

5. The projectors of the ends of line PQ are 90 mm apart. P is 20 mm above HP while Q is 45 mm behind VP. The HT and VT of the line coincide with each other on xy, between the two end projectors and 35 mm away from the projector of an end P. Draw the projections of line PQ and determine its true length and true inclinations with both HP and VP.
6. A room is 6 m x 5 m x 3.7 m high. An electric bracket light is above the centre of the longer wall and 1.2 m below the ceiling. The bulb is 0.3 m away from the wall. The switch for the light is on an adjacent wall, 1.5 m above the floor and 1.2 m away from the other longer wall. Find graphically the shortest distance between the bulb and switch. Take scale of 1 : 100.
7. Three guy ropes AB, CD and EF are tied at points A, B and E on a vertical post 18 m long at heights of 9 m, 12 m and 15 m respectively from the ground. The lower ends of the ropes are tied to hooks at points B, D and F on the ground level. If the points B, D and F lie at the corners of an equilateral triangle of 8 m long sides and if the post is situated at the centre of this triangle, determine graphically the length of each rope. Assume the thickness of the post and the ropes to be equal to that of the line. Take scale of 1 : 150.
8. Two oranges on a tree are respectively 2.0 m and 3.5 m above the ground and 1.3 m and 2.5 m from a 0.3 m thick wall, but on the opposite sides of it. The distance between the oranges, measured along the ground and parallel to the wall is 3.0 m. Determine graphically the real distance between the oranges. Take scale of 1 : 100.

PROBLEM SET NO. 4

Topic: Engineering Curves (Part-1)

1. The foci of an ellipse are 15 mm from the ends of the major axis which is 90 mm long. Determine the length of the minor axis and draw the ellipse by concentric circle method and by arcs of circle method. Draw the tangent and normal from a point P, which is 25 mm above the major axis.
2. A ball is thrown from the ground level, reaches a maximum height of 5 m and travels a horizontal distance of 10 m from the point of projection. Trace the path of the ball.
3. Construct a curve when the distance of the focus from the directrix is 50 mm and eccentricity is $2/3$.
4. Construct a **rectangular hyperbola** when a point P on it is at a distance of 25 mm from both the asymptotes.

Problem Set No.: -5

Topic: Engineering Curves (Part-2)

1. Draw involute of an equilateral triangle of 25 mm sides. Also draw normal and tangent to it at a point 60 mm from the vertex of the triangle.
2. Draw Involute of a circle of 50 mm diameter. Also draw normal and tangent to it at a point 120 mm from the centre of the circle.

3. Draw locus of a point on the periphery of a circle which rolls on straight line path. Take circle diameter as 60 mm. Draw normal and tangent on the curve at a point 40 mm above the directing line.
4. Draw locus of a point on the periphery of a circle which rolls on a curved path. Take diameter of rolling circle 40 mm and radius of directing circle i.e. curved path, 70 mm, also draw normal and tangent on the curve at 120 mm from the centre of directing circle.
5. Draw locus of a point on the periphery of a circle which rolls from the inside of a curved path. Take diameter of rolling circle 50 mm and radius of directing circle (curved path) 80 mm. Also draw normal and tangent on the curve at a point 30 mm from the centre of directing circle.
6. A point P moves towards another point O, 70 mm from it and reaches it while moving around it once. Its movement towards O being uniform with its movement around it. Draw the curve traced out by point P.
7. Draw an Archimedean spiral of one and half convolution, greatest and least radii being 115 mm and 15 mm respectively. Draw a normal and tangent to the spiral at a point 70 mm from the pole.
8. Rod AB, 120 mm long, revolves in clockwise direction for one revolution. Meanwhile point P, initially on A starts moving towards B and reaches B. Draw locus of point P.
9. In a logarithmic spiral, the shortest radius is 50 mm. The length of adjacent radius vectors enclosing 45° are in the ratio of 9:8. Construct one revolution of the spiral. Draw tangent to the spiral at a point 75 mm from it.

Problem set No.: - 6
Topic: - Projection of Planes

1. Draw the projections of a circle of 50 mm diameter having its plane perpendicular to H.P. and parallel to the V.P. Its center is 50 mm above the H.P. and 30 mm in front of the V.P. Show also its traces.
2. Draw the projection of regular hexagon of 30 mm side with its two sides are parallel to V.P. Its plane parallel and 30 mm below the H.P. and perpendicular to V.P. with its centre at 30 mm behind the V.P. show its traces.
3. A regular pentagon of 50 mm side has one side on the ground. Its plane is inclined at 50° to the H.P. and perpendicular to the V.P. Draw its projections and show its traces.
4. Draw the projections of a circle of 60 mm diameter having its plane vertical and inclined at 30° to the V.P. Its centre is 30 mm above the H.P. and 20 mm in front of the V.P. Show also its traces.
5. A semicircular plate of 90 mm diameter has its straight edge in the V.P. and inclined at 45° to H.P. The surface of the plate makes an angle of 30° with the V.P. Draw its projections.

6. Draw the projections of a circle of 50 mm diameter resting on the HP on point A on the circumference. Its plane inclined at 45° to the HP and (a) The top view of the diameter AB making 30° angle with the VP (b) The diameter AB making 30° angle with the VP
7. A hexagonal lamina has its one side in HP and its opposite parallel side is 25 mm above HP and in VP. Draw its projections. Take side of hexagon 30 mm long
8. A circular plate of negligible thickness and 50 mm diameter appears as an ellipse in the front view, having its major axis 50 mm long and minor axis 30 mm long. Draw its top view when the major axis of the ellipse is horizontal
9. A rhombus of diagonals 40 mm and 70 mm long respectively has one end of its longer diagonal in VP while that diagonal is 35° inclined to VP. If the top-view of the same diagonal makes 40° inclination with HP, draw its projections
10. An isosceles triangle of 50 mm long base side, 70 mm long altitude is freely suspended from one corner of Base side. Its plane is 45° inclined to HP. Draw its projections.

Problem set No.: - 7
Topic: - Projection of Solids

1. A cube of 50 mm long edges is resting on the HP with its vertical face equally inclined to VP. Draw its projection.
2. Draw the projection of (a) a cylinder base mm diameter and axis 50 mm long and (b) a cone base of 40 mm diameter and axis 50 mm long resting on the HP on their respective bases.
3. A hexagonal prism has one of its rectangular face parallel to the HP. Its axis is perpendicular to the VP and 3.5 cm above the ground. Draw its projection when the nearer end is 2 cm in front of the VP. side of base 2.5 cm and axis is 5 cm long
4. Draw the projection of a square pyramid having one of its triangular face in the VP. and the axis parallel to and 40 mm above the HP. Base 30 mm side axis 75 mm long
5. Draw the projections of a cone, base 75 mm diameter and axis 100 mm long, lying on the HP on one of its generator with the axis parallel to the VP.
6. Draw the projections of a pentagonal prism, base 30 mm side and axis 50 mm long, resting on one of its rectangular faces on the HP. with the axis inclined at 45° to the VP.
7. A hexagonal prism base 25 mm side and axis 50 mm long has an edge of its base on ground. Its axis is inclined at 30° to the ground and parallel to the VP. Draw its projections.