
UNIT – I PLANE CURVES & FREEHAND SKETCHING

ELLIPSE, PARABOLA & HYPERBOLA

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.
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. Draw an ellipse when the distance of focus from the directrix is 40 mm & eccentricity is $\frac{3}{4}$. Draw a tangent at a point of the ellipse.
7. Draw a parabola when the distance of focus from the directrix is 40 mm. Draw a tangent at a point on the parabola.
8. Construct a curve when the distance of focus from the directrix is 35 mm and eccentricity is $\frac{4}{3}$. Draw a tangent to a point on the curve. Name the curve.

CYCLOIDS & INVOLUTES

1. Draw the involute of a square of side 30 mm. Also draw tangent and normal to the curve from any point on it.
2. 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° . Draw also a tangent and normal at any point on the curve.
3. 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.

4. 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.
5. 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.
6. Construct a cycloid given the diameter of the generating circle radius is 30 mm. Draw a tangent at point on the cycloid.
7. Construct the path traced by a point on a circular disc radius of 30 mm rolls on a circular path of radius 100 mm.
8. Construct the path traced by a point on a circular disc radius of 30 mm rolls on a circular path of radius 100 mm inside it.
9. A circle of radius 20 mm rolls on the concave side of another circle of radius 40 mm. Draw the path traced by a point on the rolling circle.
10. Draw the involutes of the following. (i) A square of side 30 mm (ii) Rectangular pentagon of side 25 mm. (iii) Circle of radius 25 mm.
11. A string of length 160 mm is wound around a pentagon of side 30 mm. Draw the path traced by the end of the string.
12. A circular disc of radius 24 mm rolls on a plane surface. Draw the locus of a point which is at a distance of 300 mm from the centre of the disc, which rolls for one revolution.