CE 181103

1st Semester
Civil and Chemical
Engg

EGD

Construction Conic Sections

PARABOLA (Part-1)

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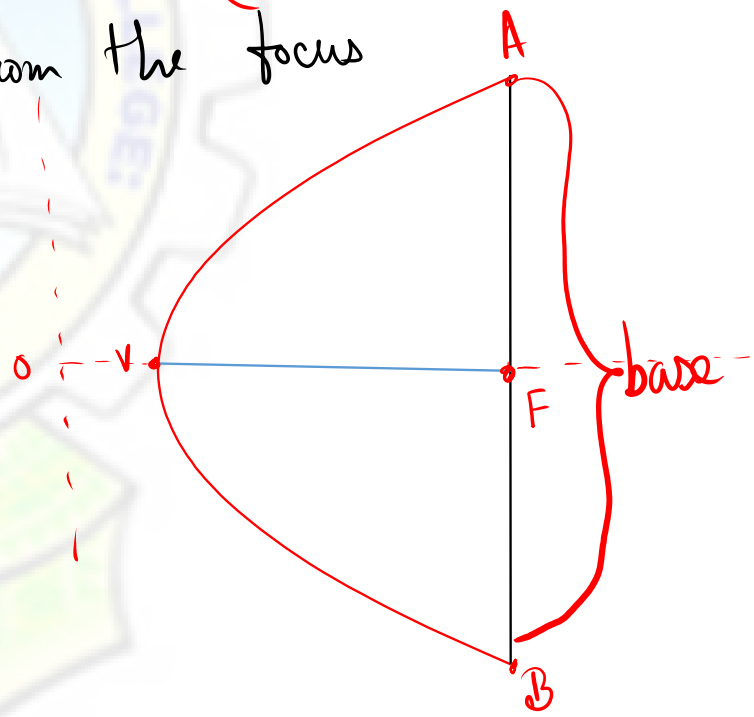
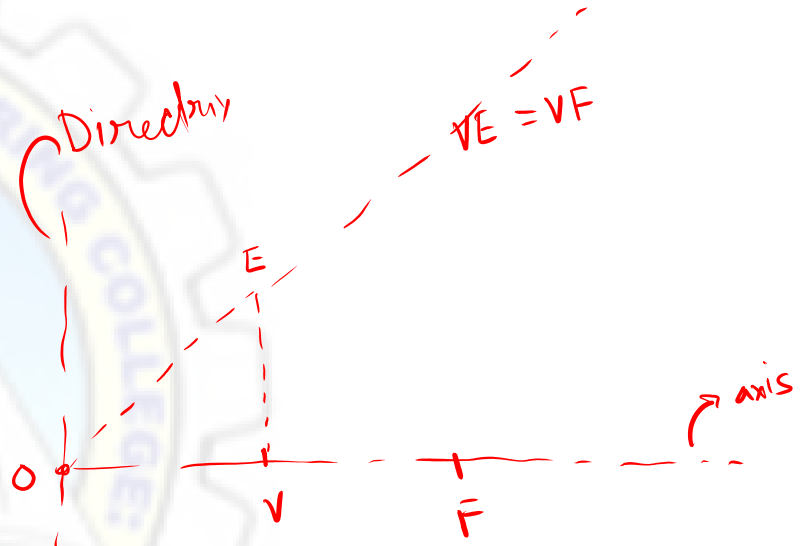
* General Method:
  - Distance of focus from the directrix (OF)
  - Eccentricity (e)

* Rectangular method:
* Tangent method:
  - The distance of vertex from the focus (VF)
  - Length of base (AB)



Q.1 Construct a conic section (parabola) if the distance of the focus is 50 mm from the directrix. Also draw tangent and normal to a point P on the curve.

Soln $e = 1$ → construction of parabola



Steps

(i) Draw a straight line (AB) as directrix and from any point (O) on AB draw a perpendicular line.

(ii) Mark the focus 'F' on the axis at 50 mm from the directrix.

(iii) Mark the vertex 'V' of the parabola

(IV) Draw a 1^{st} line 'VE' on V such that VE = VF

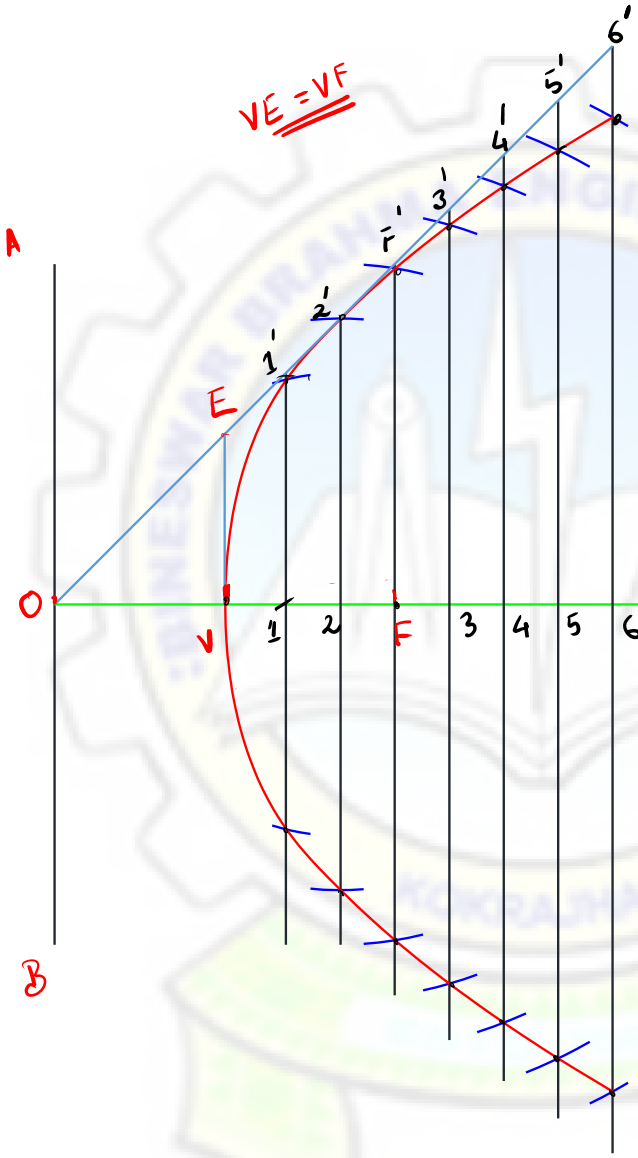
(V) Join 'OE' and extend the line.

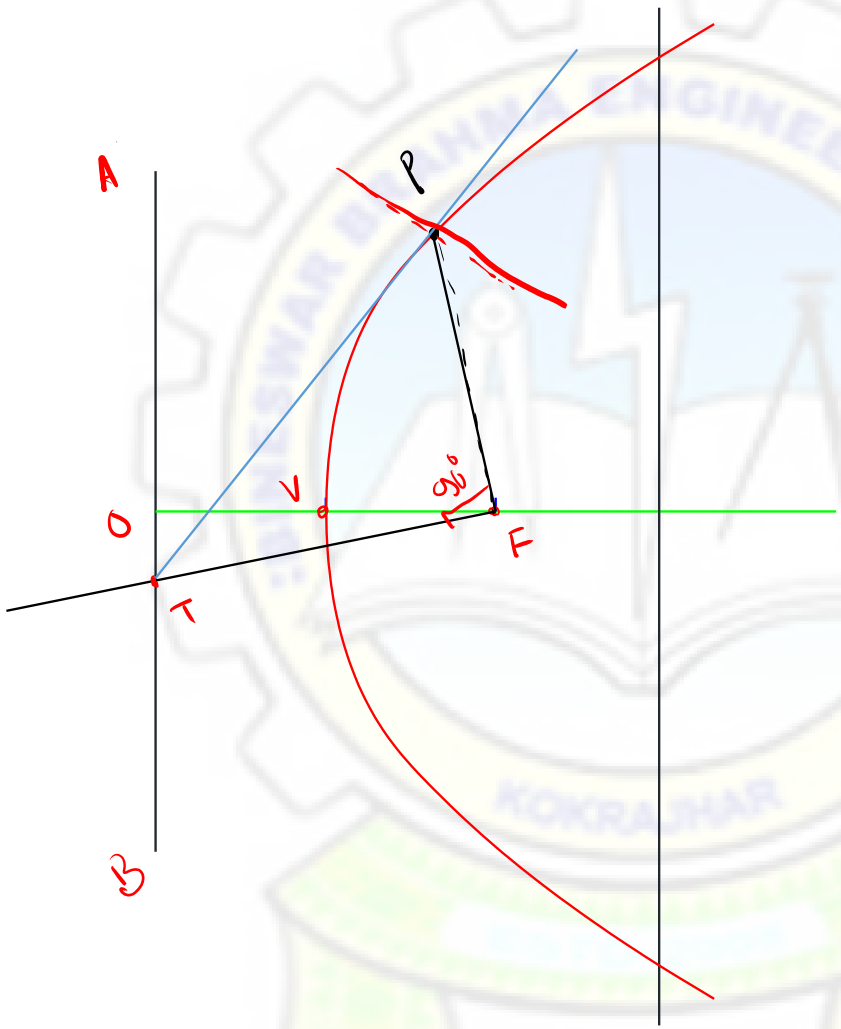
(VI) Draw some perpendicular line to the right of vertex and mark them.

(VII) Now, using compass measure (11') and take 'F' as the center and draw arcs of radius (11') on the same line to the both side of the axis

(VIII) Repeat the same (step VII) for lines 22', 33', 44', 55', 66' & FF'.

(IX) Through all these point of intersection draw a smooth curve going through vertex (V) to get the required parabola.


VE = VF
A
B
O
V
E
F
1
2
3
4
5
6
1'
2'
3'
4'
5'
6'



Step I :

① Join P with F

② Through 'F' draw a 1st line to 'PF' to cut the directrix at T.

③ Join PT to get tangent

Q.2 Draw a parabola if the distance of the vertex from the focus is 100 mm and the length of the base is 150 mm.

Rectangular method

(I) Draw the base and using the other length make a rectangle (ABCD)

(II) Mark the center (F) of the base (AB) and draw a 1^{st} line through it. (VF)

(III) Divide 'AD' into suitable no of equal parts. (and mark)

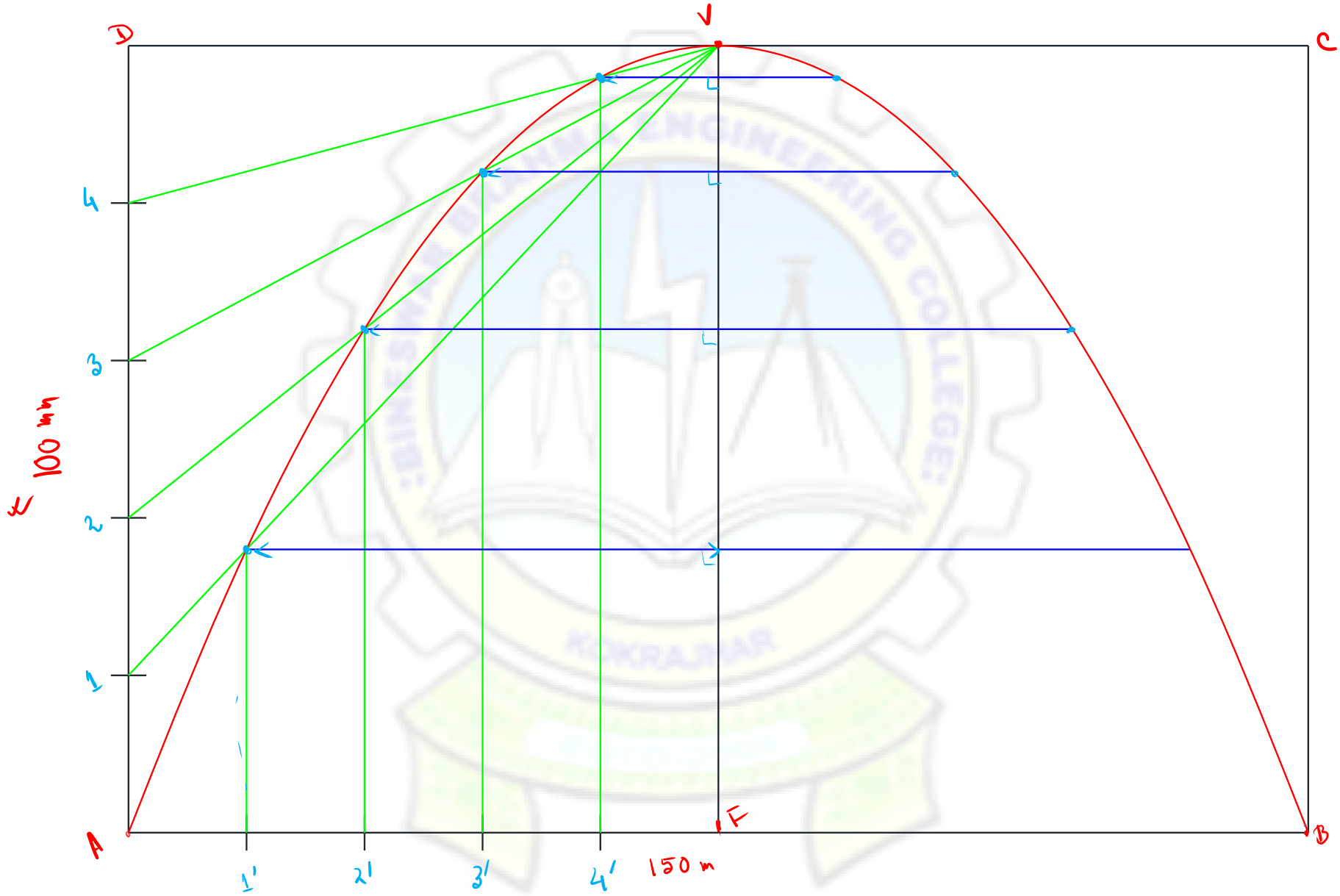
(IV) Consider the section of base next to the line 'AD' (AF) and divide it into same no of equal parts. (and mark)

(v) Join 1, 2, 3, 4 to the vertex 'v'

(vi) Draw 1^{st} lines from 1', 2', 3', 4' to cut the lines V1, V2, V3 and V4 respectively.

(vii) Project these new point of intersection to the other side of the axis.

(viii) Join all these points by smooth curve which goes through the vertex (v) and touches the base


D
V
C
4
3
2
1
100 m
A
1'
2'
3'
4'
150 m
F
B

Q.3 A ball thrown up in the air reaches a maximum height of 45 m and travels a horizontal distance of 75 m. Trace the path of the ball assuming it to be parabolic.

Sol^n

⊛ → Dist of vertex from focus = 45 m (→ 9 cm)

⊛ → Length of base = 75 m → (15 cm)

45 m → 9 cm

Scale :

$$RF = \frac{9\text{ cm}}{45\text{ m}} = \frac{9\text{ cm}}{4500\text{ cm}} = \frac{1}{500}$$

→ 1 : 500

$$75\,00 \times \frac{1}{5\,00}$$

Steps

→ Draw the base and (AB) and mark the (focus) center (F)

→ Through F Draw a 1st line VF = dist of vertex from focus.

→ Extend the line VF to C such that VC = VF.

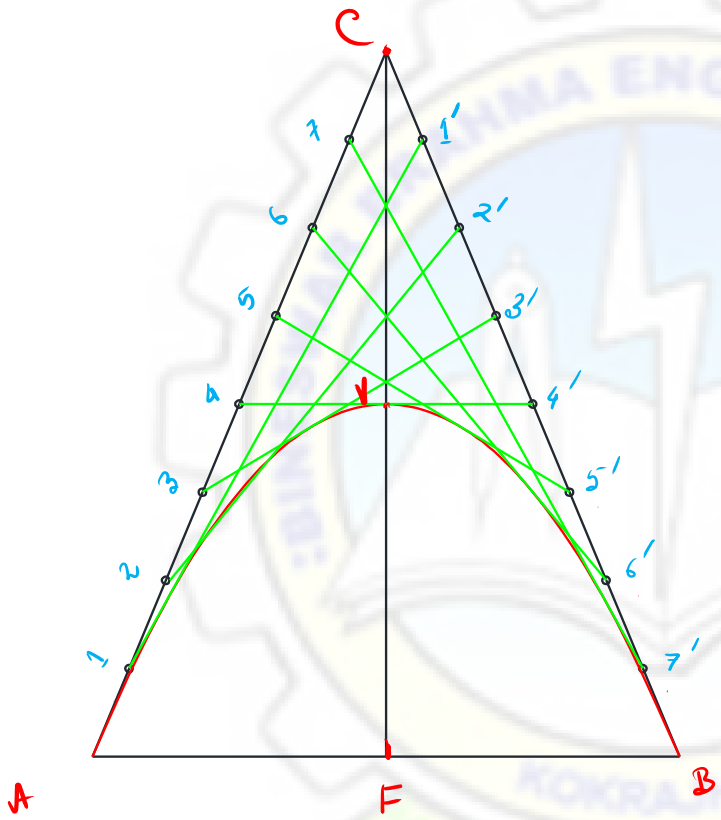
→ Join C with A & B.

→ Divide AC & BC into same no of equal parts and mark

→ Join 11', 22', 33' - - - - -

→ Draw a smooth curve TANGENTIAL to 11', 22', 33' .... to go through vertex and touch ends of the base.

Divid AC / BC



AB = 15 cm = 75 m

VF = 9 cm = 45 m

VC = VF


Thank
You