

ENGINEERING GRAPHICS I (GET 215)

Engineering Curves

BY

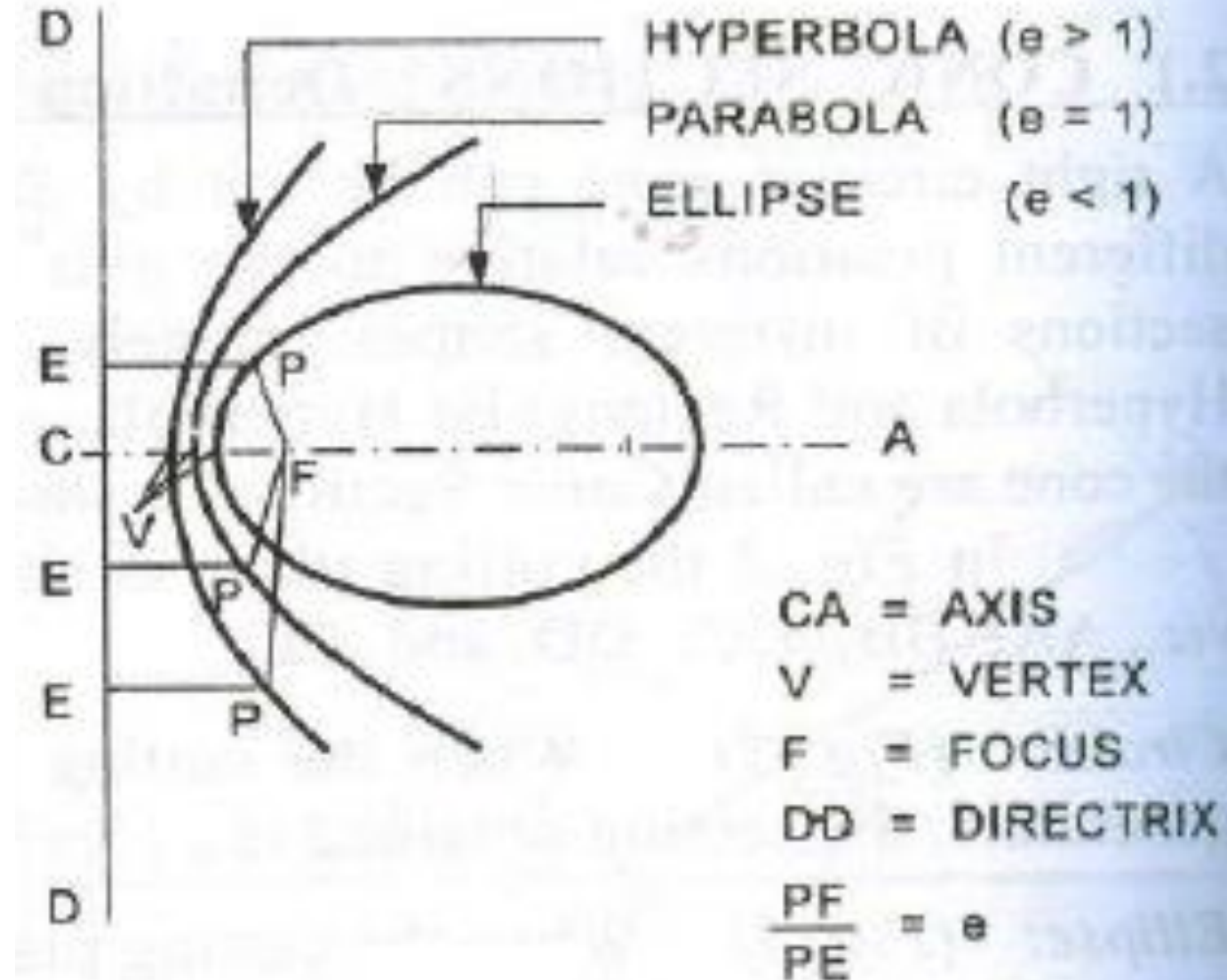
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Conic figures

Points to note:

- Ellipse: eccentricity is always < 1
- Parabola: eccentricity is always $= 1$
- Hyperbola: eccentricity is > 1
- The fixed point is called the Focus
- The fixed line is called the Directrix
- Axis is the line passing through the focus and perpendicular to the directrix
- Vertex is a point at which the conic cuts its axis



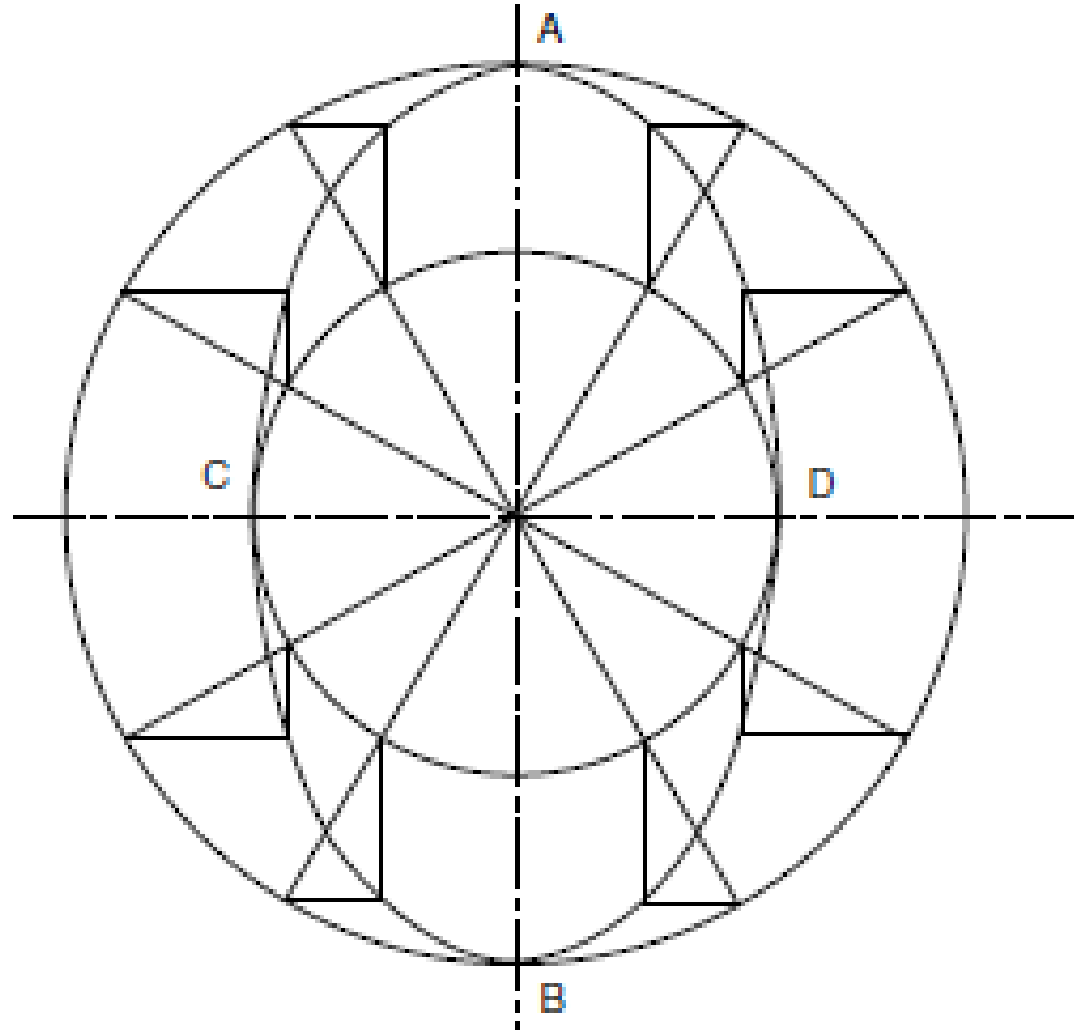
Ellipse (Accurate)

Two-circle method

Steps to follow are:

- 1) Construct two concentric circles equal in diameter to the major and minor axes of the required ellipse. Let these diameters be AB and CD
- 2) Divide the circles into 12 parts.
- 3) The radial lines now cross the inner and outer circles.
- 4) Where the radial lines cross the outer circle, draw short lines parallel to the minor axis CD.
- 5) Where the radial lines cross the inner circle, draw lines parallel to AB to intersect with those drawn from the outer circle.
- 6) The points of intersection lie on the ellipse. Draw a smooth connecting curve.

Ellipse Cont'd



Two-circle method of constructing ellipse

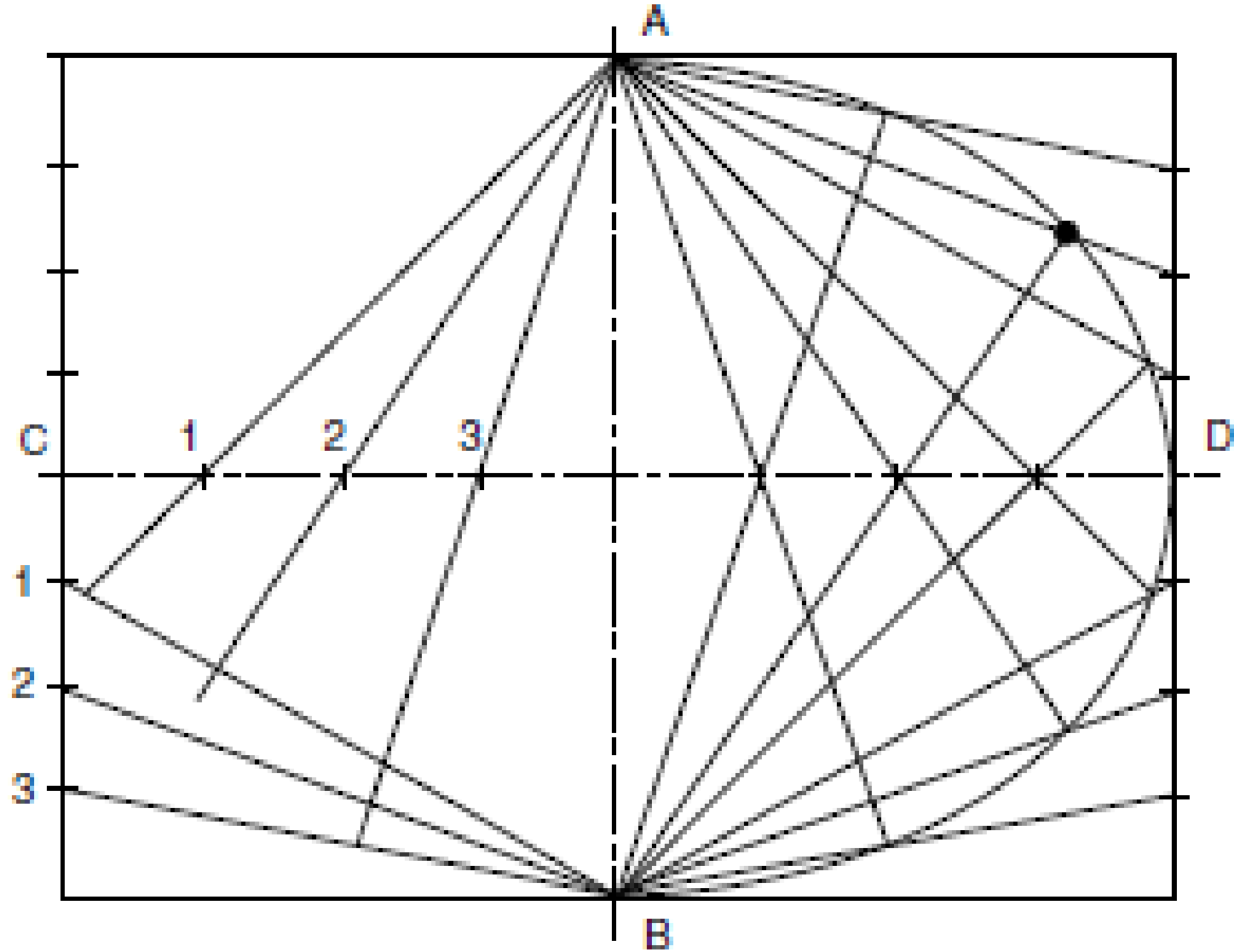
Ellipse Cont'd

Approximate method

Steps to follow are:

- 1) Draw a rectangle with sides equal in length to the major and minor axes of the required ellipse.
- 2) Divide the major axis into an equal number of parts; eight (8) parts are shown here.
- 3) Divide the side of the rectangle A through point 1, and let this line intersect the line joining B to point 1 at the side of the rectangle as shown.
- 4) Repeat for all other points in the same manner, and the resulting points of intersection will lie on the ellipse.

Ellipse Cont'd



Approximate method of constructing ellipse

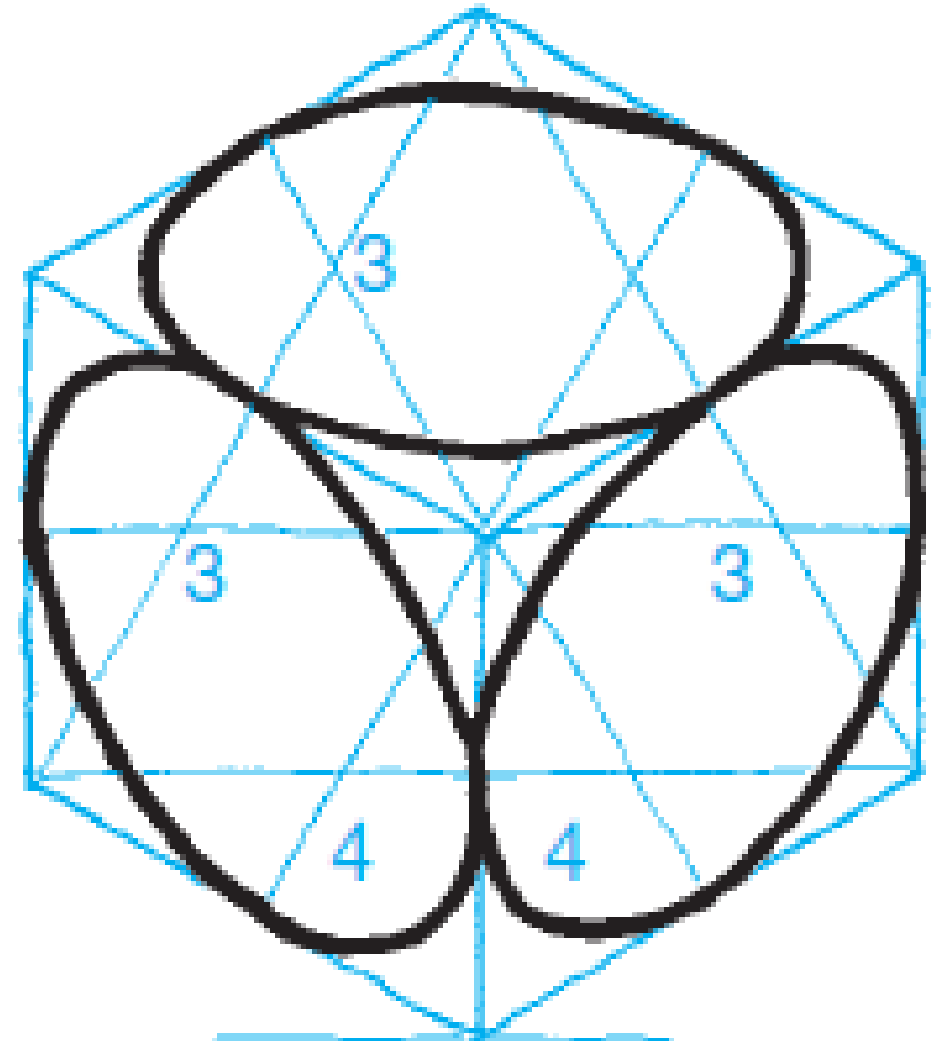
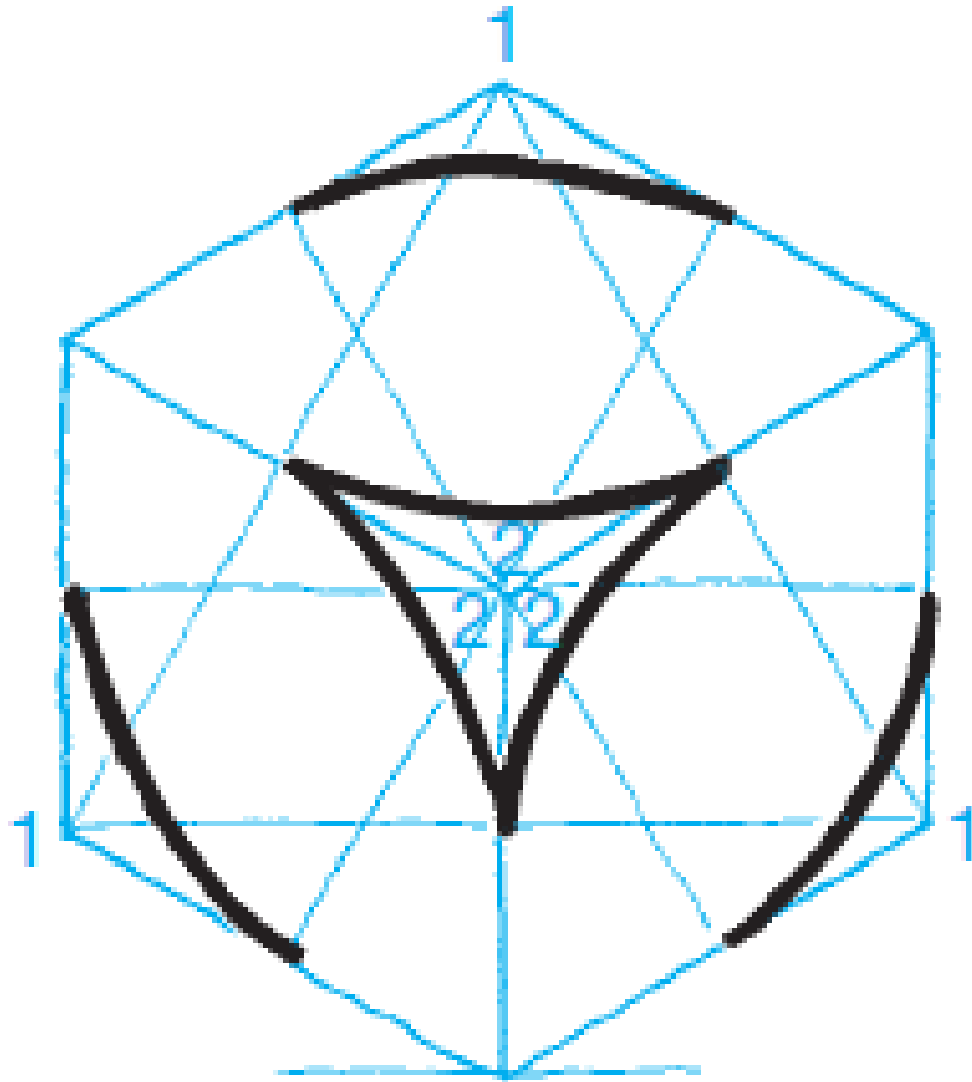
Isometric Ellipse

Four-centre method

Steps to follow are:

- 1) Draw an isometric cube based on the given dimension.
- 2) On each surface of the cube, draw line segments that connect the 120° corners to the centers of the opposite sides.
- 3) With points 1 and 2 as the centers, sketch arcs that begin and end at the centers of the opposite sides on each isometric surface.
- 4) On each isometric surface, with points 3 and 4 as the centers, complete the isometric ellipses by sketching arcs that meet the arcs sketched in Step 3.
- 5) The **horizontal plane, right plane and left plane ellipses** are completed. Note that these shows how circle would be constructed in isometric drawing

Isometric Ellipse Cont'd



Four-centre method of constructing isometric ellipses

Parabola

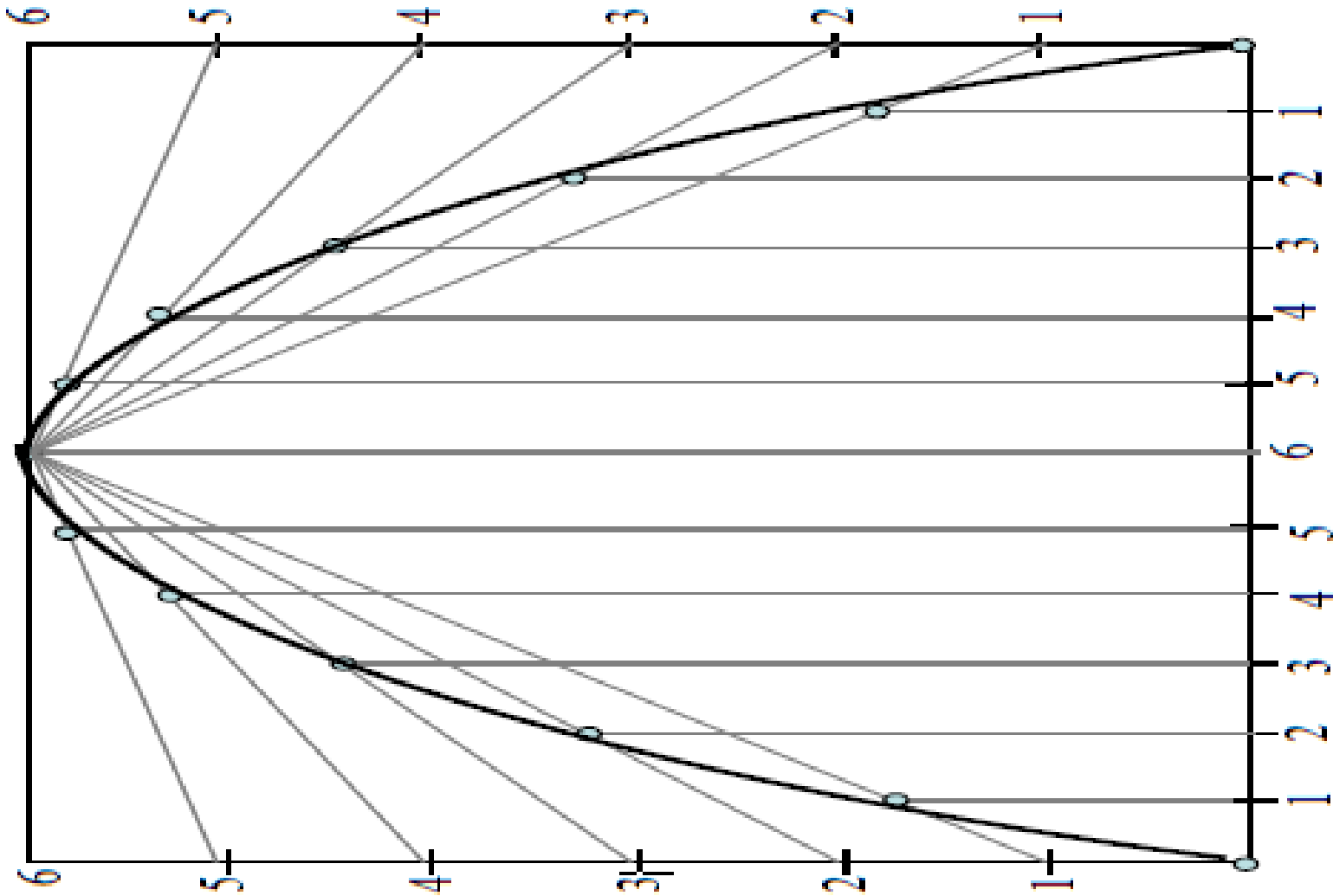
Rectangular method

Draw a parabola having a vertical distance of 60 mm and the horizontal distance 120 mm.

Steps to follow are:

- 1) Draw rectangle of above size and divide it in two equal horizontal parts
- 2) Consider lower part for construction. Divide height and length in equal number of parts and name them 1, 2, 3, 4, 5 & 6.
- 3) Join horizontal 1, 2, 3, 4, 5 & 6 to the left center of rectangle
- 4) Similarly draw horizontal lines from vertical 1, 2, 3, 4, 5 and wherever these lines intersect previously drawn inclined lines in sequence. Mark those points and join in smooth possible curve.
- 5) Repeat the construction on the upper side of the rectangle. Join all in sequence.
- 6) The obtained locus is parabola.

Parabola Cont'd



Rectangular method of constructing parabola

Parabola Cont'd

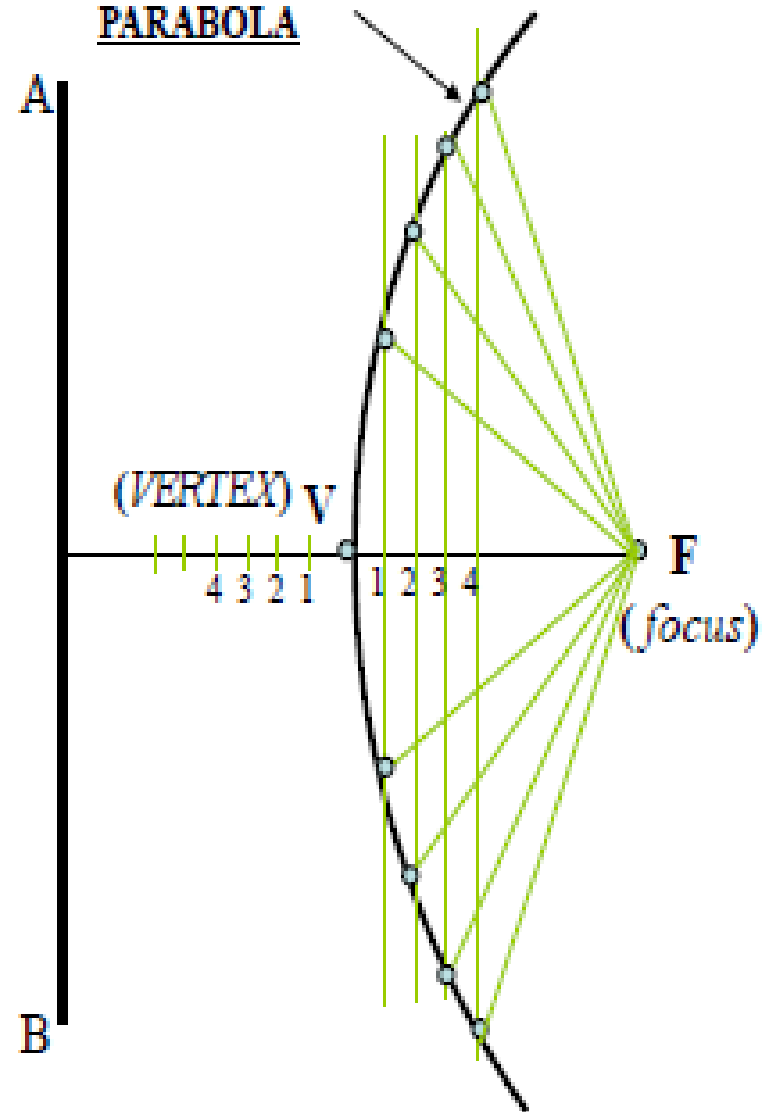
Directrix-Focus method

Point F is 50 mm from a vertical straight line AB. Draw locus of point P, moving in a plane such that it always remains equidistant from point F and line AB.

Steps to follow are:

- 1) Locate center of line, perpendicular to AB from point F. This will be initial point P.
- 2) Mark 5 mm distance to its right side, name those points 1, 2, 3, 4 and from those points draw lines parallel to AB.
- 3) Mark 5 mm distance to the left of P and name it 1.
- 4) Take F-1 distance as radius and F as center, draw an arc cutting first parallel line to AB. Name upper point P1 and lower point P1¹.
- 5) Similarly repeat this process by taking again 5 mm to right and left and locate
- 6) P2, P2¹, etc.
- 7) Join all these points in smooth curve.

Parabola Cont'd



Directrix-focus method of constructing parabola

Hyperbola

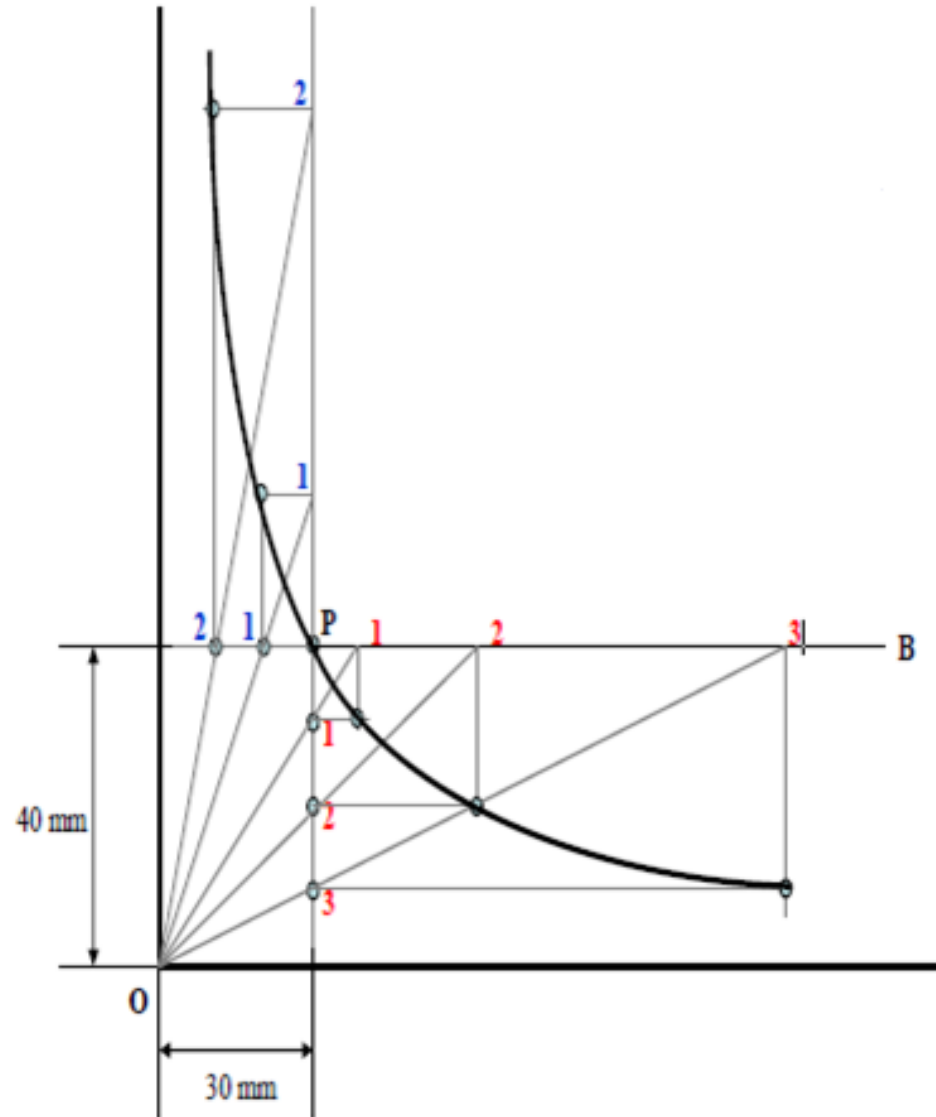
Rectangular method (given coordinate)

Draw Hyperbola through point P, 40 mm and 30 mm from horizontal and vertical axes, respectively.

Steps to follow are:

- 1) Extend horizontal line from P to right side and vertical line from P upward.
- 2) On horizontal line from P, mark some points taking any distance and name them after P- 1, 2,3,4 etc.
- 3) Join 1-2-3-4 points to pole O.
- 4) Let them cut part [P-B] also at 1,2,3,4 points.
- 5) From horizontal 1, 2, 3, 4 draw vertical lines downwards and from vertical 1,2,3,4 points
- 6) [from P-B] draw horizontal lines.
- 7) Line from 1 horizontal and line from 1 vertical will meet at P1. Similarly mark P2, P3, P4 points.
- 8) 8. Repeat the procedure by marking four points on upward vertical line from P and joining all those to pole O. Name them points P6, P7, P8 etc. and join them by smooth curve.

Hyperbola Cont'd



Rectangular method of constructing hyperbola

Assignment 4

1. Using two-circle method, draw an ellipse with major and minor diameters of 75 mm and 58 mm, respectively.
2. Use dimension given in 1 to draw an ellipse using rectangular method.
3. Draw a parabola having a vertical distance of 65 mm and the horizontal distance 125 mm.
4. Draw hyperbola through point P, 38 mm and 26 mm from horizontal and vertical axes, respectively.
5. Draw locus of point P, moving in a plane such that it always remains equidistant from point F and a vertical straight line AB. Note that point F is 56 mm from line AB.
6. Draw horizontal plane, left plane and right plane isometric ellipses on 76 mm².