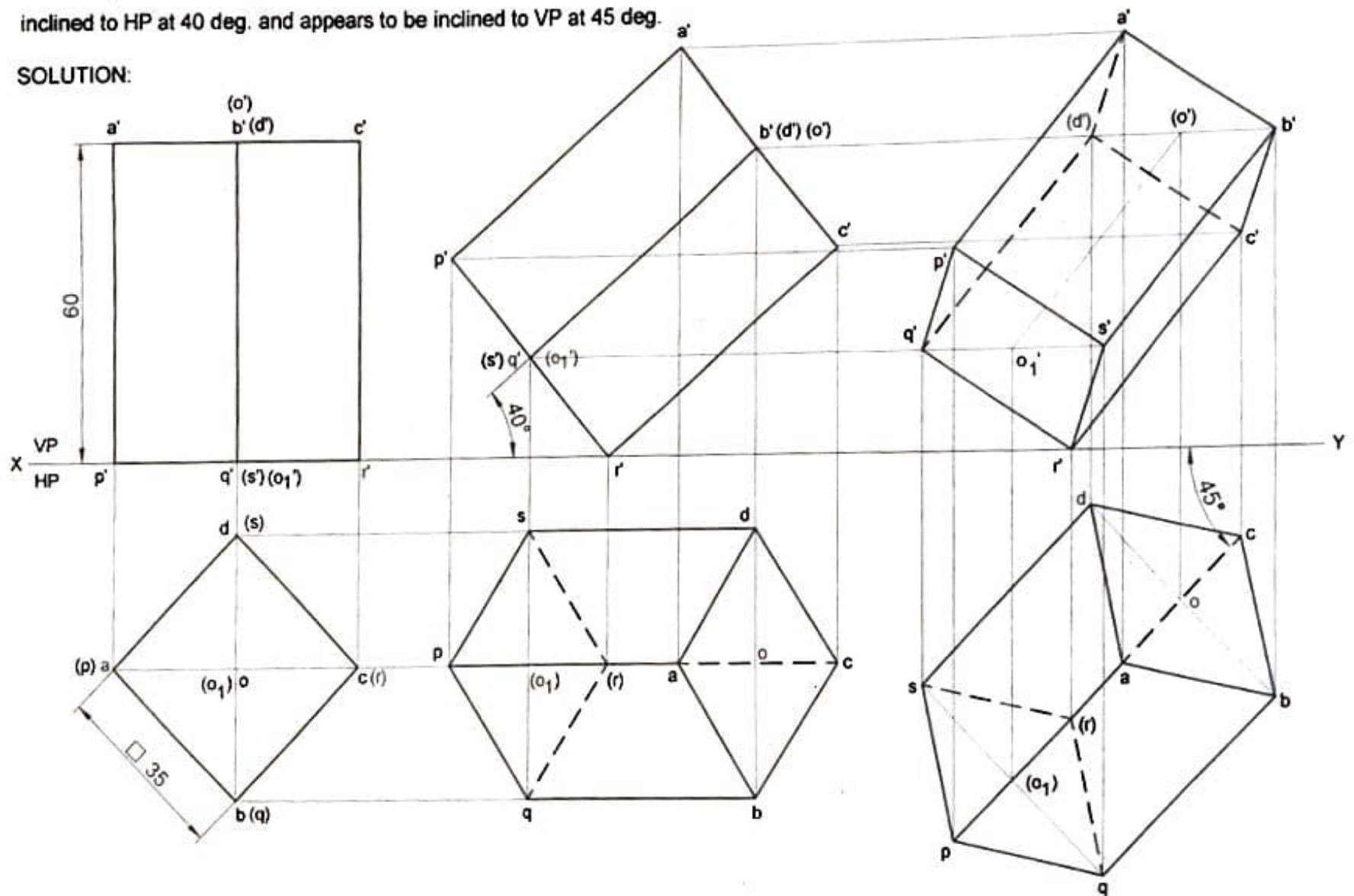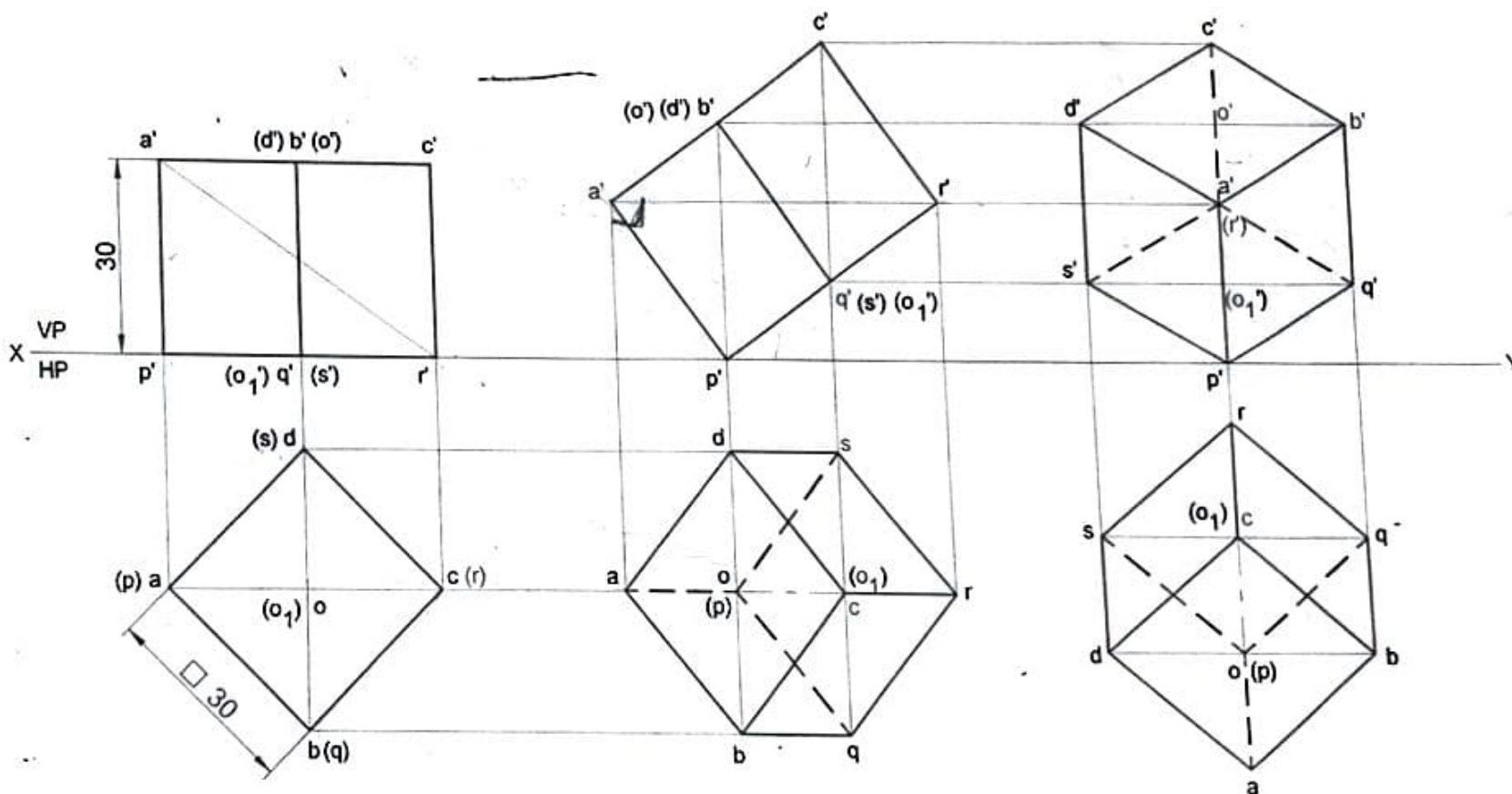
SOLUTION:

2. A square prism 35 mm sides of base and 60 mm axis length rests on HP on one of its corners of the base such that the two base edges containing the corner on which it rests make equal inclinations with HP. Draw the projections of the prism when the axis of the prism is inclined to HP at 40 deg. and appears to be inclined to VP at 45 deg.
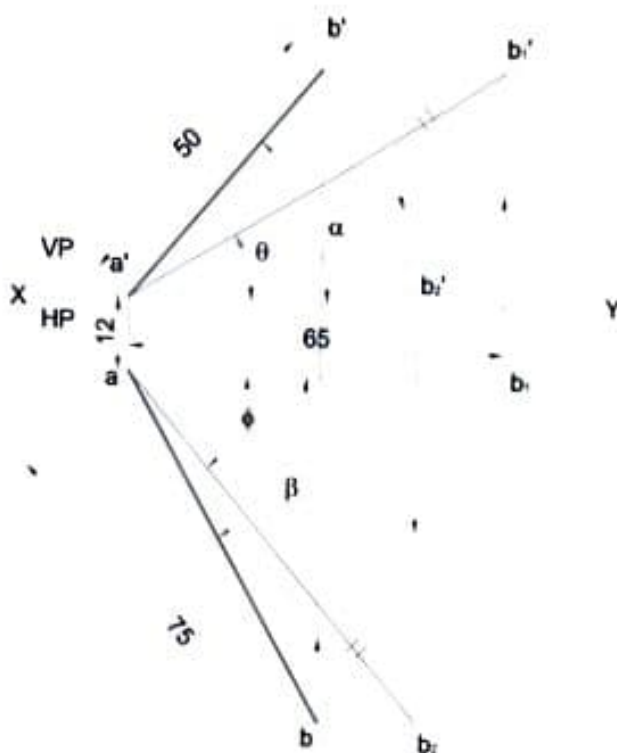
SOLUTION:

47. A Hexahedron of 30 mm sides is resting on one of its corners on HP such that one of its solid diagonals is perpendicular to VP. Draw the projections of the solid.

SOLUTION:

Problem 17 The top view of a 75 mm long line AB measures 65 mm, while the front view is 50 mm. Its one end A is in the H.P and 12 mm in front of the V.P. Draw the projections of AB and determine its inclinations with the H.P. and the V.P.

Solution

ANSWERS :
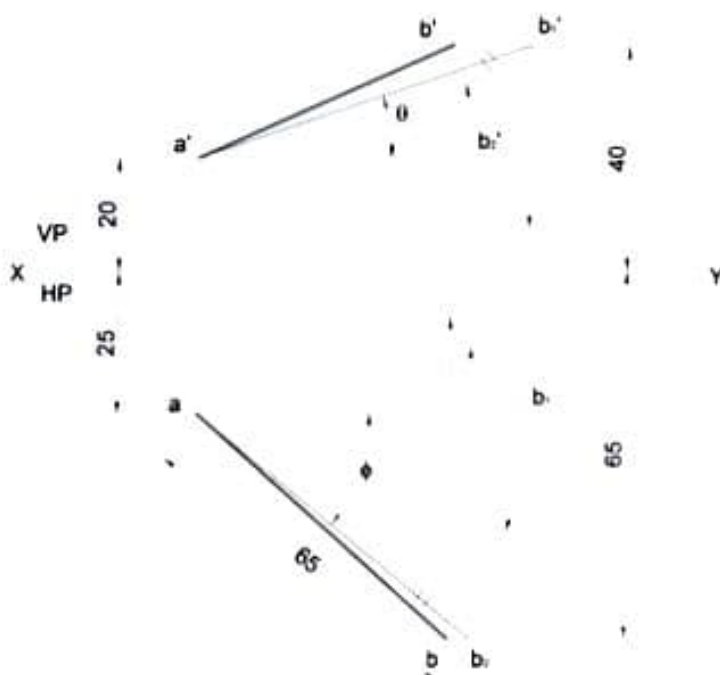$\theta = 30^\circ$
$\phi = 48^\circ$
$\alpha = 48^\circ$
$\beta = 60^\circ$

Problem 18 A line AB, 65 mm long, has its end A 20 mm above the H.P and 25 mm in front of the V.P The end B is 40 mm above the H.P. and 65 mm in front of the V.P. Draw the projections of AB and show its inclinations with the H.P. and the V.P.
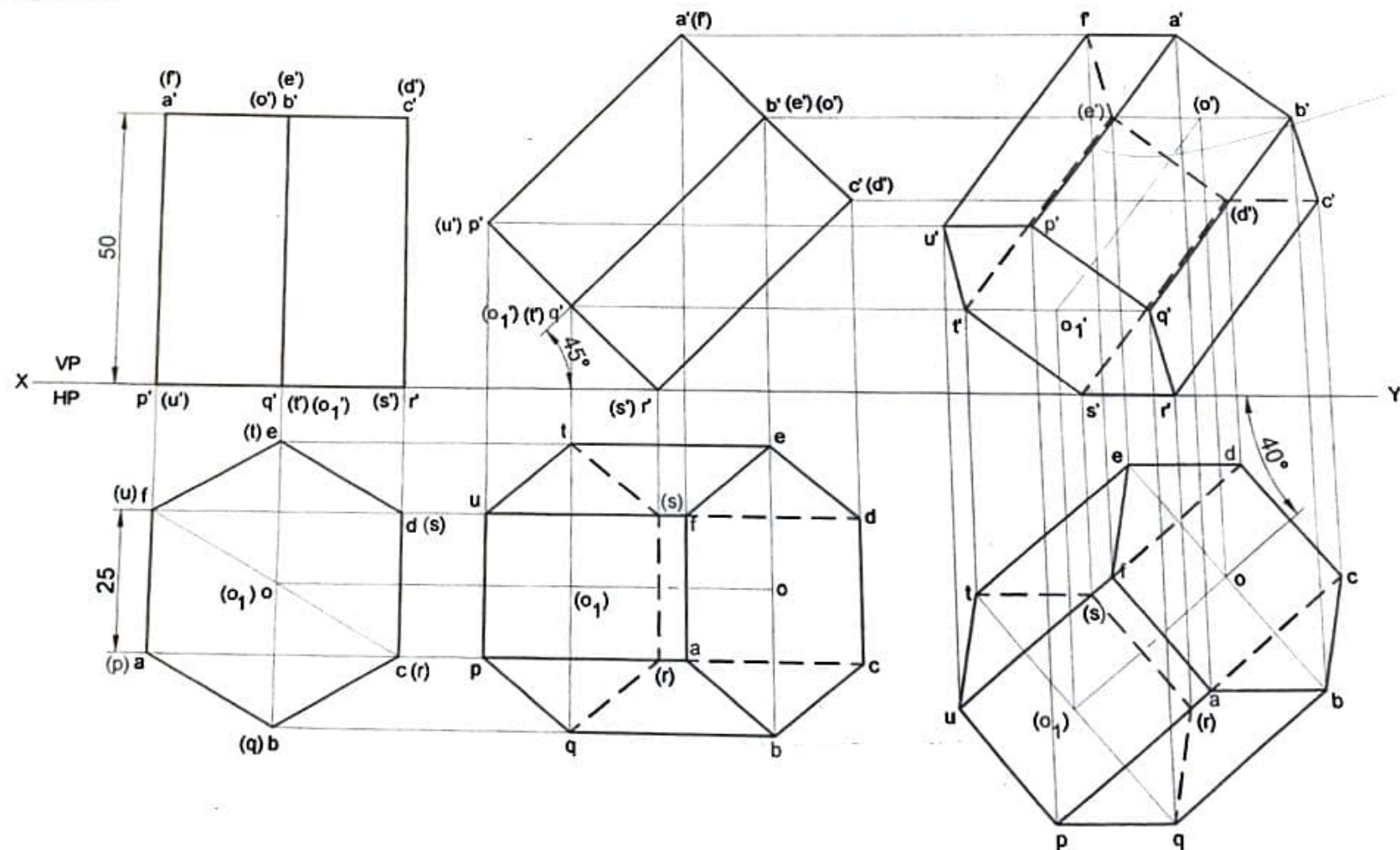
Solution

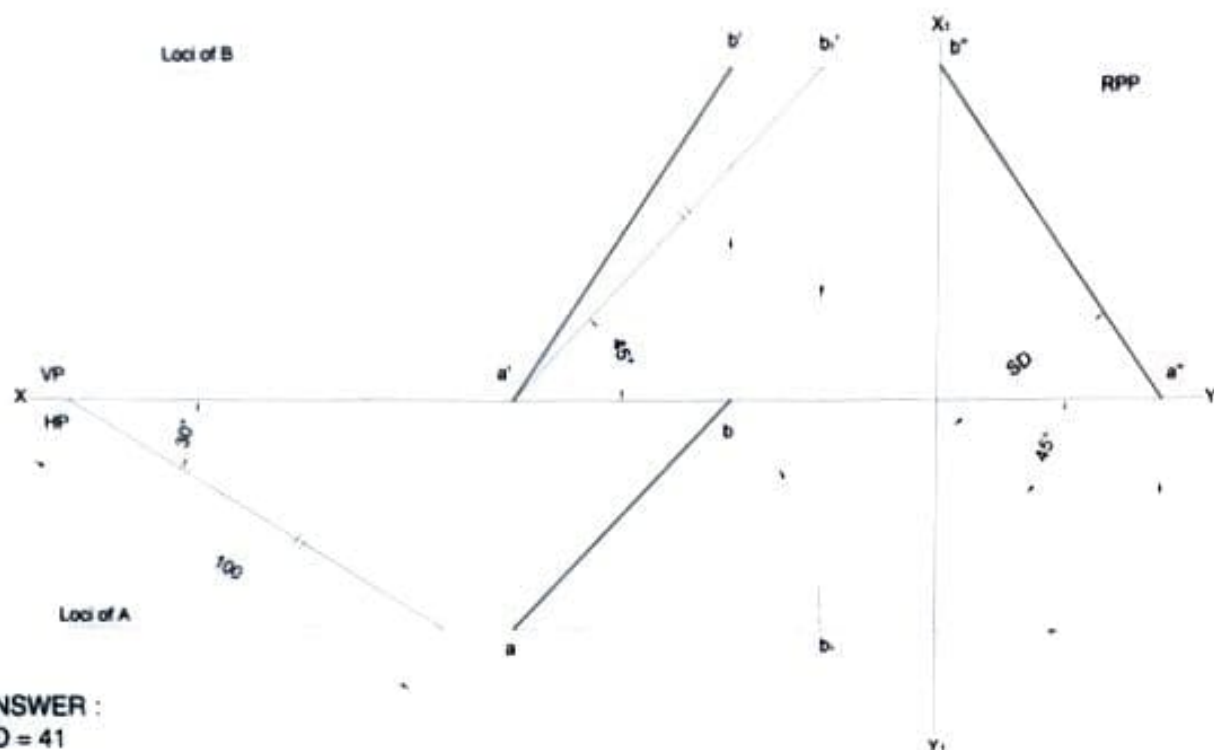ANSWERS :
$\theta = 10^\circ$
$\phi = 38^\circ$

35

9. A hexagonal prism 25 mm sides of base and 50 mm axis length rests on HP on one of its edges. Draw the projections of the prism when the axis is inclined to HP at 45 deg. and appears to be inclined to VP at 40 deg.

SOLUTION:

Problem 15 Draw the projections of a straight line AB, 100 mm long, inclined at 45° to HP and 30° to VP. The end A is in HP and the end B is in VP. Find the shortest distance between the straight line AB and the line of intersection of planes of projection.
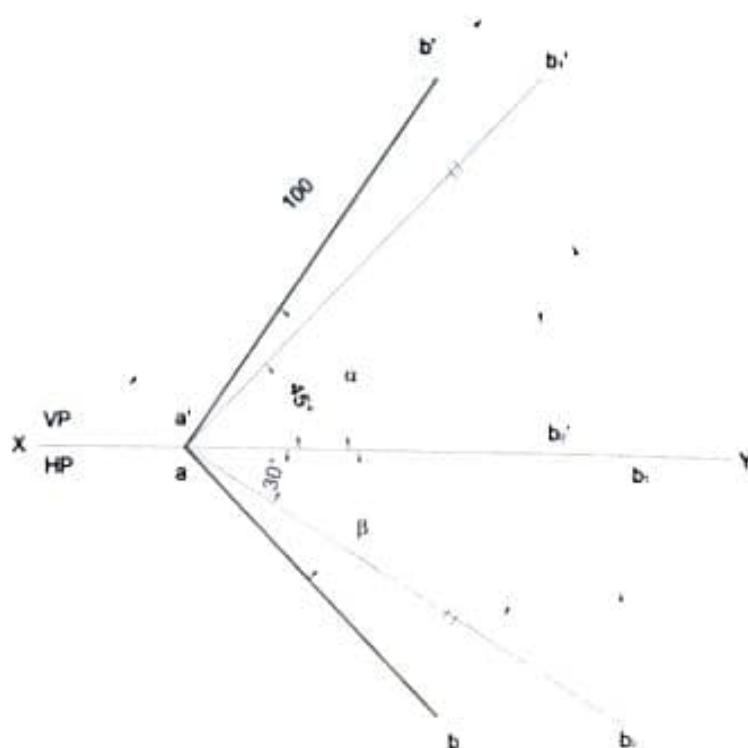
Solution

Loci of B

b'   b₁'   X₁
              b°
                    RPP

VP   a'   SD   a°
X ─── Y
HP   b   45

30

100

Loci of A   a   b

ANSWER :
SD = 41
                                    Y₁

Problem 16 A line AB 100 mm long is inclined to HP at 45° and inclined to VP at 30°. Draw front and top views of line and determine their lengths. Also determine the perpendicular distance of end Q from both HP and VP.

Solution

b'   b₁'

100

                    α
        VP   a'   b₁'
X ───────────────────────────── Y
        HP   a   b₂

30   45   b

ANSWERS :
α = 55°
β = 65°
a'b' = 87
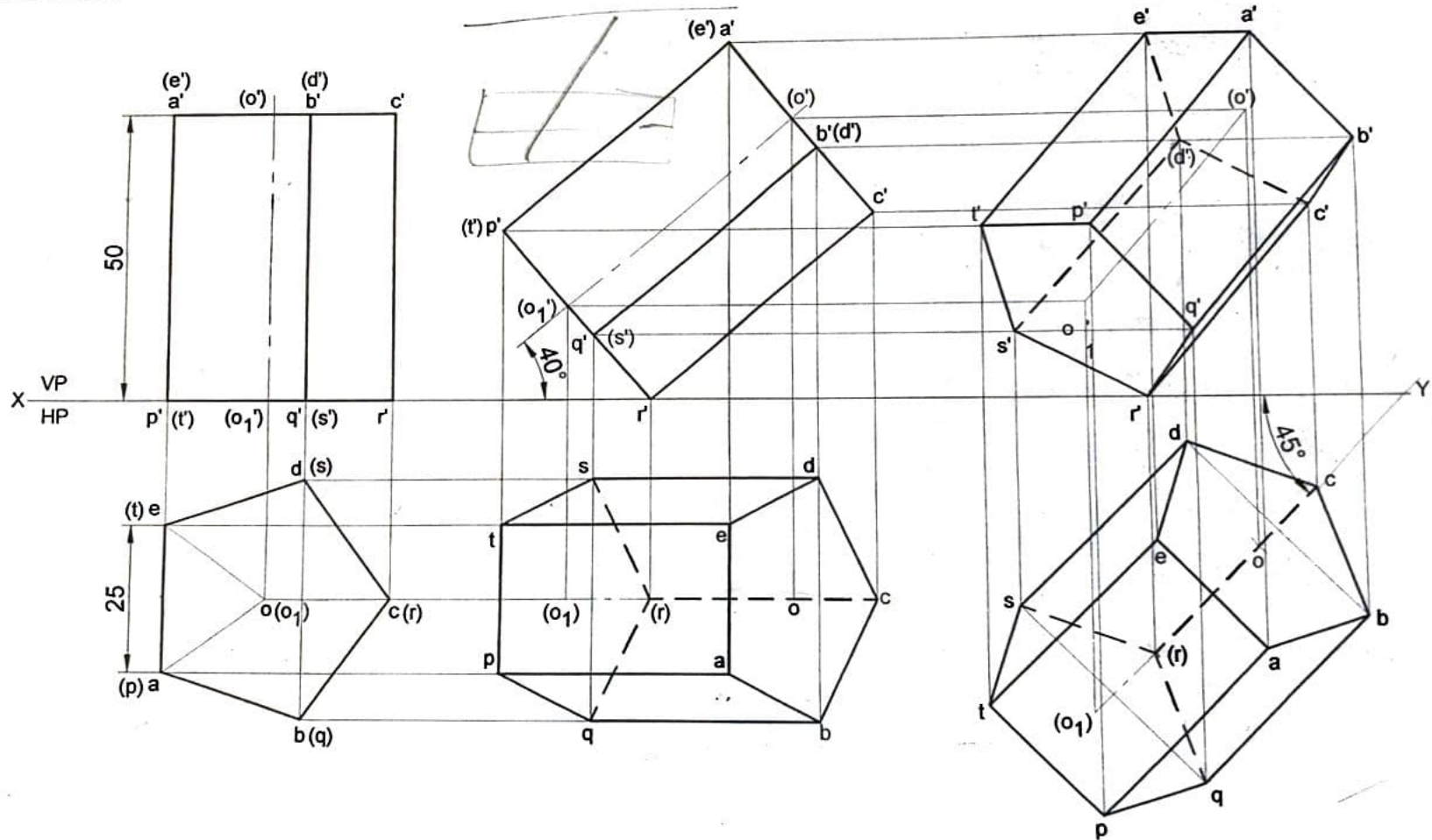ab = 71
b'b₁' = 71
b'b₂' = 50

                        β

   b   b₂

34

7. A pentagonal prism 25 mm sides of base and 50 mm axis length rests on HP on one of its corners of the base such that the two base edges containing the corner on which it restsmake equal inclinations with HP. Draw the projections of the prism when the axis of the prism is inclined to HP at 40 deg. and appears to be inclined to VP at 45 deg.

SOLUTION:

11. A hexagonal prism 25 mm sides of base and 50 mm axis length rests on HP on one of its corners of the base such that the two base edges containing the corner on which it rests make equal inclinations with HP. Draw the projections of the prism when the axis of the prism is inclined to HP at 40 deg. and appears to be inclined to VP at 45 deg.
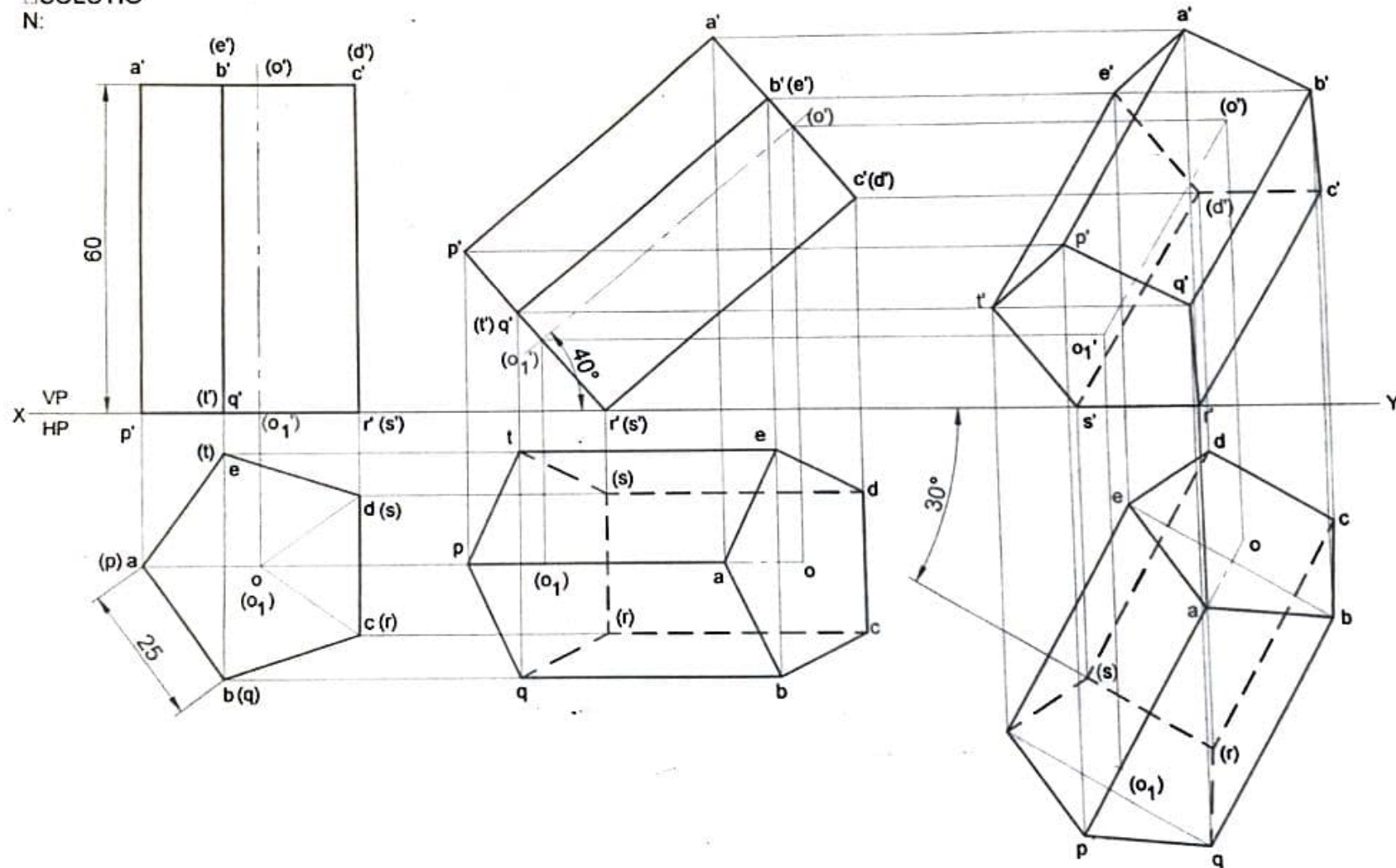
SOLUTION:

Projections of Solids
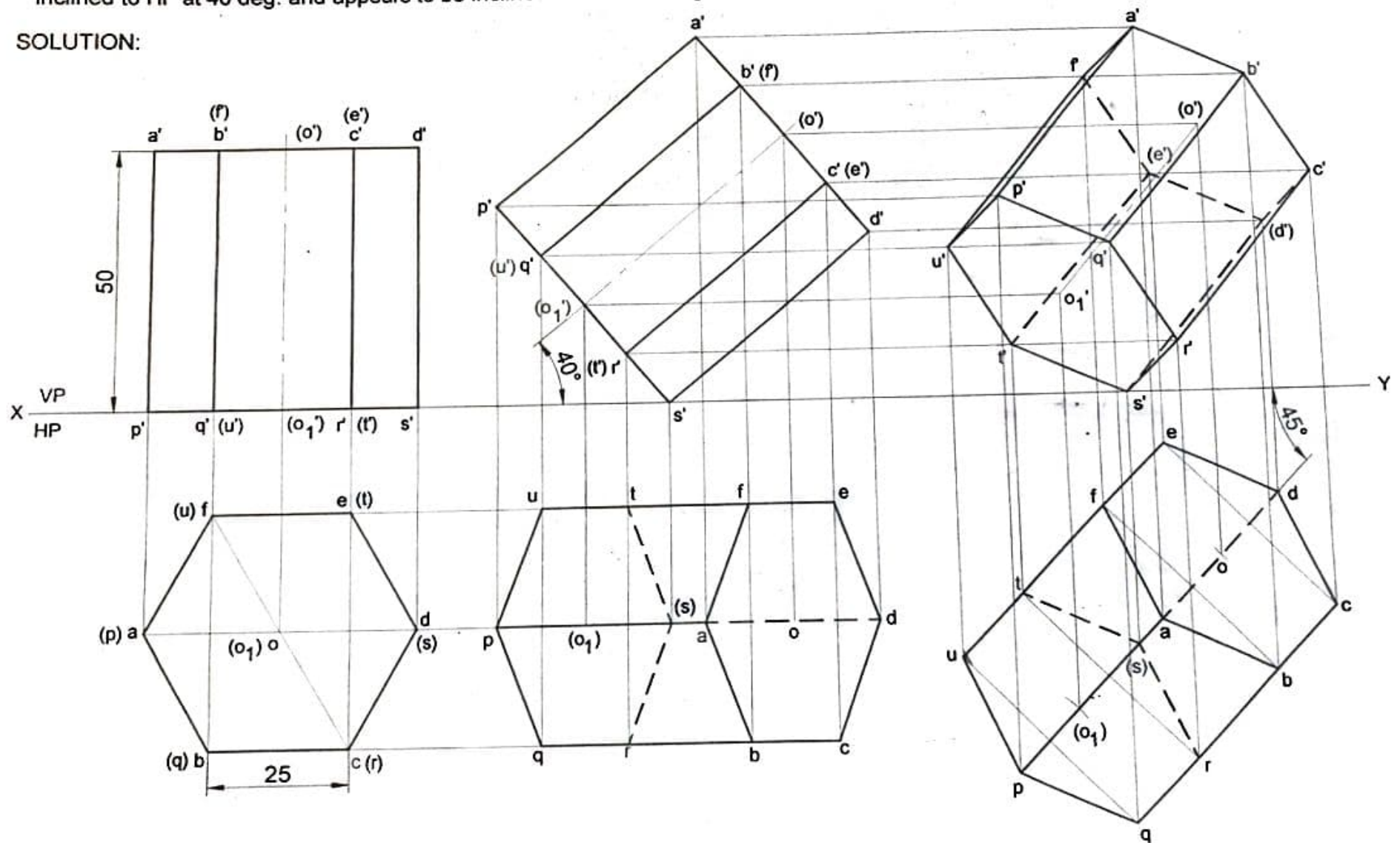
5. A pentagonal prism 25 mm sides of base and 60 mm axis length rests on HP on one of its edges of the base which is inclined to VP at 30 deg. Draw the projections when the axis is inclined to HP at 40 deg.
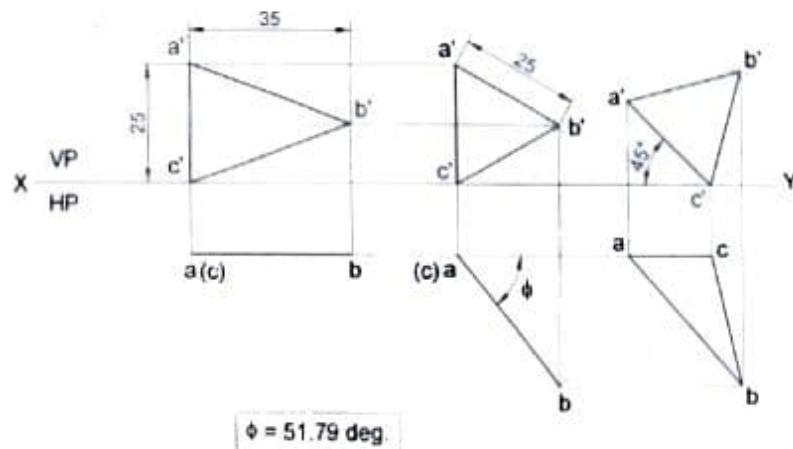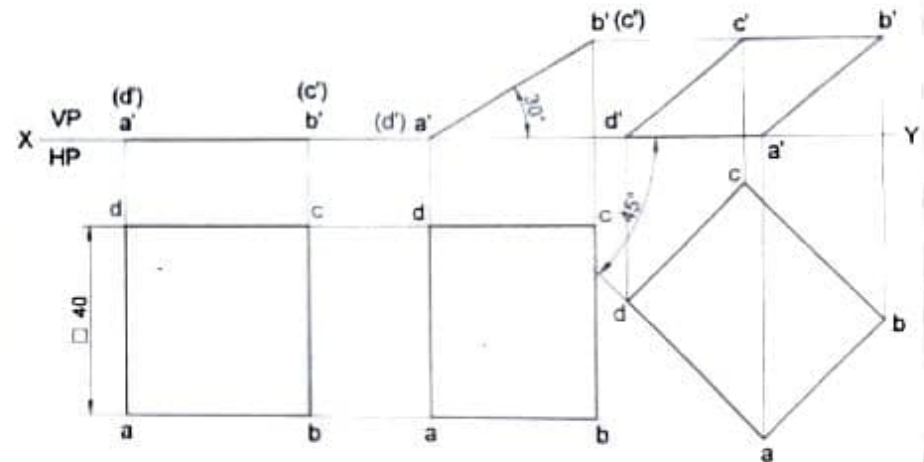
☐SOLUTION:

7. An isosceles triangular plate of negligible thickness has base 25 mm long and altitude 35 mm it is placed on HP such that in the front view is seen as an equilateral triangle of 25 mm sides with the side that is parallel to VP is inclined at 45 deg. to HP. Draw its top and front views. Also determine the inclination of the plate with the reference plane.
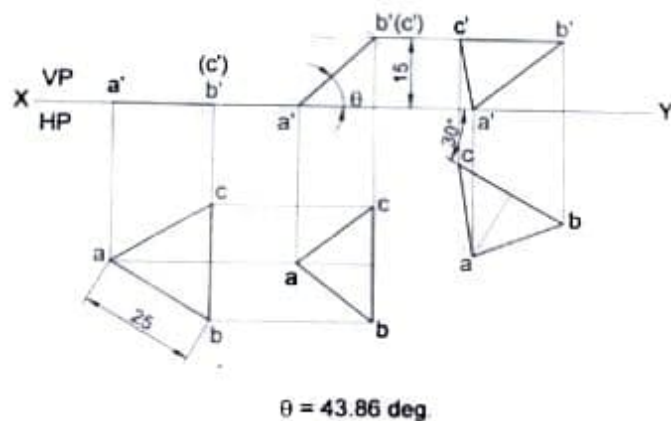
SOLUTION:

φ = 51.79 deg.

8. A square lamina of 40 mm side rests on one of its sides on HP. The lamina makes 30 deg. to HP and the side on which it rests makes 45 deg. to VP. Draw its projections.
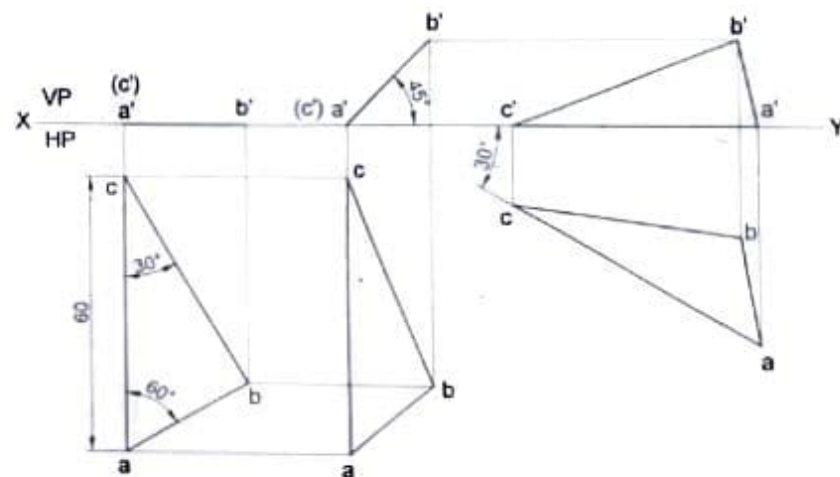
SOLUTION

5. A Triangular plane lamina of sides 25 mm is resting on HP with one of its corners touching it, such that the side opposite to the corner on which it rests is 15 mm above HP and makes an angle of 30 deg. with VP. Draw the top and front views in this position. Also determine the inclination of the lamina to the reference plane.

SOLUTION:

θ = 43.86 deg.

6. A 30 - 60 deg. set square of 60 mm longest side is so kept such that the longest side is in HP making an angle of 30 deg. with VP. The set square itself is inclined at 45 deg. to HP. Draw the projections of the set square.

SOLUTION:

41. A hexagonal pyramid 25 mm sides of base and 50 mm axis length rests on HP on one of its slant triangular faces. Draw the projections of the pyramid when the axis appears to be inclined to VP at 45 deg.
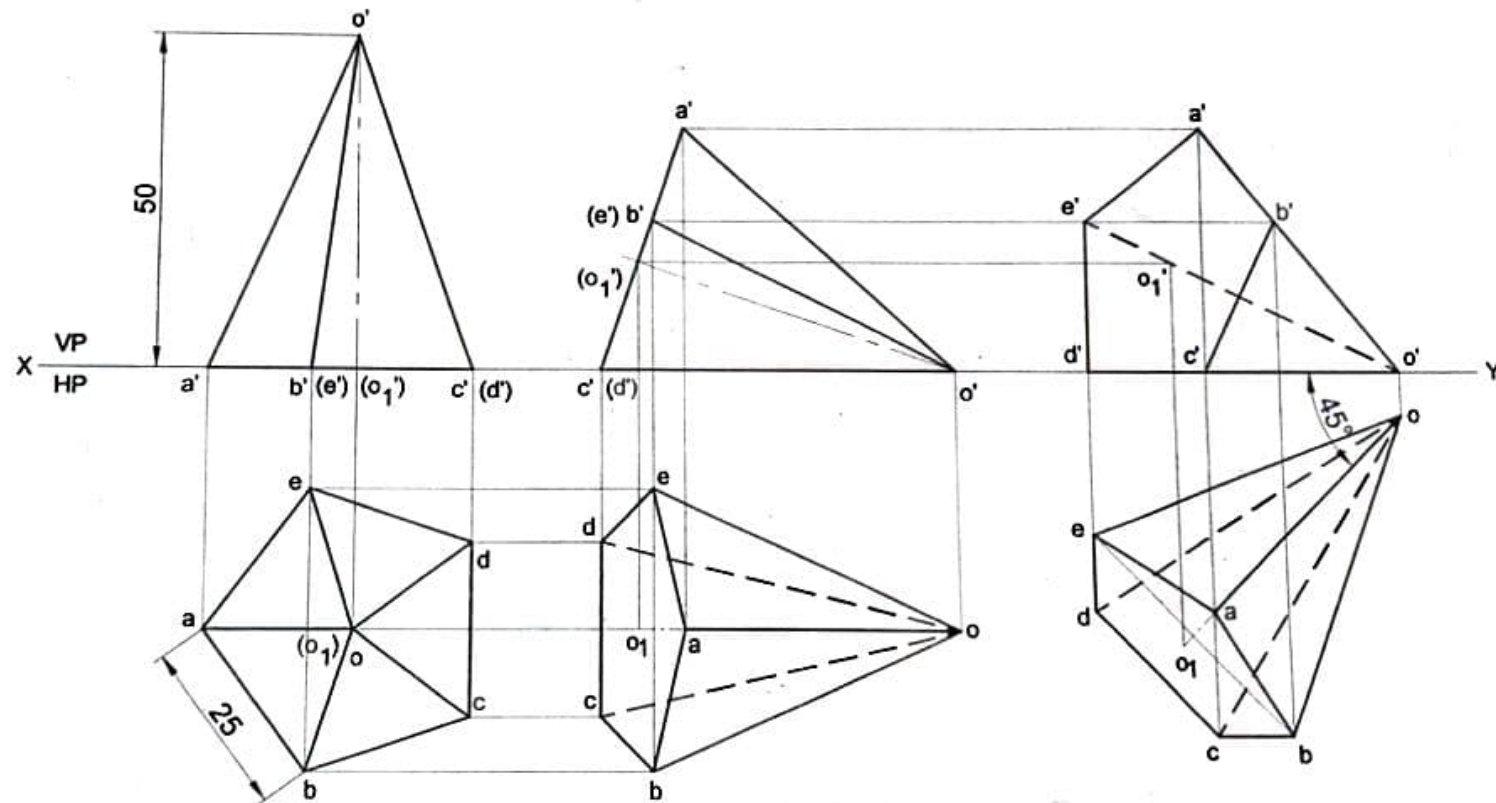
SOLUTION:
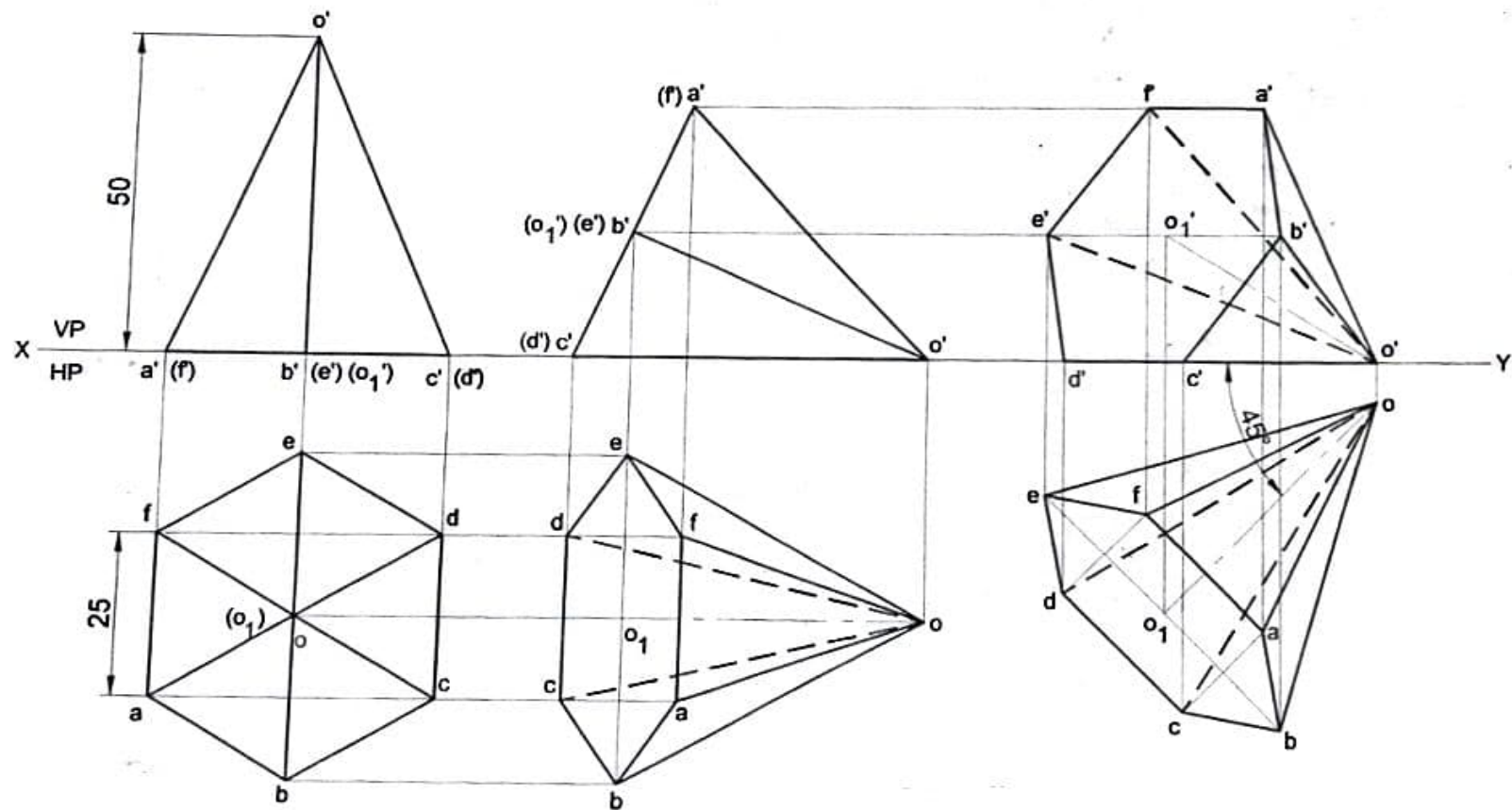
Note: Make the slant triangular face inclined to HP and perpendicular to VP.

37. A pentagonal pyramid 25 mm sides of base and 50 mm axis length rests on HP on one of its slant triangular faces. Draw the projections of the pyramid when the axis appears to be inclined to $\square$VP at 45 deg.

SOLUTION:

Note: Make the slant triangular face inclined to HP and perpendicular to VP.

Problem 45 A hexagonal lamina of sides 25mm rests on one of its corners on HP. The corner opposite to the corner on which it rests is 35mm above HP and the diagonal passing through the corner on which it rests is inclined at 30° to VP. Draw its projections. Find the inclination of the surface with HP
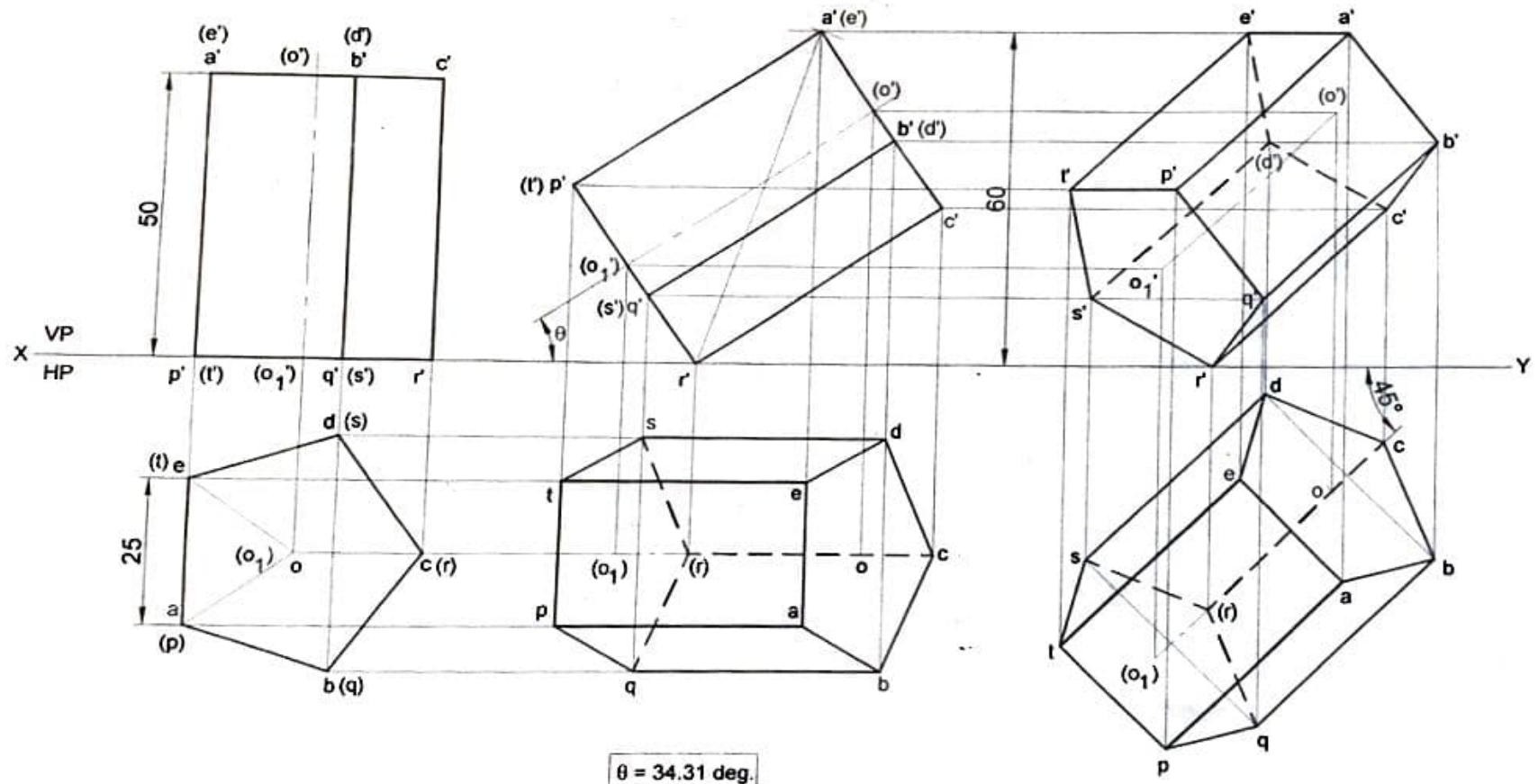
Solution
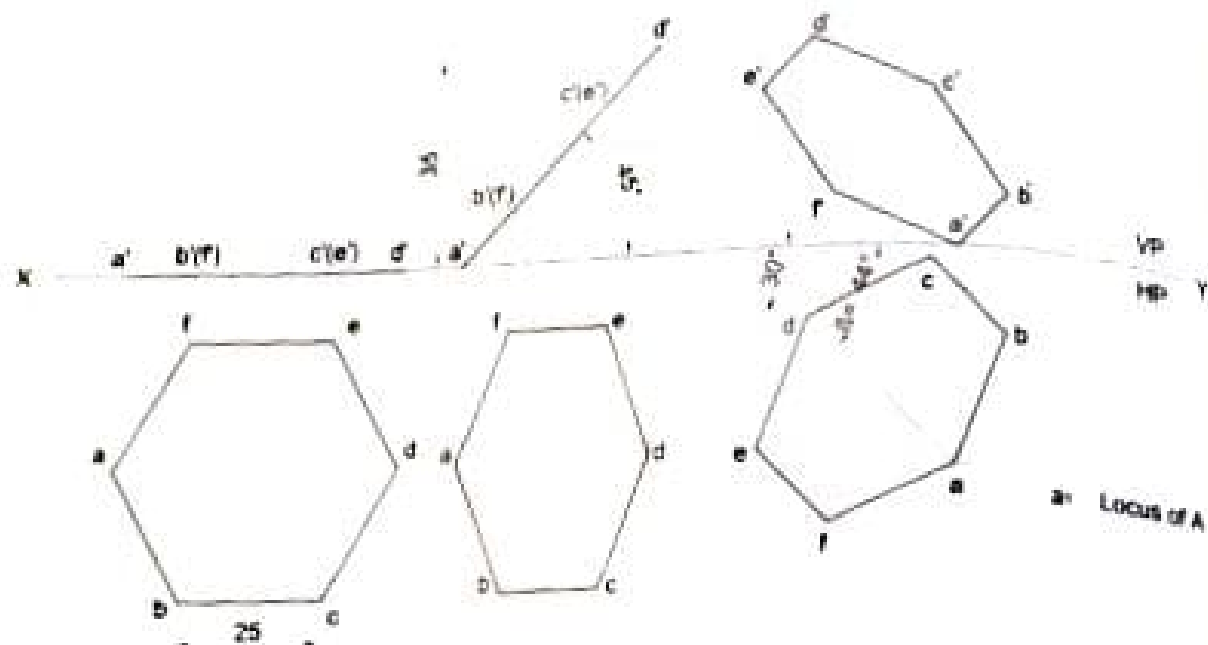
Problem 46 Draw the projections of a circular plate of negligible thickness of 50mm diameter resting on HP on a point A on the circumference, with its plane inclined at 45° to HP and the top view of the diameter passing through the resting point makes 60° with VP.
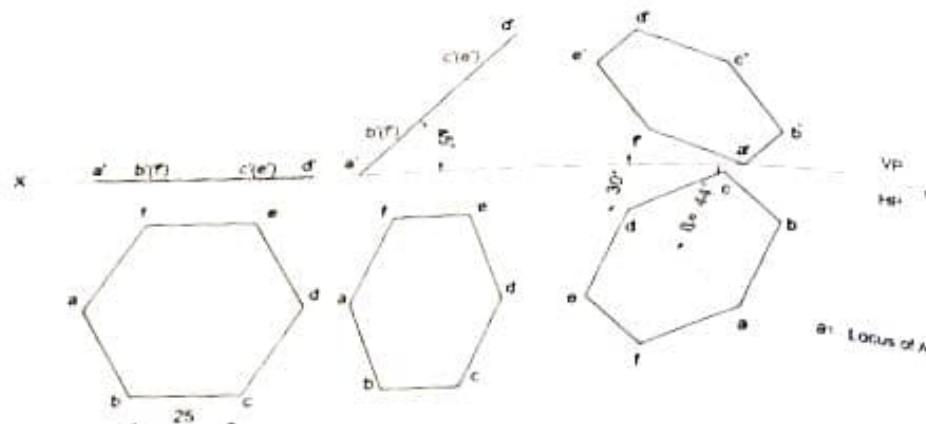
Solution
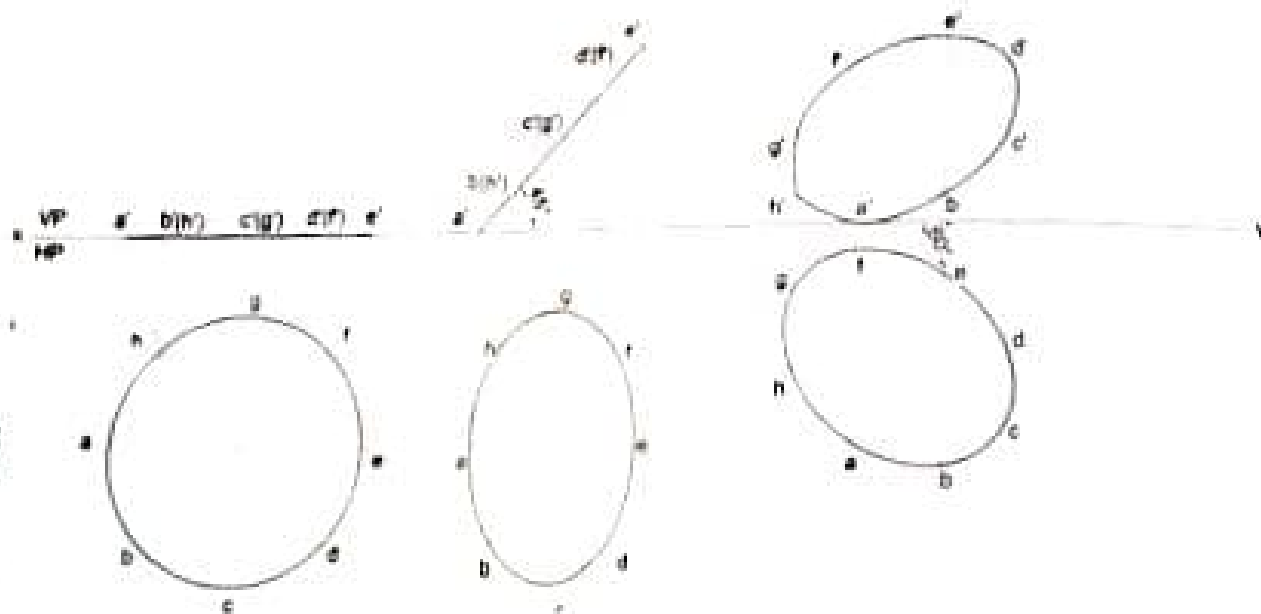
48. A pentagonal prism of base side 25 mm and height 50 mm is resting on HP on one of its base corners such that the top most edge is at a distance of 60 mm above HP. Draw its projections, when its top view of the axis is inclined at 45 deg. to VP. Also, determine the inclination of the longer edge of the prism to HP which contains the resting corner.
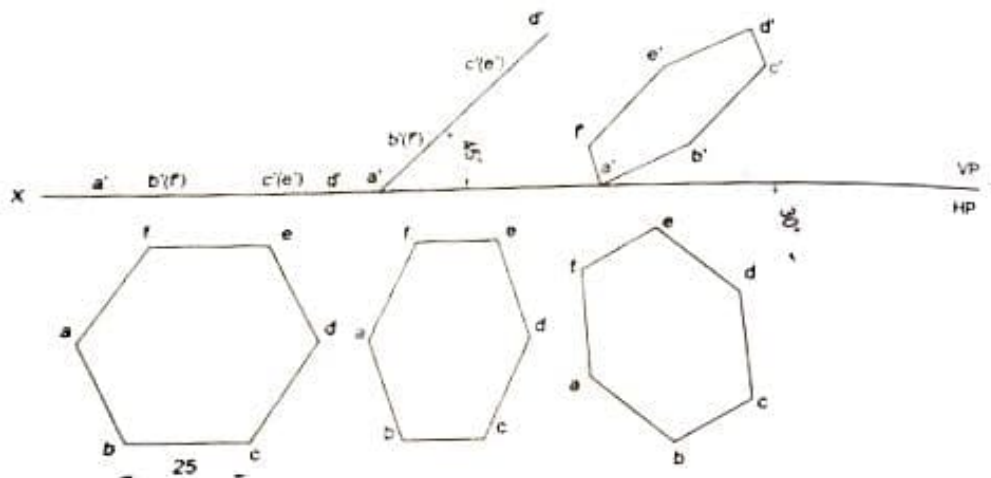
SOLUTION:

θ = 34.31 deg.

Problem 41 A hexagonal lamina of sides 25mm rests on one of its corners on HP. The lamina makes 45° to HP and the diagonal passing through the corner on which it rests is inclined at 30° to VP. Draw its projections.
**Solution**

Problem 42 A hexagonal lamina of sides 25mm rests on one of its corners on HP. The lamina makes 45° to HP and the diagonal passing through the corner on which it rests appears to be inclined at 30° to VP. Draw its projections.
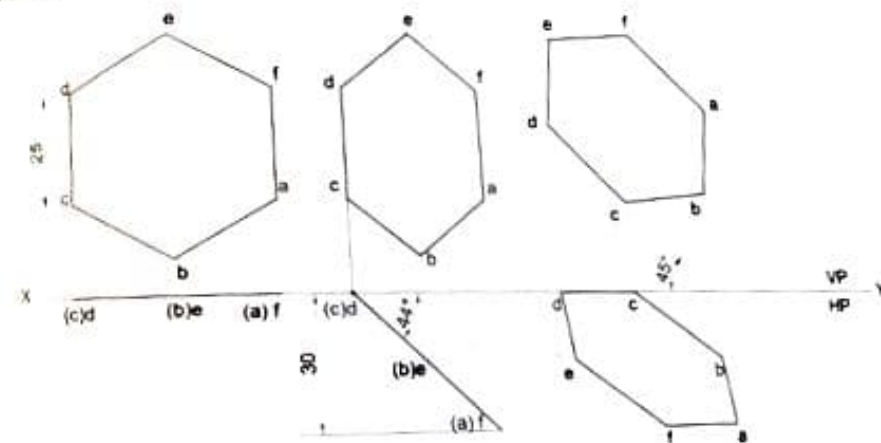**Solution**

Problem 43 A hexagonal lamina of sides 25mm rests on one of its sides on VP. The lamina makes 45° to VP and the side on which it rests makes 45° to HP. Draw its projections.
**Solution**
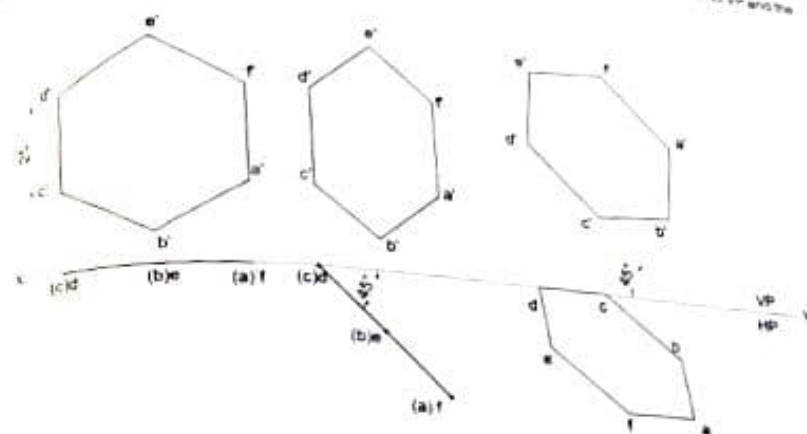
Problem 44 A hexagonal lamina of sides 25mm rests on one of its sides on VP. The side opposite to the side on which it rests is 30mm infront of VP & the side on which it rests makes 45° to HP. Draw its projections. Also determine the inclination of the lamina with the reference plane.
Solution

73

39. A hexagonal pyramid 25 mm sides of base and 50 mm axis length rests on HP on one of its slant edges. Draw the projections of the pyramid when the axis appears to be inclined to VP at 45 deg.
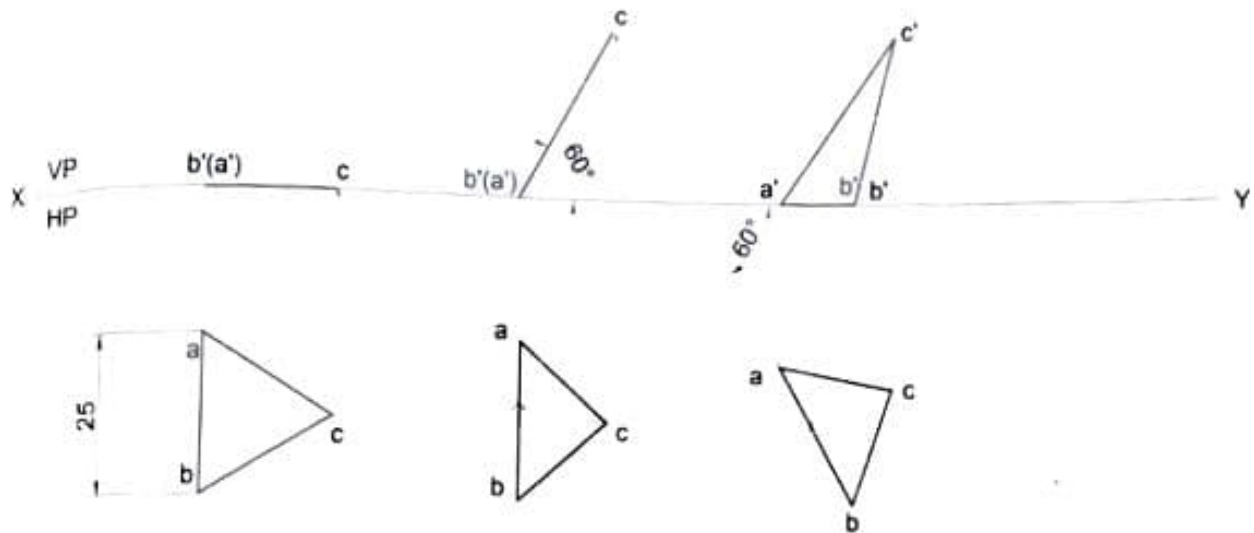
SOLUTION:
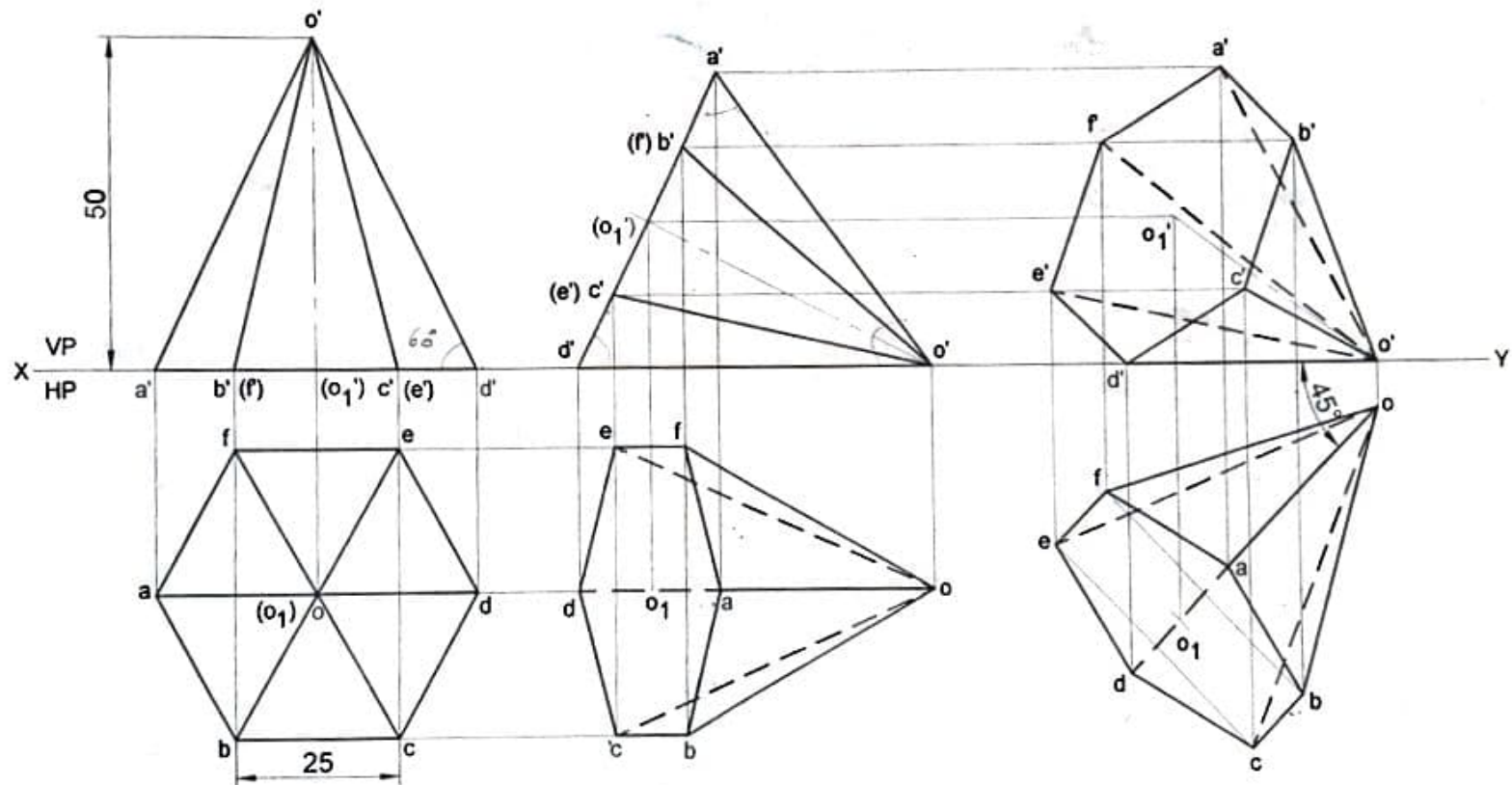
Note: Make the slant edge parallel to VP in the top view.

CHAPTER 3

PROJECTIONS OF PLANE SURFACES

Problem 1 An equilateral triangular lamina of 25mm side lies with one of its edges on HP such that the surface of the lamina is inclined to HP at 60°. The edge on which it rests is inclined to VP at 60°. Draw the projections.

Solution

Problem 2 An equilateral triangular lamia of 25mm side lies on one of its sides on HP. The lamina makes 45° with HP and one of its medians is inclined at 40° to VP. Draw its projections.
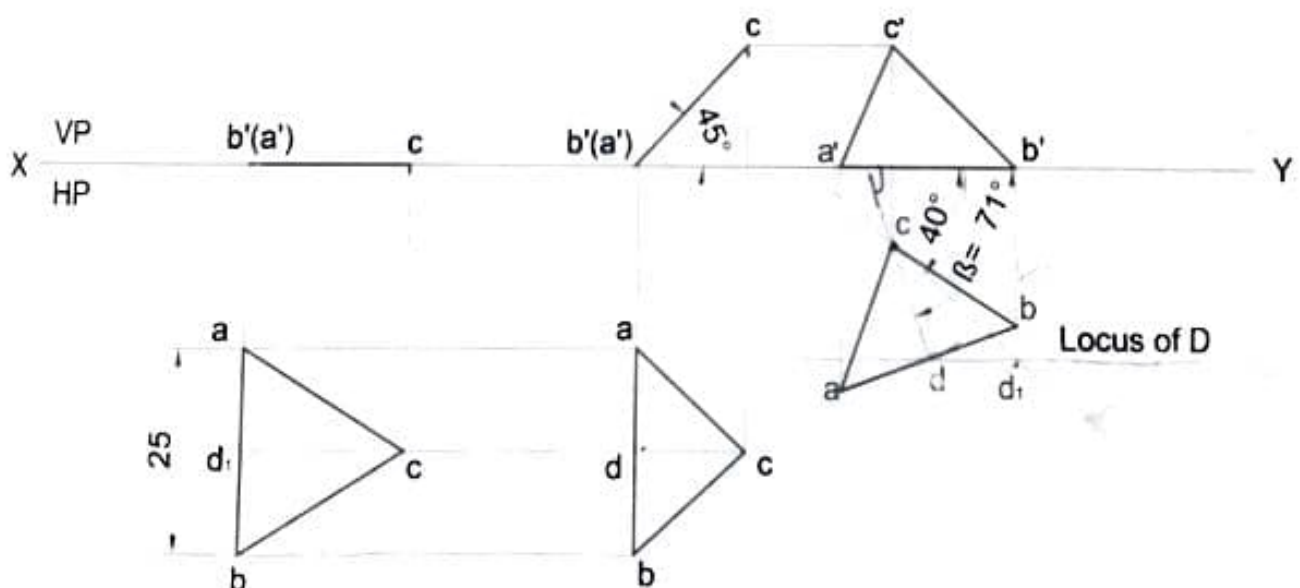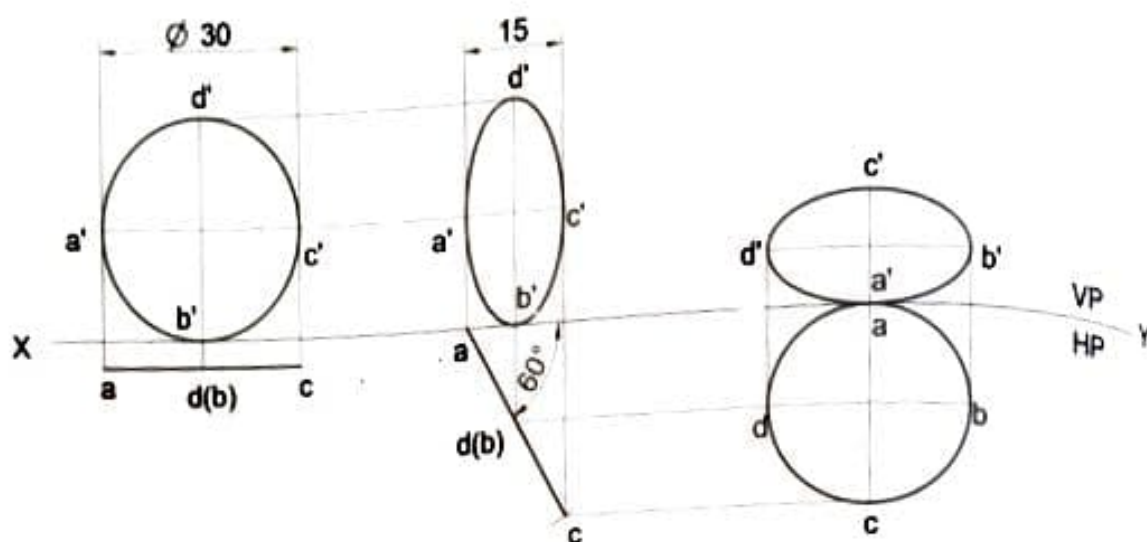
Solution

43. A cube of 40 mm sides rests on HP on an edge which is inclined to VP at 30 deg. Draw the projections when the lateral square face containing the edge on which it rests makes an angle of 50 deg. to HP

SOLUTION:

Projections of Solids
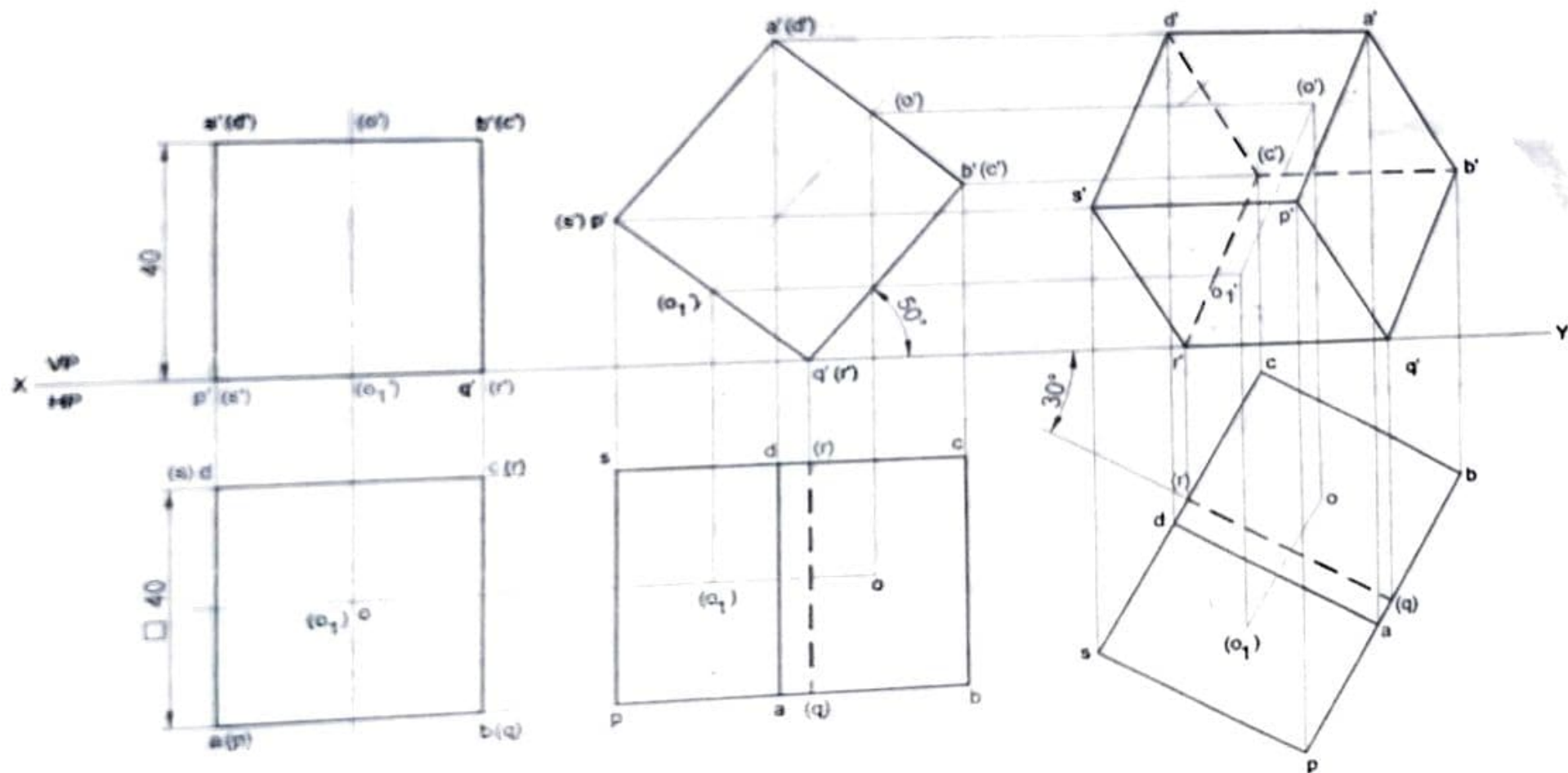
Problem 49 A circular lamina inclined to the VP appears in the front view as an ellipse of major axis 30mm and minor axis 15mm. The major axis is parallel to both HP and VP. One end of the minor axis is in both the HP and VP. Draw the projections of the lamina and determine the inclination of the lamina with the VP.

Solution

Problem 50 A circular lamina of 30mm diameter rests on VP such that one of its diameters is inclined at 30° to VP and 45° to HP. Draw its top and front views in this position.

Solution
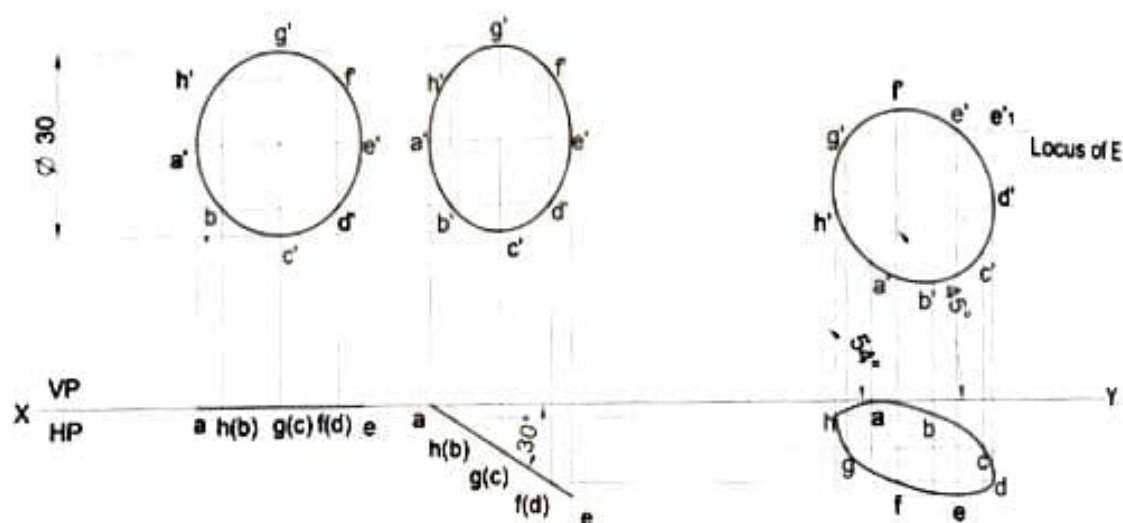
50 A cone of base diamter 40 mm and axis length 50 mm is resting on HP on a point on the circumference of its base such that its apex is at 40 mm above the HP and its top view of the axis is inclined at 60 deg. to VP. Draw the top and front views of the solid. Also, determine the inclinations of the axis when the base is nearer to the observer.

SOLUTION

θ = 26.03 deg