

**GE8152 Engineering Graphics**

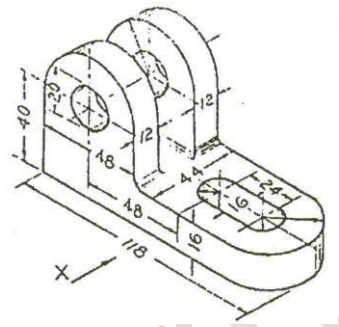
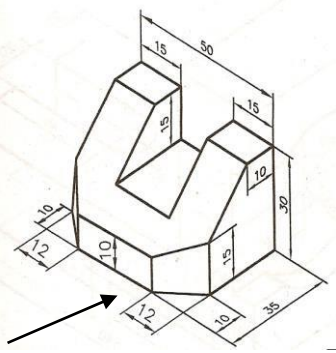
**Unit-1 CONIC SECTION**

- 1 Draw an **Ellipse** when eccentricity is  $\frac{2}{3}$  and the distance of focus from the directrix is equal to 50mm. Also draw a normal and tangent to a point on the ellipse which is at a distance of 70 mm from the directrix.
- 2 Construct a **parabola** when the distance of focus from the directrix is 40 mm using eccentricity method. Also draw a tangent and normal at any point on the curve.
- 3 Construct a **hyperbola** when the distance between its focus and directrix is 40 mm and eccentricity is  $\frac{4}{3}$ . Also draw the tangent and normal at any point on the curve.
- 4 Draw the **involute** of a circle of diameter 30 mm. Draw the tangent, and normal at any point "P" and name them
- 5 An inelastic string of length 100 mm is **wound** around a circle of diameter 26 mm. Draw the path traced by the end of the string. Draw also normal and tangent at any point on the curve.
- 6 Draw the **involute** of a circle of diameter 40 mm.

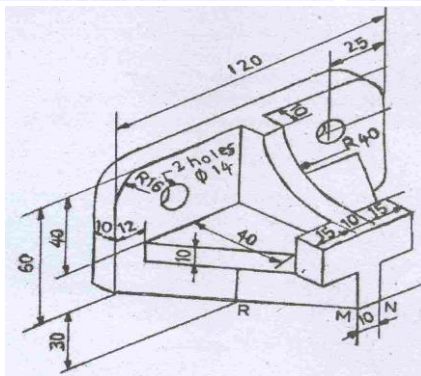
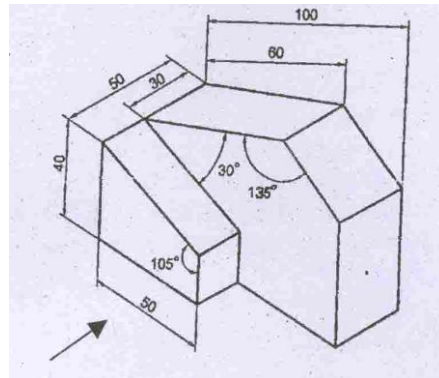
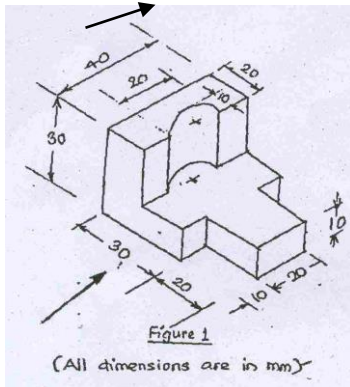
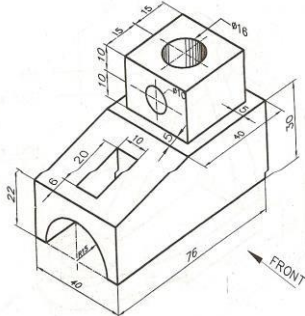
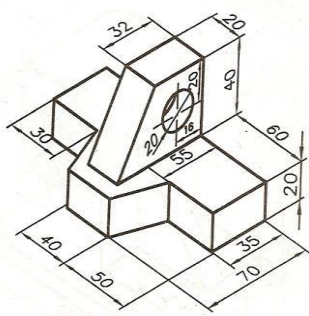
**FREE HAND SKETCHING**

- 7 Draw the front, top and right side views of the isometric view of the object shown in figs.

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### **Unit-2 PROJECTIONS OF POINTS**

1. Draw the projections of points on the common reference line by taking the distance between the projectors 25 mm and mention the quadrant name.
  - i) Point A is lying on HP and 30 mm in front of VP
  - ii) Point B is 20 mm above the HP and 40 mm in front of VP.
  - iii) Point C is on XY line
  - iv) Point D is 20 mm below HP and 40 mm behind VP.
  - v) Point E is on VP and 15 mm above HP
2. Draw the projections of points on the common reference line .
  - i) Point P is 35 mm behind the VP and 20 mm below the HP.
  - ii) Point Q is 30 mm above the HP and 40 mm in front of VP.
  - iii) Point R 50 mm behind the VP and 15 mm above the HP.
  - iv) Point S is 40 mm below HP and in the VP.
  - v) Point T is 30 mm in front of VP and 50 mm below the HP

### **LINES**

1. A line AB 75 mm long has its end A in HP and 12 mm in front of VP. The top view and front view measures 65 mm and 50 mm respectively. Draw the projections of the line and determine its inclinations with HP and VP.
2. A line MN measures 70 mm long is 25 mm above HP and 35 mm in front of VP. The line is inclined  $35^\circ$  to HP and  $45^\circ$  to VP. Draw its projections.
3. A straight line ST has its end S, 10 mm in front of the VP and nearer to it. The mid-point 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.
4. The mid point of 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.
5. The projection on the XY line of the horizontal and vertical traces of a straight line AB in the first quadrant are 120 mm apart. The vertical trace is 100 mm above XY and horizontal trace 50 mm in front of XY line. The points A & B are 30 mm & 80mm above the horizontal plane respectively. Draw the projections.

### **PLANES**

6. A square lamina PQRS of side 40 mm rests on the ground on its corner P in such a way that the diagonal PR is inclined at  $45^\circ$  to the HP and apparently inclined at  $30^\circ$  to the VP. Draw its projections
7. A rectangular plate of side 50 mm X 25 mm is resting on its shorter side on HP and inclined at  $30^\circ$  to VP. Its surface is inclined at  $60^\circ$  to HP. Draw its projections.
8. A hexagonal plane of side 25 mm having one of its sides in the HP & inclined at  $60^\circ$  to the VP and its surface makes  $45^\circ$  with HP. Draw the projection of the lamina.
9. A circular plate of diameter 70 mm has the end P of the diameter PQ in the HP and plate is inclined at  $40^\circ$  to the HP. Draw its projection a) the diameter PQ appears to be inclined at  $45^\circ$  to the VP in the top view. b) the diameter PQ makes  $45^\circ$  with the VP.
10. A rhombus of diagonals 25 mm and 15 mm with longer diagonal being parallel to xy-line represents the top view of a square of diagonal 25 mm, with a corner on HP. Draw its front view.

### **Unit-3 PROJECTION OF SOLID**

1. Draw the projections of a cube of edge 45 mm resting on one of its corners on HP, with a **solid diagonal perpendicular to HP**.
2. A hexagonal prism of base side 20mm and height 50mm rests on the ground on one of the edges of the base & the **axis is inclined at  $45^\circ$  to the ground** & parallel to VP draw its projections.

3. A pentagonal prism side 25 mm and axis height 50 mm is resting with one of its shorter edges on HP such that **base containing that edge makes an angle of  $30^\circ$  to HP** & Axis is parallel to VP. Draw its projections. .
4. A square pyramid of 30mm side of base and 50mm height rests on ground on one of its **base edges such that its axis is inclined at  $45^\circ$  to the ground** and parallel to the VP. Draw its projections. .
5. A cone of base diameter 60 mm and altitude 80 mm rests on the HP with its **axis inclined at  $30^\circ$  to the HP** and parallel to the VP. Draw its front and top views. .
6. A tetrahedron of edges 30 mm rests on one of its edges on the VP. That edge is normal to the HP. **One of the faces containing the resting edge is inclined at  $30^\circ$  to the VP**. Draw the projections of the tetrahedron. .
7. Draw the projections of a solid cylinder of diameter 60 mm and axis 80 mm long when it rests on the HP with its one of the circumferential line on HP and **axis makes  $30^\circ$  to VP**.
8. A right pentagonal pyramid of base side 35 mm and altitude 70 mm rests on one of its base edges in HP, **the base being lifted up until the highest corner in it is 30 mm above HP**. Draw its projections when the edge on which it rests is made perpendicular to VP.
9. A cylinder of base side 50 mm and altitude 70 mm is **freely suspended** by means of a string from one of its base point with its axis parallel to VP. Draw its projections.
10. A hexagonal pyramid of base edge 40 mm and altitude 80 mm rests on one of its base edges on the HP with its axis inclined at  $30^\circ$  to the HP and parallel to the VP. Draw its top and front views using change of position method.
11. A square prism of base side 30 mm and axis 70 mm rests on HP on one of its longer edges with the rectangular faces equally inclined to HP. The axis is inclined at  $30^\circ$  to VP. Draw the top and front views of the prism
12. Draw the projections of a right circular cone of base diameter 60 mm and altitude 80 mm lying on HP with one of its generators The axis is parallel to VP .

#### Unit-4 SECTION OF SOLID

1. A solid cone of base diameter 60 mm and axis length 80 mm rests on its base on the HP. It is **cut by a plane perpendicular to the VP , inclined at  $45^\circ$  to HP** and passing through a point on the axis 35 mm above the base. Draw the sectional top view and the true shape of the section.
2. A square pyramid of base side 40 mm and altitude 65 mm rests base on HP and all the edges of the base are equally inclined to VP. A section plane perpendicular to VP , **inclined at  $45^\circ$  to the HP** and bisecting the axis. Draw sectional top view and true shape of the section.
3. A cone of base diameter 75 mm and axis length 80 mm is rests on its base on the HP. It is cut by a plane perpendicular to VP and **parallel to and 12 mm away from one of its end generators**. Draw the sectional top view and true shape of the section.
4. A cube of side 40 mm is placed and cut by a plane in such a way that the **true shape of the section is a regular hexagon**. Draw the front and top views of the cube and determine the inclination of the cutting plane with the HP.
5. 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.
6. A square prism of base side 30 mm and axis length 60 mm lies on the HP on one of its longer edges with its axis parallel to both HP and VP. It is cut by a vertical plane **inclined at 45 degrees to the VP**. The cutting plane meets the axis **at 15 mm from one end of the prism**. Draw plan, sectional elevation and true shape of the section.

#### DEVELOPMENT OF THE SOLID SURFACE

7. 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 HP** and perpendicular to VP and passing through **the midpoint of the axis**.
8. A rectangular pyramid 60 mm X 50 mm and height 75 mm is rests on its base on HP, such that two of its sides of parallel to VP. It is cut by a plane inclined **at  $65^\circ$  to HP** and perpendicular to VP. The cutting plane **bisects** the axis of the pyramid. Develop the lateral surface of the cut pyramid.

9. A pentagonal pyramid of base edge 30 mm and height 52 mm rests on its base on the HP such that one of its base edge parallel to VP and nearer to it. It is cut by a plane, inclined at **40° to HP** and passes through a point **32 mm above the base**. Draw the development of the lateral surface of the truncated pyramid.
10. A cone of base 50 mm diameter and height 60 mm rests with its base on HP. A section plane perpendicular to VP and parallel to an extreme generator and passing through a point on the axis at a distance of 20 mm from the apex. Draw the development of the retained surface.

#### Unit-5 ISOMETRIC VIEW

1. Draw **the isometric view** of the frustum of a hexagonal pyramid when it is resting on its base on the HP with two sides of the base parallel to the VP. The pyramid has base side of 30 mm and top side of 10mm. The height of the frustum is 60 mm.
2. A pentagonal pyramid of base edge 40 mm height 70 mm rests with its base on the HP. One of the base edges is perpendicular to the VP. It is **cut by a plane, inclined at 30° to HP** and passes through a point 30 mm from the base. Draw the isometric projection of the object.
3. A cone of base diameter 60 mm and height 65 mm is resting on its base on the HP. It is cut by a plane perpendicular to the VP and **inclined at 30° to the HP**. The plane meets the axis at a distance of **30 mm above the base**. Draw the isometric projection of the truncated cone.
4. A cylinder of 50 mm diameter and 75 mm height stands with its base on H.P. It is **cut by a section plane inclined at 45° to H.P** and perpendicular to V.P, passing through a point on the axis 50 mm above the base. Draw the isometric projection of the truncated cylinder showing the cut surface.
5. A hexagonal prism of base side 20 mm and height 40 mm has **a square hole of side 16 mm at the centre**. The axes of the square and hexagon coincide. One of the faces of the square hole is parallel to the face of the hexagon. Draw the isometric projection of the prism with hole to full scale.
6. Draw the isometric projection of a sphere of diameter 16 mm kept centrally over a frustum of a square pyramid of height 25 mm. The frustum has a base of side 35 mm and top of side 20 mm. Take isometric lengths from an isometric scale drawn.

#### PERSPECTIVE VIEW

7. A rectangular lamina of size 30 X 50 mm, rests on the ground with one edge on PP and the remaining portion behind PP. The station point is 60 mm above GP and 30 mm in front of PP and lies on a central plane 35 mm to the left of the nearest edge of the lamina. Draw the perspective view of the lamina.
8. A square prism, side of base 40 mm and height 60 mm rests with its base on the ground such that one of its rectangular faces is parallel to and 10 mm behind the picture plane. The station point is 30 mm in front of PP, 80 mm above the ground plane and lies in a central plane 45 mm to the right of the center of the prism. Draw the perspective view.
9. A rectangular pyramid 30 X 20 mm and 35 mm long, is placed on the GP on its base, with the longer edge of the base parallel to and 30 mm behind the PP. the central plane is 30 mm to the left of the apex and the station point is 50 mm in front of PP and 25 mm above the ground. Draw the perspective view.
10. A square pyramid of base edge 20 mm and altitude 40 mm rests on its base on the ground with a base edge parallel to the picture plane. The axis of the pyramid is 25 mm behind the PP and 25 mm to the right of the eye. The eye is 50 mm in front of the PP and 50 mm above the ground. Draw the perspective view of the pyramid.
11. Draw the perspective view of a pentagonal prism of base side 20 mm and height mm when it rests on its base on the ground plane with one of its rectangular 40 faces parallel to and 20 mm behind the picture plane. The station point is 45 mm in front of the PP and 60 mm above the GP. The observer is 20 mm to the left of the axis. Draw the perspective by visual ray method. Use the top view and front view.
12. A hollow cylinder of external diameter 60 mm internal diameter 40 mm and axis 80 mm long lies with its generator on ground with one of its circular ends touching the picture plane. The station point is 90 mm in front of the picture plane and 60 mm to the right of the axis of the cylinder. The horizon is 100 mm above ground. Draw the perspective view of the cylinder.