


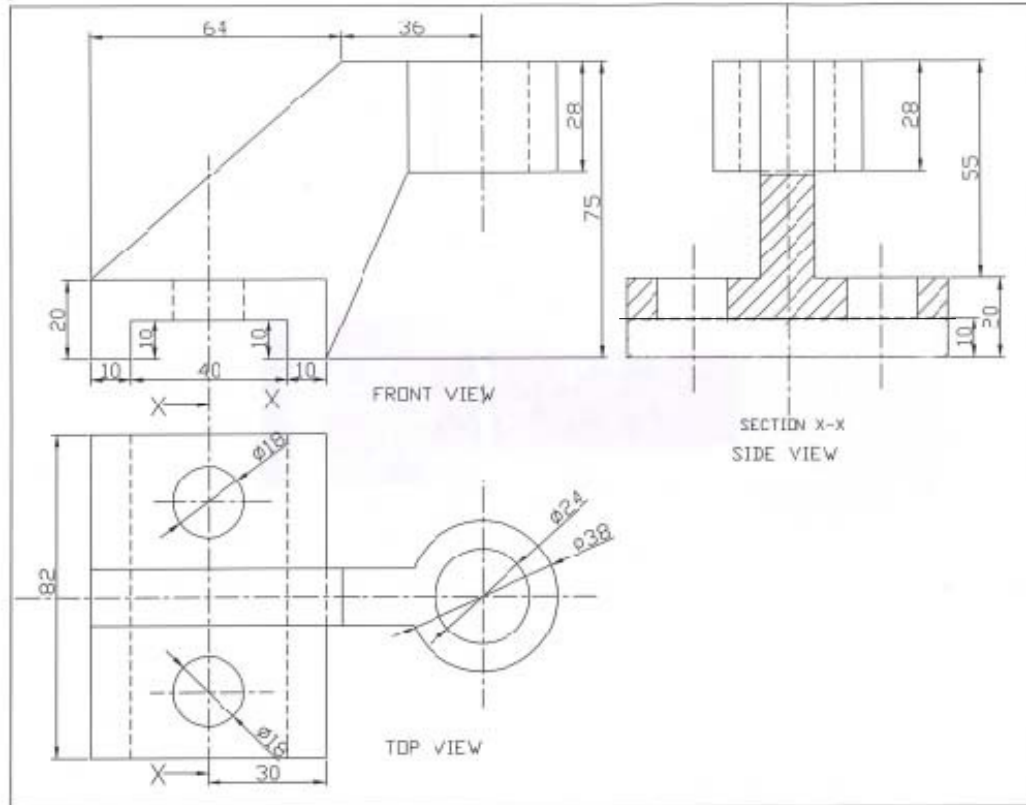
**Detailed Solutions      A-02      June 2003**

*All dimensions are in mm.*

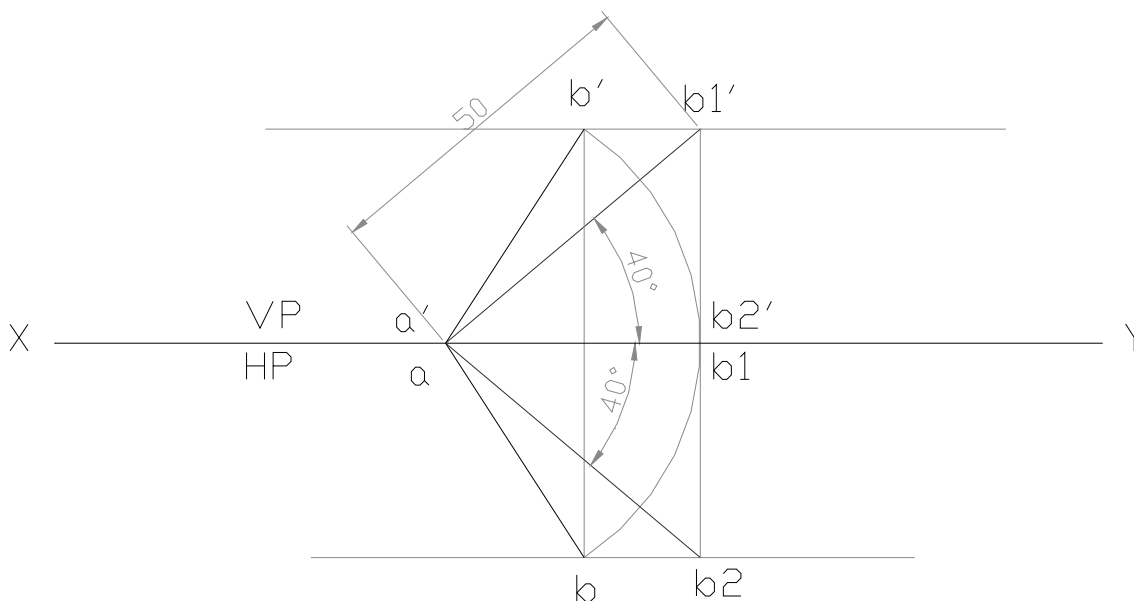
**Q1**

- i. The  symbol shows the projection in **(A) first angle**
- ii. To get the idea of a shape, of a part one should draw it in **(B) isometric** projection.
- iii. Drawings of big parts of an equipment like car can be drawn on drawing sheet (A<sub>0</sub>) by using **(B) reduction** scale.
- iv. Minimum clearance between shaft  $\phi 20 h_7$  & hub  $\phi 20 H_7$  is **(B) + 20 microns**
- v. Two main types of dimensioning are 1) **(C) size** 2) Location.
- vi. **(D) Involute** is a curve traced by a point in a straight line which rolls without slippage along a circle or polygon.
- vii. A cone is cut by a plane, perpendicular to base and passing through vertex, the section will be **(A) triangle**.
- viii. When a line is parallel to H.P. & inclined to V.P. it has **(B) vertical** trace.

**Q2.**



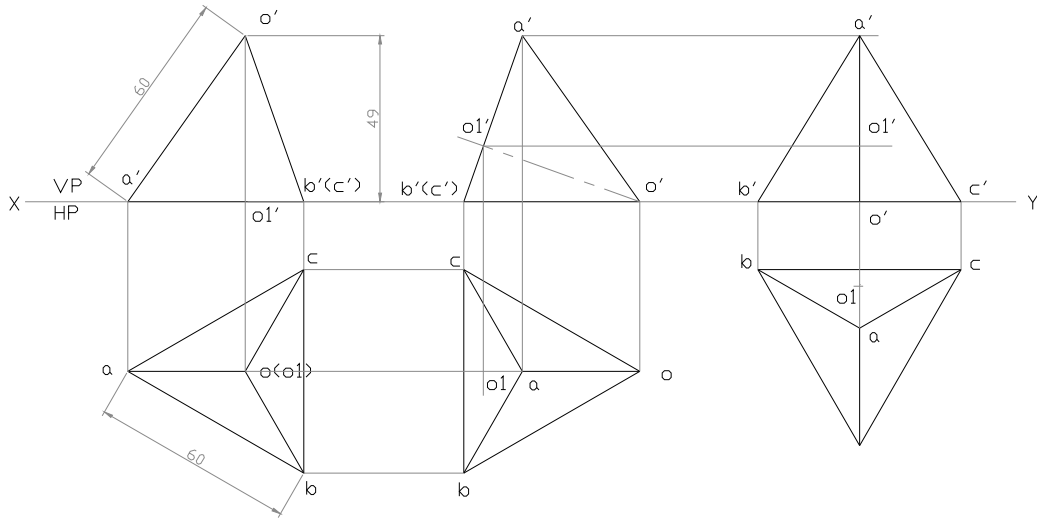
Q3.



Draw X-Y line and print VP and HP as shown for Ist angle of projection. Then follow the following steps:

- First on X-Y line mark a' and a the front view and top views of the end A
- With a' as reference draw a line at an angle of  $40^\circ$  to X-Y line and mark b1' at a length of 50 mm, the true length of the line
- With a as reference draw a line at an angle of  $40^\circ$  to X-Y line and mark b2 at a length of 50 mm, the true length of the line
- Draw the perpendicular lines through b1' and b2 to intersect the X-Y line at b1 and b2' respectively
- With a as centre and radius equal to ab1 which is the plan length of the line, draw an arc to cut the locus passed through b2 at b
- Join a with b, which is the actual **top view** of the line
- With a' as centre and radius equal to a'b2' drawn an arc to cut the projector drawn through b at b'.
- Join a' with b', which is the actual **front view** of the line

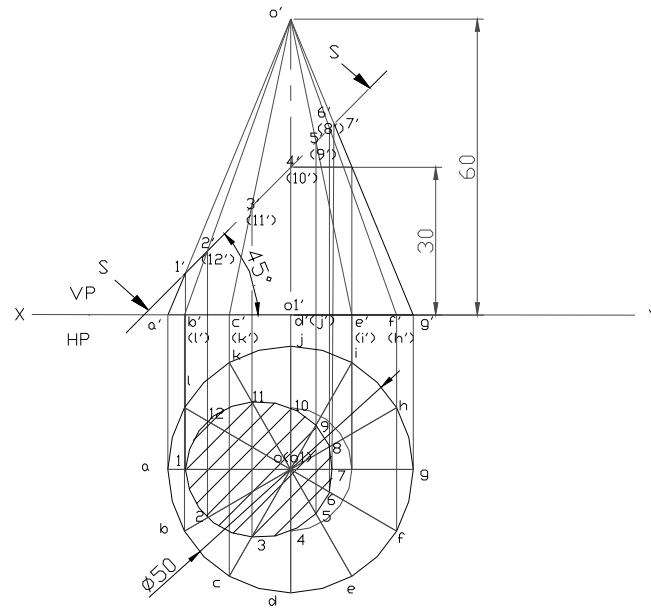
Q4.



Draw X-Y line and print VP and HP as shown for Ist angle of projection. Then follow the following steps:

- Draw the top view and front view of a tetrahedron of side 60 mm as shown in the first position
- Redraw the front view of the solid, such that one of its faces (o'b'c') is on HP as shown in second position . Draw projectors through the solid to get the corresponding top view
- Now draw the top view such that the edge bc contained by the face obc which is lying on the ground, is parallel to VP as shown in third position.
- Draw projectors through all the corners of the solid to get corresponding front view as shown in fig.
- Measure the distance of the apex from X-Y line as shown in fig.

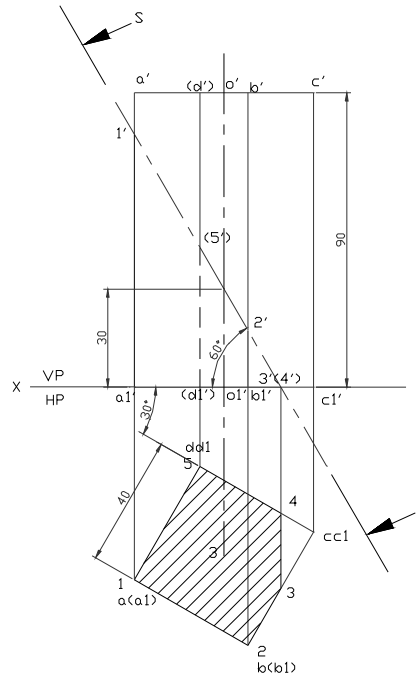
Q5.



Draw X-Y line and print VP and HP as shown for Ist angle of projection. Then follow the following steps:

- Draw the top and front view of a cone of diameter 50 mm and height 60 mm as shown in fig.
- Pass a section plane in the front view at an angle of  $45^\circ$  so as to pass through the mid point of the axis of the solid.
- Mark the section points along the section plane, wherever it cuts the generators of the solid
- Transfer these section points to the top view and join them with smooth continuous curve to get the sectional top view

Q6.

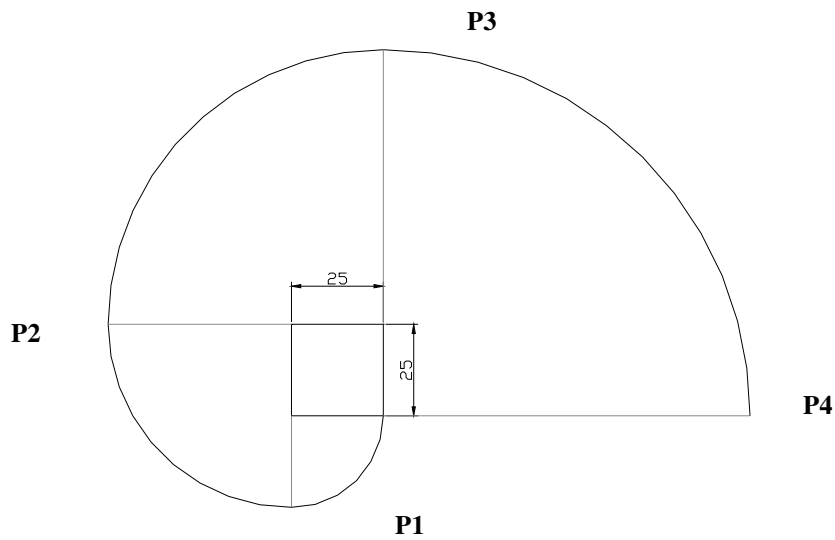


Draw X-Y line and print VP and HP as shown for Ist angle of projection. Then follow the following steps:

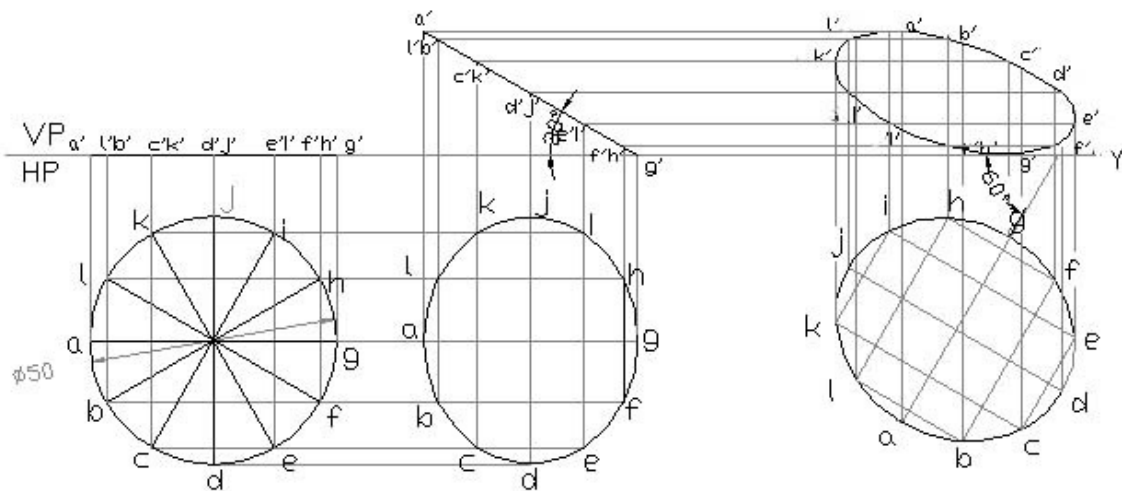
- Draw the top and front view of a square prism of side 40 mm and height 90 mm such that one of the rectangular faces is inclined at  $30^\circ$  to VP as shown in fig.
- Pass a section plane in the front view at an angle of  $60^\circ$  so as to pass through a point on the axis at a height of 30 mm of the solid
- Mark the section points along the section plane, wherever it cuts the edges or corners of the solid

Transfer

Q7.



Q8.



Draw X-Y line and print VP and HP as shown for 1st angle of projection. Then follow the following steps:

- Draw the top view and front view of a circular plate of 50 mm diameter as shown in the first position

- Redraw the front view of the lamina, such that a point on the circular plate is on HP and the surface of the lamina being inclined at  $30^\circ$  to ground (HP) as shown in second position. Draw projectors through the lamina to get the corresponding top view
- Now draw the top view such that the diameter passing through the point on which it rests being inclined at  $60^\circ$  to VP in the top view as shown in third position
- Draw projectors through all the points on the circumference of the circular plate to get corresponding front view as shown in fig.

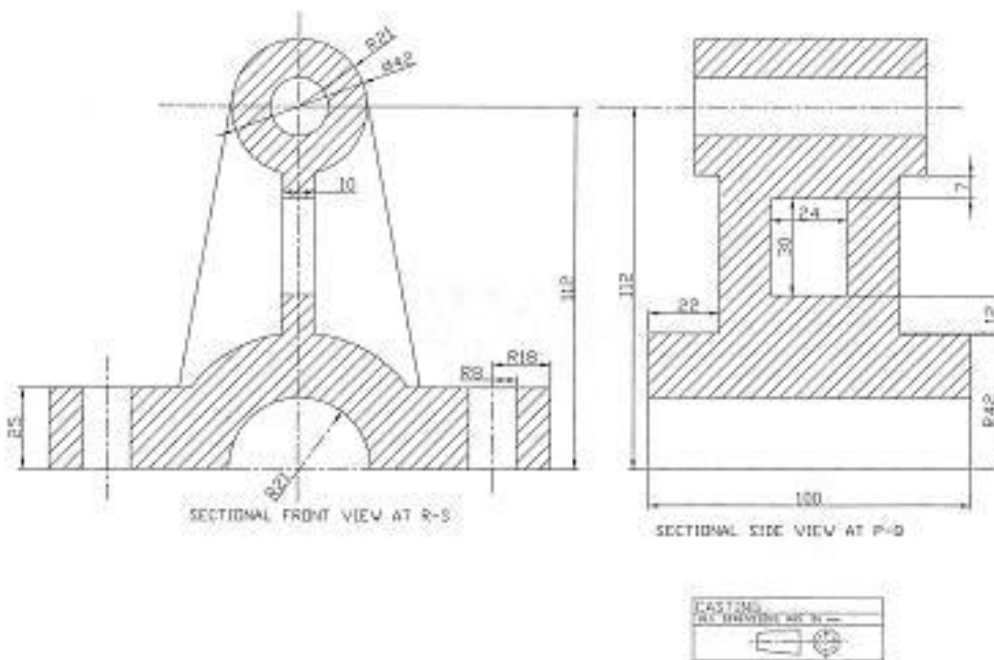
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All dimensions are in mm.

Q1.

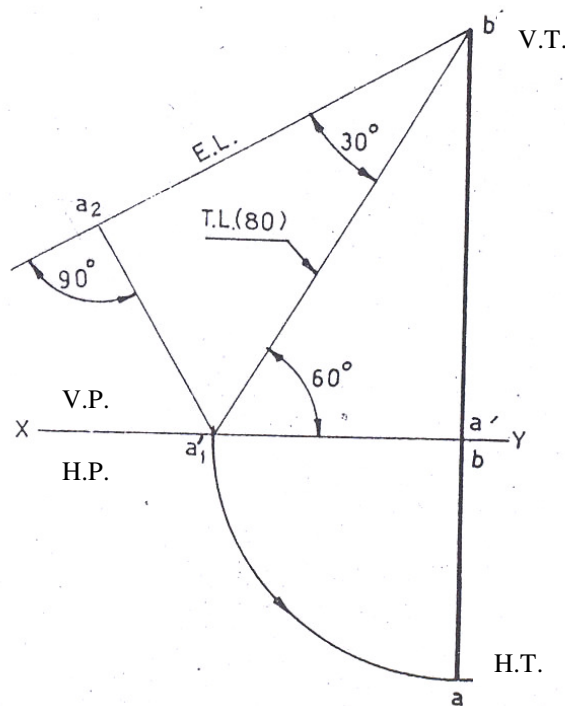
- a. The locus of a point equidistant from the sides of a given angle is the **bisector** of that angle.
- b. The double ordinate through the focus of a conic is called the **Latus Rectum**
- c. **Traces** are the points in which the line, produced if necessary, intersects the H.P and V.P.
- d. A regular dodecahedron is a solid bounded by twelve equal faces, each is regular **pentagon**.
- e. When a solid is cut by an auxiliary inclined plane, for the true shape of section, an **auxiliary** projection is necessary on a plane parallel to section plane.
- f. When the development of a cone is semi-circle of 120 mm diameter, then dimensions of the base cone **30 mm** radius and that of slant height **60 mm**.
- g. If 'd' is the diameter of rivet in mm and 't' the thickness of the plate also in mm, then in practice empirical rule for calculating the diameter of rivet is  $d = 6\sqrt{t}$ .
- h. The feather keys are **parallel** keys.
- i. When the shafts are slightly misaligned then most suitable coupling to connect them is **flexible coupling**.

Q2.





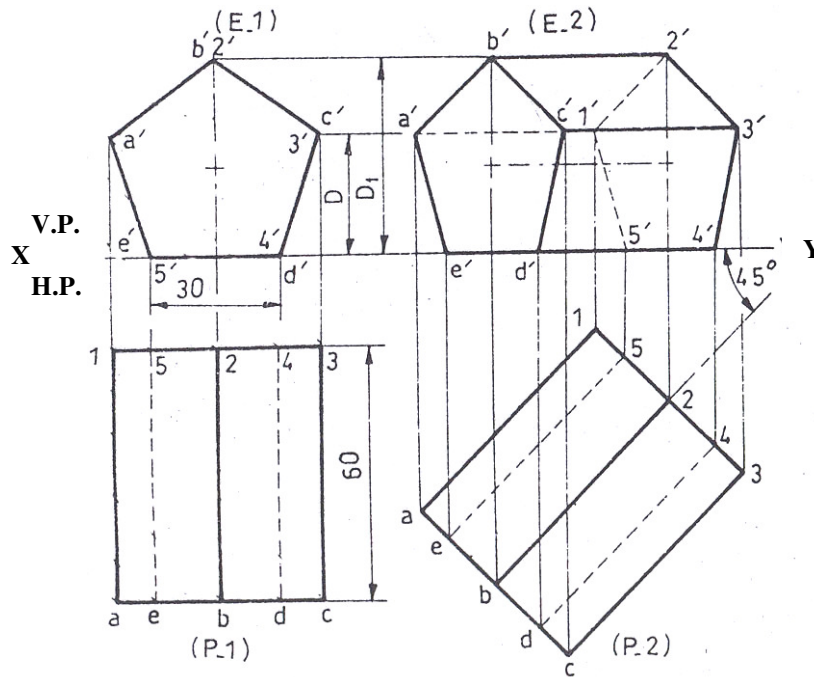
Q3.



Draw X-Y line and print VP and HP as shown for Ist angle of projection. Then follow the following steps:

- First consider line in VP and inclined at  $60^\circ$  to HP with end A in HP. Draw  $a_1'b'$  at an angle of  $60^\circ$  to X-Y line
- Construct right-angled triangle  $a_1'a_2b'$  and  $a_1'a_2b'$   $a_1' = 30^\circ$ , which is the true inclination with VP.  $a_2b'$  is the front view length of the line
- Take radius  $b'a_2$  and with  $b'$  as center draw an arc to cut the X-Y line at  $a'$
- Join  $a'$  with  $b'$ , which is the actual **front view** of the line
- Take radius  $ba_1'$ , with  $b$  as center draw an arc to get the point  $a$  on the projector of  $a'$
- Join  $a$  with  $b$ , which is the actual **top view** of the line
- Using top view and front view, draw the horizontal trace (HT) and vertical trace (VT) to complete the solution

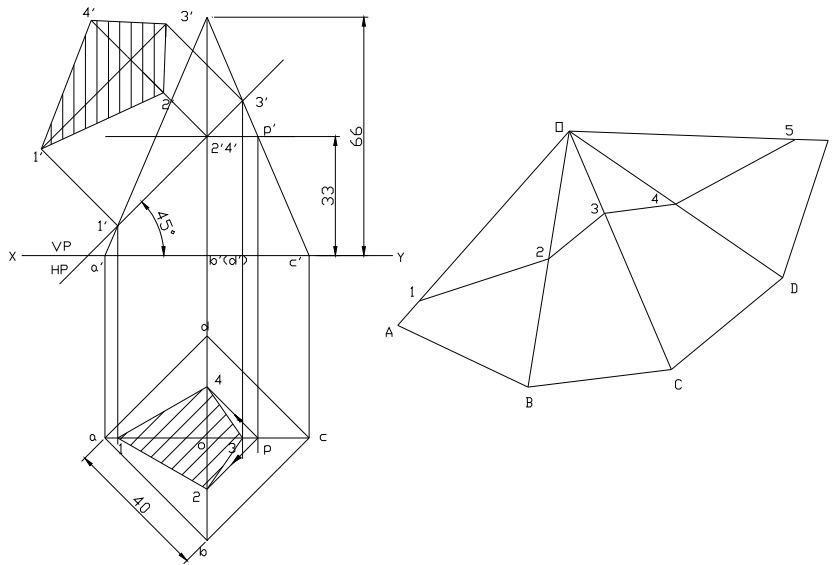
Q4.



Draw X-Y line and print VP and HP as shown for Ist angle of projection. Then follow the following steps:

- Draw the top view and front view of a pentagonal prism of side 30 mm and height 60 mm such that one of the rectangular surfaces is on HP and axis being perpendicular to VP as shown in position P.1
- Draw top view such that the axis is inclined at  $45^\circ$  to VP as shown in position P.2
- Draw projectors through all the corners of the solid to get corresponding front view as shown in P.2

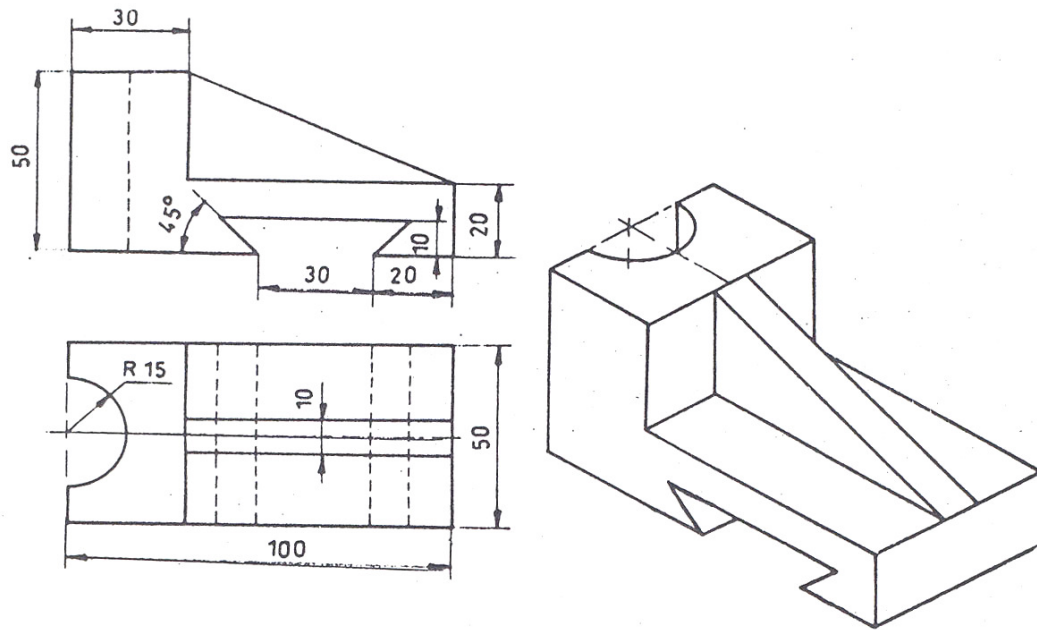
Q5.



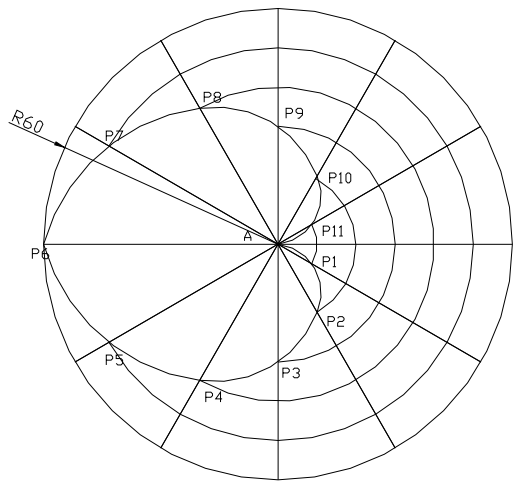
Draw X-Y line and print VP and HP as shown for 1st angle of projection. Then follow the following steps:

- Draw the top and front view of a square pyramid of side 40 mm and height 66 mm as shown in fig.
- Pass a section plane in the front view at an angle of  $45^\circ$  so as to pass through the mid height of the solid
- Mark the section points along the section plane, wherever it cuts the edges or corners of the solid
- Transfer these section points to the top view and join them to get the sectional top view
- Draw the true shape of the section on a plane parallel to the section plane
- Add the development of the solid for the retained portion as shown in fig.

Q6.



Q7.



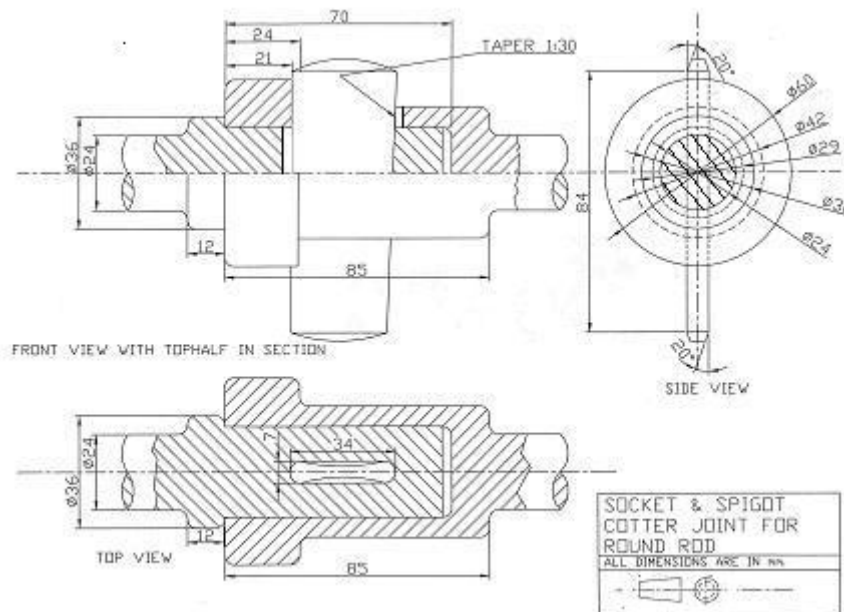


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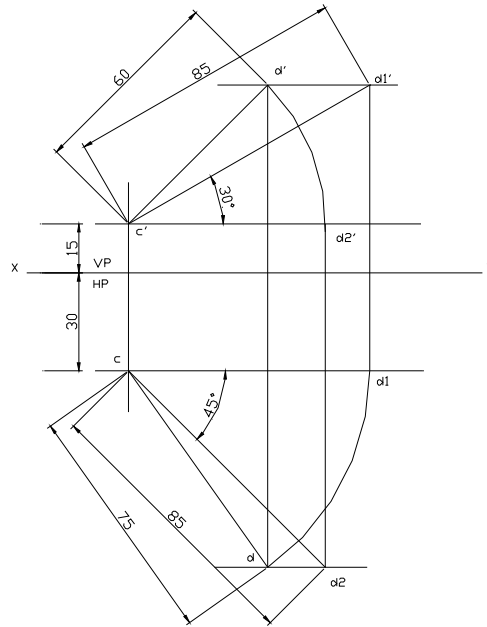
Q1

- a. A triangular pyramid is cut by a section plane parallel to its base, the sectioned surface will be **(B) Triangle**.
- b. Second angle of projection is not used because **(B) both the views overlap each other**.
- c. If a square plane is inclined to H.P. and perpendicular to V.P., its front view is a **(C) line**.
- d. Ample margin is provided in a riveted joint beyond the axis of hole up to edge of plate so that the joint **(A) leak proof**
- e. Taper is provided on one side of a cotter used for a cotter joint because **(B) it helps to maintain the joint tight**
- f. What type of coupling is required when the axes of two shafts are slightly inclined to each other ? **(D) Flexible coupling**
- g. A M24 x 3 represents a bolt having **(A) nominal bolt diameter 24 mm and threads of pitch 3 mm**
- h. A hexagonal bolt and nut is usually preferred to other types of bolts and nuts because it can be tightened in space which allows the spanner to be moved by **(C) 60° rotation**.
- i. V-thread is commonly used for screw fastening because it is **(B) less costly**

Q2.



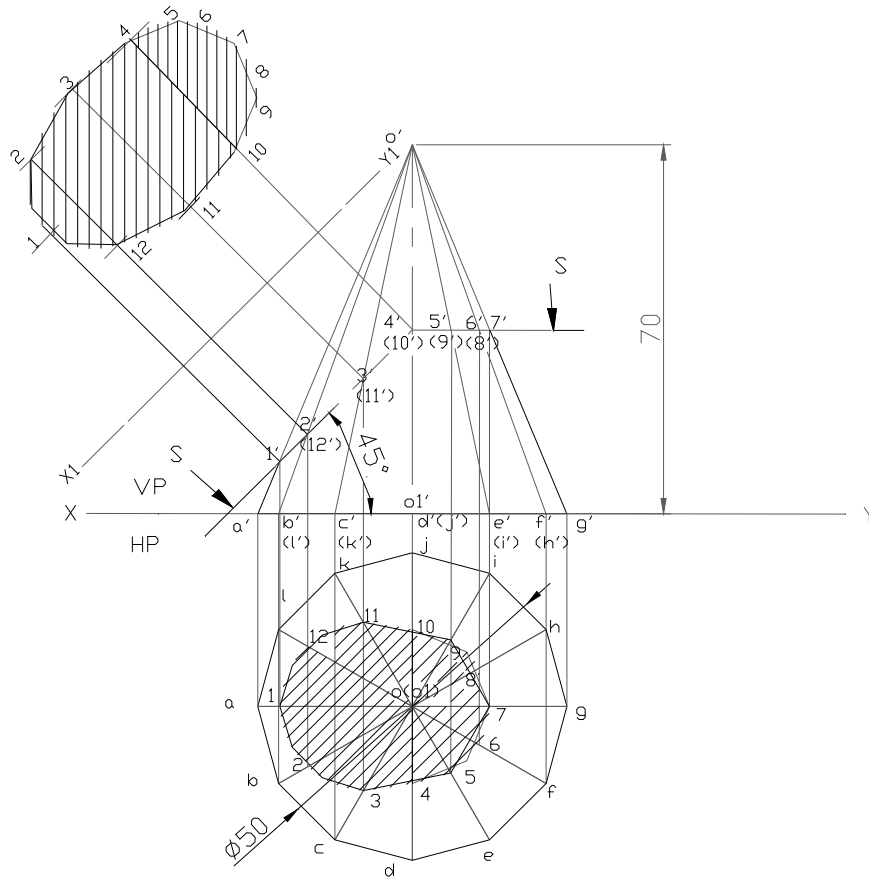
Q3.



Draw X-Y line and print VP and HP as shown for Ist angle of projection. Then follow the following steps:

- First measure 15 mm above X-Y line and mark  $c'$  and measure 30 mm below X-Y line to mark  $c$  on the projector line drawn through  $c'$
- Take radius of 60 mm equal to length of the elevation of line and cut the locus of  $c'$  at  $d_2'$
- With  $c$  as centre and radius equal to 85 mm, the true length of the line, cut the perpendicular drawn through  $d_2'$  at  $d_2$ .
- Join  $d_2$  with  $c$ , and measure the inclination of the line with X-Y line which gives the inclination of the line with VP
- With  $c$  as centre and radius equal to 75 mm which is the plan length of the line, draw an arc to cut the locus passed through  $d_2$  at  $d$
- Join  $c$  with  $d$ , which is the actual **top view** of the line
- With  $c'$  as centre and radius equal to  $c'd_2'$  drawn an arc to cut the projector drawn through  $d$  at  $d'$ .
- Join  $c'$  with  $d'$ , which is the actual **front view** of the line
- With  $c'$  as centre and radius equal to 85 mm, the true length of the line, cut the locus through  $d'$  at  $d_1'$
- Join  $d_1'$  with  $c'$ , and measure the inclination of the line with X-Y line, which gives the inclination of the line with HP

Q4.

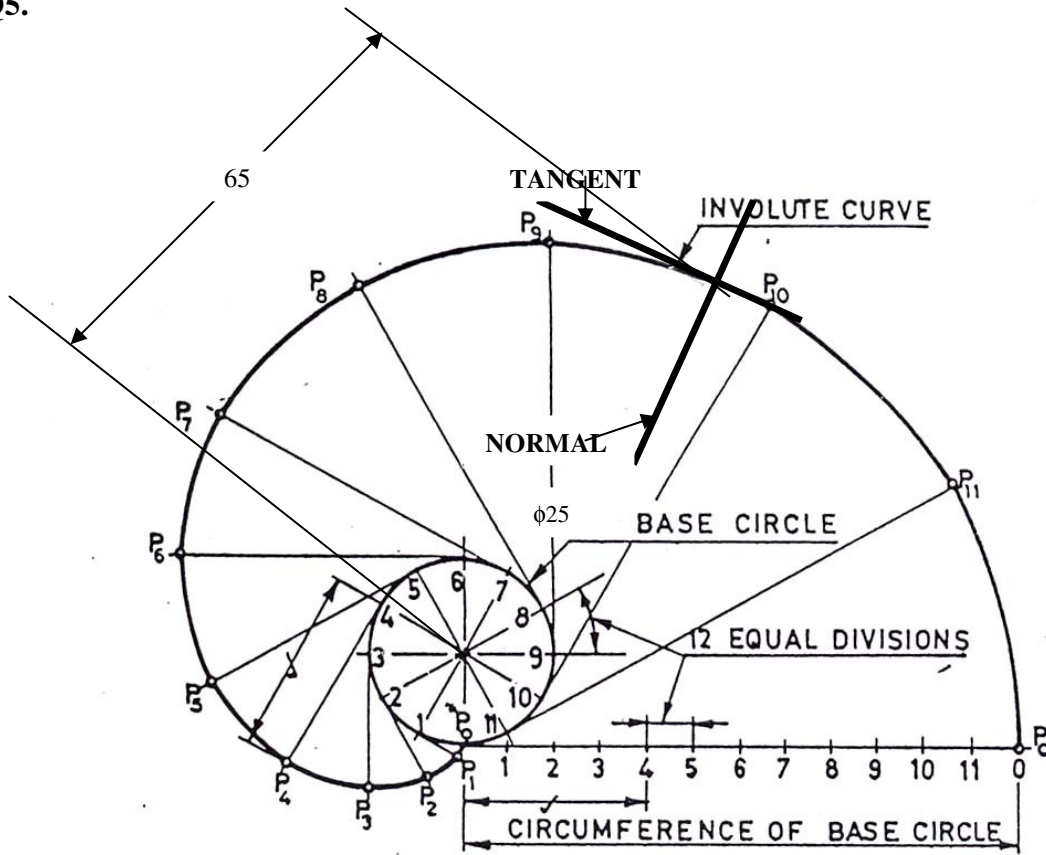


Draw X-Y line and print VP and HP as shown for 1st angle of projection. Then follow the following steps:

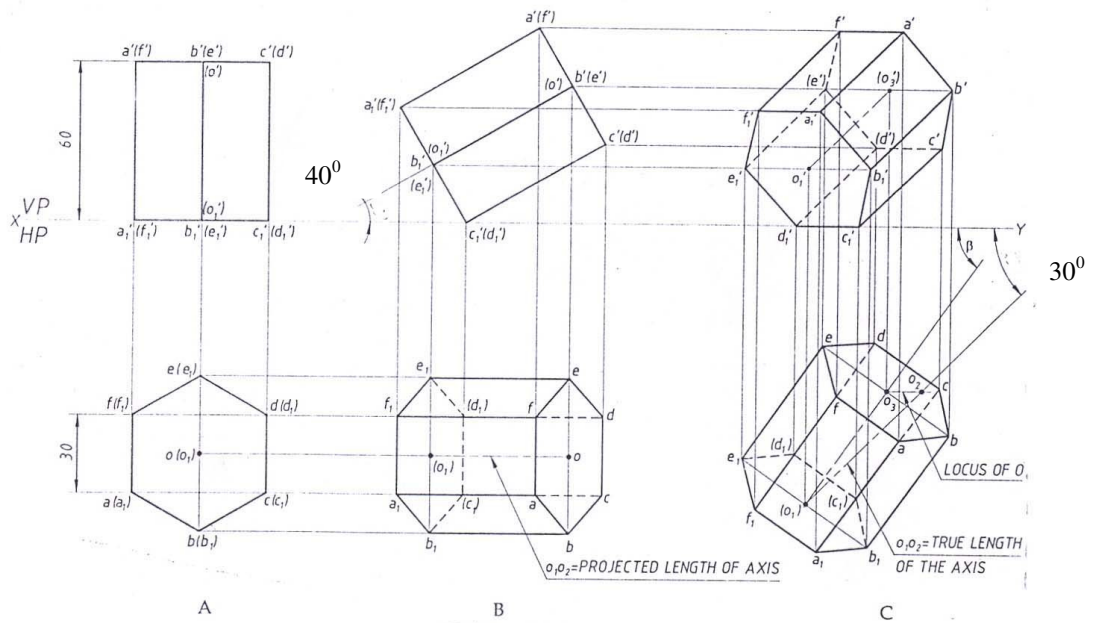
- Draw the top and front view of a cone of diameter 50 mm and height 70 mm as shown in fig.
- Pass a section plane in the front view at an angle of  $45^\circ$  so as to pass through the mid point of the axis of the solid. Pass another horizontal section plane through the mid point of the axis of the solid
- Mark the section points along the section plane, wherever it cuts the generators of the solid
- Transfer these section points to the top view and join them with smooth continuous curve to get the sectional top view
- Draw the true shape of the section adjoining each other on a plane parallel to the inclined section plane as shown in fig.



Q5.



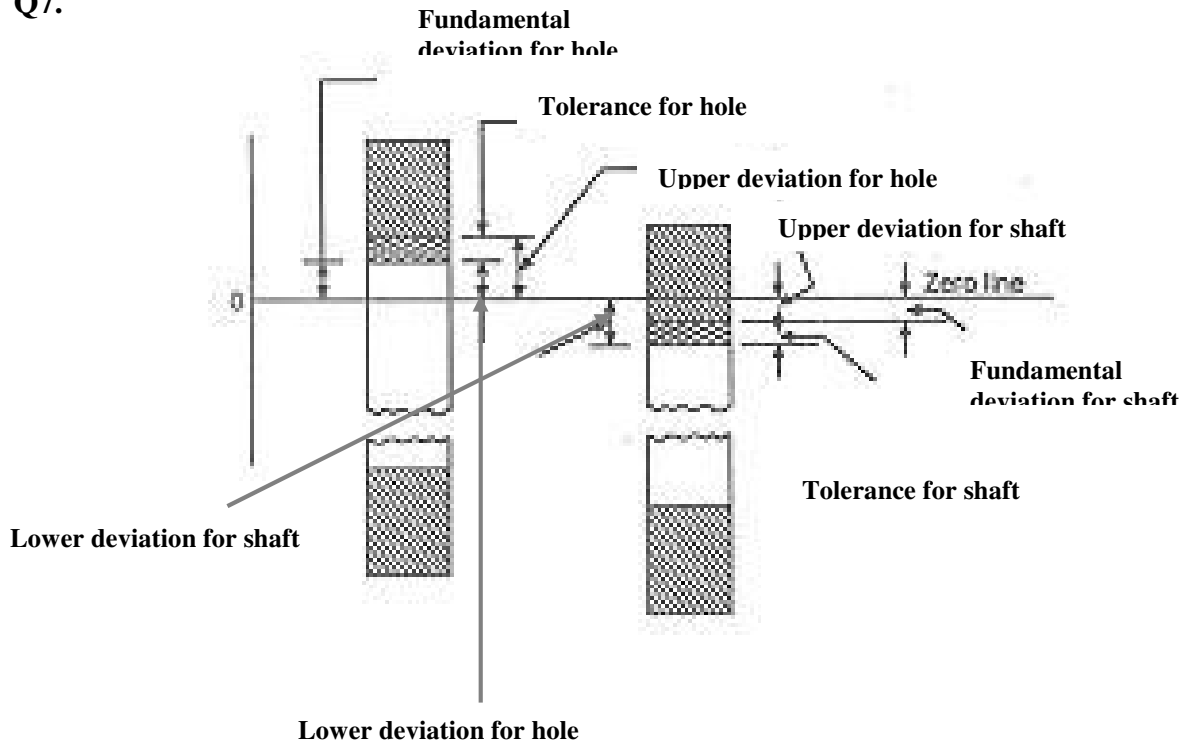
Q6.



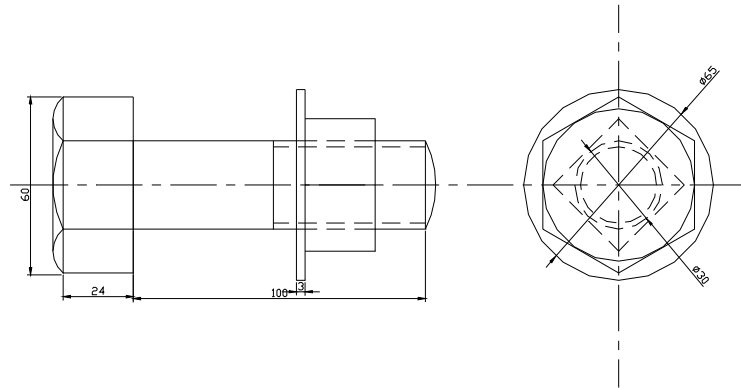
Draw X-Y line and print VP and HP as shown for 1st angle of projection. Then follow the following steps:

- Draw the top view and front view of a hexagonal prism of side 30 mm and height 60 mm as shown at 'A'
- Redraw the front view of the solid, such that one of the base side is on HP and axis being inclined at  $40^\circ$  to HP as shown in position at 'B'. Draw projectors through the solid to get the corresponding top view
- Now draw the top view such that the axis is inclined at  $30^\circ$  to VP as shown in position 'C' by determining the apparent angle
- Draw projectors through all the corners of the solid to get corresponding front view as shown in fig.

Q7.



Q8.

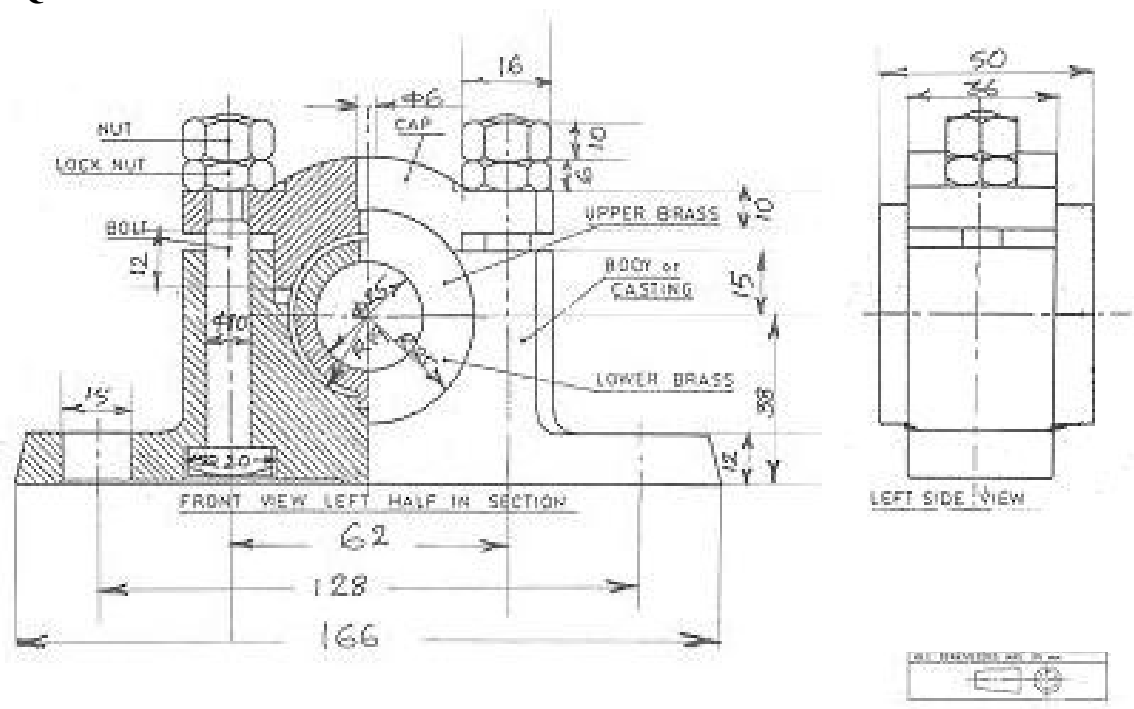


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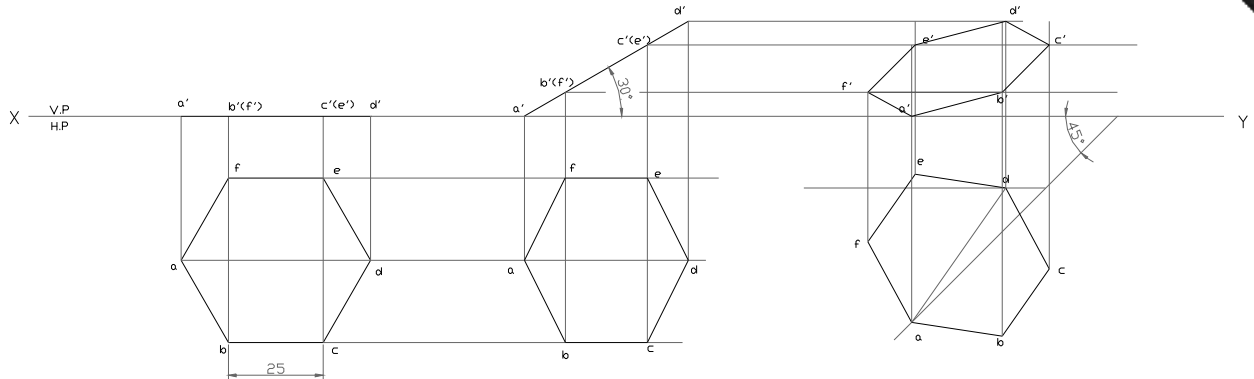
*All dimensions are in mm.*

- Q1.**
- a. The hidden edge of an object is shown by: **(C) Thick dotted line.**
  - b. If 5 mm represents 1 km on a map, the representative fraction is **(D)  $\frac{1}{200000}$ .**
  - c. When a section plane is inclined to the axis of a cone and is parallel to any one of the generators, the shape of the section is **(C) parabola.**
  - d. A Lewis bolt is a **(A) foundation bolt.**
  - e. A cotter joint is provided for joining two rods which can transmit **(A) axial force.**
  - f. A rigid coupling is used for joining two shafts which **(D) are in perfect alignment.**
  - g. Square headed bolts are used for fixing the cap of a Plummer block to the body **(C) because of ease of tightening with one wrench only.**
  - h. If the slant height of a cone is equal to the diameter of the base circle, the shape of development of the cone is **(B) semicircle.**

**Q2**



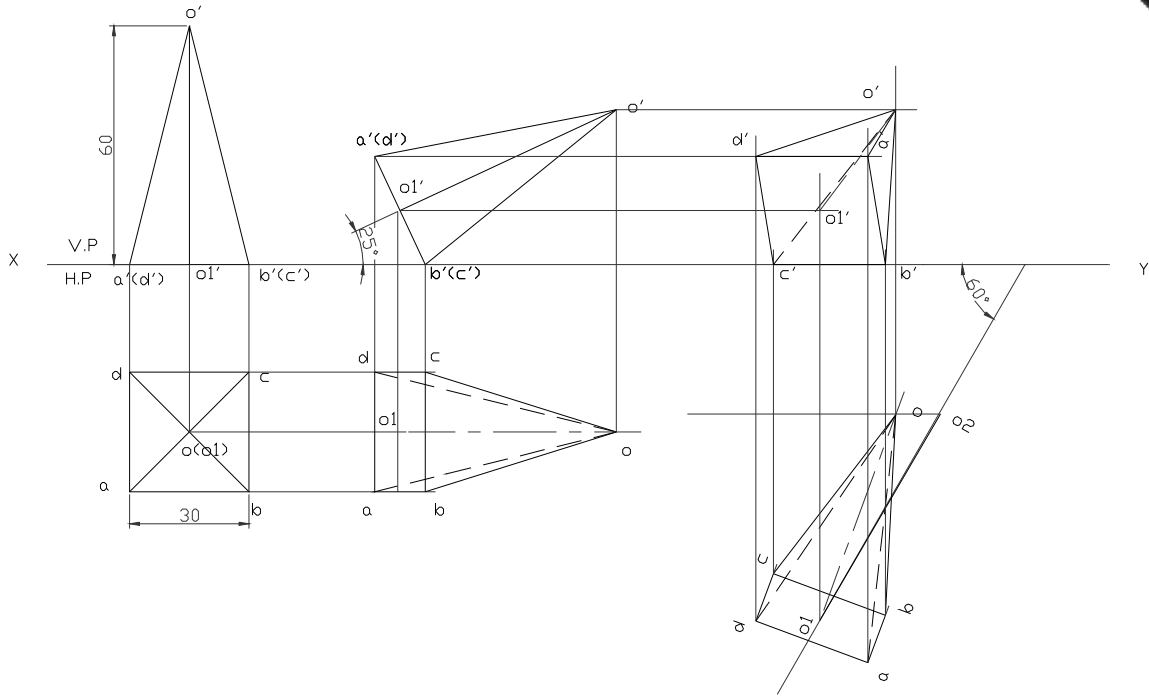
Q3.



Draw X-Y line and print VP and HP as shown for 1st angle of projection. Then follow the following steps:

- Draw the top view and front view of a regular hexagonal lamina side 30 mm as shown in the first position
- Redraw the front view of the lamina, such that one of the corner of the lamina is on HP and the surface of the lamina being inclined at  $30^\circ$  to HP as shown in second position. Draw projectors through the lamina to get the corresponding top view
- Now draw the top view such that diagonal passing through the corner on which it rests being inclined at  $45^\circ$  to VP as shown in third position by determining the apparent angle
- Draw projectors through all the corners of the lamina to get corresponding front view as shown in fig.

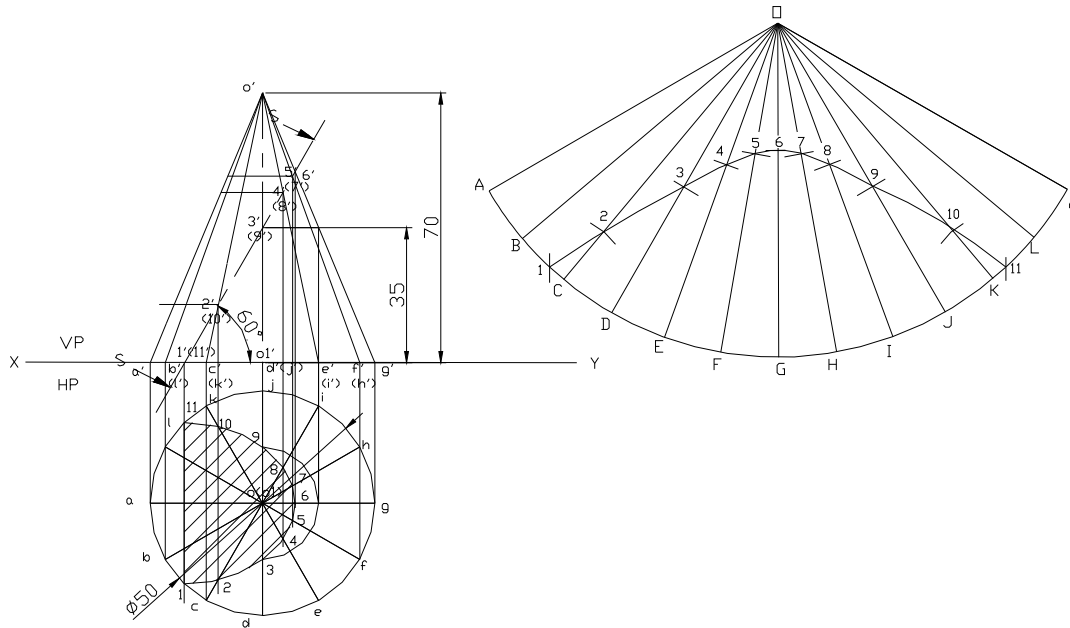
Q4.



Draw X-Y line and print VP and HP as shown for Ist angle of projection. Then follow the following steps:

- Draw the top view and front view of a square pyramid of base side 30 mm and height 60 mm as shown in the first position
- Redraw the front view of the solid, such that one of the edge of the base is on HP and axis being inclined at  $25^\circ$  to HP as shown in second position . Draw projectors through the solid to get the corresponding top view
- Now draw the top view such that the axis is inclined at  $60^\circ$  to VP as shown in third position by determining the apparent angle
- Draw projectors through all the corners of the solid to get corresponding front view as shown in fig.

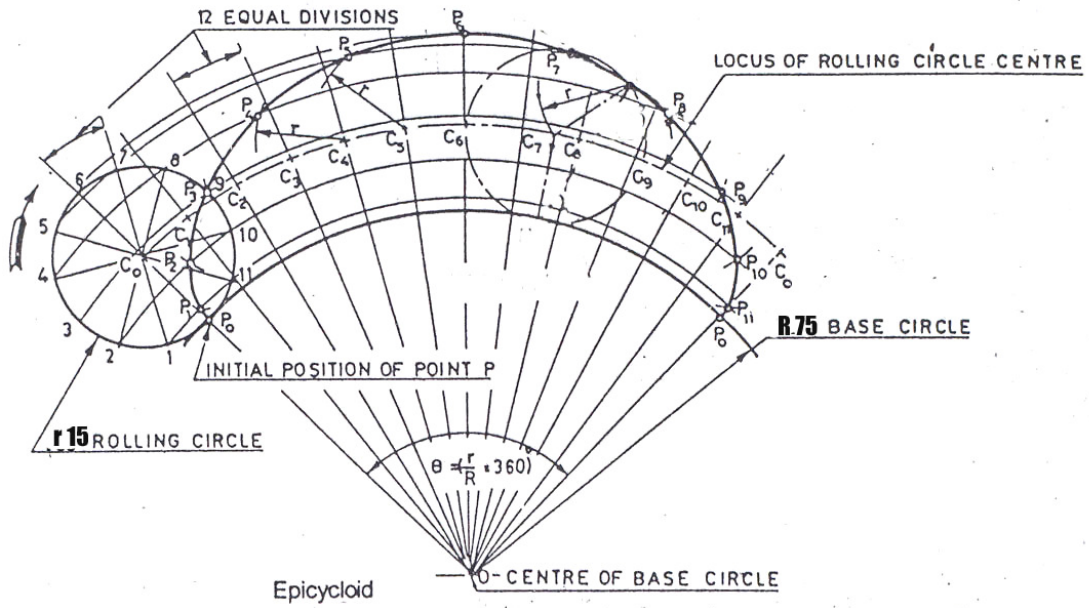
Q5.



Draw X-Y line and print VP and HP as shown for 1st angle of projection. Then follow the following steps:

- Draw the top and front view of a cone of diameter 50 mm and height 70 mm as shown in fig.
- Pass a section plane in the front view at an angle of  $60^\circ$  so as to pass through the mid point of the axis of the solid.
- Mark the section points along the section plane, wherever it cuts the generators and the circumference of the base of the solid
- Transfer these section points to the top view and join them with smooth continuous curve to get the sectional top view
- Draw the development of the solid for the truncated portion as shown in fig.

Q6.



Q7.

