

ENGINEERING GRAPHICS

UNIT IV

SECTION OF SOLIDS

SECTION:-

The surface produced when a section plane cuts a solid is termed a section.

SECTION PLANE(S.P) OR CUTTING PLANE:-

The imaginary plane which is assumed to cut the object as required is called a cutting plane (or) section plane.

SECTIONAL VIEW:-

The drawing showing that part of the object which is between the plane of projection and the section plane is called a sectional view.

Types of Section Planes

1. Section Planes Perpendicular to the HP and Parallel to VP.
2. Section Planes Perpendicular to the VP and Parallel to HP.
3. Section Planes Perpendicular to the VP and Inclined to the HP.
4. Section Planes Perpendicular to the HP and Inclined to the VP.
5. True shape given problem.

UNIT IV - Section of Solids

Type	Condition of cutting plane	Cutting Line	Cutting Plane
1	Cutting plane parallel to VP and Perpendicular to HP	TV	FV
2	Cutting plane parallel to HP and Perpendicular to VP	FV	TV
3	Cutting plane inclined to HP and perpendicular to VP	FV	TV
4	Cutting plane inclined to VP and perpendicular to HP	TV	FV

Section of solids – Type 1

1. A hexagonal prism, side of base 30mm and axis 60mm long, rests with its base on HP such that one of its rectangular faces is parallel to VP. A section plane perpendicular to HP and parallel to VP cuts the prism at a distance of 10mm from its axis. Draw its top and sectional front views.
2. A pentagonal pyramid, side of base 30 mm and axis 60 mm long rests with its base on HP such that one of the edges of the base is perpendicular to VP. **A section plane perpendicular to HP and parallel to VP cuts the pyramid at a distance of 20 mm from the corner of the base nearer to the observer.** Draw its top view and sectional front view. (UQ)

Section of solids – Type 2

1. A pentagonal pyramid, side of base 30mm and axis 60mm long, rests with its base on HP and one of the edges of its base is perpendicular to VP. It is cut by a section plane perpendicular to VP, parallel to HP and passing through the axis at a point 35mm above the base.
2. A cube of 50mm side rests with one of its edges on HP such that the square faces containing that edge are making equal inclinations with HP. 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.

Section of solids – Type 3

1. A pentagonal pyramid, side of base 26mm and 52mm height rests with its base on HP. One of the edges of its base is perpendicular to VP. A section plane perpendicular to VP and inclined at 45° to HP bisects the axis at distance of 26mm from apex. Draw the sectional top view and true shape of section. (UQ)
2. A pentagonal pyramid, side of base 30mm and axis 60mm 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° to HP passes through the axis at a point 35mm above the base. Draw the sectional top view and true shape of section.
3. A square prism, side of base 30mm and axis 60mm long, rests with its base on HP and one of its rectangular faces is inclined at 30° to VP. A section plane perpendicular to VP and inclined at 60° to HP cuts the axis of the prism at a point 20mm from its top end. Draw the sectional top view and true shape of section. (UQ)
4. A cone of base diameter 40 mm and axis length 60 mm is resting on HP on its base. **It is cut by a plane perpendicular to VP and parallel to a contour generator and is 10 mm away from it.** Draw the front view, sectional top view and true shape of section. (UQ)

Section of solids – Type 3

5. A cone of base diameter 50mm and axis length 60mm stands with its base on HP. Draw the true shape of section made by a plane perpendicular to VP and inclined to the HP at 50° and passing through a point on the base circle of the cone.
6. A cone of base diameter 50 mm and axis length 60 mm is resting on HP on its base. **Its cut by a plane perpendicular to VP and inclined at 75° to HP and is passing through the apex of the cone.** Draw its front view, sectional top view and true shape of section. (UQ)
7. A cone, base 40mm diameter and axis 60mm long, 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 25mm from the apex. Draw the sectional top view and true shape of the section. (UQ)
8. A cylinder of base diameter 40mm and height 60mm, rests on its base on HP. It is cut by a plane perpendicular to VP and inclined at 35° to HP and meet the axis at a distance 25mm from base. Draw front view sectional top view and true shape of section.

Section of solids – Type 3

9. A cylinder of 40 mm diameter and height 65 mm rest on its base on HP. **It is cut by a section plane inclined at 45° to HP and perpendicular to VP.** The section plane passes through a point on the axis at a height of 55 mm from the base. **Draw the front view, sectional plan** and true shape of section.
10. A square prism of base side 25 mm and axis length 60 mm is lying on HP on one of its base side inclined at 25° to VP. **It is cut by a plane inclined at 40° to HP and perpendicular to VP and bisecting the axis of the prism.** **Draw its front view, sectional top view and true shape of section.**
11. A hexagonal prism of base side 25 mm and axis 65 mm rest on its base on HP. **It is cut by a plane inclined at 45° to HP and perpendicular to VP.** The section plane passes through a point on the axis at a height of 50 mm from the base. **Draw the front view, sectional plan** and true shape of section.

Section of Solids – Type 4

1. A hexagonal pyramid, side of base 25mm and axis 55mm long, rests with its base on HP such that one of the edge of its base is perpendicular to VP. It is cut by a section plane perpendicular to HP, inclined at 45° to VP and passing through the pyramid at a distance of 10mm from the axis. Draw the sectional front view and the true shape of section.
2. A square prism, side of base 40mm and axis 60mm long, rests with its base on HP such that one of its rectangular faces is inclined at 30° to VP. A section plane perpendicular to HP and inclined at 60° to VP passes through the prism such that a rectangular face which is making 60° with VP is cut into two halves. Draw the top view, sectional front view and true shape of section.
3. A cone of base diameter 50 mm and axis length 60 mm is resting on HP on its base. **It is cut by a plane inclined at 40° to VP and perpendicular to HP that cuts the cone at a distance of 10 mm from axis and in front of it.** Draw the top view, sectional front view and true shape of section.

Section of Solids – Type 4

4. A hexagonal pyramid of base side 25 mm and axis 70 mm long is resting with two of the sides perpendicular to VP. **It is cut by a section plane perpendicular to horizontal and 10 mm away from the axis.** Draw the top and sectional front view and true shape of section.
5. A pentagonal pyramid of base 30 mm and axis 60 mm is resting on HP on its base with a base side parallel to VP. It is cut by a plane inclined at 45° to VP and perpendicular to HP and is 12 mm away from the axis. Draw the sectional top view and true shape of section.

Section of solids – Type 5 (True shape is given)

1. A cube of 60mm side has its base edges equally inclined to VP. It is cut by a sectional plane perpendicular to VP, so that the true shape of cut section is a regular hexagon. Locate the plane and determine the angle of inclination of the VT with the reference line XY. Draw the sectional top view and true shape of section. (UQ). ($\theta=55^\circ$)
2. A square prism of 32mm side and 100mm height is lying on its base on HP such that the edges of the base are equally inclined to VP. The prism is cut by a section plane passing through the midpoint of the axis such that the true shape of section is a rhombus of diagonals of 102 mm and 42mm. Determine the inclination of the section plane with HP. (UQ)
3. A cone of base 40 mm diameter and axis 70 mm long is resting on its base on HP. **It is cut by a section plane, so that the true shape of section is an ellipse of major axis 50 mm and minor axis 25 mm.** Determine the inclination of section of the section plane with HP and draw the projections of solid.

Section of solids – Type 5 (True shape is given)

4. A square prism of 32.5 mm side and 102mm height is lying on its base on HP such that the edges of the base are equally inclined to VP. **The prism is cut by a section plane passing through the mid point of the axis such that the true shape of section is a rhombus of diagonals of 93 mm and 46 mm.** Determine the inclination of the section plane.
5. A square pyramid of base side 30 mm and axis 50 mm lies on the HP on its base with its base edges equally inclined to VP. **It is cut by a plane perpendicular to VP and inclined to HP cuts the base also, such that the true shape is an isosceles triangle of base side 20 mm and altitude 45 mm.** Draw the projection and find the inclination of the section plane.

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