

**GE 6152 ENGINEERING GRAPHICS**  
**ANNA UNIVERSITY QUESTION BANK**  
**UNIT – I PLANE CURVES & FREEHAND SKETCHING**

1. Draw the locus of a point P moving so that the ratio of its distance from a fixed point F to its distance from a fixed straight line DD' is  $\frac{3}{4}$ . Also draw tangent and normal to the curve from any point on it.
2. Construct an ellipse given the distance of the focus from the directrix as 60 mm and eccentricity as  $\frac{2}{3}$ . Also draw tangent and normal to the curve at a point on it 20 mm above the major axis. (repeated AU question)
3. 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.
4. Draw the locus of a point P moving so that the ratio of its distance from a fixed point F to its distance from a fixed straight line DD' is 1. Also draw tangent and normal to the curve from any point on it.
5. Draw a hyperbola when the distance between the focus and directrix is 40 mm and the eccentricity is  $\frac{4}{3}$ . Draw a tangent and normal at any point on the hyperbola.
6. The head lamp reflector of a motor car has a maximum rim diameter of 130 mm and maximum depth of 100 mm. draw the profile of reflector and name it.
7. A fixed point is 60 mm from a fixed straight line. Draw the locus of point P moving in such a way that its distance from the fixed straight line is i).twice the distance from its fixed point ii). Equal to its distance from fixed point and iii) half of distance from fixed point.
8. Draw the locus of the point P moves in such way that the ratio of its distance from fixed point and fixed line always be  $\frac{2}{3}$ . The distance between fixed point and line is 50 mm. Also draw tangent and normal on a point on locus horizontal distance of 55mm from fixed straight line.
9. The distance of focus from directrix is 60 mm. trace the path of the point which moves in such that the distance from focus is equal to its distance from directrix.
10. The focus of a conic is 50mm from directrix. Draw the locus of P in such a way that its distance from directrix is equal to its distance from focus. Name the curve. Draw a tangent of the curve at 60mm from directrix.
11. Draw the conic curve, if the distance of focus from the directrix is 70 mm and the eccentricity is  $\frac{3}{4}$ . Also draw a tangent and a normal at any point on the curve [Jan'09]
12. Draw the involute of a circle of diameter 40 mm and draw the tangent and the normal to the involute at any point on the curve. [Jan'09]
13. Draw a hyperbola when the distance between its focus and directrix is 50 mm and eccentricity is  $\frac{3}{2}$ . Also draw the tangent and normal at a point 25 mm from the directrix. [Jan'10]
14. A fixed point F is 3.5cm from a fixed straight line. Draw the locus of the point P moving in such a way that its distance from the fixed straight line is equal to its distance from F. Name the curve and draw a normal and tangent at any point on the curve [June'11]
15. Draw the involute of a circle of diameter 50mm when a string is unwound in the clockwise direction. Draw a tangent and normal at a point located on the involute. [Jan'12]

16. An inelastic string of length 150mm is wound around a circle of diameter 40 mm. draw the path traced by the end of the string. Draw also normal and tangent at any point on the curve
17. Construct a hyperbola when the distance between the focus and the directrix is 50mm and the eccentricity is  $\frac{4}{3}$ . Draw a tangent and normal at any point on the hyperbola.
18. Draw the locus of a point P which moves in a plane in such a way that the ratio of its distances from a fixed point F and a fixed straight line AB is always  $\frac{2}{3}$ . The distance between the fixed point F and fixed straight line is 50mm. Also draw a tangent and normal on a point on the locus at a horizontal distance of 55 mm from the fixed straight line [Jan'12]
19. The focus of a conic is 50 mm from the directrix. Draw the locus of a point 'P' moving in such a way that its distance from the directrix is equal to its distance from the focus. Name the curve. Draw a tangent to the curve at a point 60 mm from the directrix. [Jan'10]
20. Draw the locus of a curve traced by a point, when the distance of focus from the directrix is equal to 35mm and eccentricity is  $\frac{4}{3}$ . Also draw the tangent and normal to the curve at any point on the curve.
21. A circle of 50 mm diameter rolls along a line. A point on the circumference of the circle is in contact with the line in the beginning and after one complete revolution. Draw the cycloidal path of the point. Draw a tangent and normal at any point on the curve. [Jan'09]
22. Draw the involute of a square of side 30 mm. Also draw tangent and normal to the curve from any point on it.
23. A coil is unwound from a drum of 30mm diameter. Draw the locus of the free end of the coil for unwinding through an angle of  $360^\circ$ . Draw also a tangent and normal at any point on the curve. (repeated AU question)
24. Draw the involute of a circle of diameter 40 mm.
25. Draw the involute of a square of side 40 mm. Also draw tangent and normal to the curve at a point on 95 mm from centre of circle.
26. A circular wheel of 50 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 a tangent and normal at any point on the curve.
27. A thread of length 165 mm wound on a circle of 40 mm diameter. trace the path of end point of the thread when being unwound.
28. A circle of 50 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 a tangent and normal on it 40 mm from the base line.
29. Draw an epicycloid generated by a rolling circle of diameter 40 mm and the diameter of the directing circle is 140 mm. Also draw tangent and normal to the curve from any point on it.
30. Draw a hypocycloid generated by a rolling circle of diameter 50 mm and the diameter of the directing circle is 240 mm. Also draw tangent and normal to the curve from any point on it.

## UNIT – II PROJECTION OF POINTS, LINES & PLANE SURFACES

1. Mark the projections of the following points on a common reference line: P, 35 mm behind the VP and 20 mm below the HP.  
  
Q, 40 mm in front of VP and 30 mm above the HP.  
  
R, 50 mm behind the VP and 15 mm above the HP.  
  
S, 40 mm below the HP and in the VP.
2. A point C is on HP and 15 mm behind VP. Another point D is also on HP and 40 mm in front of VP. The distance between their projectors is 45 mm. Join their front views and determine inclination of this line with XY line.
3. Draw the projections of the following points on a common reference line. A) P 35mm behind the VP and 20mm below the HP, B) Q 40mm in front the VP and 30mm above the HP. C) R 50mm behind the VP and 15mm above the HP. D) S 40mm below the HP and in the VP. E) T 30 mm in front of the VP and 50mm below the HP.(Jan 2013)
4. A point P is on HP and 20 mm in front of VP. Another point Q is also on HP and behind VP. The distance between their end projectors is 60 mm. Draw its projections if the line joining P & Q makes an angle of  $60^\circ$  with the reference line. Also find the positions of point P and Q.
5. The end P of a line PQ, 70mm long is 15mm above HP and 20mm in front of the VP. Its plan is inclined at  $45^\circ$  to the VP. Draw the projections. [Jan'13]
6. A line CD, inclined at  $25^\circ$  to the HP, measures 80 mm in top view. The end C is in the first quadrant and 25 mm and 15 mm from the HP and the VP respectively. The end D is at equal distances from both the reference planes. Draw the projections, find true length and true inclinations with the VP .[Jan'09]
7. The projection of a line measures 80 mm in the top view and 70 mm in the front view. The midpoint of the line is 45 mm in front of VP and 35 mm above HP. One end is 10mm in front of VP and nearer to it. The other end is nearer to HP. Draw the projections of the line. Find the true length and true inclinations.[Jan'10]
8. A line AB 60mm long has its end B, 20mm above HP and 25mm in front of VP. The end A is 50mm away from the both reference planes. Draw its projections and find its inclinations with HP and VP. [Jan'11]
9. The front view of a line AB 90mm long is inclined at  $45^\circ$  to XY line. The front view measures 65mm long. Point A is located 15 mm above HP and is in VP. Draw the projections. [Jan'12]
10. The top view of a 75mm long line AB measures 65mm while the length of its front view is 50mm. its one end A is in HP and 12mm in front of the VP. Draw the projections. [Jan'13]
11. The plan of a line AB is 80mm long and makes  $35^\circ$  with XY. Its elevation makes  $45^\circ$  with XY and line intersects XY at A. find its true length and inclinations to HP and VP. . [Jan'10]
12. A line PF, 65 mm has its end P, 15 mm above the HP and 15 mm in front of the VP. It is inclined at  $55^\circ$  to the HP and  $35^\circ$  to the VP. Draw its projections.[June'09]
13. The end A of a line AB is 35mm above HP and 30mm in front of VP. The line is inclined at  $35^\circ$  to HP. It's top view is 75mm long inclined at  $40^\circ$  to XY. Draw the projections of straight line. [Jan'11]

14. The end P of a line PQ is 30 mm above HP and 35 mm in front of VP. The line is inclined at  $35^\circ$  to the HP. Its top view is 70 mm long and inclined at  $40^\circ$  to the XY. Draw the projections of the straight line. Locate the traces. Find the true length and inclination of the line with VP. [June'11]
15. A straight line AB has its end A, 20mm above HP and 25mm in front of VP. The other end B is 60mm above HP and 65mm in front of VP. The distance between ends of the projectors is 60mm. Find the true length and true inclinations of the line with HP and VP. Also mark traces.[Jan'09]
16. A line AB 90 mm long is inclined at  $45^\circ$  to the HP and its top view makes an angle of  $60^\circ$  with the VP. The end A is in the HP and 12 mm in front of the VP. Draw its front view and find its true inclination with the VP.[Nov'10]
17. A line PQ has its end P, 10 mm above the HP and 20 mm in front of the VP, the end Q is 35 mm in front of the VP. The front view of the line measures 75 mm. The distance between the end projectors is 50 mm. Draw the projections of the line and find its true length and its true inclinations. with the VP and HP.[Jan'10]
18. A line PQ, 50 mm long is perpendicular to HP and 15 mm in front of VP. The end P nearer to HP 20 mm above it. Draw the projections of the line.
19. A line PQ, 60 mm long has one end P, 20 mm above the HP and 35 mm in front of VP. The line is parallel to HP. The front view has a length of 50 mm. Find its true inclinations with VP.
20. A line NS, 80 mm long has its end N, 10 mm above the HP and 15 mm in front of VP. The other end S is 65 mm above the HP and 50 mm in front of VP. Draw the projections of the line and find its true inclination with HP and VP.
21. The end P of a line PQ is 30 mm above HP and 35 mm in front of VP. The line is inclined at  $35^\circ$  to HP. Its top view is 70 mm long inclined at  $40^\circ$  to XY. Draw the projections of straight line. Find the true length and inclination of the line with VP.
22. A line MN has its end M, 15 mm in front of VP and 20 mm above the HP. The other end N is 55 mm in front of VP. The front view has a length of 80 mm. The distance between end projectors is 65 mm. Draw the projections of line. Find its true length and true inclinations .
9. The mid point of a line AB, 80 mm long, is 30 mm above HP and 45 mm in front of VP. The line is inclined at  $30^\circ$  to HP and  $50^\circ$  to VP. Draw the projections.
10. A straight line ST has its end S, 10 mm in front of the VP and nearer to it. The midpoint m of the line is 50 mm in front of the VP and 40 mm above HP. The front and top view measure 90 mm and 120 mm respectively. Draw the projections of the line. Also find its true length and true inclinations with the HP and the VP [Jan'09].
11. A line MN has its end M, 10 mm in front of VP and 15 mm above HP. The other end N is 20 mm in front of VP. The front view has a length of 70 mm. The distance between the end projectors is 60 mm. Draw the projections of the line. Find its true length, true inclinations .
12. A line AB 65mm long has its end A, 10mm above HP and 25mm in front of VP. It is inclined at  $65^\circ$  to HP and  $25^\circ$  to VP. Draw its projections. Also mark the traces.
13. One end P of line PQ, 80mm long is 10mm above HP and 15mm in front of VP. The line is inclined at  $40^\circ$  to HP and the top view of the line is making  $50^\circ$  with VP. Draw the projections of the line and find its true inclination with the VP.
14. One end of a line AB is 5mm above HP and 15mm in front of VP. Its elevation and plan measures 50mm and 65mm respectively. The elevation is inclined at  $50^\circ$ . Draw the projections and find true length and true inclinations.

15. The plan of a line AB is 80mm long and makes  $35^\circ$  with XY. Its elevation makes  $45^\circ$  with XY and the line intersects XY at A. Identify and find its true length and inclinations to HP and VP. Also mark the traces.
16. The top view of a line is 65mm long and inclined to XY at  $30^\circ$ . One end is 20mm above HP and 10mm in front of VP. The other end is 60mm above HP and is in front of VP. Identify and find the true length of the line, its inclination with HP and VP. Also mark the traces.
17. A point P is 45mm above HP and 25mm in front of VP. Another point Q is 25mm above HP and 55mm in front of VP. The top view of the line PQ is inclined at  $40^\circ$  to XY line. Draw the projections of the line. Identify and find the true length and true inclinations of the line with HP and VP.
18. A line AB 75mm long has its end A is in HP and other end B is in VP. The line is inclined  $45^\circ$  to HP and  $30^\circ$  to VP. Draw the projections.
19. A line measuring 75mm long has one of its ends 50mm in front of VP and 20mm above HP. The other end is 15mm in front of VP and above HP. The top view of the line measures 50mm. Draw the projections and find its true inclinations .
20. The midpoint of a line AB is 35mm above HP and 45mm in front of VP. The top view and front view of the line measures 80mm and 70mm respectively. The end A is 10mm in front of VP and the end B is nearer to HP. Draw the projections and find its true length and true inclinations.
21. The midpoint of a straight line AB 90mm long is 60mm above HP and 50mm in front of VP. It is inclined  $45^\circ$  to VP and  $30^\circ$  to HP. Draw the projections.
22. A regular hexagonal lamina of side 30 mm rests on one of its edges on HP. The lamina makes  $60^\circ$  with HP and the edge on which it is resting makes an angle of  $60^\circ$  with VP. Draw its projections.
23. A circular plate of diameter 70 mm has the end P of the diameter PQ in the HP and the plate is inclined at  $40^\circ$  to HP. Draw its projections when the diameter PQ appears to be inclined at  $45^\circ$  to VP in the top view.
24. A pentagonal lamina of side 30mm rests on the ground with one of its sides inclined at  $30^\circ$  to VP while the surface of the lamina is inclined at  $45^\circ$  to HP. Draw the projections of the lamina.
25. A regular hexagon of side 40mm is resting on one of its corners on HP and the surface inclined  $45^\circ$  to HP. Draw the projections when the diagonal through the corner resting on HP makes an angle of  $60^\circ$  with VP.
26. A rectangular plate of size 60mm x 30mm has one of its shorter edges in VP and inclined at  $40^\circ$  to HP. Draw its top view if its front view is a square of side 30mm.
27. Draw the projections of a square plane of side 35mm rests on the ground on one of its corners with a diagonal containing that corner is inclined  $40^\circ$  to HP and  $50^\circ$  to VP.
28. A circular plate of negligible thickness and 50mm diameter is vertical and inclined at  $45^\circ$  to VP. Draw its projections when the centre of the circular lamina is 40mm above HP and 60mm in front of VP.
29. A hexagonal plate of side 20 mm rests on the HP on one of its sides inclined at  $45^\circ$  to VP. The surface of the plate makes an angle of  $30^\circ$  with the HP. Draw the front view and top view of the Plate.

### UNIT – III PROJECTION OF SOLIDS

1. A cube of side 40 mm rests on the HP on one of its ends with a vertical face inclined at  $40^\circ$  to VP. Draw its projections (top view, front view and side view).
2. A pentagonal prism of base side 30 mm and axis length 55mm is lying on the ground on one of its rectangular faces. Draw its top view, front and left side view when its axis is perpendicular to VP and the end nearer to the VP is 15 mm away from it.
3. A hexagonal prism of base side 30 mm and axis length 60 mm rests on the HP on one of its base edges with its axis inclined at  $60^\circ$  to HP and parallel to the VP. Draw its top and front views.
4. A cylinder of diameter 30 mm and axis length 50 mm is resting on the HP on a point so that its axis is inclined at  $45^\circ$  to HP and parallel to VP. Draw its top and front views.
5. A hexagonal prism, side of base 20mm and axis 60mm long lies on one of its longer edges on HP and its axis is parallel to both HP and VP. Draw its projections.
6. Draw the projection of a cone of diameter 40mm and height 70mm lying on the ground on one of its base points with a generator perpendicular to HP.
7. A cone of base diameter 50mm and axis length 65mm is resting on H.P on a point on the circumference of the base with its axis inclined at  $40^\circ$  to V.P and parallel to H.P. Draw its Projections.
8. A square prism of base side 35mm and axis length 60mm lies on the HP on one of its longer edges with its faces equally inclined to the HP. Draw its projections when its axis is inclined at  $30^\circ$  to the VP.
9. A square pyramid of base side 35mm and axis length 65mm is resting on HP on one of its triangular faces with its axis parallel to VP. Draw its projections.
10. A right pentagonal pyramid of side 20 mm and altitude 50 mm rests on one of its edges of the base in the HP. The base being tilted up such that the apex is 30 mm above HP. Draw the projection of the pyramid when the edge on which it is resting is perpendicular to VP.
11. A pentagonal prism of base side 35mm, axis height 60mm is resting on HP on one of its base edges with its axis inclined at  $45^\circ$  to HP and parallel to VP. Draw the projections of the prism.
12. A hexagonal prism of base side 30mm, axis height 50mm is resting on HP on one of its base corners with its base inclined at  $35^\circ$  to HP and parallel to VP. Draw the projections of the prism.
13. A square pyramid of base side 30mm, axis height 60mm is resting on HP on one of its base corners with its axis inclined at  $50^\circ$  to HP and parallel to VP. Draw its projections when the base sides containing the resting corners are equally inclined to HP.
14. A pentagonal pyramid of base side 30mm, axis height 60mm is resting on HP on one of its base edges with its axis inclined at  $50^\circ$  to HP and parallel to VP. Draw the projections of the pyramid by change of position method.
15. A hexagonal pyramid of base side 30mm, axis height 60mm is resting on HP on one of its base corners with its axis inclined at  $40^\circ$  to HP and parallel to VP. Draw its projections when the base sides containing the resting corners are equally inclined to HP.
16. A pentagonal pyramid of base side 30mm and axis height 55mm is resting on HP on one of its base edges with the face containing the resting edge perpendicular to both HP and VP. Draw its projections.

17. A hexagonal pyramid of base side 30mm and axis height 50mm is resting on HP on one of its base corners with its axis parallel to VP. Draw its projections when the slant edge containing the resting corner is vertical.
18. A square pyramid of base side 40mm and axis height 50mm is resting on HP on one of its base corners with its axis parallel to VP. Draw its projections when the slant edge containing the resting corner is vertical.
19. A pentagonal prism of base 30mm and axis length 60mm is resting on HP on one of its rectangular faces with its axis inclined  $45^\circ$  to VP. Draw its projection.
20. A hexagonal pyramid of base side 35mm and axis height 65mm is resting on HP on one of its triangular faces with its axis parallel to VP. Draw its projections.
21. A cone of base diameter 50mm and axis height 65mm is resting on HP on one of its generators with its axis parallel to VP. Draw its projections.
22. A cylinder of base diameter 50mm and axis height 65mm is resting on HP on one of its generators with its axis inclined at  $50^\circ$  to VP. Draw its projections.
23. A cylinder of base diameter 50mm and axis height 65mm is resting on HP on a point on the circumference of the base with its axis inclined at  $50^\circ$  to HP and parallel to VP. Draw its projections.
24. A pentagonal pyramid of base side 30mm and axis length 60mm is suspended by means of a string from one of its base corners with its axis parallel to VP. Draw its projections
25. A square pyramid of base side 30mm and axis length 60mm is suspended by means of a string from one of its base corners with its axis parallel to VP. Draw its projections.
26. A hexagonal prism side of base 25mm and axis 55mm long, lies with one of its rectangular faces on the HP, such that the axis is inclined at  $55^\circ$  to the VP. Draw its projections by using change of reference line method.
27. A pentagonal pyramid of base side 25mm and axis 55mm long lies with one of its slant edges on HP such that its axis is parallel to VP. Draw its projections.
28. A hexagonal prism of the base side 25mm and axis height 55mm resting on HP with one of its base edges such that, the axis is inclined at  $30^\circ$  to HP and parallel to VP. Draw the projections of Prism by using change of reference line method.
29. A square pyramid of base side 30mm and height 50mm rests on the ground on one of its base edges such that its axis is inclined at  $45^\circ$  to the ground and parallel to VP. Draw its projections.
30. Draw the projections of a hexagonal prism of base side 20mm and axis length 50mm when its rests on the ground on one of the edges of the base and axis inclined at  $35^\circ$  to ground and parallel to the VP.
31. A pentagonal prism, side of base 25mm and axis 50mm long, rests with one of its shorter edges on HP such that the base containing the edge makes an angle of  $30^\circ$  to HP and its axis parallel to VP. Draw its projections.
32. A hexagonal prism side of base 25mm and axis 60mm long lies with one of its rectangular faces on the HP, such that the axis is inclined at  $45^\circ$  to the VP. Draw its projections.

33. A right regular hexagonal pyramid, edge of base 25mm and height 50mm, rests on one of its base edges on HP with its axis parallel to VP. Draw the projections of the pyramid when its base makes an angle  $45^{\circ}$  to the HP.
34. Draw the projections of a pentagonal prism of 30mm base edges and axis 60mm long when the axis is inclined at  $75^{\circ}$  to the HP and parallel to the VP with an edge of the base on the HP.
35. A cylinder, diameter of base 60mm and height 70mm, having a point of its periphery of base on HP with axis of the cylinder inclined to HP at  $45^{\circ}$  and parallel to VP. Draw the projections of the cylinder.
36. A hexagonal prism of side of base 25mm and axis 60mm long, freely suspended from a corner of the base. Draw the projections by change position method.
37. Draw the projection of a cone of diameter 35mm and height 75mm lying on the ground on one of its base points with a generator perpendicular to HP.
38. A cylinder of diameter 40mm, height 60mm is resting on the ground on its base. It is then tilted such that a solid diagonal is vertical. Draw the projection.
39. A right pentagonal pyramid of base side 20mm and altitude 60mm rests on one of its edges of the base in HP, the base being tilted up until the highest corner in it is 30mm above HP. Draw the elevation of the pyramid when the edge on which it rests is made perpendicular to VP.
40. A cone of 15mm radius and 70mm height rests on the ground on one of its base circle points such that the apex is 20mm and the nearest base circle point is 50mm in front of VP and the base is perpendicular to HP. Draw the projections.
41. A hexagonal pyramid of base side 30mm and axis length 60mm is resting on HP on one of its base corners with the base sides containing the corner equally inclined to HP and its axis is parallel to both HP and VP. Draw its projections.
42. Draw the projections of a square prism of size 30mm 60mm with a solid diagonal vertical.
43. A cone of 30mm diameter and 70mm height rests on the ground on one of its base circle point such that the apex is 20mm and the nearest base circle point is 50mm in front of VP and the base is perpendicular to HP. Draw the projections.
44. A cylinder of base diameter 60mm and height 80mm is resting on HP in one of its generators with its axis inclined at  $50^{\circ}$  to VP. Draw the projections.
45. Draw the projections of a cylinder of diameter 30mm and axis 50mm long lies on HP on one of its generators and the base is perpendicular to HP and inclined at  $60^{\circ}$  to VP.
46. A hexagonal pyramid of base 25mm and axis 60mm long is freely suspended from corner of the base. Draw the projections.
47. A cone of diameter 40mm and height 60mm is freely suspended from one of its base points such that the axis parallel to VP. Draw the projection.



48. Draw the projection of a hexagonal prism whose one rectangular face size is 25mm, 65mm resting on HP on one of its base corners such that the other extreme corner is 30mm above HP with the axis parallel to VP.
49. A hexagonal pyramid of side 25mm, axis 75 mm long lies with one of its triangular faces on the HP and its axis parallel to VP. Draw its projections.
50. A right pentagonal pyramid side of base 30mm and height 60mm rests on one of its base on HP, the base being lifted up until highest corner in it is 40mm above the HP. Draw the projection when the edge on which it rests made perpendicular to VP.

## UNIT – IV SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES

### SECTION OF SOLIDS

1. A cube of side 30 mm rests on the HP on its end with the vertical faces equally inclined to the VP. It is cut by a plane perpendicular to the VP and inclined at  $30^\circ$  to HP meeting the axis at 25 mm above the base. Draw its front view, sectional top view and true shape of the section.
2. A pentagonal prism of base side 40mm and height 85mm rests on the H.P such that two of its base edges are equally inclined to VP. It is cut by a plane perpendicular to the V.P and inclined  $45^\circ$  to the H.P. The cutting plane meets the axis at 30mm from the top. Draw the front view, sectional top view and true shape of the section.
3. A hexagonal prism of side of base 20 mm and length 60 mm rests on HP with its axis being vertical and one edge of its base inclined at  $15^\circ$  to VP. The solid is cut by a plane perpendicular to VP and inclined at  $40^\circ$  to HP and bisecting the axis of the prism. Draw the projections of the prism and true shape of the section.
4. A cylinder of diameter 50mm and height 60mm rests on its base on H.P. It is cut by a plane perpendicular to V.P. and inclined at  $45^\circ$  to H.P. The cutting plane meets the axis at a distance of 15mm from the top. Draw the sectional plan and true shape of the section.
5. A right circular cone of base diameter 50mm and axis length 60mm rests on its base on the H.P. It is cut by a plane perpendicular to the H.P and inclined at  $60^\circ$  to the VP. The shortest distance between the cutting plane and the top view of the axis is 8mm. Draw the top view, sectional front view and the true shape of the section.
6. A pentagonal pyramid of base side 20mm and altitude 55mm rests on its base on HP with one base edge being perpendicular to VP. It is cut by plane inclined at  $50^\circ$  to base. The cutting plane meets the axis at 15mm above the base. Draw the front view, sectional top view and true shape of the section
7. A hexagonal pyramid of base side 25mm and axis 55 mm rests on its base on the HP with two base edges perpendicular to VP. It is cut by a plane perpendicular to VP and inclined at  $30^\circ$  to HP, meeting the axis at 20mm from the vertex. Draw its front view, sectional top view and true shape of the section.
8. A square pyramid of base side 25mm and altitude 40mm rests on the HP on its base with the base edges equally inclined to the VP. It is cut by a plane perpendicular to the VP and inclined at  $30^\circ$  to the HP meeting the axis at 21mm above the HP .Draw the sectional top view and the true shape of the section.
9. A cone of base diameter 50mm and altitude 60mm rests on its base on the HP. It is cut by a plane perpendicular to the VP and inclined at  $40^\circ$  to the HP. The cutting plane meets the axis at 30mm from the vertex .Draw the sectional top view.

10. A cone of base diameter 50mm and altitude 60mm rests on its base on the HP . It is cut by a plane perpendicular to the VP and parallel to one of the extreme generators , 10mm away from it .Draw the sectional top view and the true shape of the section.
11. A hexagonal prism of base 30mm and axis 60mm rests on its base on HP with its axis perpendicular to HP and one of the base edge parallel to VP. The solid is cut by a plane which is perpendicular to VP, inclined at  $40^\circ$  to HP and bisecting the axis of the prism. Draw the front view, sectional top view and true shape of the section.
12. A square pyramid has a base side of 40mm and altitude 80mm. It rests with its base on HP such that one side of the base is inclined at  $30^\circ$  to VP. The pyramid is cut by a plane which bisects the axis and is inclined at  $45^\circ$  to HP. Draw the front view, sectional top view and true shape of the section.
13. A cylinder of base diameter 50mm and height 65mm 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 30mm from the base. Draw the front view, sectional top view and true shape of the section.
14. A cone of base diameter 40mm and altitude 50mm rests on its base on the HP. It is cut by a plane inclined at  $45^\circ$  to HP and passes through a point on axis which is 20mm above HP. Draw the front view, sectional top view and true shape of the section.
15. A hexagonal pyramid of base 35mm and axis 70mm is resting on HP on its base with two sides of base perpendicular to VP. It is cut by a plane inclined at  $45^\circ$  to VP, perpendicular to HP and 10mm away from the axis. Draw its top view, sectional front view and true shape of the section.
16. A hexagonal prism, side of base 45mm and axis 75mm long, rests with its base on HP such that one of its rectangular faces is parallel to VP. A sectional plane perpendicular to HP and parallel to VP cuts the prism at a distance of 15mm from the axis. Draw its top view and sectional front view.
17. A cone of base diameter 70mm and height 80mm is resting on HP on its base. It is cut by a plane perpendicular to VP and parallel to a contour generator and is 10mm away from it. Draw the front view, sectional top view and true shape of the section.
18. A pentagonal prism of base edge 35mm and axis 65mm lies on HP with its base edge parallel to VP. It is cut by the plane perpendicular to HP and inclined at  $30^\circ$  to VP passes through a point 8mm away from the axis. Draw the sectional elevation and true shape of the section.
19. 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 perpendicular to VP and inclined at  $75^\circ$  to HP and is passing through the apex of the cone. Draw its front view, sectional top view and true shape of section.
20. A pentagonal pyramid of base side 30 .nm and axis length 60 mm is resting on HP on its base with a side of base parallel to VP. It is cut by a plane inclined at  $45^\circ$  to VP and perpendicular to HP and is 12 mm away from the axis. Draw its top view, sectional front view and true shape of section.
21. A cylinder of base diameter 50 mm and height 60 mm rests on its base on HP. It is cut by a plane perpendicular to VP and inclined at  $45^\circ$  to HP. The cutting plane meets the axis at a distance 15 mm from top to the base. Draw the sectional plan and true shape of section.
22. A square pyramid base 40 mm side and axis 65 mm long has its base on H.P and all the edges of the base are equally inclined to V.P. It is cut by a section plane perpendicular to V.P. and inclined at  $45^\circ$  to H.P. and bisecting the axis. Draw its sectional top view, and the true shape of the section.

23. A cone of base 75 mm diameter and axis 80 mm long is resting on its base on the H.P. It is cut by a section plane perpendicular to the V.P. and parallel to and 12 mm away from one of its end generators. Draw its front view, sectional top view and true shape of the section.
24. A hexagonal pyramid of base side 25mm and axis 70mm long has the hexagonal end on VP, with two edges perpendicular to HP. A section plane perpendicular to VP and inclined at  $30^\circ$  to HP, cuts the pyramid at a point 8mm from the axis and above it. Draw the sectional top view. Also find true shape of the section.
25. A hexagonal pyramid of base 30mm and axis 70mm lies on HP on its base edge such that one of the slant faces is perpendicular to both the planes. Draw the projection. When it is cut by section plane parallel to HP and a distance 15mm from the apex point.
26. A vertical cylinder 40 mm diameter is cut by a vertical section plane making  $30^\circ$  to VP in such a way that the true shape of the section is a rectangle of 25 mm and 60 mm sides. Draw the projections and true shape of the section.
27. A cone of base diameter 50mm and axis length 60mm is resting on HP on its base. It is cut by a plane inclined at  $40^\circ$  to VP and perpendicular to HP that cuts the cone at a distance of 10mm from the axis and in front of it. Draw its top view, sectional front view and true shape of the section.
28. A hexagonal pyramid of base side 30mm and axis height 60mm is resting on HP on its base with a base edge parallel to VP. It is cut by a plane perpendicular to VP, inclined  $70^\circ$  to HP and passing through a point in its axis at a distance of 20mm from the base. Draw the sectional top view and true shape of the section.
29. A hexagonal prism of base 35mm side and axis 65mm long is resting on its base on HP with a base edge parallel to VP. It is cut by a plane perpendicular to HP, inclined  $50^\circ$  to VP and 15mm away from the axis of the prism. Draw the top view and sectional front view of the prism. Also draw the true shape of the section.

### **DEVELOPMENT OF SURFACES**

1. A pentagonal prism of base side 30 mm and axis height 75 mm is resting on its base on HP with two of its lateral surfaces parallel to VP. It is cut by plane perpendicular to VP and inclined at  $45^\circ$  to HP, bisecting the axis. Draw the development of lateral surfaces of the lower portion of the prism.
2. Draw the development of the lateral surface of the lower portion of a cylinder of diameter 50 mm and axis 70 mm. The solid is cut by a section plane inclined at  $40^\circ$  to H.P. and perpendicular to VP and passing through the midpoint of the axis.
3. A regular hexagonal pyramid side of base 30mm and height 60mm is resting vertically on its base on HP such that two of its 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. Obtain the development of the lateral surface of the truncated pyramid.
4. A cube of 40 mm edge stands on one of its faces on HP with a vertical face making  $45^\circ$  to VP. A horizontal hole of 30 mm diameter is drilled centrally through the cube such that the hole passes through the opposite vertical edges of the cube. Draw the development of lateral surface of the cube with the hole.
5. A right circular cone, diameter 40 mm base and 50 mm height, rests on its base on HP. A section plane perpendicular to VP and inclined to HP at  $45^\circ$  cuts the cone bisecting its axis. Draw projections of the truncated cone and develop its lateral surface.

6. A pentagonal pyramid of base edge 25 mm and height 60 mm rests vertically on its base on the HP such that one of its base edge parallel to VP. It is cut by a plane, inclined at  $60^\circ$  to HP and passes through a point 35 mm from the apex. Draw the development of the lateral surface of the pyramid.
7. A cone of base 60 mm and height 80 mm is resting with its base on HP. An insect starts from a point on the circumference of the base, goes round the solid and reaches the starting point in the shortest path. Find the distance travelled by the insect and also the projections of the path followed by it.
8. A cylinder of diameter 40 mm and height 50 mm is resting vertically on one of its ends on the HP. It is cut by a plane perpendicular to the VP and inclined at  $30^\circ$  to the HP. The plane meets the axis at a point 30 mm from the base. Draw the development of the lateral surface of the lower portion of the truncated cylinder.
9. A pentagonal pyramid of base 30 mm side and height 70 mm stands with its base on the HP. such that one of the base edges is parallel to the VP. It is cut by a section plane perpendicular to the VP and inclined at  $30^\circ$  to the HP. bisecting the axis. Draw the development of the surface of the cut solid.
10. A cone of base diameter 50 mm and height 75 mm rests vertically on its base on the ground. A string is wound around the curved surface of the cone starting from left extreme point on the base and ending at the same point. Find the shortest length of the string required. Also, trace the path of the string in the front and top views.
11. A hexagonal prism of base side 30 mm and axis height 70 mm is resting on its base on HP with one of its faces parallel to VP. It is cut by plane perpendicular to VP and inclined at  $35^\circ$  to HP, meeting the axis at a distance of 40 mm from the base. Draw the development of lateral surfaces of the lower portion of the prism
12. A pentagonal prism of base side 30 mm and height 60 mm is cut by a plane perpendicular to VP and  $50^\circ$  to HP and passing through the axis at a height of 35 mm above the base. Draw the development of the lower portion of the solid.
13. A hexagonal prism of side of base is 25 mm and height 55mm rests with its base on HP and one of its rectangular faces is parallel to VP. A circular hole of 40 mm diameter is drilled through the prism such that the axis of the hole bisects the axis of the prism at right angles and is perpendicular to VP. Draw the development of the lateral surface of the prism with the hole.
14. A cylinder of diameter 45 mm and height 70 mm is resting vertically on one of its ends on the HP. It is cut by a plane perpendicular to VP and inclined at  $45^\circ$  to HP. The plane meets the axis at a point 35 mm above the base. Draw the development of the lateral surface of the lower portion of the truncated cylinder.
15. A vertical chimney of 60 m diameter joins a roof sloping at an angle of  $35^\circ$  with the horizontal. The shortest portion over the roof is 25 m. Determine the shape of the sheet metal from which the chimney can be fabricated. Take a scale of 1:20.
16. A right circular cone of base diameter 50 mm and height 75 mm is resting on its base on the ground. It is cut by a plane perpendicular to VP and inclined at  $30^\circ$  to HP. The cutting plane bisects the axis of the cone. Draw the development of the lateral surface of the truncated cone.
17. A cone of base diameter 50 mm and height 75 mm rests vertically on its base on the ground. A string is wound around the curved surface of the cone starting from the left extreme point on the base and ending at the same point. Find the shortest length of the string required. Also trace the path of the string in front and top views.

18. A hexagonal pyramid of base side 30 mm and height 65 mm rests on its base on the ground with a base edge parallel to VP. It is cut by a plane perpendicular to VP and inclined at  $55^\circ$  to HP and meets the axis at a height of 30 mm from the base. Draw the lateral surface development.
19. A square pyramid of base side 25 mm and altitude 50 mm rests on its base on the HP with two side of the base parallel to VP. It is cut by a plane bisecting the axis and inclined at  $30^\circ$  to the base. Draw the development of the lower part of the pyramid.
20. A pentagonal pyramid of base side 30 mm and height 70 mm is resting vertically on its base on the ground with one of its base edge parallel to VP. It is cut by a plane perpendicular to VP and parallel to HP at a distance of 35 mm above the base. Draw the development of the lateral surfaces of the frustum of pyramid. Also show the sectional plan view.
21. A pentagonal prism of base side 25mm and height 60mm stands on one of its ends on the HP with a rectangular face parallel to the VP. A hole of diameter 30mm is drilled centrally through the prism in such a way that the axis of the hole bisects the axis of the prism at right angles. The axis of the hole is perpendicular to the VP. Draw the development of the lateral surfaces of the prism.
22. A hexagonal pyramid of base side 30mm and axis height 60mm is resting on its base on HP with two of the base edges parallel to VP. It is cut by a plane perpendicular to VP, inclined  $30^\circ$  to HP and bisects the axis of the pyramid. Draw the development of the lateral surfaces of the lower portion of the pyramid.
23. A hexagonal prism of base side 30mm and axis 60mm 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 passing the axis at a distance of 35mm from the top surface. Draw the development of the remaining portion of the prism.
24. A square pyramid has a base side of 40mm and altitude 80mm. It rests with its base on HP such that one side of the base is inclined at  $30^\circ$  to VP. The pyramid is cut by a plane which bisects the axis and is inclined at  $45^\circ$  to HP. Draw the development of the remaining portion of the pyramid.
- [www.pandianprabu.weebly.com](http://www.pandianprabu.weebly.com)
25. A pentagonal pyramid has a base side of 30mm and axis height of 70mm. It rests with its base on HP such that one of the base edges perpendicular to VP. The pyramid is cut by a plane which bisects the axis and is inclined at  $30^\circ$  to HP. Draw the development of the remaining portion of the pyramid.
26. A cone of base diameter 40mm and altitude 60mm rests on its base on the HP. It is cut by a plane inclined at  $40^\circ$  to HP and passes through a point on axis which is 40mm above HP. Draw the development of the lateral surface of the lower portion of the cone.
27. A circular hole of diameter 30mm is drilled through a vertical cylinder of diameter 50mm and height 65mm. The axis of the hole is perpendicular to the VP and meets the axis of the cylinder at right angles at a height of 30mm above the base. Draw the development of the lateral surface of the cylinder.

## **UNIT – V ISOMERTIC AND PERSPECTIVE PROJECTION**

### **ISOMERTIC PROJECTION**

1. A cylinder of height 65 mm and diameter 40 mm is resting on its base on the HP. It is cut by a plane perpendicular to VP and inclined at  $30^\circ$  to the HP. The plane passes through a point on the axis located at 25 mm from the top. Draw the isometric projection of the cut cylinder.
2. A frustum of a square pyramid of bottom edge 50 mm, top edge 25 mm and height 50 mm. Draw the isometric projection of the frustum.
3. A hexagonal pyramid of base 25 mm and height 60 mm stands with its base on the HP with an edge of base parallel to VP. A horizontal plane cuts the pyramid and passes through a point on the axis at a distance of 30 mm from the apex. Draw the isometric projection of the frustum of the pyramid.
4. A pentagonal pyramid of base side 30 mm and height 65 mm stands with its base on HP 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 of 30 mm from the apex. Draw the isometric view of the bottom portion of the pyramid.
5. Draw the isometric projection of a hexagonal prism of base side 25 mm and height 50 mm when it rests on one of its ends on HP with two its base sides parallel to VP.
6. A cone of 50 mm diameter and height 70 mm stands on HP with its base. It is cut by a cutting plane perpendicular to VP and inclined at  $30^\circ$  to HP, cutting the axis of the cone at a height of 40 mm from the base. Draw the isometric view of the remaining part of the cone.

### **PERSPECTIVE PROJECTION**

1. A cube of side 40mm is resting on the ground on one of its faces, with a vertical face in PP and the rest behind it. The central plane is located 50mm to the left of the axis of the cube. This station point is 40mm in front of PP and 60mm above GP. Draw the perspective view of the solid.
2. A square pyramid of side of base 50mm and altitude 70mm stands on the ground vertically with an edge of base parallel to and 20mm behind PP. The station point is 40mm in front of PP and 70mm above the ground. The central plane is located 45mm to the left of the axis of the solid. Draw the perspective view of the solid.
3. A Pentagonal pyramid of 30mm base side and axis height 40mm is standing on its base on the ground Plane with a base side parallel to and 25mm behind PP. The central plane is 35mm to the left of the apex and the station point is 40mm in front of PP and 20mm above the GP. Draw the perspective view of the solid.
4. A cylinder of diameter 40mm and height 65mm rests with its base on the GP such that the axis is 25mm behind the PP. The station point is 30mm in front of the PP and 110mm above the GP and lies in a central plane which is 65mm to the right of the axes of the solids. Draw the perspective view of the cylinder.