

## **Module I - Plane Curves**

1. Draw the locus of a point P moving so that the ratio of the distance from a fixed point F to its distance from a fixed straight line DD' is  $\frac{3}{4}$ . Point F is at a distance of 50 mm from DD'. Also, draw a tangent and normal to the curve
2. Construct a parabola when the distance between the focus and directrix is 40 mm. Draw the tangent and normal at any point on the curve.
3. Draw an ellipse when the distance between the focus and directrix is 30 mm and the eccentricity is  $\frac{3}{4}$ . Draw the tangent and normal at any point on the curve
4. Draw an ellipse when the distance between the focus and directrix is 30 mm and the eccentricity is  $\frac{2}{3}$ . Draw the tangent and normal at any point on the curve
5. Construct a curve traced by the point when the distance of focus from the directrix is 50 mm and the eccentricity is  $\frac{3}{2}$ . Draw the tangent and normal at any point on the curve.
6. Construct an ellipse given the distance of the focus from the directrix as 50 mm and eccentricity as  $\frac{2}{3}$ . Draw the tangent and normal at any point on the curve.
7. Construct a parabola given the distance of the focus from the directrix as 50 mm. Also draw tangent and normal to the curve from any point on it.
8. Construct a hyperbola when the distance between the focus and the directrix is 35 mm and the eccentricity is  $\frac{4}{3}$ . Draw a tangent and normal at any point on the hyperbola.
9. Construct a parabola when the distance between the focus and the directrix is 60 mm using eccentricity method. Draw tangent and normal at any point on the resultant curve.
10. Construct a hyperbola when the distance between the focus and the directrix is 60 mm and the eccentricity is  $\frac{3}{2}$ . Draw a tangent and normal at any point on the hyperbola.
11. A coin of 40 mm diameter rolls over a horizontal table without slipping. A point on the circumference of the coin is in contact with the table surface in the beginning and after one complete revolution. Draw the path traced by the point. Draw a tangent and normal at any point on the curve.
12. A circle of 40 mm diameter rolls along a straight line without slipping. Draw the curve traced by a point P on the circumference for one complete revolution. Draw the tangent and normal at any point on the curve.
13. A circle of 50 mm diameter rolls on a straight line without slipping. Trace the locus of a point 'P' on the circumference of the circle rolling for one revolution. Name the curve. Draw normal and tangent to the curve at any point on the curve.
14. A coin of 50 mm diameter rolls over a horizontal table without slipping. A point on the circumference of the coin is in contact with the table surface in the beginning and after one complete revolution. Draw the path traced by the point. Draw a tangent and normal at any point on the curve.

## **Module II – Projection of Points, Lines and Planes**

1. A line CD measuring 80 mm is inclined at an angle of  $30^\circ$  to HP and  $45^\circ$  to VP. The point C is 20 mm above HP and 30 mm in front of VP. Draw its projections.
2. A line AB is 75 mm long. A is 50 mm in front of VP and 15 mm above HP. B is 15 mm in front of VP and is above HP. Top view of AB is 50 mm long. Find the front view length and the true inclinations
3. The mid-point M of a straight line AB is 60 mm above HP and 50 mm in front of VP. The line measures 80 mm long and inclined at an angle of  $30^\circ$  to HP and  $45^\circ$  to VP. Draw its projections.
4. A line AB has its end A 10 mm above HP and 15 mm in front of VP. The other end B is 50 mm above HP and 40 mm in front of VP. The distance between the end projectors of two points A and B is 70 mm. Draw its projections. Also, find the true length and true inclinations of the line with HP and VP
5. A line LM 70 mm long, has its end L 10 mm above HP and 15 mm in front of VP. Its top and front views measure 60 mm and 40 mm respectively. Draw the projections of the line. Find its inclinations with HP and VP.
6. A line AB 80 mm long has its end A 20 mm above HP and 25 mm in front of VP. The line is inclined at  $45^\circ$  to HP and  $35^\circ$  to VP. Draw its projections
7. A line AB 70 mm long, has its end A 35 mm above HP and 30 mm in front of VP. The top view and front view has a length of 45 mm and 60 mm respectively. Draw its projections.
8. A line AB 75 mm long has its end A in both HP and VP. The line is kept inclined at  $45^\circ$  to HP and  $30^\circ$  to VP. Draw its Projections.
9. One end A of a line AB, 75 mm long is 20 mm above HP and 15 mm in front of VP. The line is inclined at  $30^\circ$  to HP and the top view makes  $45^\circ$  with VP. Draw the projections of the line and find the true inclinations with the vertical plane.
10. A line AB has its end A 20 mm above HP and 25 mm in front of VP. The other end B is 45 mm above HP and 55 mm in front of VP. The distance between the end projectors is 60 mm. Draw its projections. Also find the true length and true inclinations of the line with HP and VP.
11. The mid-point M of a straight line AB 90 mm long is 60 mm above HP and 50 mm in front of VP. It is inclined at  $30^\circ$  to HP and  $45^\circ$  to VP. Draw its projections.
12. The top view of a line is 65 mm long and is inclined at  $30^\circ$  to the reference line. One end is 20 mm above HP and 10 mm in front of VP. The other end is 60 mm above HP and is in front of VP. Draw the projections and find the true length of the line and its true inclinations to HP and VP.

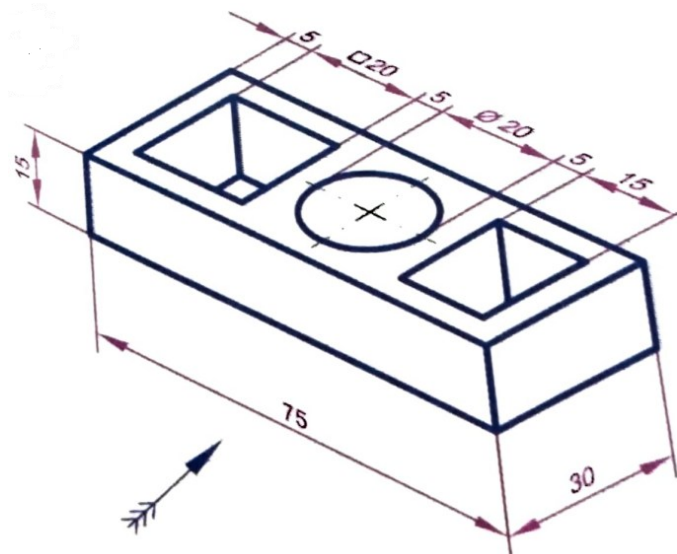
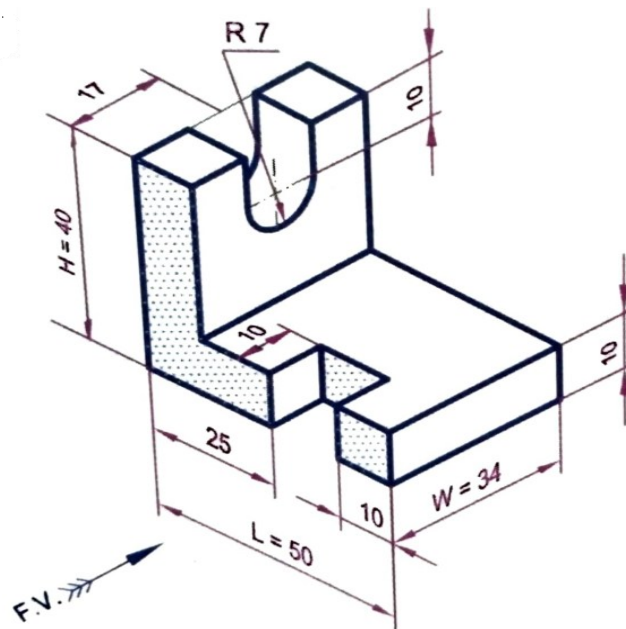
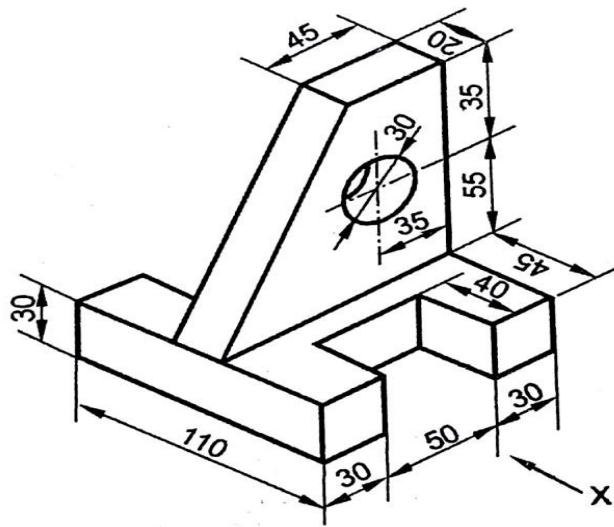
1. A pentagonal plate of side 30 mm is placed with one side on HP and the surface is inclined at  $50^\circ$  to HP and perpendicular to VP. Draw its projections.
2. A pentagonal plate of side 40 mm is placed with one of the corners on HP and the surface is inclined at  $45^\circ$  to HP and perpendicular to VP. Draw its projections.
3. A hexagonal plane of side 30 mm is placed with one side on HP. The surface is inclined at  $50^\circ$  to HP and perpendicular to VP. Draw its projections.
4. A hexagonal plane of side 40 mm is placed with one of the corners on HP. The surface is inclined at  $45^\circ$  to HP and perpendicular to VP. Draw its projections.
5. A thin rectangular plate of sides 50 mm x 25 mm has its shorter side in the HP. The surface is inclined at an angle of  $45^\circ$  to HP and perpendicular to VP. Draw its projections.
6. A thin square plate of sides 50 mm has its one of the side in the HP. The surface is inclined at an angle of  $45^\circ$  to HP and perpendicular to VP. Draw its projections.
7. A circular lamina of 60 mm diameter rests on HP on a point 1 on the circumference. The lamina is inclined at an angle of  $45^\circ$  to HP and perpendicular to VP. Draw its projections.
8. A pentagonal plate of side 30 mm is placed with one side on VP and the surface is inclined at  $50^\circ$  to VP and perpendicular to HP. Draw its projections.
9. A pentagonal plate of side 40 mm is placed with one of the corners on VP and the surface is inclined at  $45^\circ$  to VP and perpendicular to HP. Draw its projections.
10. A hexagonal plane of side 30 mm is placed with one side on VP. The surface is inclined at  $50^\circ$  to VP and perpendicular to HP. Draw its projections.
11. A hexagonal plane of side 40 mm is placed with one of the corners on VP. The surface is inclined at  $45^\circ$  to VP and perpendicular to HP. Draw its projections.
12. A thin rectangular plate of sides 50 mm x 25 mm has its shorter side in the VP. The surface is inclined at an angle of  $45^\circ$  to VP and perpendicular to HP. Draw its projections.
13. A thin square plate of sides 50 mm has one of the sides in the VP. The surface is inclined at an angle of  $45^\circ$  to VP and perpendicular to HP. Draw its projections.
14. A circular lamina of 60 mm diameter rests on VP on a point 1 on the circumference. The lamina is inclined at an angle of  $45^\circ$  to VP and perpendicular to HP. Draw its projections.

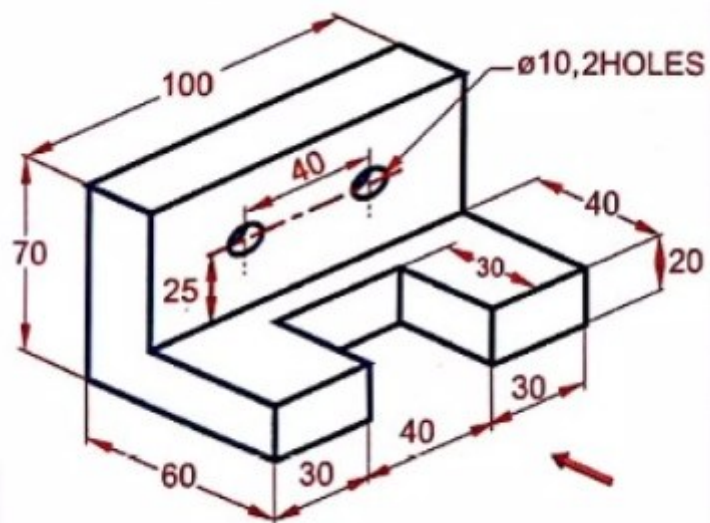
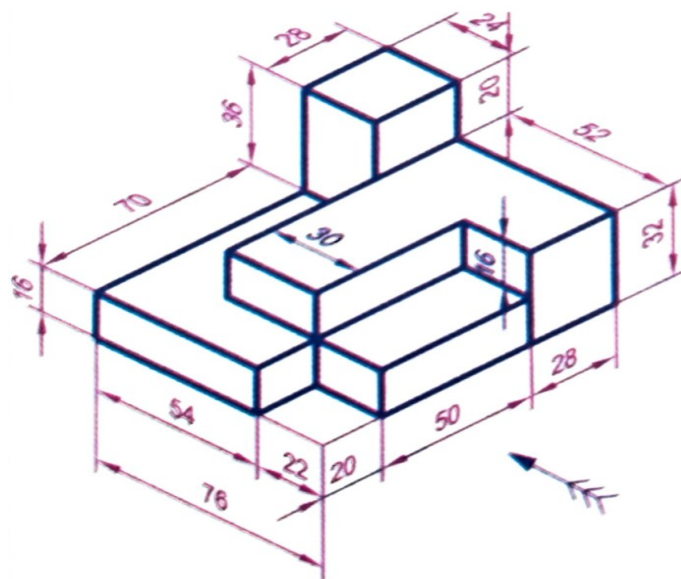
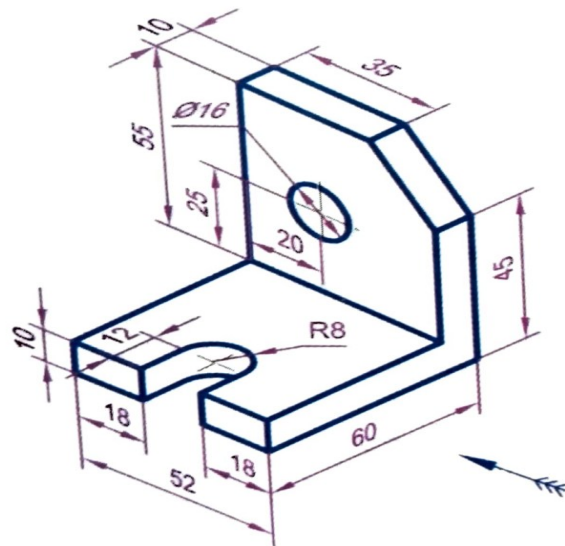
### **Module III – Projection of Solids**

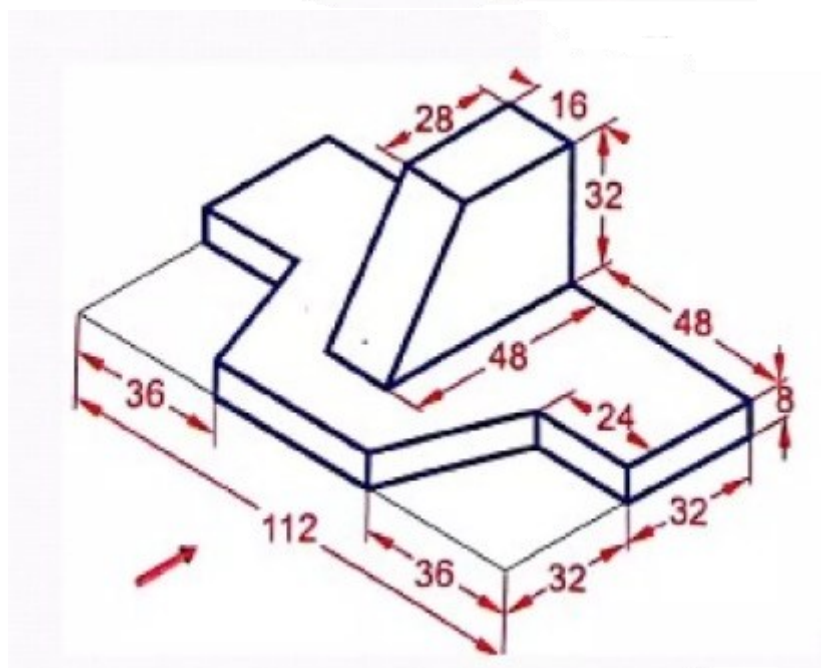
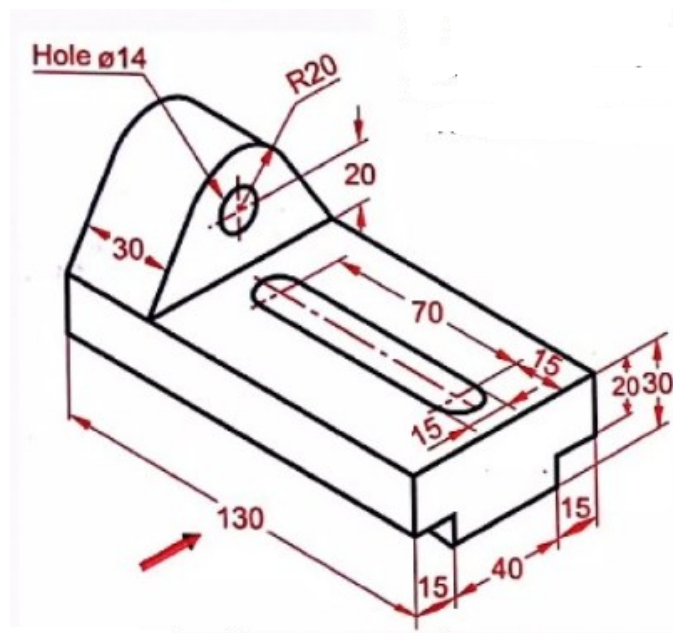
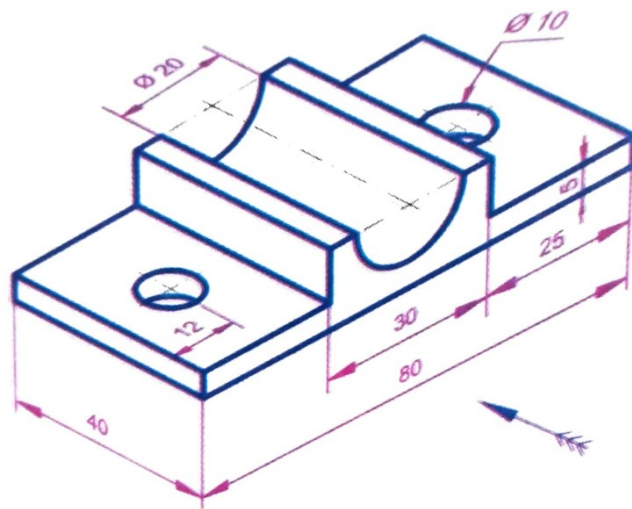
1. A pentagonal prism, side of base 25 mm and axis 50 mm long, rests with one of its edges on HP such that the base containing that edge makes an angle of  $30^\circ$  to HP and its axis is parallel to VP. Draw the (i) simple position of solid (ii) final projections of solid
2. A hexagonal pyramid, side of base 25 mm and axis 50 mm long, rests with one of the edges of its base on HP and its axis is inclined at  $30^\circ$  to HP and parallel to VP. Draw the (i) simple position of solid (ii) final projections of solid
3. A pentagonal pyramid, side of base 30 mm and axis 60 mm long is lying with one of its triangular faces on the HP and axis parallel to the VP. Draw the (i) simple position of solid (ii) final projections of solid
4. A hexagonal prism, side of base 25 mm and axis 50 mm long rests with one of its base corners on HP such that its base makes an angle of  $60^\circ$  to HP and its axis is parallel to VP. Draw the (i) simple position of solid (ii) final projections of solid.
5. A pentagonal prism of base side 30 mm and axis length 60 mm rests on HP on one of the base corners with the base edges containing it being equally inclined to HP. The axis is inclined at  $45^\circ$  to HP and parallel to VP. Draw the (i) simple position of solid (ii) final projections of solid.
6. A cylinder, base 30 mm diameter and axis 40 mm long, resting with a point of its base circle on HP such that the axis is making an angle of  $30^\circ$  with HP and parallel to VP. Draw the (i) simple position of solid (ii) final projections of solid
7. A cone of base diameter 50 mm and axis length 60 mm is resting on HP on a point on the circumference of the base. Its base is inclined at  $50^\circ$  to HP and perpendicular to VP. Draw the (i) simple position of solid (ii) final projections of solid.
8. A cone of base diameter 46 mm and height 65 mm lying with one of its generators on HP. The axis is parallel to VP. Draw the (i) simple position of solid (ii) final projections of solid
9. A hexagonal prism, side of base 25 mm and axis 60 mm long, lies with one of its rectangular faces on HP, such that the axis is inclined at  $45^\circ$  to VP. Draw the (i) simple position of solid (ii) final projections of solid.
10. A cylinder 75 mm diameter and 100 mm long, lying on the ground with its axis inclined at  $30^\circ$  to the vertical plane. Draw the (i) simple position of solid (ii) final projections of solid
11. A cone of base 40 mm diameter and axis 50 mm long touches VP on a point of its base circle. Its axis is inclined at  $30^\circ$  to VP and parallel to HP. Draw its projections.
12. A hexagonal prism of base side 30 mm axis length 60 mm is resting on HP on one of its base sides with its axis inclined at  $40^\circ$  to HP and parallel to VP. Draw the (i) simple position of solid (ii) final projections of solid

13. A hexagonal pyramid of base side 30 mm and axis length 60 mm is resting on HP on one of its base corners with its axis inclined at  $35^\circ$  to HP. The base sides containing the resting corner are equally inclined to HP. Draw the (i) simple position of solid (ii) final projections of solid
14. A hexagonal pyramid of base side 30 mm and axis length 60 mm is resting on HP on one of its base corners with its axis inclined at  $35^\circ$  to VP and parallel to HP. The base sides containing the resting corner are equally inclined to HP. Draw the (i) simple position of solid (ii) final projections of solid
15. A pentagonal prism of base side 30 mm and axis length 60 mm is resting on HP on one of its rectangular faces with its axis inclined at  $40^\circ$  to VP. Draw the (i) simple position of solid (ii) final projections of solid

## Module IV – Orthographic Projection

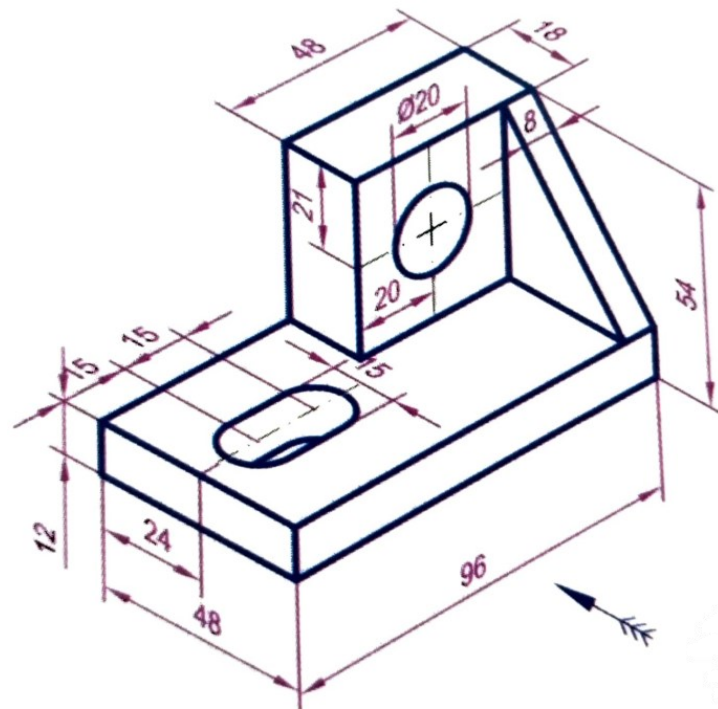
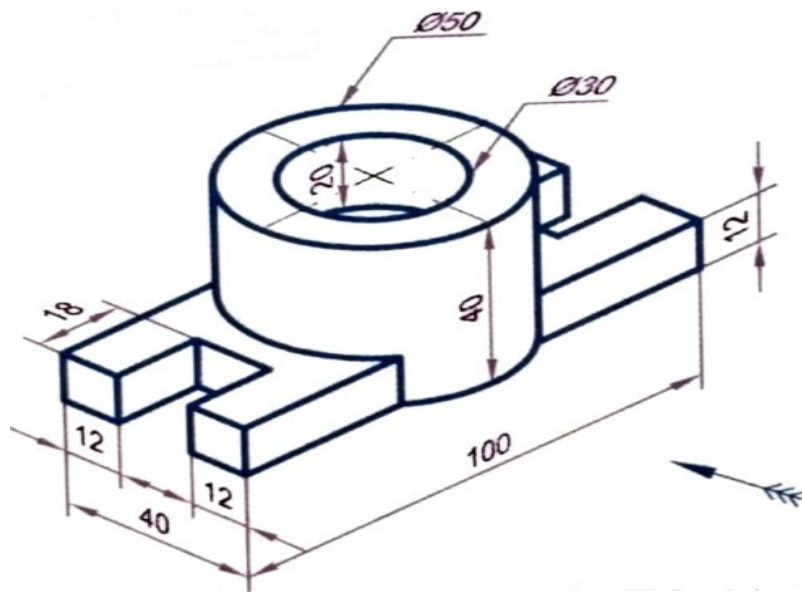
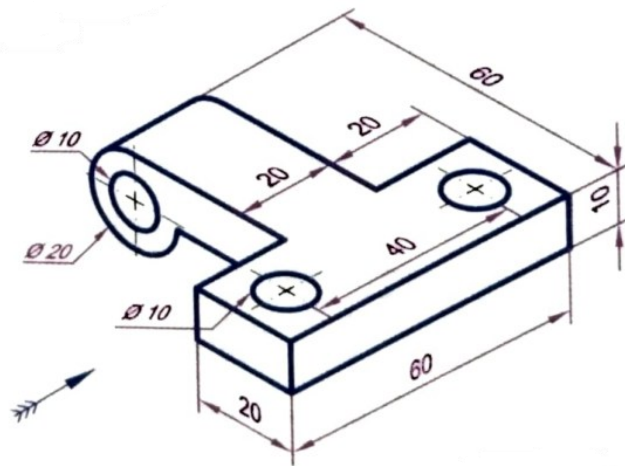












## **Module V – Section and Development of Lateral Surface**

1. A square prism, side of base 30 mm and axis 60 mm long, rests with its base on HP and one of its rectangular faces is inclined at  $30^\circ$  to VP. A section plane perpendicular to VP and inclined at  $60^\circ$  to HP cuts the axis of the prism at a point 20 mm from its top end. Draw (i) sectional top view and (ii) true shape of section.
2. A hexagonal prism of base side 30 mm and axis length 60 mm is resting on HP on one of its bases with two of the vertical faces perpendicular to VP. It is cut by a plane inclined at  $50^\circ$  to HP and perpendicular to VP and passing through a point at a distance 12 mm to the top base. Draw (i) sectional top view and (ii) true shape of section.
3. A pentagonal pyramid, side of base 30 mm and axis 60 mm long, rests with its base on HP and an edge of its base is parallel to VP. A section plane perpendicular to VP and inclined at  $45^\circ$  to HP passes through the axis at a point 35 mm above the base. Draw (i) sectional top view and (ii) true shape of section.
4. A square pyramid of base 30 mm and axis 60 mm long is standing on HP with its base edges equally inclined to VP. It is cut by a section plane perpendicular to VP and inclined at  $30^\circ$  to HP, bisecting the axis. Draw (i) sectional top view and (ii) true shape of section.
5. A hexagonal pyramid, side of base 25 mm and altitude 70 mm long, rests with its base on HP with two of its base sides parallel to VP. It is cut by a section plane perpendicular to VP and inclined at  $45^\circ$  to HP and passing through a point 15 mm above the base and located on the axis. Draw (i) sectional top view and (ii) true shape of section.
6. A cylinder of diameter 40 mm and height 60 mm is having its axis vertical. It is cut by a plane perpendicular to VP and inclined at  $30^\circ$  to HP. The plane bisects the axis of the cylinder. Draw (i) sectional top view and (ii) true shape of section.
7. A cone, base 50 mm diameter and axis 65 mm long, rests with its base on HP. It is cut by a section plane perpendicular to VP, inclined at  $45^\circ$  to HP and passing through a point on the axis 35 mm above the base. Draw (i) sectional top view and (ii) true shape of section.
8. A cone, base 40 mm diameter and axis 60 mm long, rests with its base on HP. It is cut by a section plane perpendicular to VP, parallel to one of the end generators and passing through a point on the axis 25 mm from the apex. Draw (i) sectional top view and (ii) true shape of section.
9. A hexagonal pyramid side of base 30 mm and altitude 70 mm rests with its base on HP and with a side of base parallel to VP. It is cut by a cutting plane inclined at  $35^\circ$  to HP and perpendicular to VP and is bisecting the axis. Draw (i) sectional top view and (ii) true shape of section.
10. A cylinder of base diameter 45 mm and height 65 mm rests on its base on HP. It is cut by a plane perpendicular to VP and inclined at  $30^\circ$  to HP and meets the axis at a distance 30 mm from base. Draw (i) sectional top view and (ii) true shape of section.

11. A hexagonal prism, edge of base 20 mm and axis 50 mm long, rests with its base on HP such that one of its rectangular faces is parallel to VP. It is cut by a plane perpendicular to VP, inclined at  $45^\circ$  to HP and passing through the right corner of the top face of the prism. Draw (i) simple position of solid and (ii) development of its lateral surface.
12. A pentagonal prism, side of base 25 mm and altitude 50 mm, rests on its base on the HP such that an edge of the base is parallel to VP and nearer to the observer. It is cut by a plane inclined at  $45^\circ$  to HP, perpendicular to VP and passing through the center of the axis. Draw (i) simple position of solid and (ii) development of its lateral surface.
13. A cylinder of base diameter 50 mm and axis length 60 mm is resting on HP on its base, cut by a plane inclined at  $55^\circ$  to HP and perpendicular to VP. The cutting plane is passing through a point on the axis at a distance 30 mm from the top end. Draw (i) simple position of solid and (ii) development of its lateral surface.
14. The cylinder of diameter 50 mm and axis 70 mm when sectioned by a plane inclined at  $40^\circ$  to HP and perpendicular to VP and bisecting the axis. Draw (i) simple position of solid and (ii) development of its lateral surface.
15. A regular hexagonal pyramid of side of base 30 mm and height 60 mm is resting vertically on its base on HP such that two of the sides of the base are perpendicular to VP. It is cut by a plane inclined at  $40^\circ$  to HP and perpendicular to VP. The cutting plane bisects the axis of the pyramid. Draw (i) simple position of solid and (ii) development of its lateral surface.
16. A pentagonal pyramid, side of base 30 mm and height 52 mm, stands with its base on HP and an edge of the base is parallel to VP and nearer to it. It is cut by a plane perpendicular to VP, inclined at  $40^\circ$  to HP and passing through a point on the axis, 32 mm above the base. Draw the sectional top view. Draw (i) simple position of solid and (ii) development of its lateral surface.
17. A square pyramid, base 35 mm side, axis 70 mm long, rests on its base on HP such that two adjacent sides of the base are equally inclined to VP. It is sectioned by a plane perpendicular to VP, inclined at  $30^\circ$  to HP and passing through the mid-point of the axis. Draw (i) simple position of solid and (ii) development of its lateral surface.
18. A cone of base diameter 60 mm and height 70 mm is resting on its base on HP. It is cut by a plane perpendicular to VP and inclined at  $30^\circ$  to HP. The plane bisects the axis of the cone. Draw (i) simple position of solid and (ii) development of its lateral surface.
19. A cone of base 50 mm diameter and 60 mm height, rests with its base on HP. It is cut by a section plane perpendicular to VP, parallel to one of the generators and passing through a point on the axis at a distance of 22 mm from the apex. Draw (i) simple position of solid and (ii) development of its lateral surface.

## **Module VI – Isometric Projections**

1. A hexagonal prism, side of base 25 mm and height 50 mm rests on HP and one of the edges of its base is parallel to VP. A section plane perpendicular to VP and inclined at  $50^\circ$  to HP bisects the axis of the prism. Draw (i) simple position of solid and (ii) isometric projection of the truncated prism, showing the cut surface.
2. A cylinder 50 mm diameter and 60 mm height stands on HP. A section plane perpendicular to VP, inclined at  $55^\circ$  to HP cuts the cylinder and passes through a point on the axis at a height of 45 mm above the base. Draw (i) simple position of solid and (ii) isometric projection of the truncated portion of the cylinder, when the cut surface is clearly visible to the observer.
3. A pentagonal pyramid, 30 mm edge of base and 65 mm height, stands on HP such that an edge of the base is parallel to VP and nearer to it. A section plane perpendicular to VP and inclined at  $30^\circ$  to HP cuts the pyramid passing through a point on the axis at a height of 35 mm from the base. Draw (i) simple position of solid and (ii) isometric projection of the truncated portion of the solid.
4. A hexagonal prism, side of base 25 mm and height 50 mm rests on HP and one of the edges of its base is parallel to VP. A section plane perpendicular to VP and inclined at  $50^\circ$  to HP bisects the axis of the prism. Draw (i) simple position of solid and (ii) isometric view of the truncated portion of the solid.
5. A pentagonal pyramid of base side 30 mm and axis length 65 mm is resting on HP on its base with a side of base perpendicular to VP. It is cut by a plane inclined at  $30^\circ$  to HP and perpendicular to VP and passes through a point at a distance 30 mm from the apex. Draw (i) simple position of solid and (ii) isometric view of the truncated portion of the solid.
6. A cone of base diameter 50 mm and height 70 mm stands on HP with its base. It is cut by a cutting plane inclined at  $30^\circ$  to HP cutting the axis of the cone at a height of 40 mm from its base. Draw (i) simple position of solid and (ii) isometric view of the truncated portion of the solid.
7. A hexagonal prism, side of base 20 mm and height 60 mm rests on HP on its base with two of the rectangular faces parallel to VP. It is cut by a plane inclined at  $30^\circ$  to HP cutting the axis of the prism at a height of 45 mm from its base. Draw (i) simple position of solid and (ii) isometric view of the truncated portion of the solid.
8. A cylinder 50 mm diameter and 60 mm axis length rests on HP on one of its bases, a section plane perpendicular to VP inclined at  $45^\circ$  to HP cuts the cylinder and passes through a point on the top base circle of the cylinder. Draw (i) simple position of solid and (ii) isometric view of the truncated portion of the solid.
9. A cone of base diameter 50 mm and height 70 mm stands on HP with its base. It is cut by a cutting plane inclined at  $30^\circ$  to HP cutting the axis of the cone at a height of 45 mm from its base. Draw (i) simple position of solid and (ii) isometric projection of the truncated portion of the solid.