CE 181103

1st Semester
Comuter Science
Engg

EGD

Construction Conic Sections

ELLIPSE

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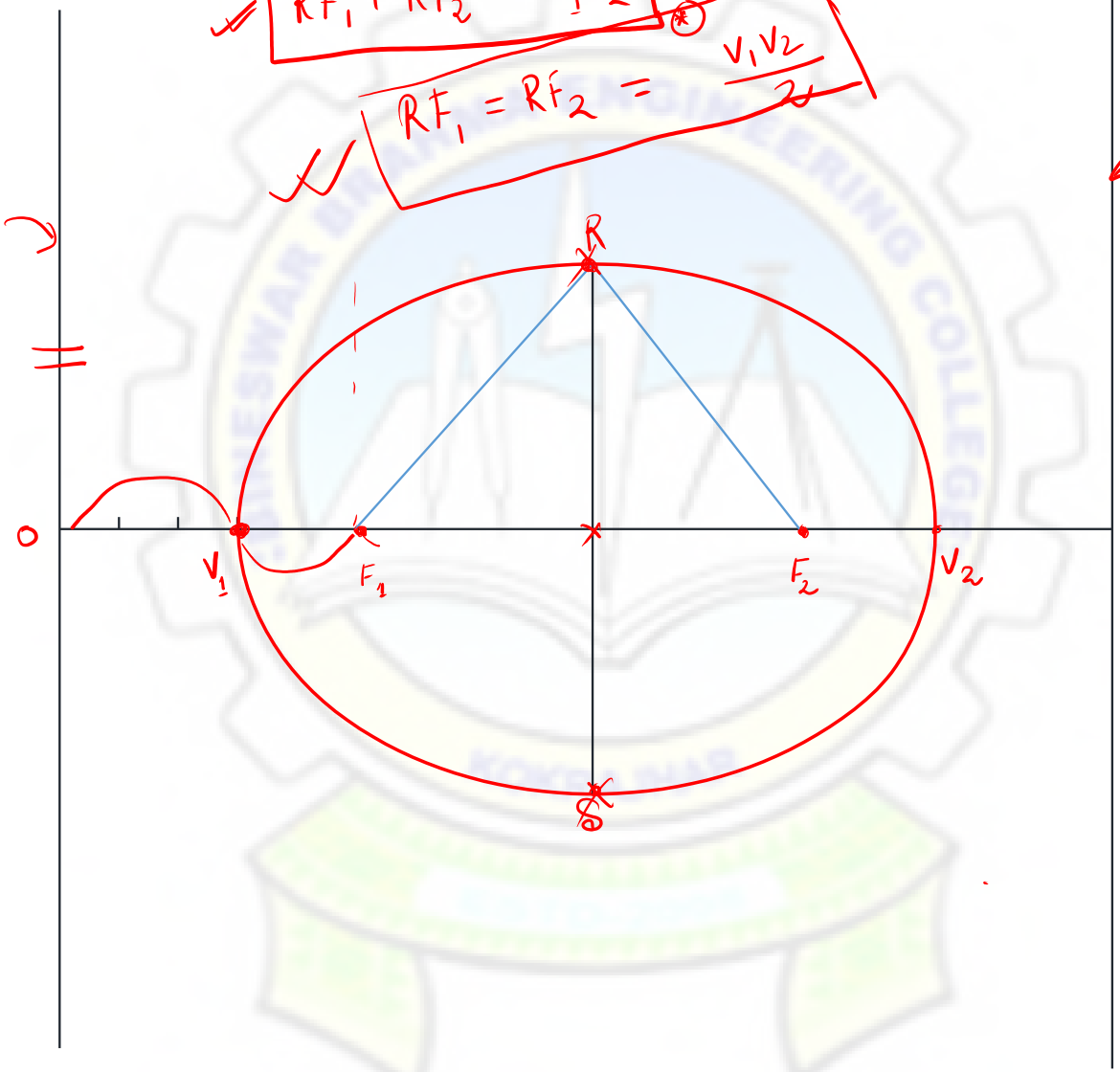
* Construction of ellipse

$RF_1 + RF_2 = V_1V_2$ (*)

$RF_1 = RF_2 = \frac{V_1V_2}{2}$ (*)



V_1V_2 → Major axis

RS → Minor axis

Eccentricity (e)

$e = \frac{V_1F_1}{V_1O}$

$e < 1$

1/⊛ Construct an ellipse whose eccentricity is $\frac{2}{3}$ and the distance of the directrix from focus is 50 mm.

2/⊛ Construct an ellipse whose major and minor axis are 100 mm and 70 mm respectively.

① Soln $e = 2/3$, $OF_1 = 50mm$ → ⊛ General method of construction ⊛

② Soln $V_1V_2 = 100mm$, $RS = 70mm$ → Concentric circle. ↵
→ Arc of a circle. ↵

⊛ Construct an ellipse whose eccentricity is $\frac{2}{3}$ and the distance of the directrix from focus is 50 mm. "Draw Tangent and normal at any point 'P' on the ellipse".

Soln

General Method:

(I) To draw a vertical line (as directrix) and on the vertical line draw a $\perp^{r}$ line (axis)

(II) To mark the focus 'F' from the directrix (50mm)

(III) Divide the line 'OF' into required number of parts (equal) (⟷ Depend upon eccentricity)

$e = \frac{2}{3}$, no of part = (numerat^{r} + denomt^{r}) = 2 + 3 = 5

(IV) Mark the vertex (V). (considering eccentricity).

$\frac{2}{3}$ →

(V) Draw a line 'VE' on vertex 'V' such that VE = VF and is ⊥r to the axis

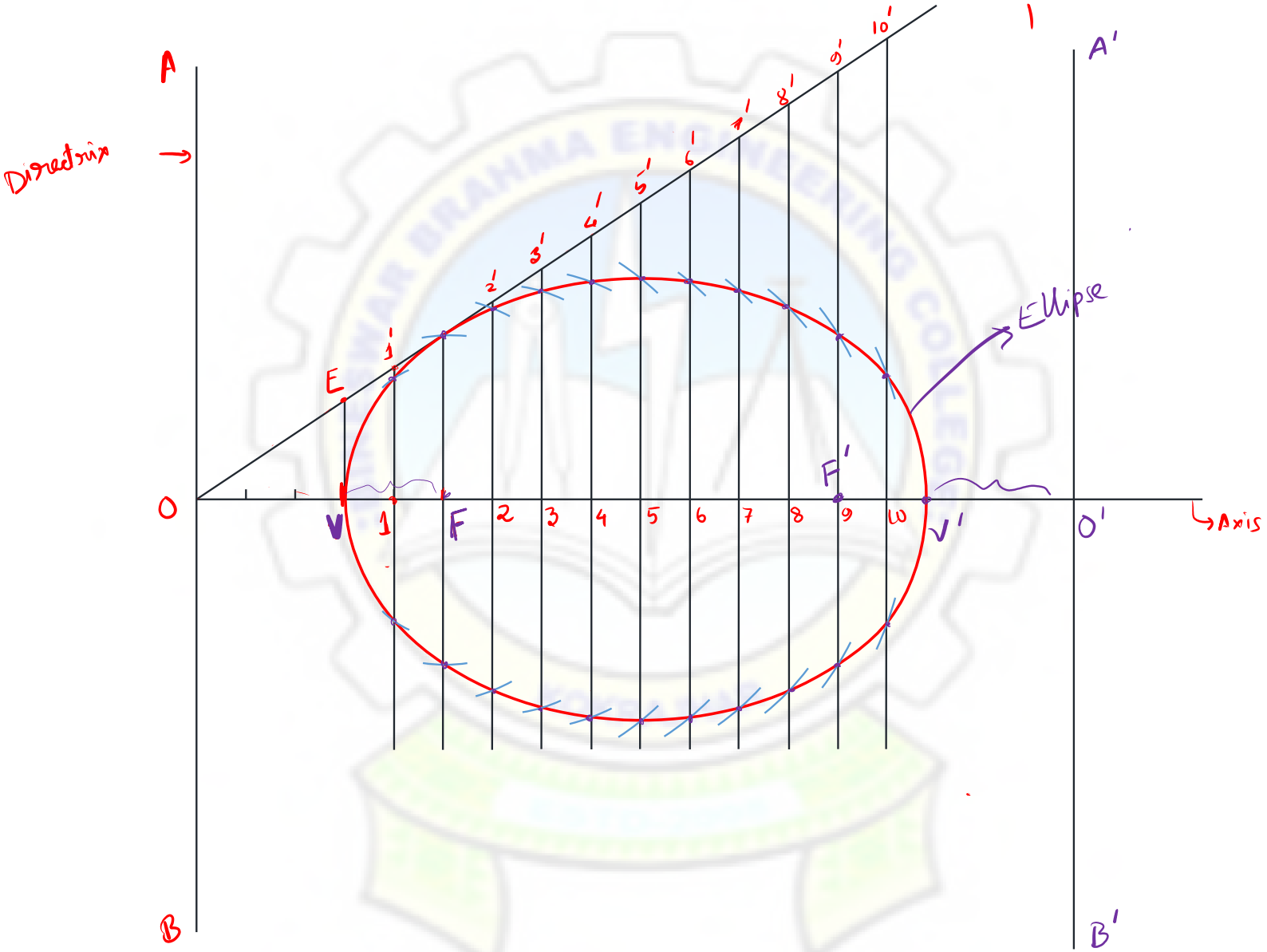
(VI) Join O with E and extend.

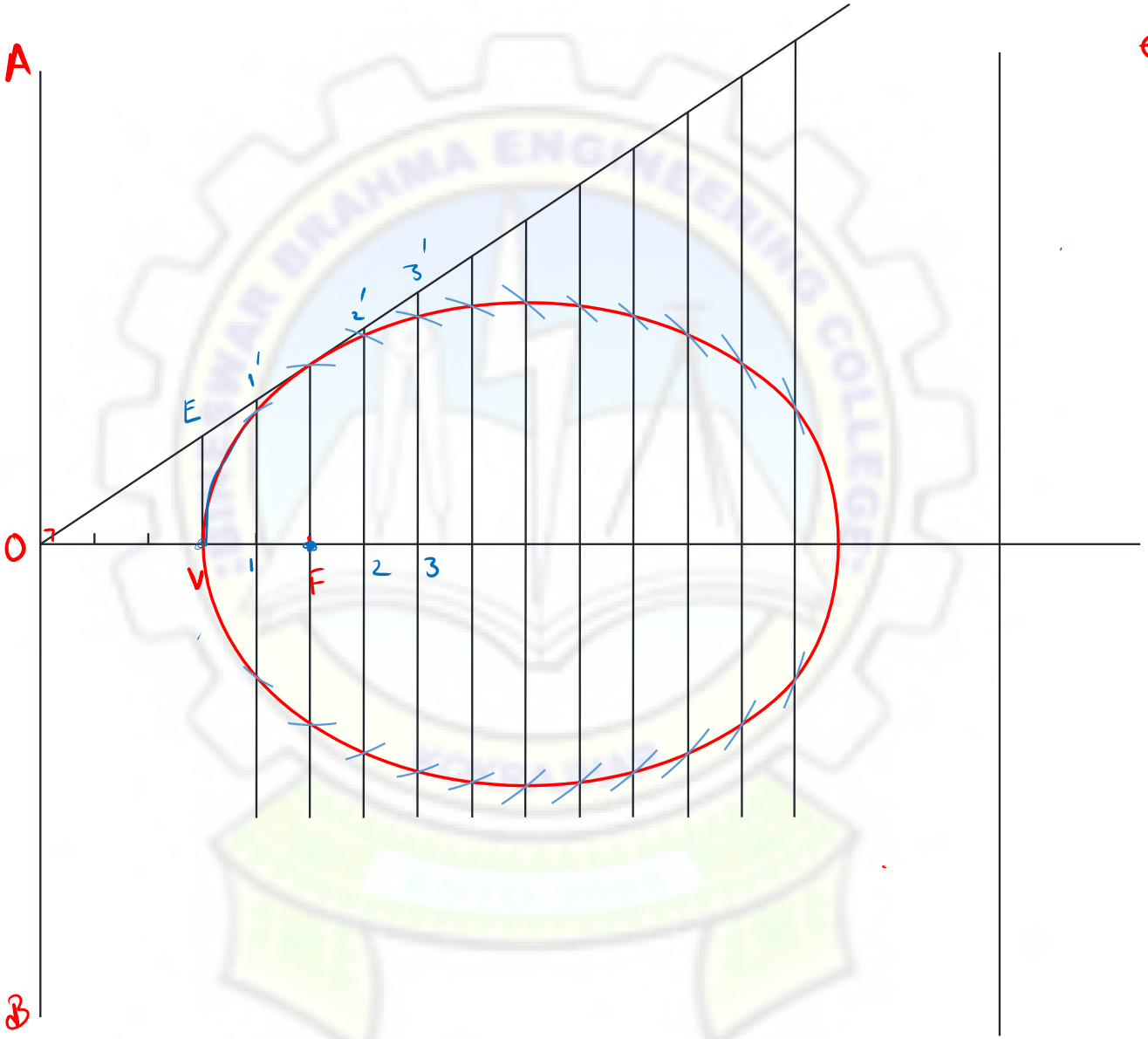
(VII) Divide the axis into some suitable no. of parts [from right of the vertex] and draw ⊥r lines on the axis and mark them.

(VIII) By compass measure the dist. 11' and taking 'F' as the center draw arcs on the line 11' on the both side of axis.

(IX) Repeat step (VIII) for all other lines 22', 33' . . . . .

(X) Join all the point of intersections using smooth curve to get the required ellipse.


A
Directrix
A'
B
B'
O
O'
Axis
E
V
F
F'
V'
Ellipse
1
2
3
4
5
6
7
8
9
10
1'
2'
3'
4'
5'
6'
7'
8'
9'
10'



$e = \frac{3'}{3} =$

$2+3=5$

VE = VF

$\frac{3}{2}$

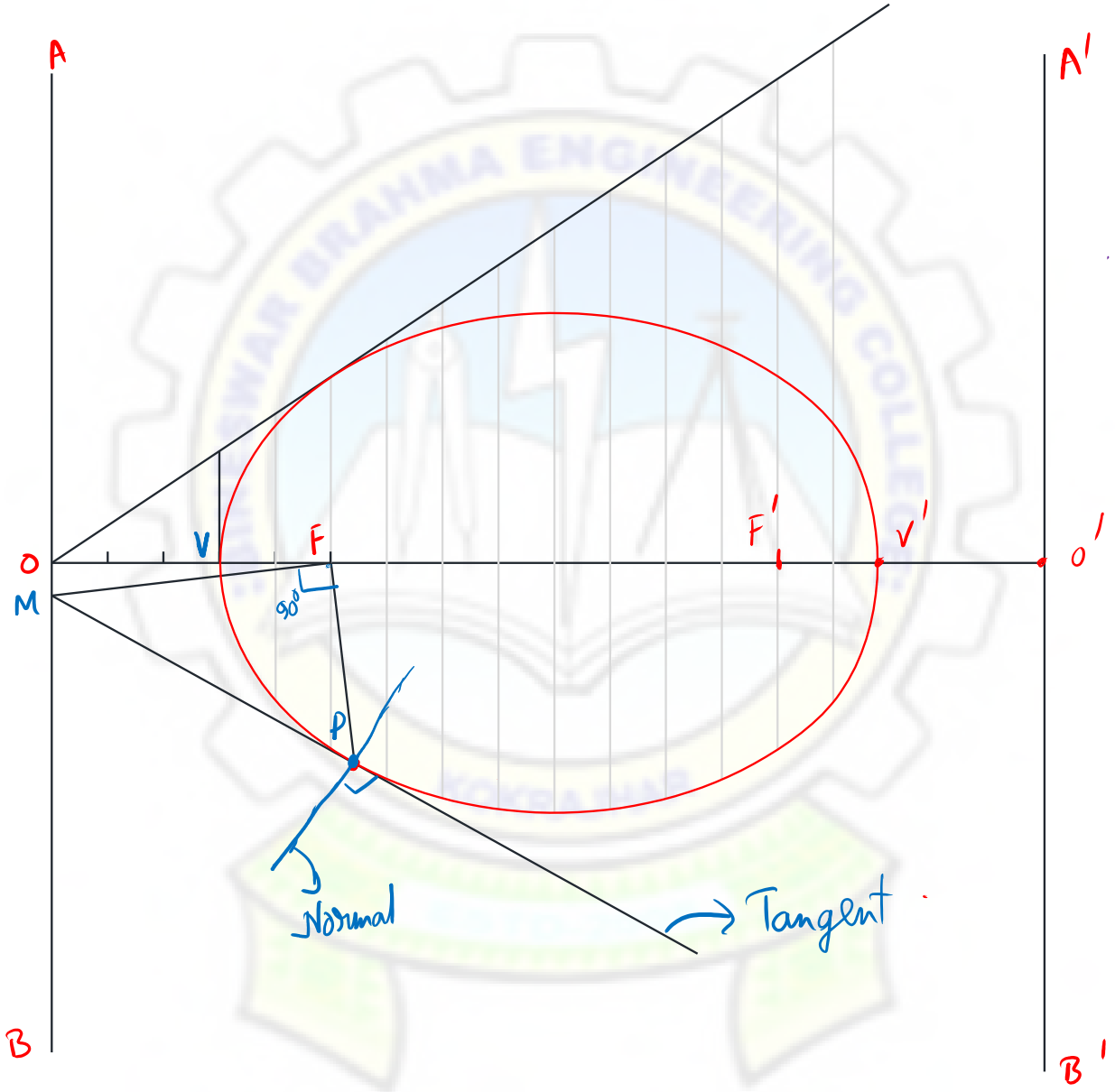
↳ Hyperbola

Drawing tangent at P:

① Join P with focus

② Draw a line MF such that MF ⊥ PF

③ Join M with P and extend. to get the reqd tangent at 'P'.



7/(*) Construct an ellipse whose major and minor axis are 100 mm and 70 mm respectively.

Soln

✓Major axis = 100 mm

✓Minor axis = 70 mm

Method 1:

Concentric circle:

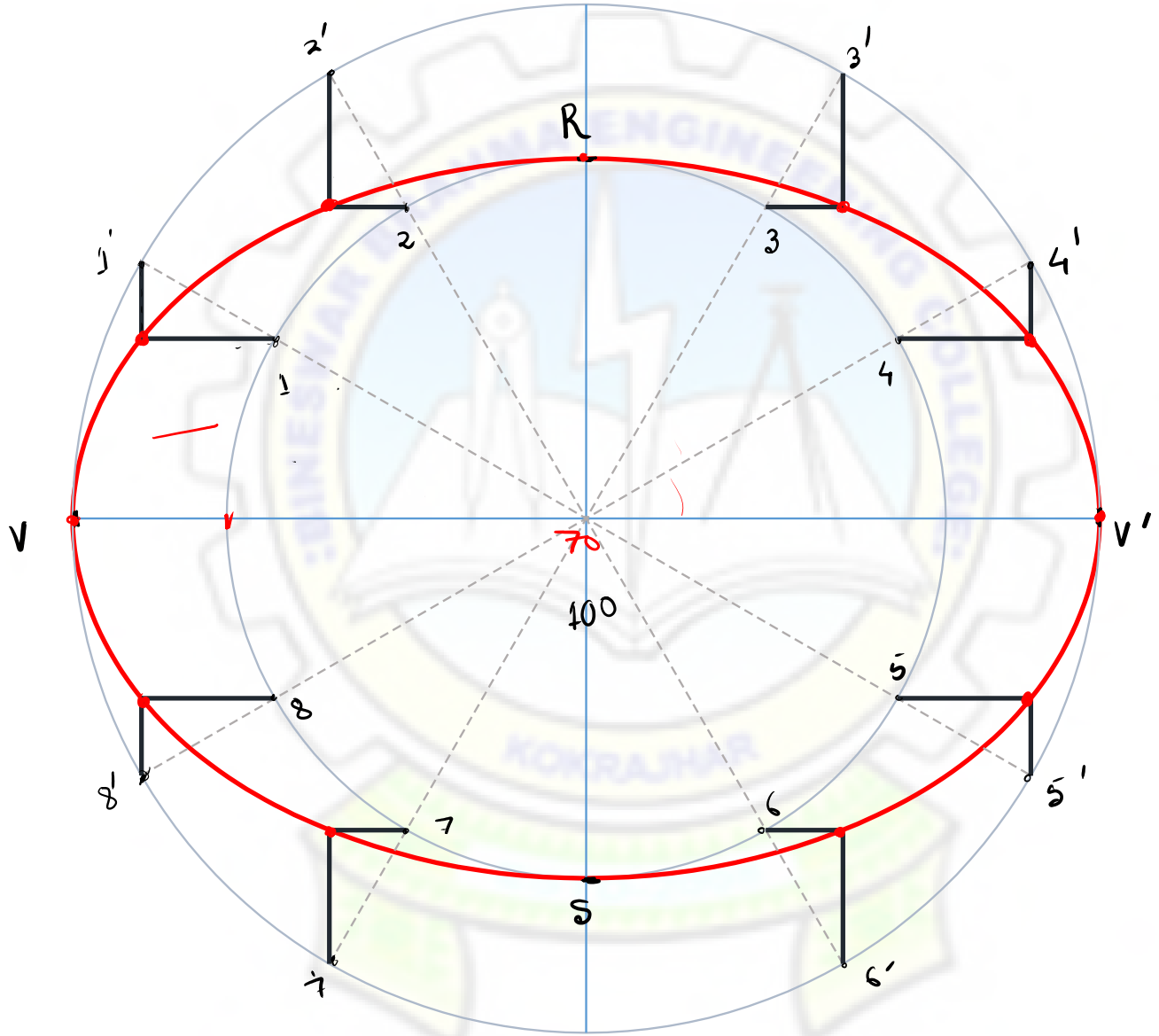
(i) Draw two concentric circles with diameters as major and minor axis respectively.

(ii) Divide both the circles into suitable no of equal parts. (12 parts)

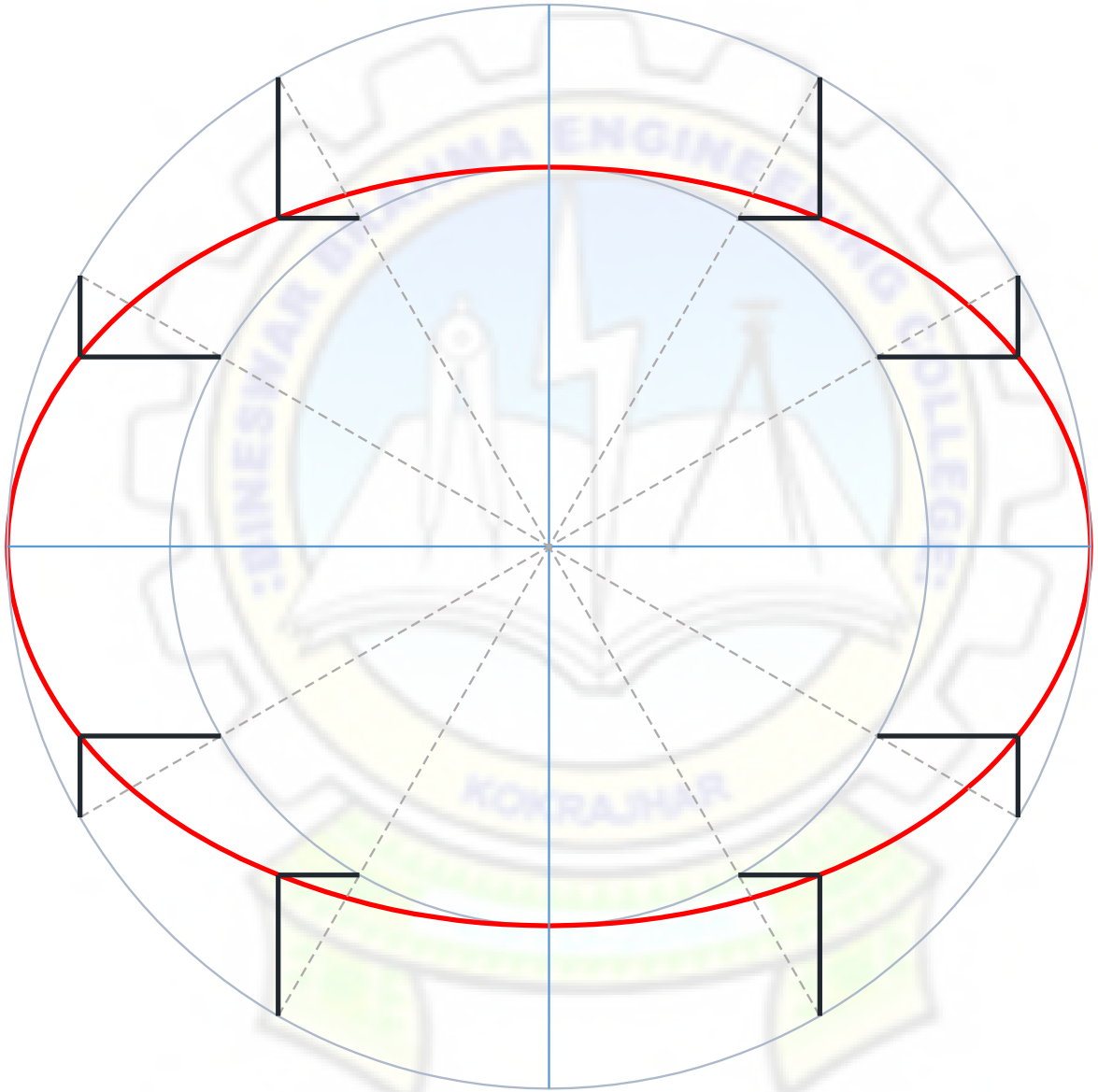
(iii) Mark the vertices on major (V, V') and minor (R, S) axis.

(iv) From all other point of intersection Draw perpendicular line and let them intersect with each other.

(v) Join the new points with vertices by a smooth curve to get the ellipse.



8 no part
12 no parts



Method 2:- Arc of a circle method:-

① Draw the major axis (VV') and minor axis (RS) such that they bisect each other at a point 'O'.

[* We know that the dist of focus from end of minor axis = half of major axis]

② [Locate the focii from any one end of the minor axis] Taking R as the center draw a circular arc to cut the major axis at 2 point F_1 & F_2, considering the radius as half of major axis (= OV).

③ Divide the line betⁿ focii (F_1, F_2) into some suitable no of parts and mark.

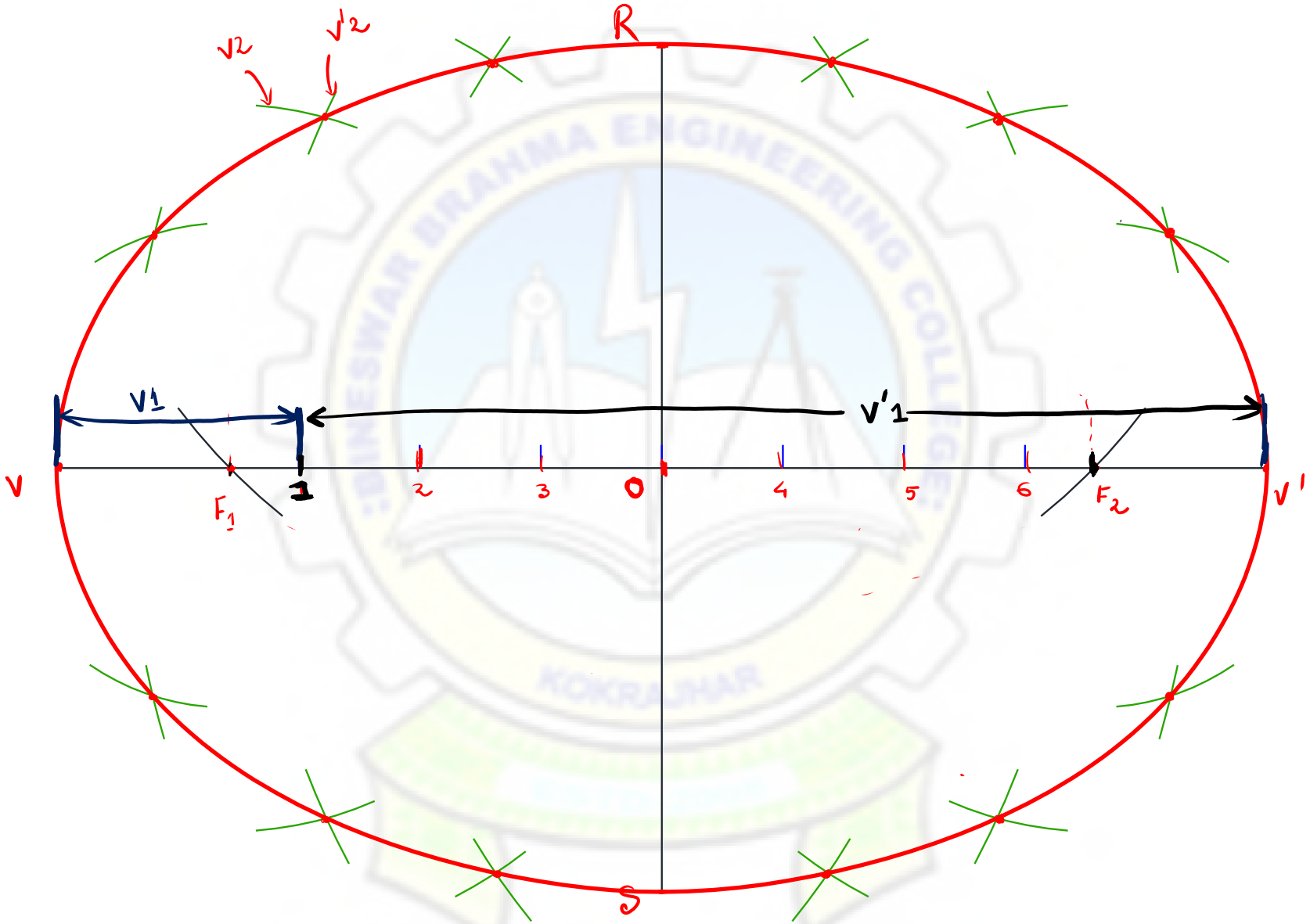
(IV) Consider the dist '1' and taking F_1 as the center draw two arcs on both side of the axis. Again consider '1' as radius and taking F_2 as the center draw two arcs such that they intersect the previous arcs.

(V) Repeat the step (IV) for all other points 2, 3, 4, 5, 6 to get the points of intersection.

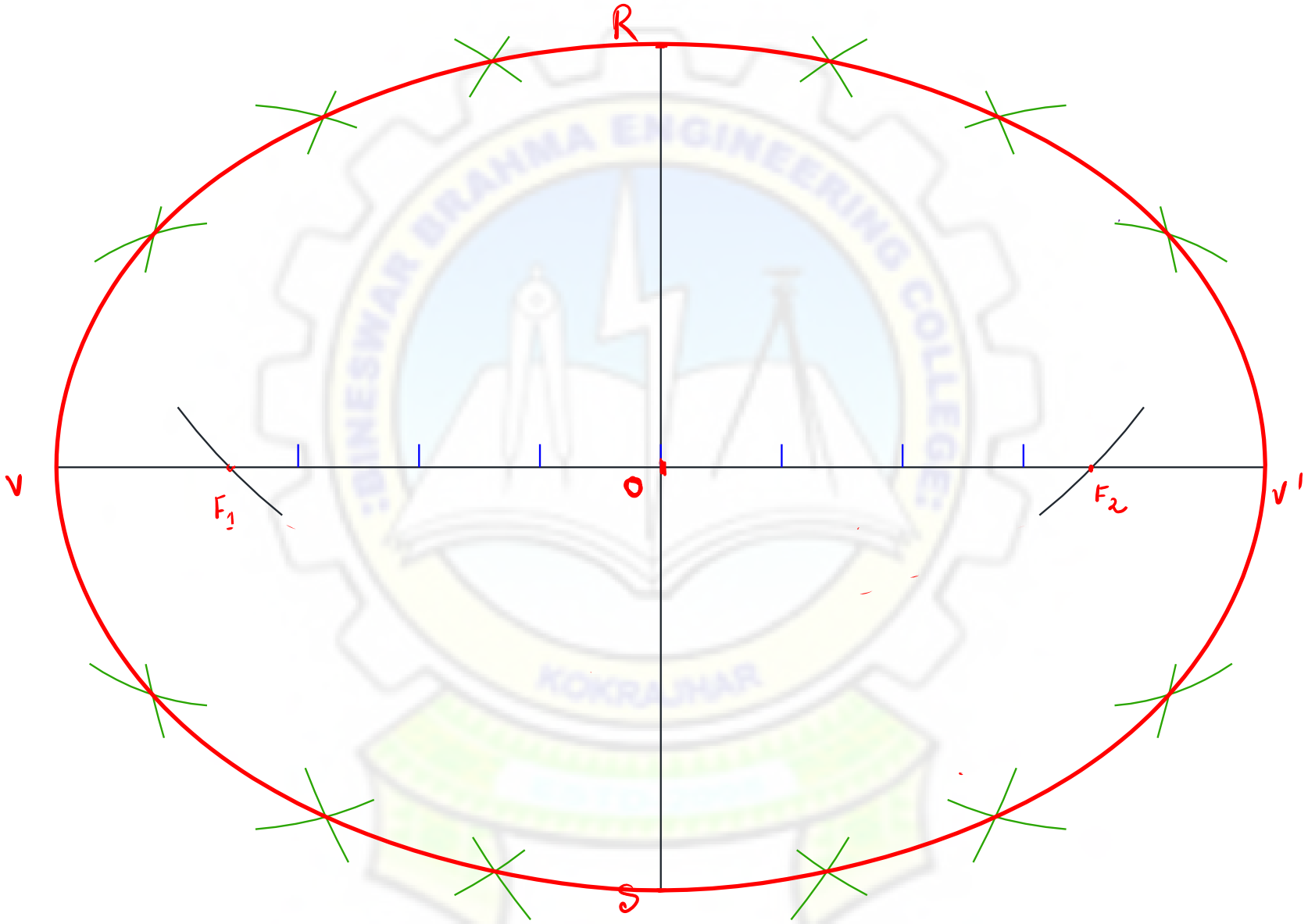
(VI) Join these point of intersections with the vertices by a smooth curve to get the required ellipse.

$VO = OV'$

$RO = OS$



VO = OV'
RO = OS



Thank You!