

Engineering Graphics

Unit-I

Drawing Office Practice and Dimensioning:-

1.1 Drawing Office Practice

1.2 Dimensioning

1.1 Drawing Office Practice:-

Engineering drawing:-

* It represents the real things with the help of Engineering drawing.

* It can express with size and shape of any object and all get accurate & clear.

Importance of Engineering drawing:-

* It's a two dimensional representation of a three dimensional object.

* Drawings are prepared by engineers of engineering objects → called as Engineering drawings.

Engineering graphics:-

* It's a graphic representation of physical objects → called as Engineering graphics.

Graphic representation → To build new structures & designing new machines, it represents the existing ones

Importance of graphic representation:-

* Without graphic language, we can't convey their ideas by speech or writing, becoz both are unreliable & difficult to understand.

* In absence of graphic language → leads to Possibility of manufacturing errors.

Drawing practice as per B.I.S. Code:- (BIS 696-1972):

Code no. with year	Name of the drawing
BIS: 10711-1983	Sizes of drawing sheet
BIS: 10713-1983	scales
BIS: 10714-1983	The general principles of Presentation.
BIS: 9609-1985	English lettering.
BIS: 11665-1985	Title block
BIS: 11664-1986	Folding of drawing points
BIS: 11669-1986	General principles of dimensioning.

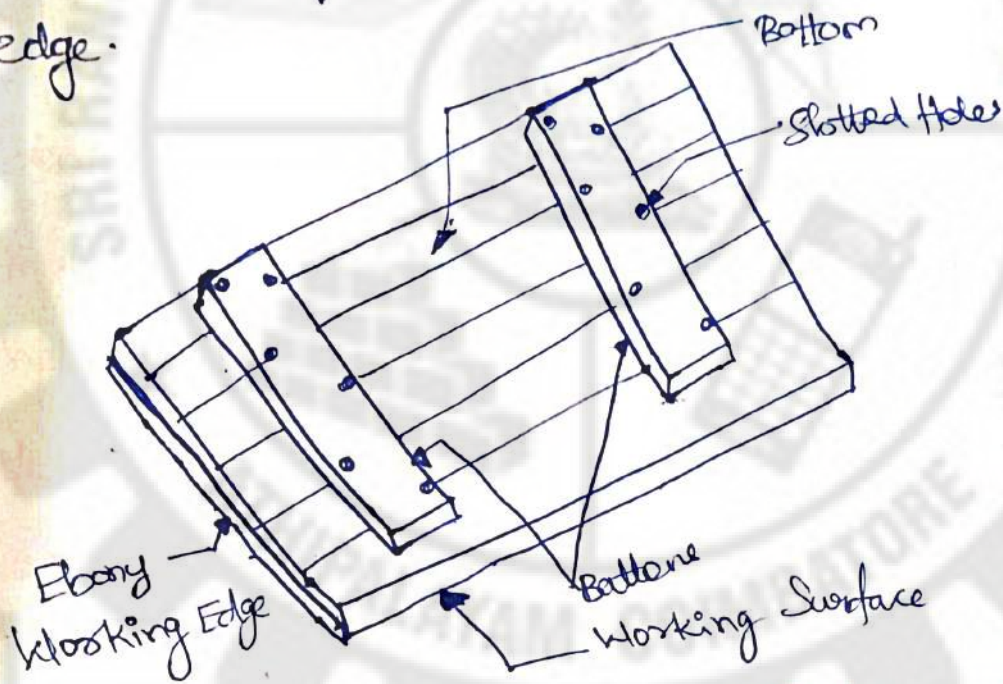
Drawing Instruments:

- * Drawing instruments are,
- * Drawing board
- * T-square
- * Set squares
- * Protractor
- * Clinograph.
- * French curve
- * Scales
- * Instrument box
- * Eraser
- * Sand paper bag
- * Duster
- * Cello tape
- * Mini duster
- * Drawing sheets
- * Compass
- * Divider
- * Drawing pencil

Drawing Board:-

* It is rectangular in size and made up of strips of well seasoned pine wood about 22mm thick.

* Left end of the board is provided with ebony edge.



Usual size of drawing board:- (BIS 1444-1963)

<u>Designation</u>	<u>Drawing board size in mm.</u>
D0	1500 x 1000 x 25
D1	1000 x 700 x 25
D2	700 x 500 x 15
D3	500 x 350 x 15

D2 & D3 → board convenient for polytechnic colleges.

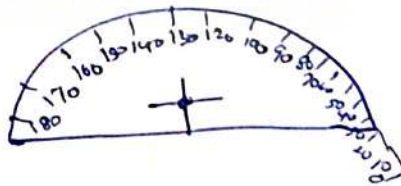
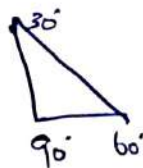
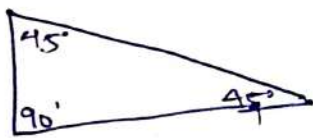
Others → convenient for engineering colleges

TEE square:

- * It consist of stock and blade which are fastened together @ right angles to each other by means of screws and pins.
- * It's made up of hardwood.
- * T-square is held against the working edge of drawing board.
- * It is used to draw only horizontal lines with help of set squares, then we can draw vertical, inclined and parallel lines.

Set squares:

- * It's triangular in shape.
- * Transparent celluloid set squares → commonly used.
- * $30^\circ - 60^\circ$ → set square → 250 mm length.
- * 45° → set square → 200 mm length. } convenient length size.
- * Set square → Mainly used to draw \perp , \parallel & Δ (inclined) lines.

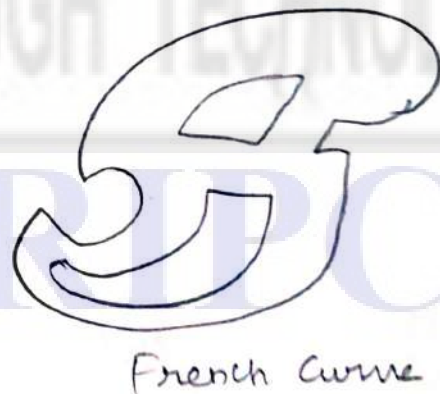
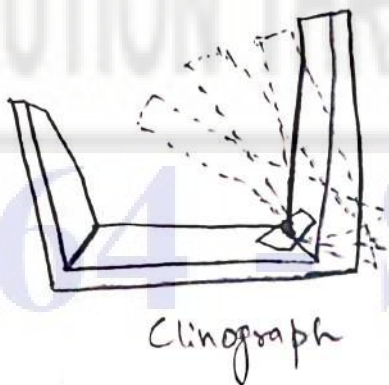


Protractor:

- * It's semi circular or circular in shape. which is divided into 1° division.
- * Transparent Celluloid Protractor \rightarrow commonly used.
- * It's used to draw (or) measure angles from 0° to 180° .

Clinograph:

- * It's an adjustable set square.
- * Made up of wood (or) plastic.
- * Adjustable side can be adjusted to any inclination.
- * It's more useful to draw lines @ any angle with speed & accuracy.



French curves

* To draw curved lines other than circles and arcs

Scales

* In engineering drawing metric scales are used as per BIS recommended:

* Full size - 1:1

* Enlarged scale - 100:1, 50:1

* Reducing scale - 1:10, 1:20

Instrument Box:

* Instrument box items are,

* Large compass (or) Large bow compass.

* Small bow compass

* Large size divider.

Large bow compass:

* It is used to draw circles and arcs.

* It has 2 legs.

* The legs are pivoted @ the top.

* At lower end of one leg, an adjustable pointed needle is fitted.

* At the lower end of another leg pencil lead is inserted.

- * A knee joint is provided @ both the legs.
- * Needle point must be longer than pencil point.

Diagram → Refer book

- * Upto 20mm dia circles are drawn by keeping the leg compass straight.
- * For larger circles, → To draw used both the legs should be bend @ knee joint. so that they are \perp to the surface paper.
- * If circle more than 300mm dia are drawn with the help of lengthening bar.

Small Bow Compass:

- * Small circles upto 25mm dia are drawn by using small bow compass.
- * To adjust the distance between the legs, an adjustable screw provided.
- * Adjusting screw → Either on side (or) @ centre.

- * A knee joint is provided @ both the legs.
- * Needle point must be longer than pencil point.

Diagram → Refer book

- * Upto 120mm dia circles are drawn by keeping the leg compass straight.
- * For longer circles, → To draw used both the legs should be bend @ knee joint. so that they are \perp to the surface paper.
- * If circle more than 300mm dia are drawn with the help of lengthening bar.

Small Bow Compass:

- * Small circles upto 25mm dia are drawn by using small bow compass.
- * To adjust the distance between the legs, an adjustable screw provided.
- * Adjusting screw → Either on side (or) @ centre.

Dividers:-

- * It also consists of two legs hinged @ the top
- * A steel needle is provided @ lower end of each leg.

Diagram → Refer Book

- * Divide straight (or) curved lines into no. of equal parts.

- * To set off given distance from scale to the drawing.

- * Transfer the dimensions from one part of drawing to another part of drawing.

Drawing Pencils:

- * Appearance of a drawing depends upon the quality of pencils being used.

- * Drawing pencils are made in grades.

- * Grades → H, 2H, 3H → It indicates the degree of hardness in an increasing order.

- * IIIrd Grades → B, 2B, 3B → It indicates the degree of softness in an increasing order.

- * Grade → HB → It indicates medium soft.

Diagram → Refer Book

* 2H Pencil → For drawing outlines, centre lines & break lines.

* H pencil → For dimensioning, arrow heads, section

* HB pencil → For Freehand works. lines, pointing, circles, arcs.

Eraser:-

* Soft quality eraser → Most suitable kind of eraser for pencil drawings.

* Rubbing → Must be reduced to minimum, used

* to rub off the mistaken lines, arc.

Sand Paper Pad:-

* Used for sharpening the pencil.

Duster:-

* used to clean all instruments and materials.

Drawing Pins (or) clips (or) cello-tapes:-

* Drawing pins → used to fix drawing sheet on the drawing board.

* Clips → used to fix the drawing sheet instead of drawing pins. It causes no holes in the sheet.

* Cello-tapes → used for fixing the drawing sheet.

They cause no obstruction to the movement of drawing instruments such as mini drafter,

set square.

Mini Drafting and Drafting Machine :

- * Special forms of drawing desk.
- * Used for preparing drawing quickly & accurately.
- * Consists of two arms, fixed @ centre ring in such a way that arms can move freely & smoothly.
- * One end of the arm is fixed to clamping bracket & other end is fixed to protractor head.
- * The clamping bracket is attached to one edge of the drawing board with help of clamping screw.
- * In the protractor head angular graduations from 0° to 360° (or) 0° to 180° left & right are marked.

* Same time from 30° to 50° .

* Size of the drawing board & size of the drafting machine will vary.

Drawing Peter Book

Imperial size - 575 x 800 mm

Double elephant size } - 750 x 1090 mm

Anti-quarian size - 825 x 1350 mm

Emperor size - 1000 x 1500 mm.

Drawing sheets:

According to BIS: 10711-1983, the standard size of the drawing sheets are given below:

S. No	sheet designation	Width x length (in mm) Trimmed size	Width x Length (in mm) Untrimmed size.
1.	A0	841 x 1189	880 x 1230
2.	A1	594 x 841	625 x 880
3.	A2	420 x 594	450 x 625
4.	A3	297 x 420	330 x 450
5.	A4	210 x 297	240 x 330
6.	A5	148 x 210	165 x 240

once we can select the correct size of the drawing sheet according to the scale of the drawing and size of the object to be drawn.

Note:

Layout of Drawing Sheets:-

* It's necessary for easy to identification of drawings. So, each and every drawing sheet must have a layout.

* It's necessary for easy reading of the drawing and easy locating of that references

* It includes all necessary information, sufficient extra margin for easy filing and binding of drawing sheets.

Requirements of a good layout:-

* Sufficient margin.

* Proper title block.

* Correct spacing and arrangement of drawings.

* Good lettering and dimensions.

* There is a border on all sides.

* Left hand margin (border) is 30 mm for filing and 10 mm on other sides.

* $185 \text{ mm} \times 60 \text{ mm}$ space for title block @ right hand bottom corner.

Di a Refel Book

fig shows an example for layout for A2 size drawing sheet.

Margin:

* Margin is provided in the drawing sheet by drawing margin lines.

* Min width for A₀, A₁ drawing sheets are 20 mm & A₂, A₃ & A₄ are 10mm.

* Along the margin line prints are trimmed.

After trimming size of the sheets to be conformed.

Title Block:-

* It must be placed @ right hand **Bottom** corner of the sheet.

* According to the BIS: 11665-1985 gives the specifications for title block, it should be 185 mm x 65 mm in size.

* The following information should be in title block.

* Title of the drawing.

* Name of firm

* Drawing number.

* Scale.

* Symbols.

* Initial with dates of staff designing drawing & checked by Standards & approval.

* The title block information by means of one or more rectangles & rectangles are subdivided into smaller boxes for providing specific information.

Drawings & tables → refer book

Folding of drawing sheets:

* After completion of drawing work, drawing sheets have to be folded for filing or binding.

Refer dia → Book → (A2 size drawing (y))

Importance of legible lettering and numbering:-

* Writing of titles, notes, dimensions & other important details on a drawing is called lettering.

* Lettering should be done properly in clear, uniform & legible style.

* The dimensions & notes should be done in freehand & speedily.

* Lettering & continuous practice will improve the efficiency of lettering skill.

Single stroke letters.

- * Single stroke lettering is used in drawing. Single stroke letters have legible neat & correct in style.
- * Letters are two types,
 - * (i) vertical (ii) inclined.

Dia refer book

Uppercase and lowercase letters.

Lettering is done in uppercase or Capital letters.

Dia refer book

Height of letters.

* The size of all letters and Numerals are designated by their height.

Letter	Height: width
Main title	6mm to 8mm
Sub title	3mm to 6mm
Notes, dimensions, figures	3mm to 5mm
Drawing no in title block letters	8mm to 12mm

How to draw scale?

Let us consider 40mm length

Convert this to a scale of 1:50 & 1:100

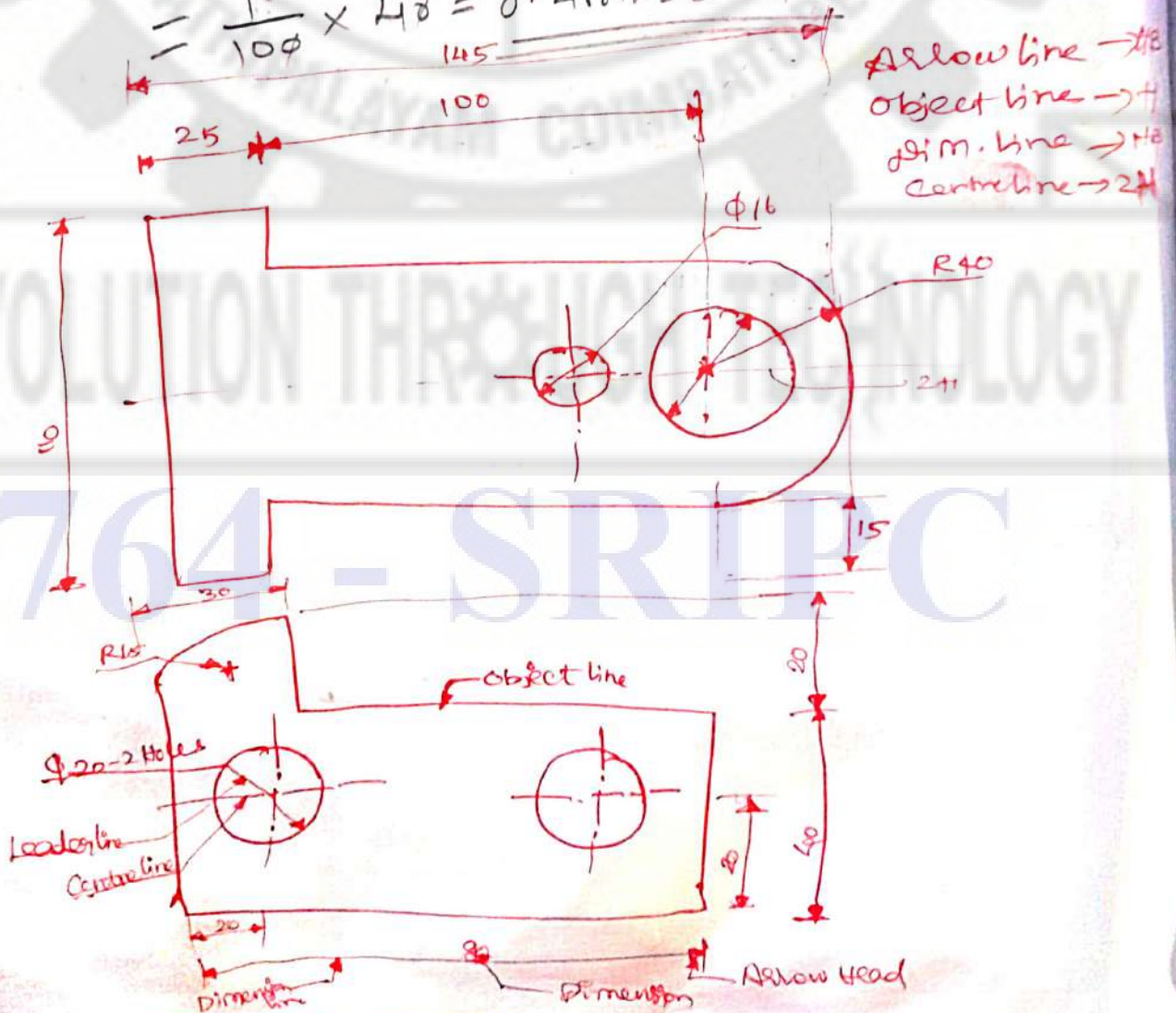
$$\text{Drawing length} = \text{Scale} \times \text{Actual length in cm}$$

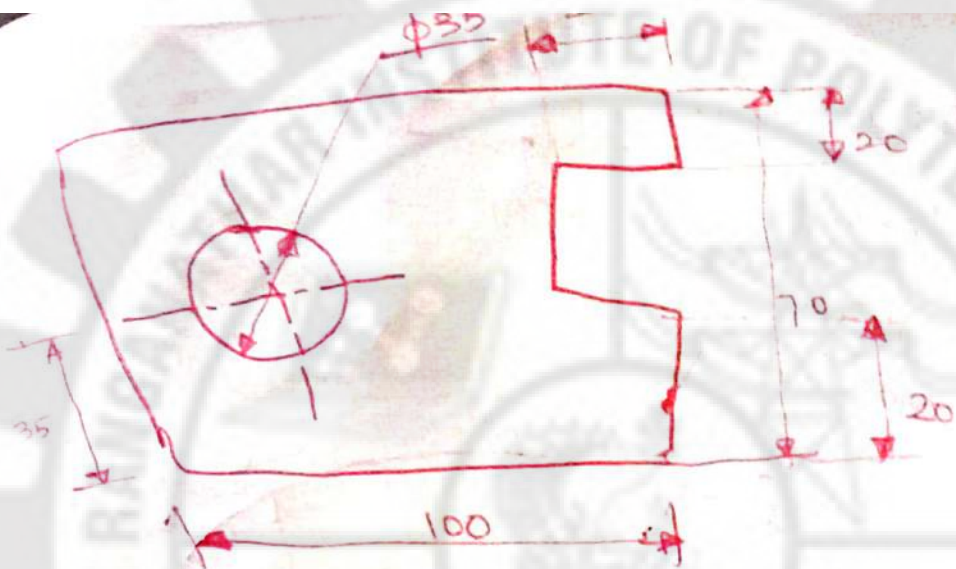
Now, Drawing length for 1:50

$$= \frac{1}{50} \times 40 = 0.8 \text{ mm} = 0.08 \text{ cm}$$

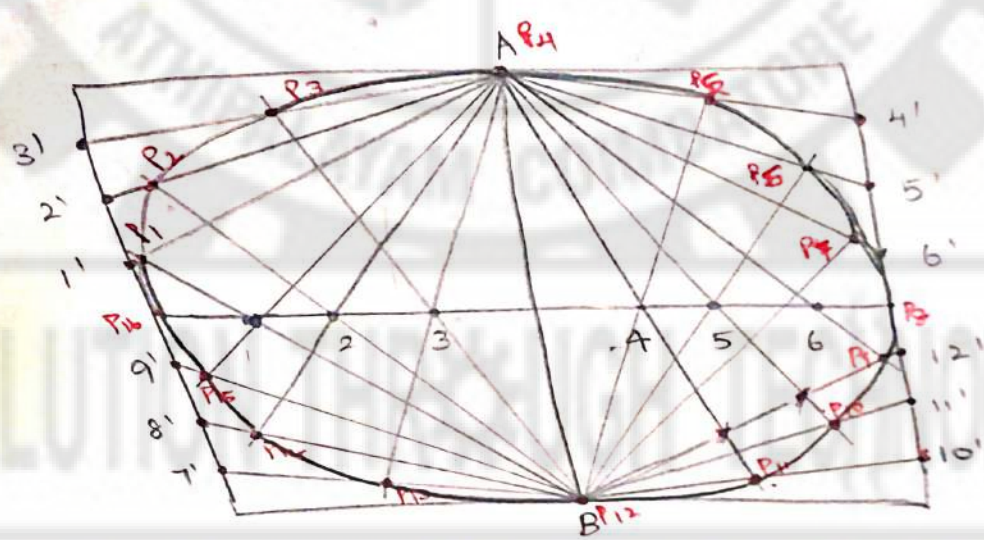
Now, Drawing length for 1:100

$$= \frac{1}{100} \times 40 = 0.4 \text{ mm} = 0.04 \text{ cm}$$



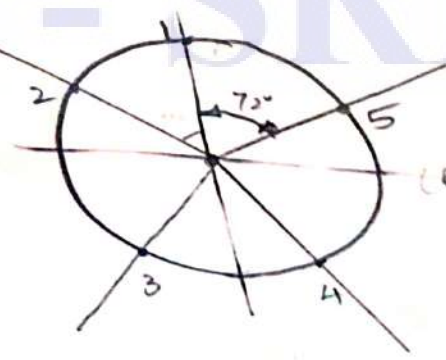


Draw an ellipse with major axis length 120 mm and minor axis length 80 mm by oblong method (or Rectangle method).



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 You tube
 (X)

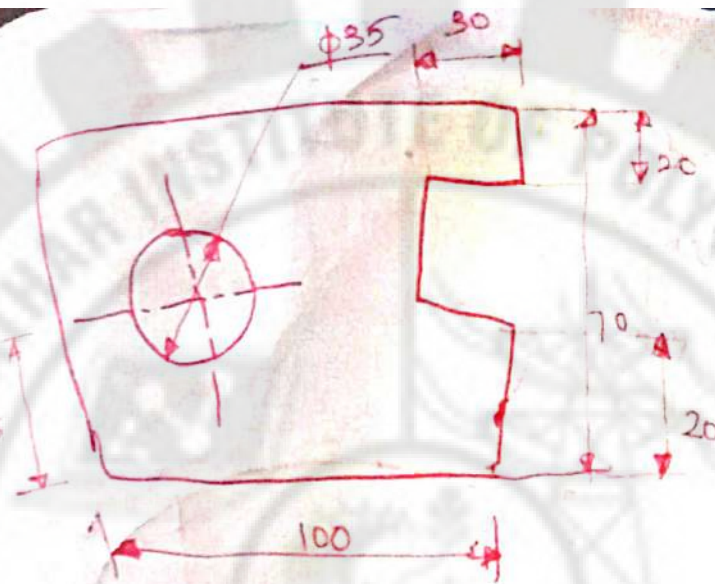
Divide a circle into 5 equal parts $\phi = 30$, angle 72°



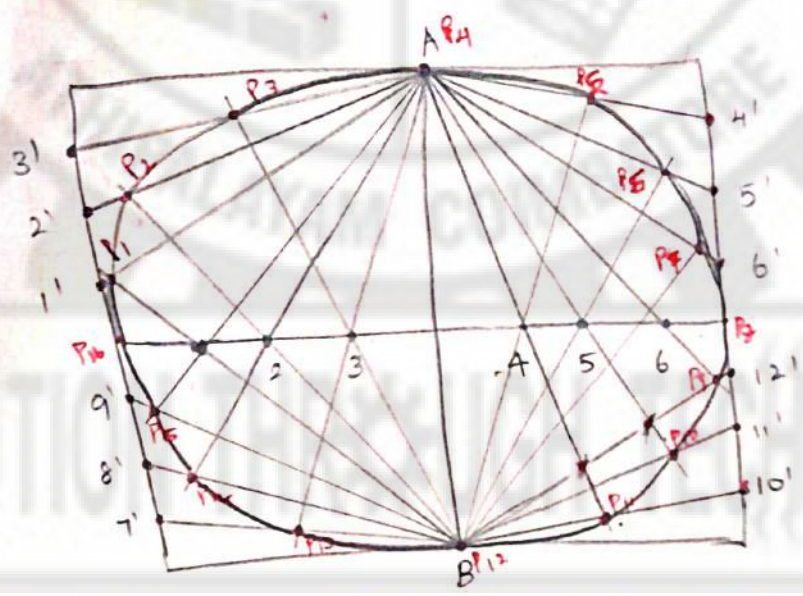
$\phi = 30$
 $R = 30/2 = 15$
 (i.e. 30 mm)

($72^\circ \times 5 = 360^\circ$)
 (or)
 $\frac{360^\circ}{5} = 72^\circ$

(Rubric + Fin lines)

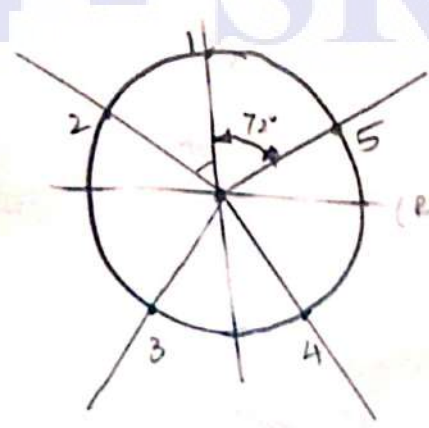


Draw an ellipse with major axis length 120 mm and minor axis length 80 mm by Oblong method (or Rectangle method)



B9TSivan
 Youtube
 X

Divide a circle into 5 equal parts ($R=30$, angle 72°)



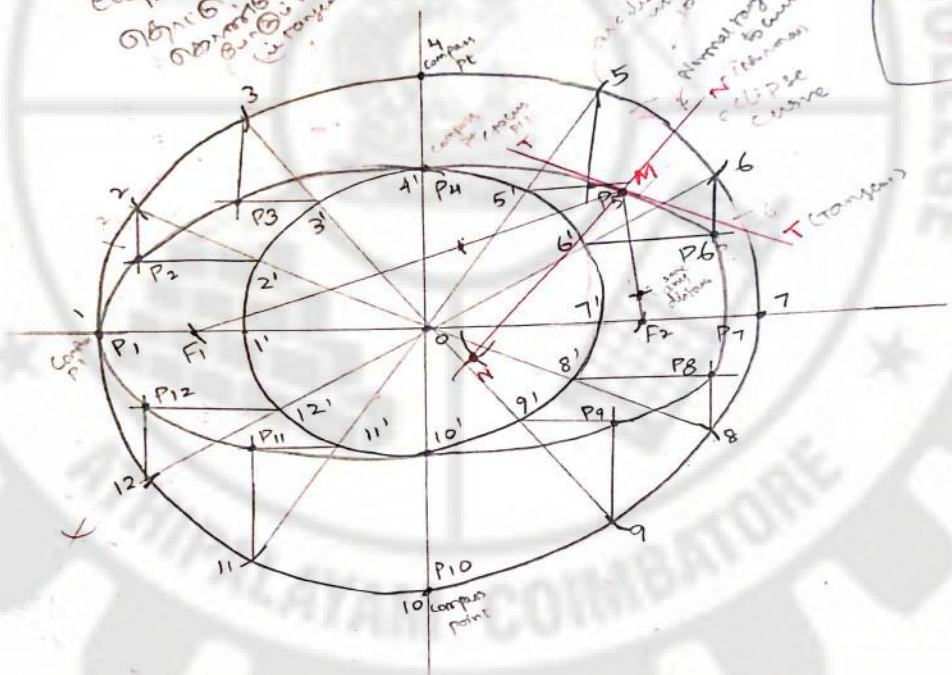
$\phi = 60$
 $R = 60/2 = 30 \text{ mm}$
 (i.e. 30 mm)

$(72^\circ \times 5 = 360^\circ)$
 (or)
 $\frac{360^\circ}{5} = 72^\circ$

Draw an ellipse with the major axis length of 120mm and minor axis length of 80mm by concentric circle method.

elliptical
 circle
 concentric circle
 (radius)

major axis = 120mm
 compass (120mm)
 $120/2 = 60$
 minor axis = 80mm



$\phi = 120$
 $r = 60$
 $\phi = 80$
 given
 Not draw this mm

$T \rightarrow$ no given sketch
 $M = h = 30$

- C502.1 —
- C502.2 —
- C502.3 —
- C502.4 —
- C502.5 —

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UNIT - II

Geometric Constructions.

Conic Sections:

* Ellipse (ඉරිබවුල) \Rightarrow Eccentricity (e) < 1

* Parabola (උග්‍රාසාරවුල) \Rightarrow eccentricity (e) $= 1$

* Hyperbolas (අභ්‍යුග්‍රාසාරවුල) \Rightarrow eccentricity > 1 .

Ellipse used in,

* Arches (ආකාරවලින්)

* dams (දෘමවලින්)

* Bridges (උරුමවලින්)

* Orbits (වර්තනවලින් උරුම)

Ellipse Methods of construction:

* It can be constructed by the following methods,

* Concentric Circles method (or) Auxillary method

* Rectangle (or) Oblong method.

* Eccentricity method.

Focus (F) \rightarrow Fixed pt. is called focus.

Directrix (D) \rightarrow Fixed straight line is called directrix.

Axis \rightarrow A line to the directrix & passing through the focus is called axis.

Vertex (V) \rightarrow Point @ which the conic cuts the axis is called vertex.

$$\text{Eccentricity } (e) = \frac{\text{Distance of moving point from the focus}}{\text{Distance of moving point from the directrix}}$$

Parabola:

Methods of Construction of Parabola:

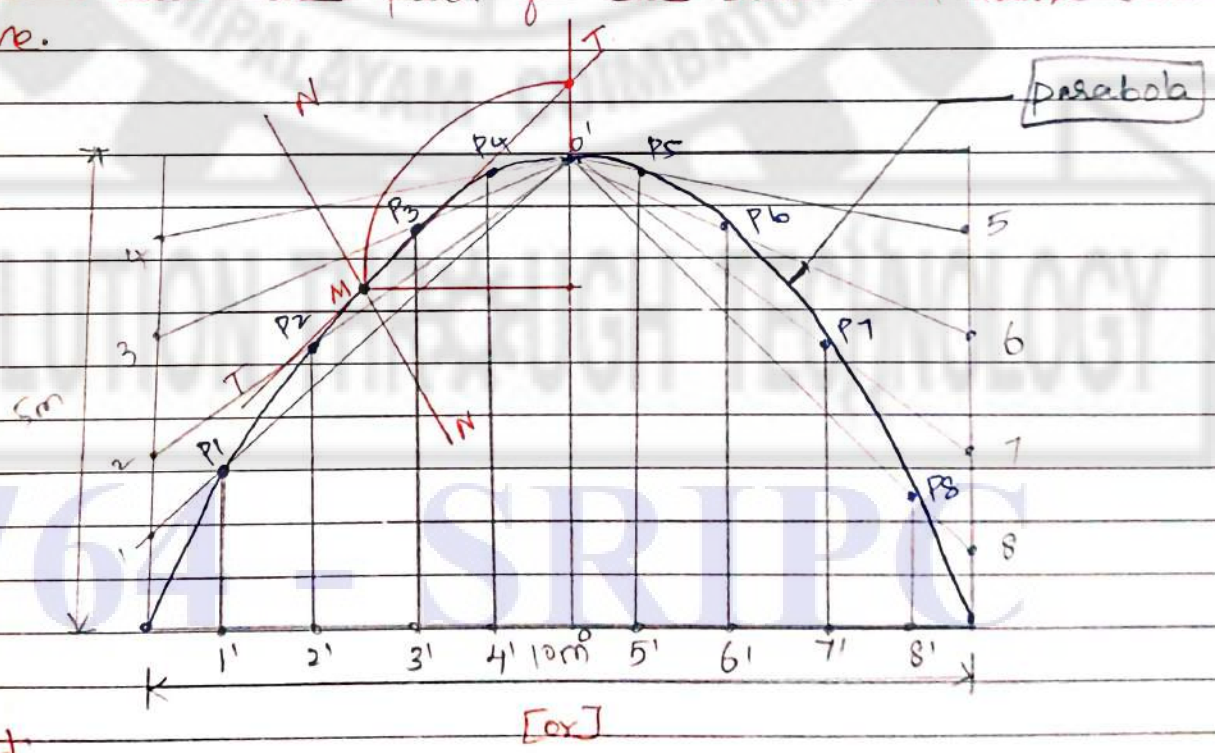
- * It can be constructed by the following methods,
- * Rectangular method (or) oblong method ✓
- * Parallelogram method.
- * Eccentricity method [when focus & directrix are given]

Methods of Parabola of Construction: Problem 1:

① Rectangular (or) oblong method:

Method 1: Problem 1:

① A ball thrown into the air reaches a maximum height of 5m and travels a horizontal distance of 10m. Draw the path of the ball and name the curve.



Quesd:

1) Draw the parabola within a rectangle of sides 100mm x 50mm.

Parabola:

Methods of Construction of Parabola:

* It can be constructed by the following methods,

* Rectangular method. (or) oblong method ✓

* Parallelogram method.

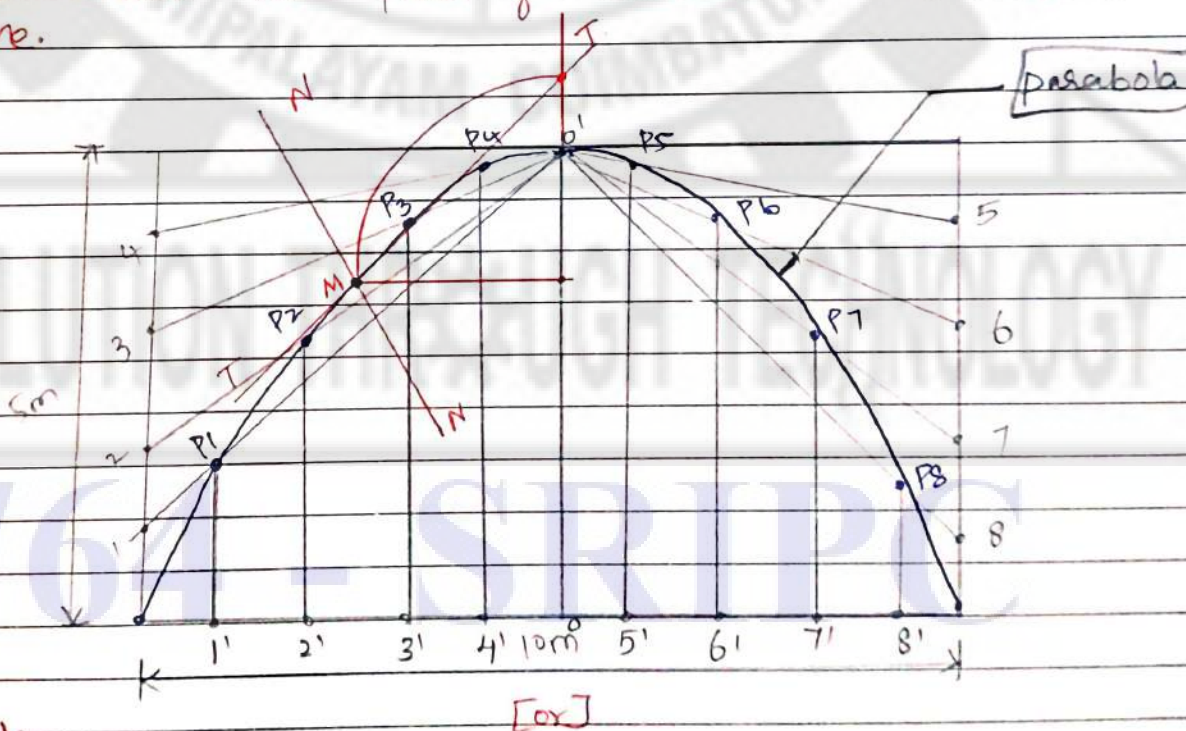
* Eccentricity method [when focus & directrix are given]

Methods of Parabola of Construction: Problem 1:

① Rectangular (or) oblong method:

Method 1: Problem 1:

① A ball thrown into the air reaches a maximum height of 5m and travels a horizontal distance of 10m. Draw the path of the ball and name the curve.



asked:

1) Draw the parabola within a rectangle of sides 100mm x 50mm.

Application of parabola.

- * Construction of arches and cable of suspension bridges.
- * Parabolic reflector.
- * Sound & light reflector.
- * Path of a projectile.
- * antenna of a radio telescope.
- * Flashlights.
- * Solar furnace.

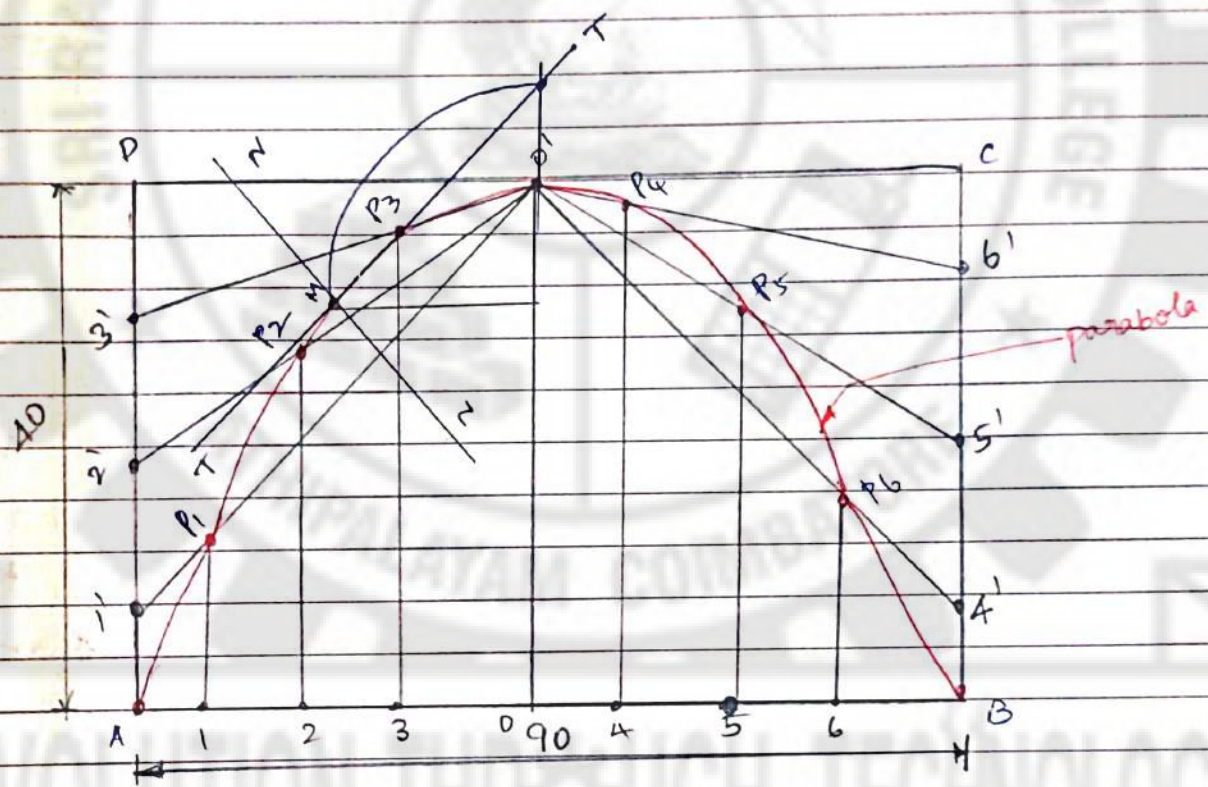
REVOLUTION THROUGH TECHNOLOGY

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Notes of Introduction to Engineering Graphics

Problem 2:

② The profile of a car reflector is in the form of a parabola. The rim diameter is 90mm and maximum depth 40mm. Draw the Parabola.



(or)

Q asked:

② Draw the parabola within a rectangle of sides 90mm x 40mm.

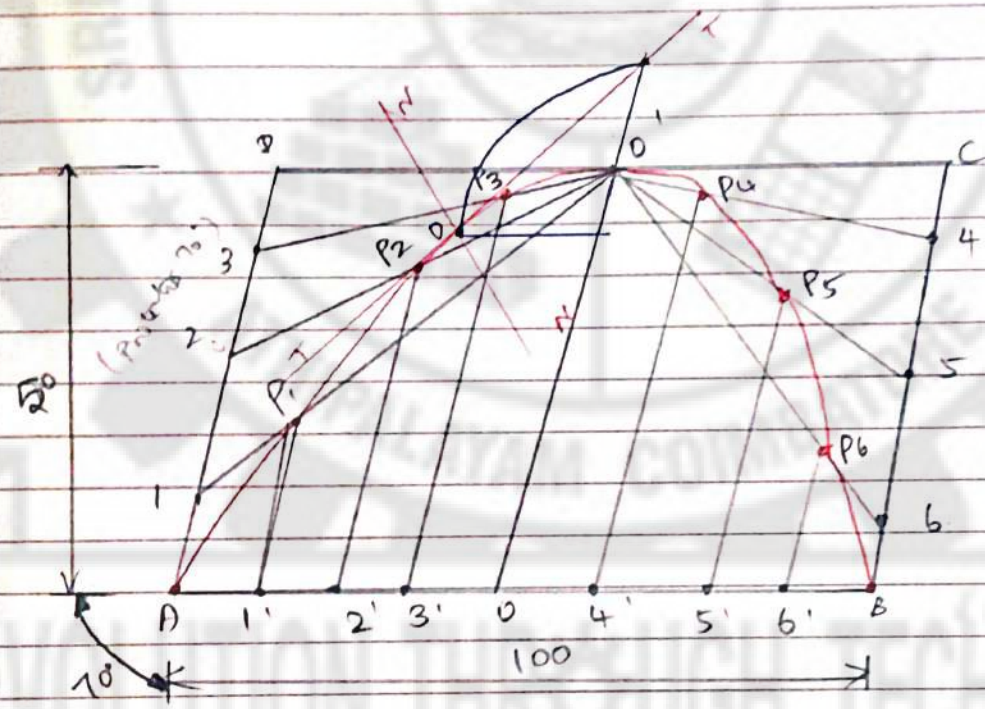
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Method 2
Parallelogram method:

Small side \rightarrow vertical side
big side \rightarrow horizontal side

Problem :-

1) Draw a Parabola within a Parallelogram with side $(100 \text{ mm} \times 50 \text{ mm})$ and one included angle between the sides is 70° .



$AB = 100 \text{ mm}$
 $AD = 50$
 $AE = 50 \times \frac{1}{4} = 12.5 \text{ mm}$
 $AE = 100$
 $H = 50 \text{ mm}$

$\text{Cons} = 4$
 $AD = 50 \text{ mm}$
 $AD = \frac{50}{4} = 12.5 \text{ mm}$

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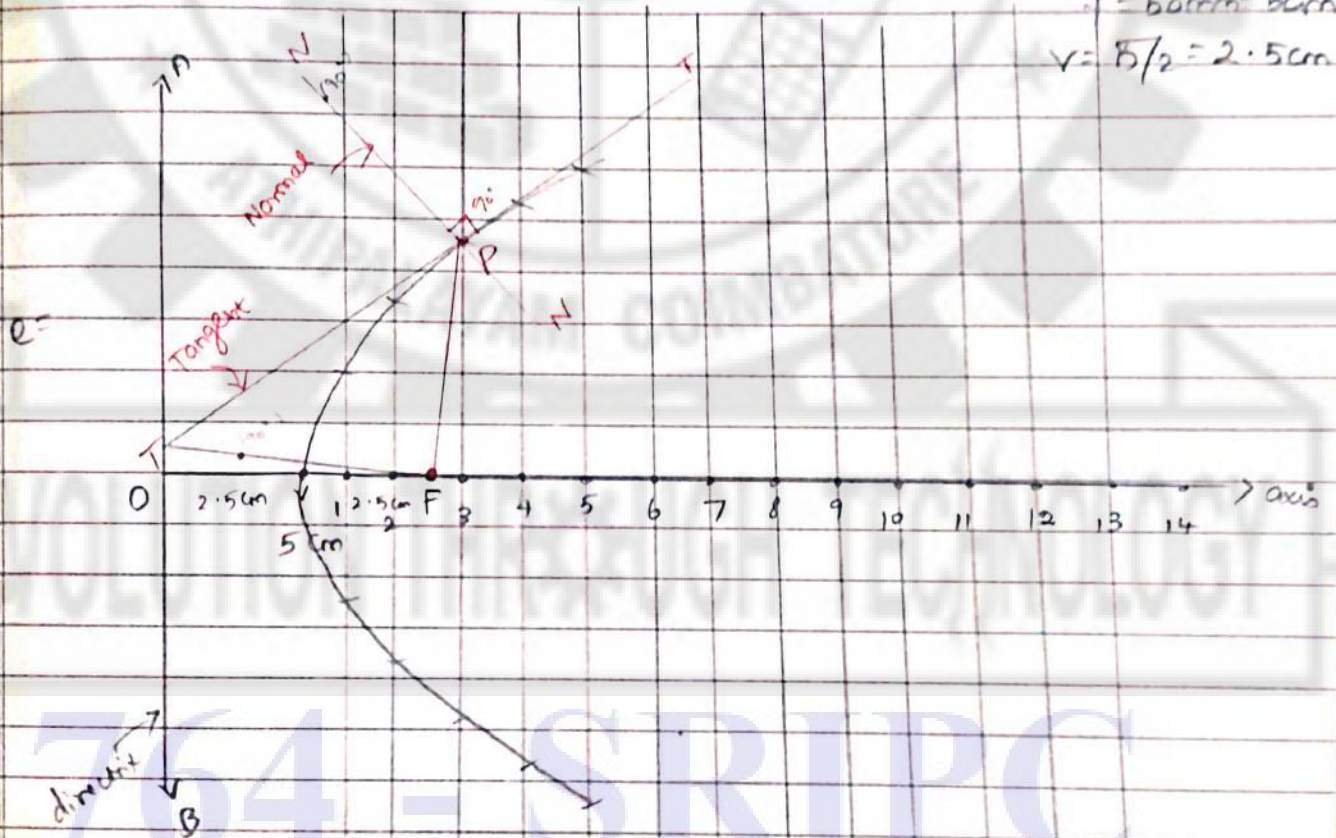
Method 3:

Eccentricity method (when focus and directrix are given)

Problem 1:

① Draw a parabola when the distance of the focus from the directrix is 50mm. (Focus distance = 50mm) parabola, $e=1$

$$f = 50\text{mm} = 5\text{cm}$$
$$v = f/2 = 2.5\text{cm}$$



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Hyperbola

Method of construction of hyperbola:

* Eccentricity method [When focus and directrix are given]

Method 1:-
problem:-

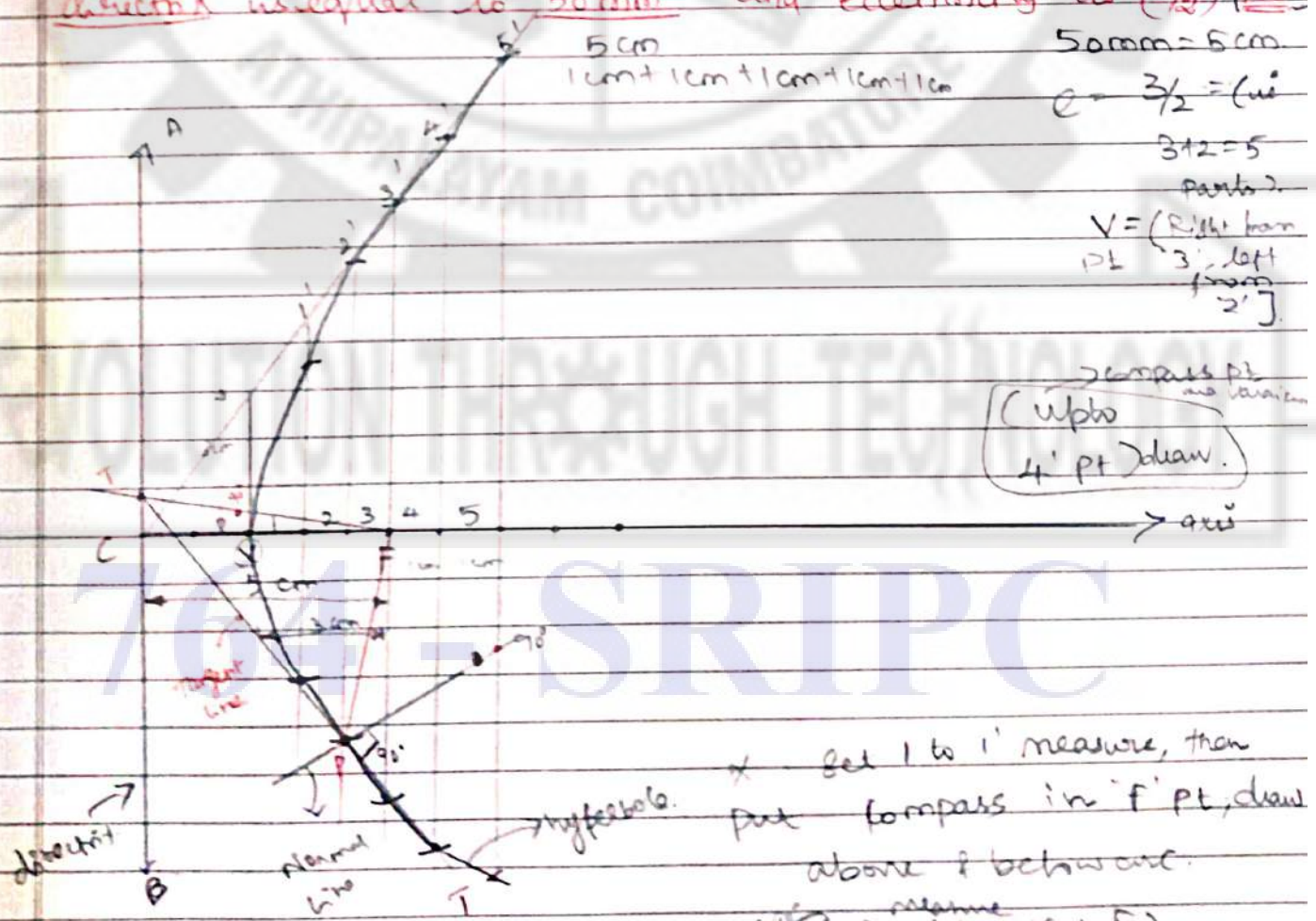
① Draw hyperbola when the distance of the focus from the directrix is 60mm and the eccentricity is 1.5 (i.e. 3/2)

✓ solved

② Construct an hyperbola when the distance of the focus from the directrix is equal to 50mm and eccentricity is (3/2) (i.e. 1.5)

50mm
1cm + 1cm + 1cm + 1cm + 1cm

50mm = 5cm
 $e = \frac{3}{2} = 1.5$
 $3+2=5$ parts.
 $V = \left(\begin{array}{l} \text{Right hand} \\ \text{pt } 3' \text{ left} \\ \text{from} \\ \text{2}' \end{array} \right)$



Compass pt. and various
(upto 4' pt) draw.

- * Set 1 to 1' measure, then put compass in 'F' pt, draw above & below arc.
- * 45° → Measure ^{measure} protractor 90° at 'F'?
- * 90° → Measure protractor 90° at 'P' point

Construction of Special Curves.Geometric Curves:

* Cycloid

* Epicycloid.

* Hypocycloid.

* Involute

* Archimedean Spiral.

* Helix [Cylinder, Cone].

↓

* cylinder [dia & pitch]

* cone

* cylinder [dia for two revolution]

for one revolution,

where r = radius of rolling circle. R = radius of base θ = angle subtended by directing circle.Applications of cycloid:

* In the design of gear-tooth system.

* In the design of mould boxes in foundry shops.

* In the design of flat disk for metal cutting machine tools.

Cycloid:-Definition:

* Cycloid is a curve traced by a point on the circumference of a circle which rolls along a straight line without slipping.

Epicycloid:-

Definition:

* An epicycloid is a curve traced by a point on the circumference of a circle which rolls on the outside of another circle without slipping.

For one revolution,

$$\theta = \frac{r \times 360^\circ}{R}$$

Where r = radius of rolling circle

R = Radius of base circle

θ = angle subtended by directing circle.

Hypocycloid:-

Definition:

* Hypocycloid is a curve traced by a point on the circumference of a circle which rolls without slipping on the inside of another circle.

$$\theta = \frac{r \times 360^\circ}{R}$$

Involute:

Definition:

An involute is a curve traced by a point on a tight string when it is unwound from a circle (or) a polygon.

Applications:

* Used in gear tooth profile. (ഭിംഗി കമ്പിൾഷൻ ഉപയോഗം)

* used in the designing of impellers of

Centrifugal pumps (കേന്ദ്ര ചക്ര പമ്പ്-യിൽ ഉപയോഗിക്കുന്നു)

ഒരു ഉദാഹരണം)

Archimedean Spiral:

Spirals:

Definition:

A spiral is a curve generated by a point moving continuously in one direction along a straight line which revolves about a fixed point.

Archimedean Spiral:-

Definition:-

The locus of a point which moves with uniform linear velocity along the radius vector while the radius vector itself rotates with uniform angular velocity is called Archimedean spiral.

Applications:-

- * Small compressor (ie compressing liquid & gases)
- * Watch balance springs & gromes.
- * Digital light processing (DLP) to minimize "rainbow effect".
- * Design of helical gears and lathe.

Helix:-

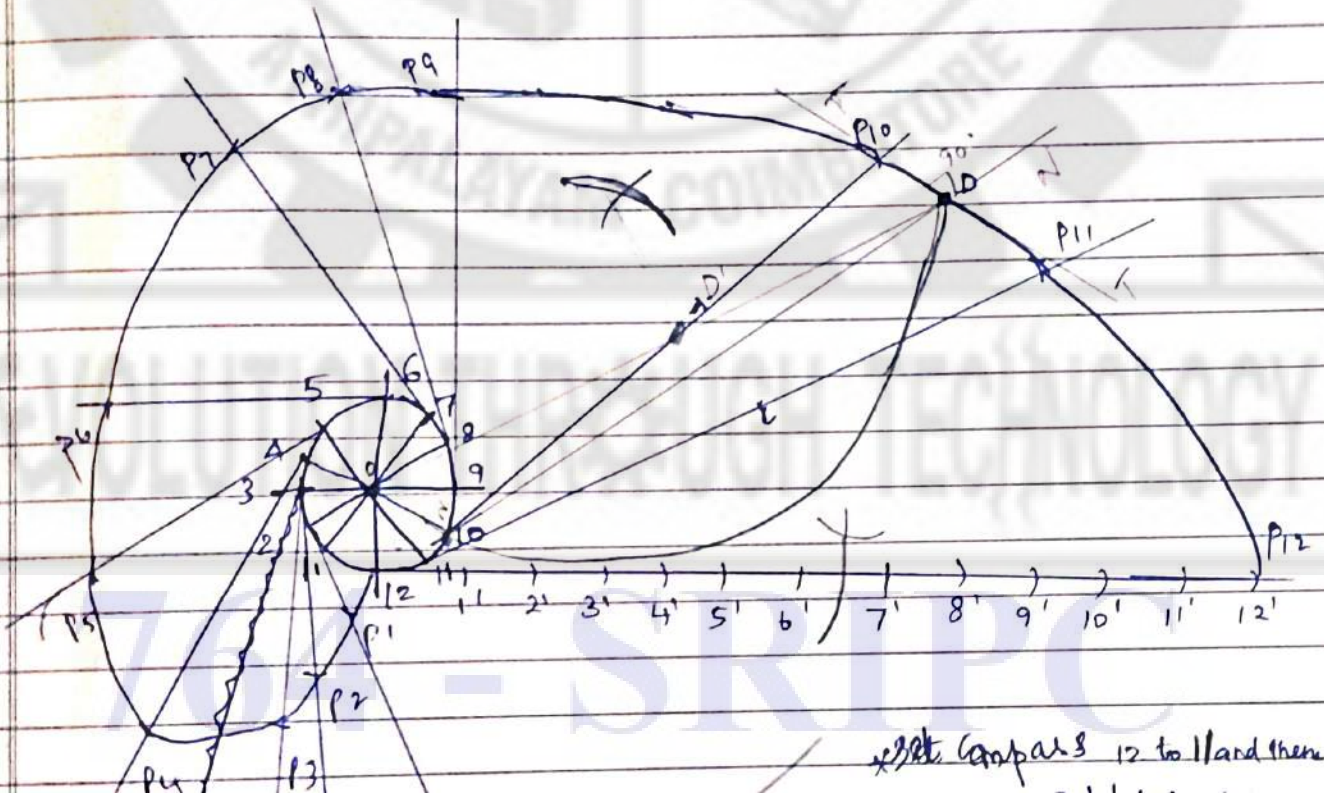
Definition:-

When a point moves around and along the surface of a right circular cylinder (or) cone with a uniform angular velocity, about the axis, curve generated by the point is called helix.

Lead (or) pitch = axial distance moved by the generating point in one revolution.

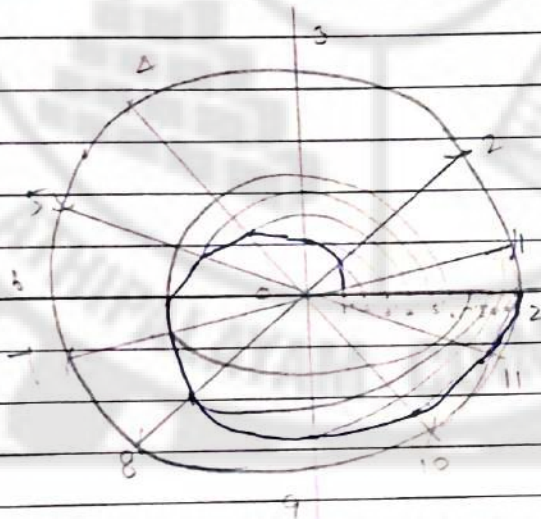
Involute

1) Draw an involute of a circle of diameter 50 mm. Draw a tangent and normal at any point on the curve.



Archimedean Spiral.

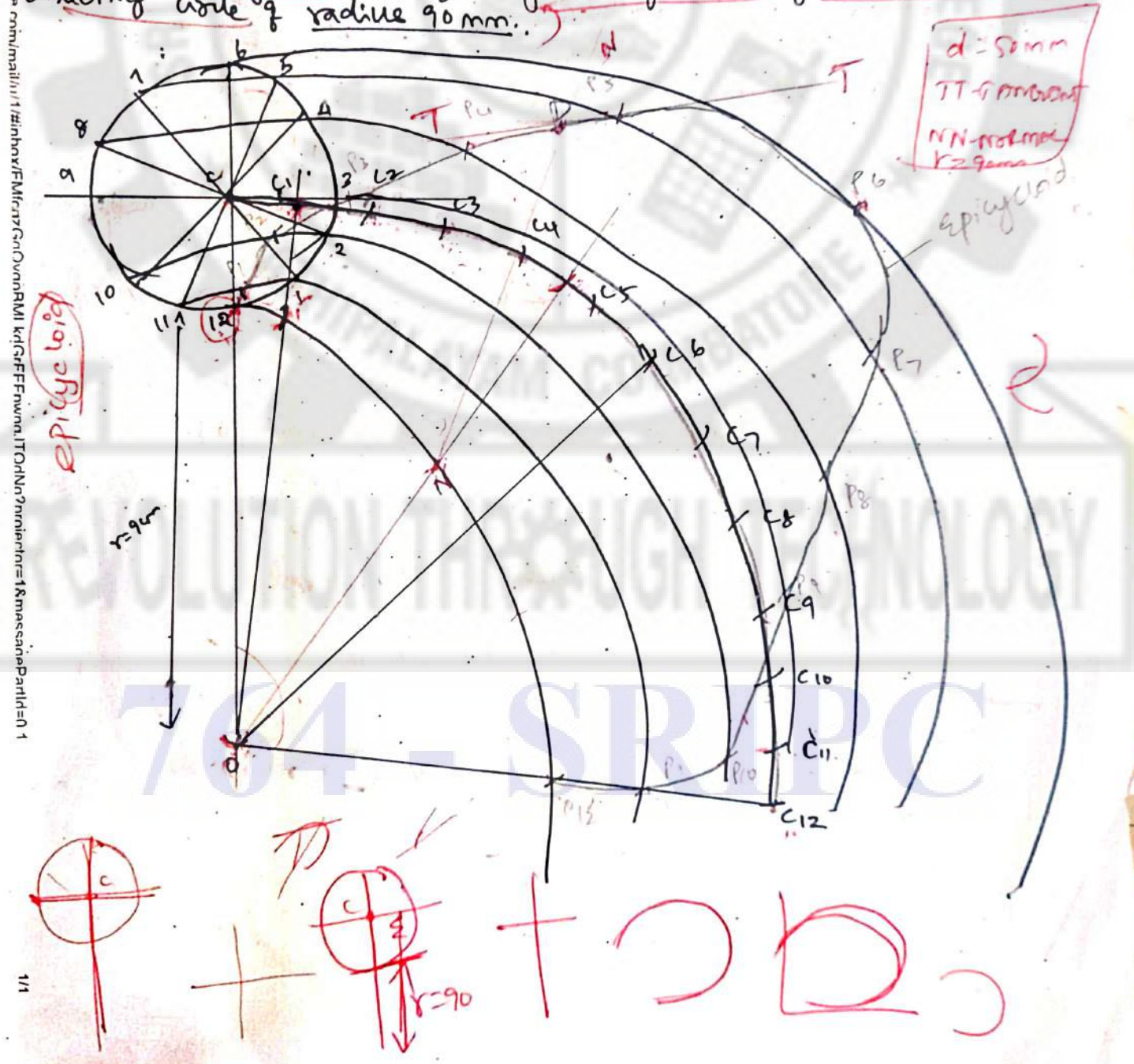
② Draw an archimedean spiral of one convolution for the Pitch (or) radius of 25mm.



Epicycloid

Draw an epicycloid of rolling circle of 40mm dia which rolls outside another circle of 160mm diameter for one revolution.

Draw an epicycloid of rolling circle of 40mm dia which rolls outside another circle of 160mm diameter for one revolution (or)
 Draw an epicycloid having a generating circle of diameter 50mm and directing circle of radius 90mm.



epicycloid

Helix (Cylinder)

Helix - 1 (Q1) (Cylinder)

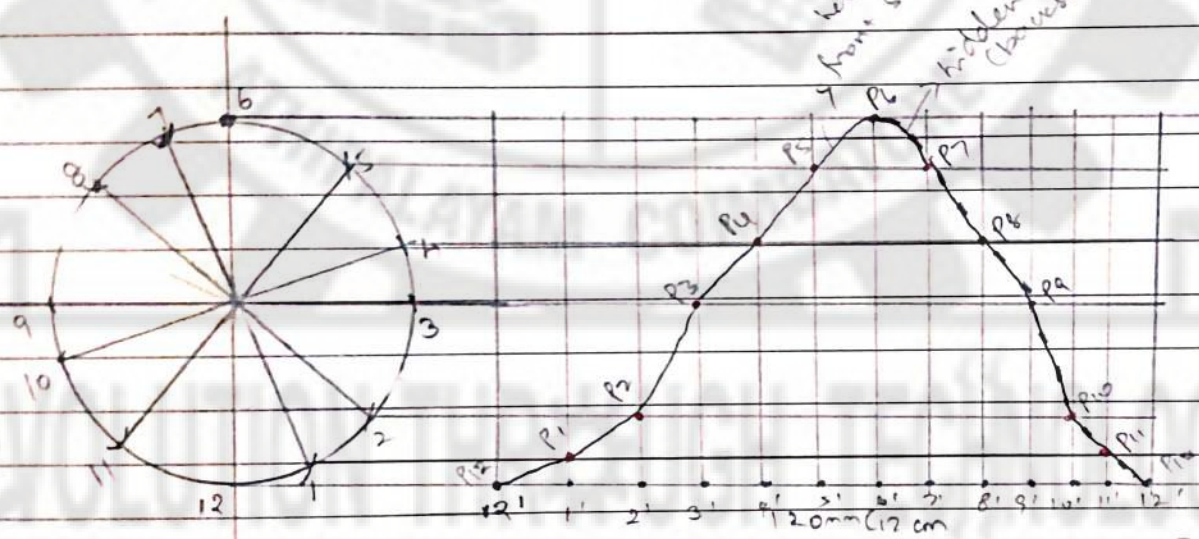
Q1 Draw a helix when the cylinder diameter is 50 mm and pitch 120 mm.

Helix - 2 (Q1)

Helix - 2 (Q1) (Cone)

Q1 Draw a helix of one convolution around a cylinder of base diameter 40 mm, height 75 mm & pitch 45 mm

Cylinder dia - 50 mm
Pitch - 120 mm



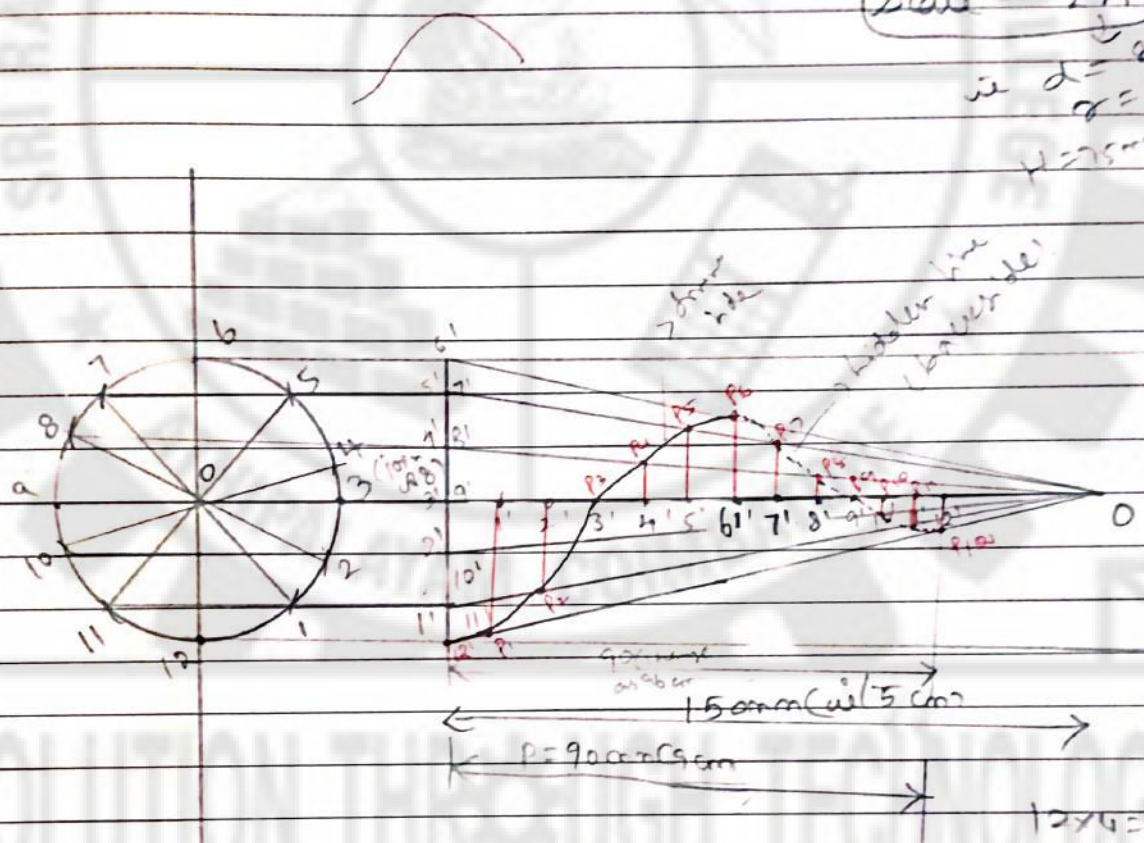
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Front
Helix
Line

Helix (2) (Cone)

1) Draw a helix of one convolution around a cone, diameter of base 40 mm, height 75 mm & pitch 45 mm.

dia = 40 mm.
Pitch = 45 mm (ie 2:1)
Scale = 2:1
ie $d = 20$ mm
 $r = 10$ mm
 $H = 75$ mm
 15 mm



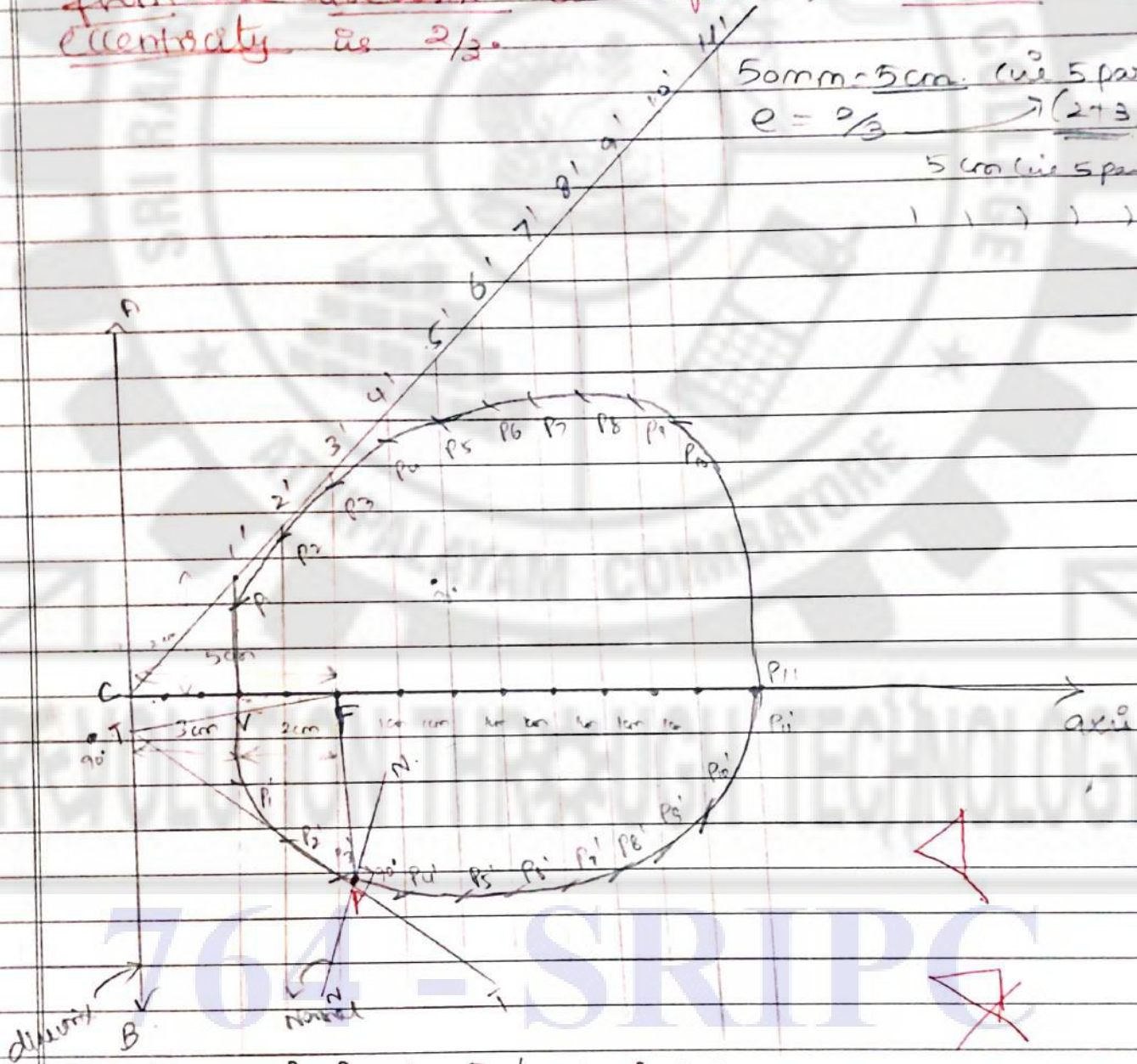
Cg: Plane (12 of divisions, helix)

$12 \times 4 = 48 \times 2 = 96$
(90 → change as 96)
↓
due to divide parts
 $9 \times 12 = 96$

Ellipse (Eccentricity method)

Q) Construct an ellipse when the distance of the focus from the directrix is equal to 50mm and eccentricity is $\frac{2}{3}$.

50mm = 5cm (in 5 parts)
 $e = \frac{2}{3} \rightarrow (2 \times 3) = 6$
 5 cm (in 5 parts)
 1 1 1 1 1



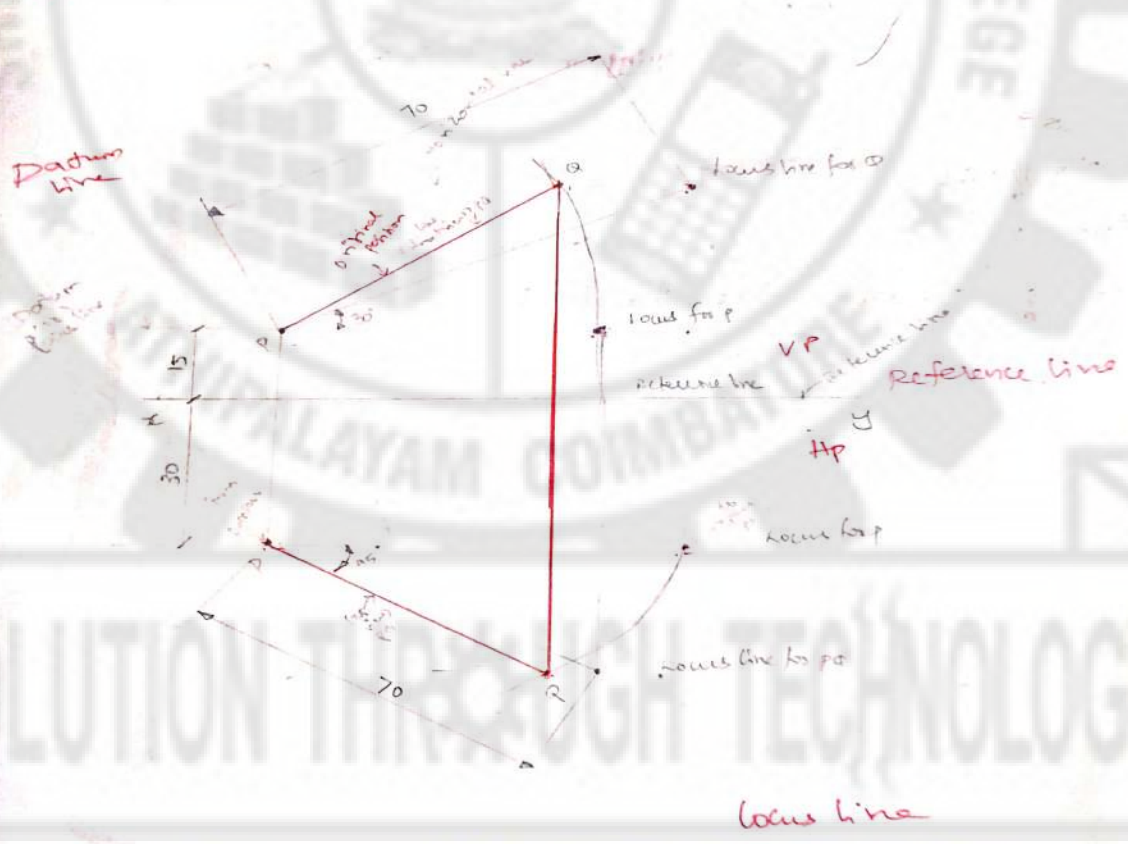
1 2 3 4 5 6 7 8 9 10 11

→ (Focus) (ie centre)
 * set v & $1'$ measure, then F' → above & below arc.
 * set centre line to $2'$ measure, then f' → above & below arc
 & same upto $11'$ to on.

* ϕ_{90° measure @
 * ϕ_{90° measure @

Projection of points & lines

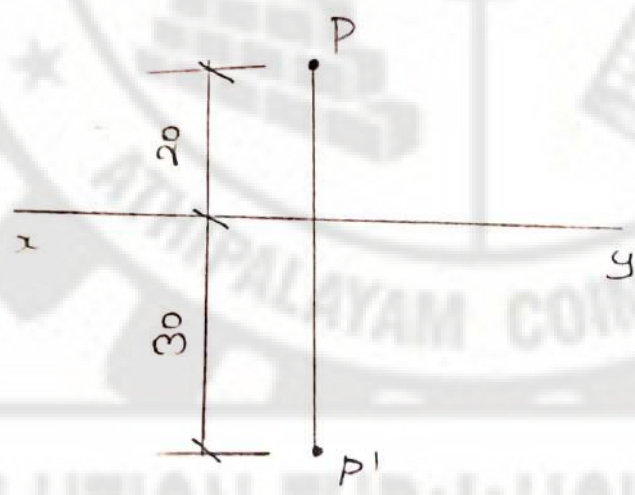
A line PQ of 70 mm long has one end 15 mm above Hp and 30 mm in front of V.P. The line is inclined at 30° to Hp and 45° to V.P. Draw the projection of the line.



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Projection of point

A point P is 20 mm above HP and 30 mm in front of VP. Draw its Projections.

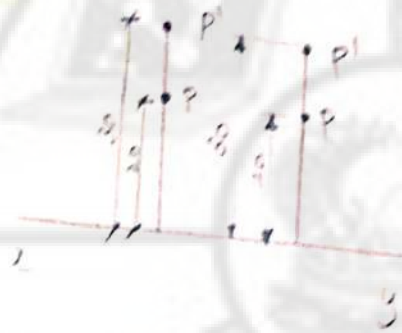


(60 mm to 80 mm)
(XY)
(XY)
(100 to 120 mm) →
XY Reference Line
(Abbrev)

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② A point P is 20 mm above HP and 30 mm below VP

VP

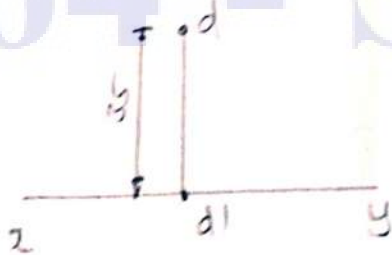


③ A point P is 20 mm above HP and 20 mm

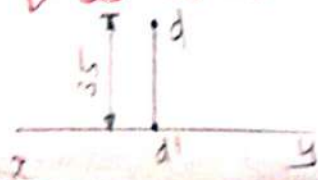
below H.P (i.e. also below VP)



④ A point D is 35 mm above HP and lying on HP.

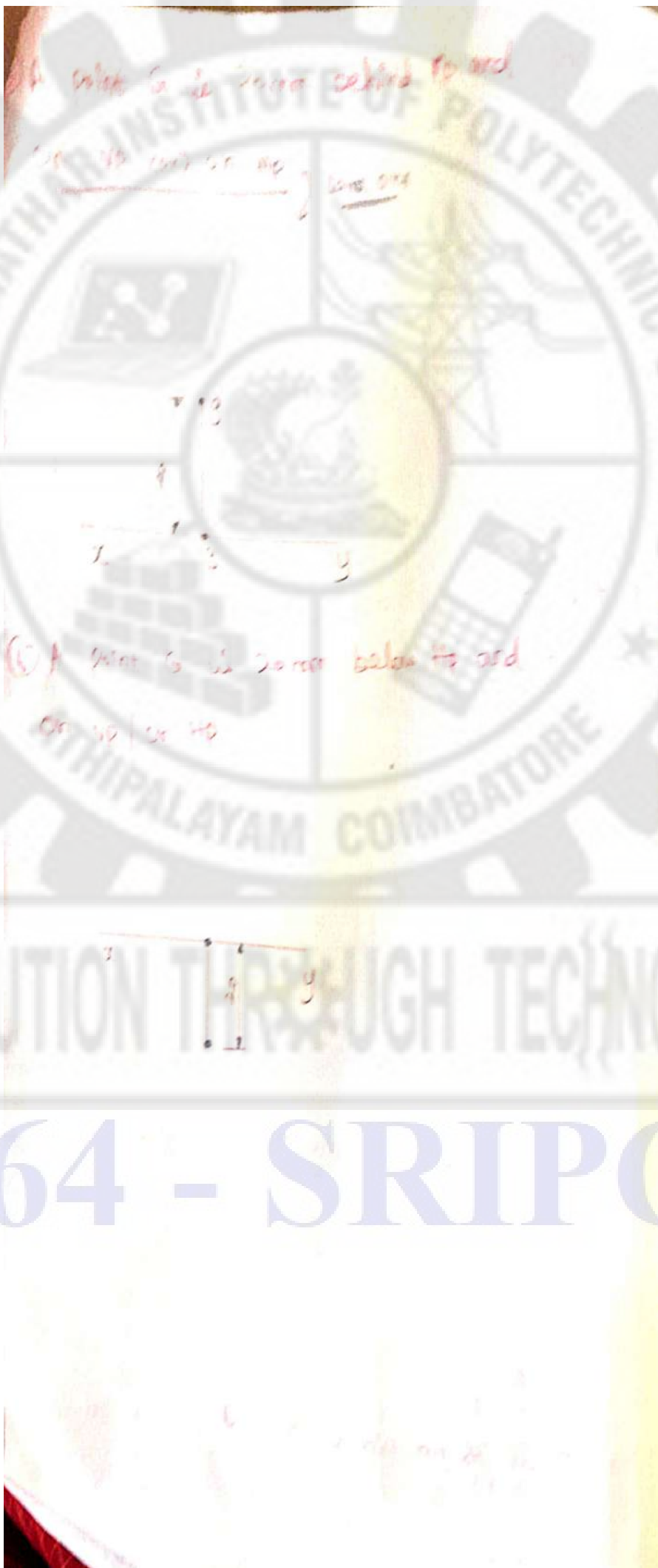


⑤ A point D is 35 mm above HP and lying on VP



(or)
On V
or

in

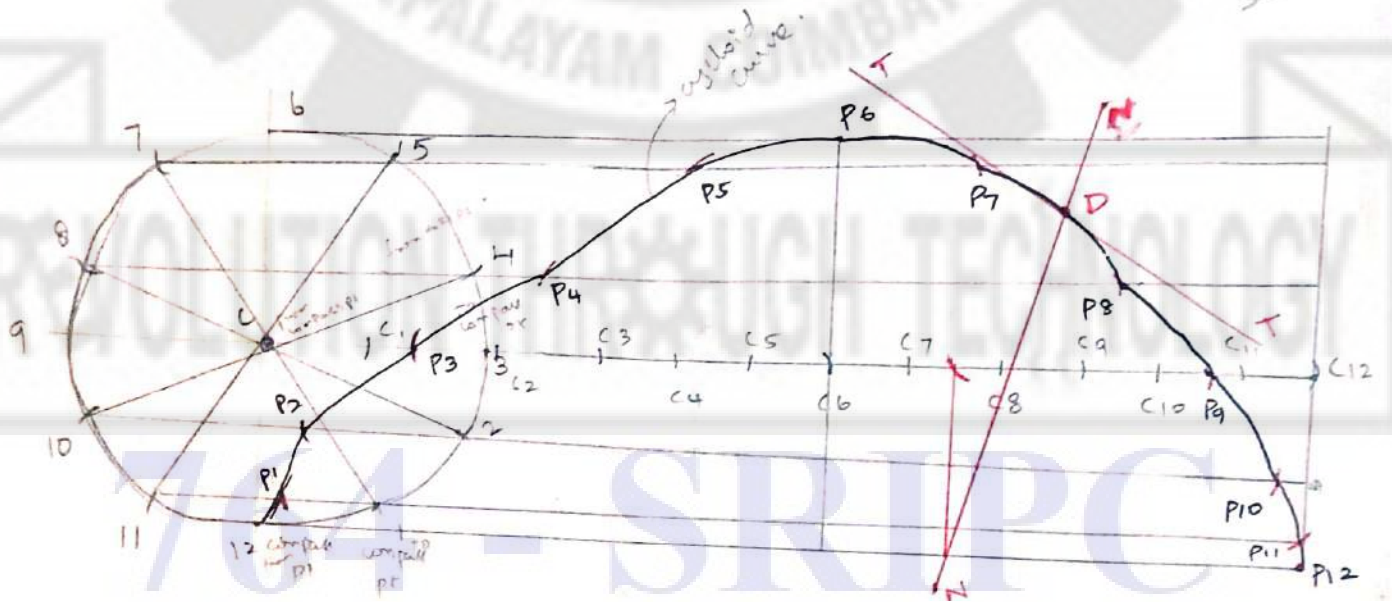


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Cycloid

- 1) A coin of diameter 30mm rolls along the straight line without slipping. Draw locus of the coin.
- 2) A circle of 40mm diameter rolls along the straight line without slipping. Draw the curve traced out by a point 'A' on the circumference, for one complete revolution of the circle.

(Marked by put 20 pt Set D)



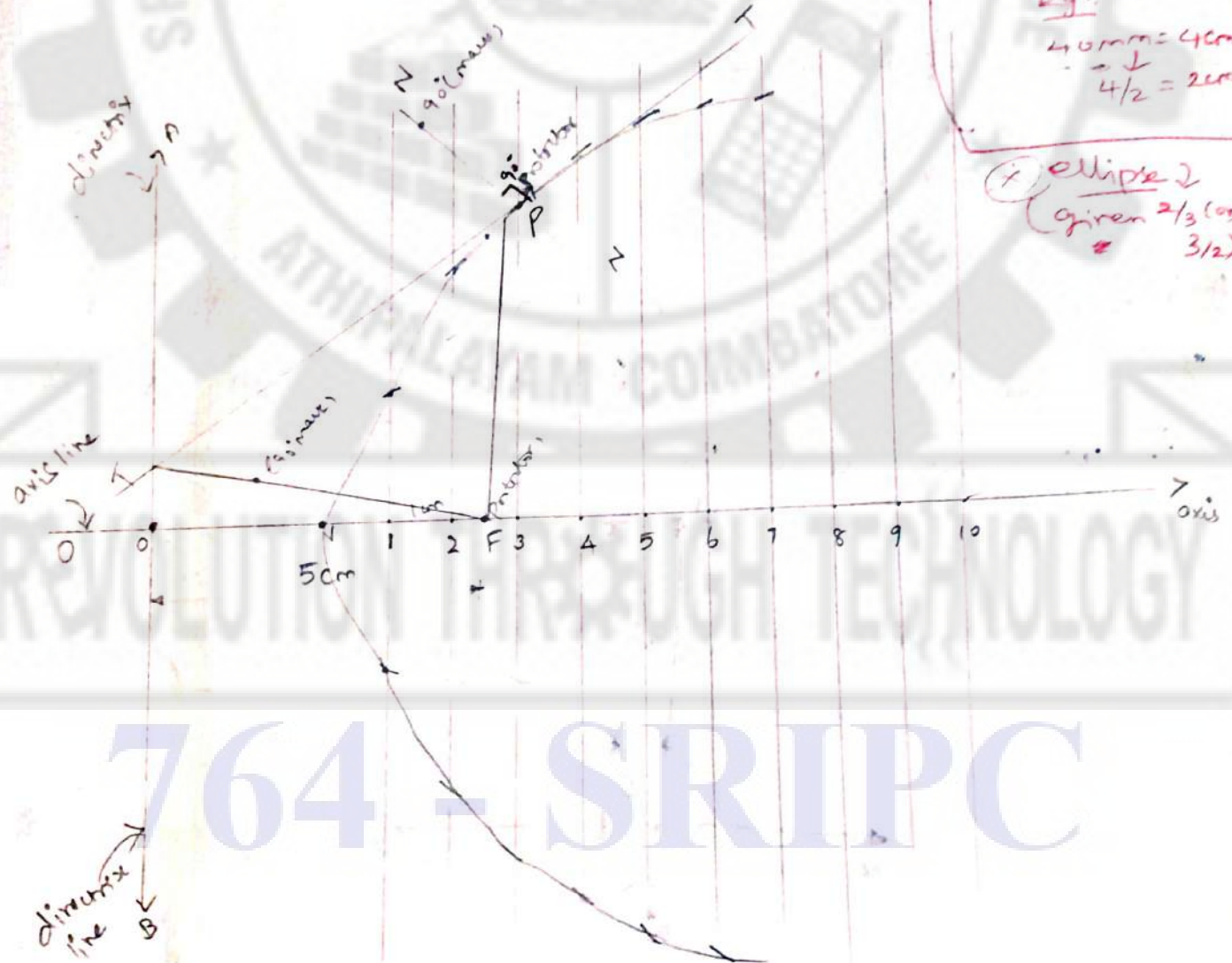
2) Construct a parabola when the distance of the focus from the directrix is equal to 50 mm

vertex = $\frac{50}{2} = 2.5\text{cm}$
(V)

$e = 1$
50mm = 5cm

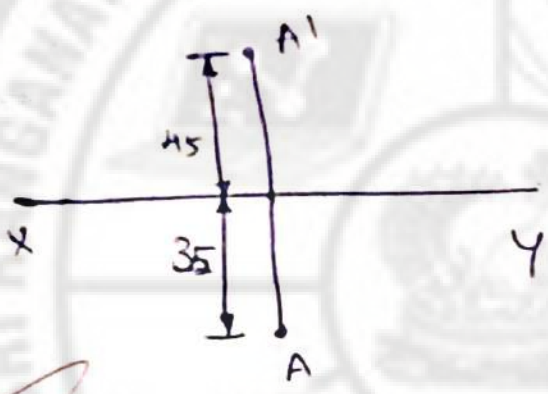
Parabola
Here $e = 1$ (not
dim)
↓
[meaning
50mm = 5cm]
↓
 $\frac{50}{2} = 2.5\text{cm}$
eg:
40mm = 4cm
↓
 $\frac{40}{2} = 2\text{cm}$

⊕ ellipse ⊖
(given $\frac{2}{3}$ or $\frac{3}{2}$)

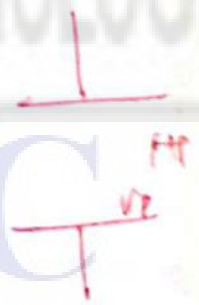
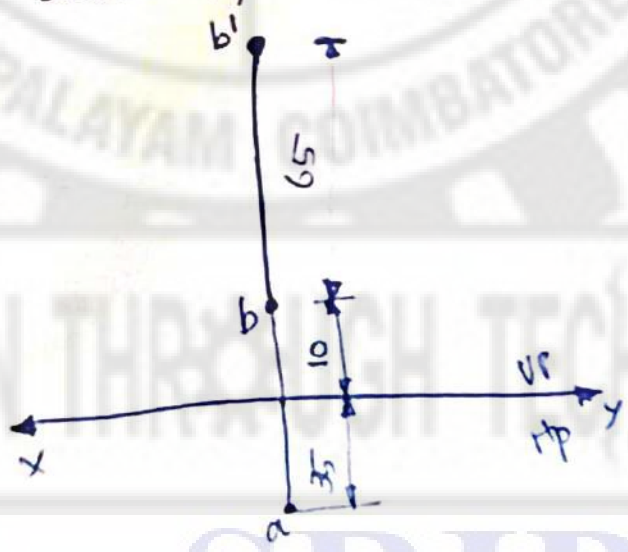


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Part - A Sem - 2 (2022-23) B02
 3) A Point 'A' is 35 mm below HP and 45 mm behind VP.
 Draw its Projections.



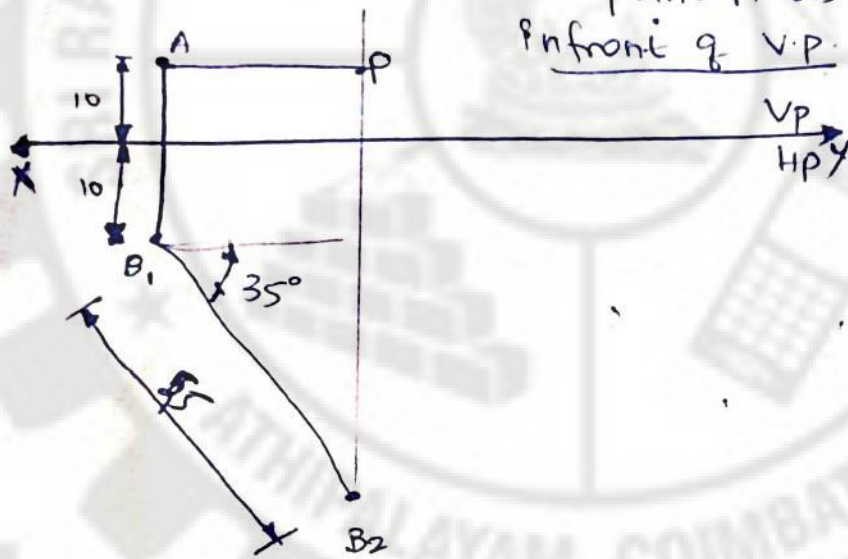
4) Draw the projection of a 65 mm long straight line which is \perp to HP and 25 mm in front of VP and one end is 10 mm above HP.



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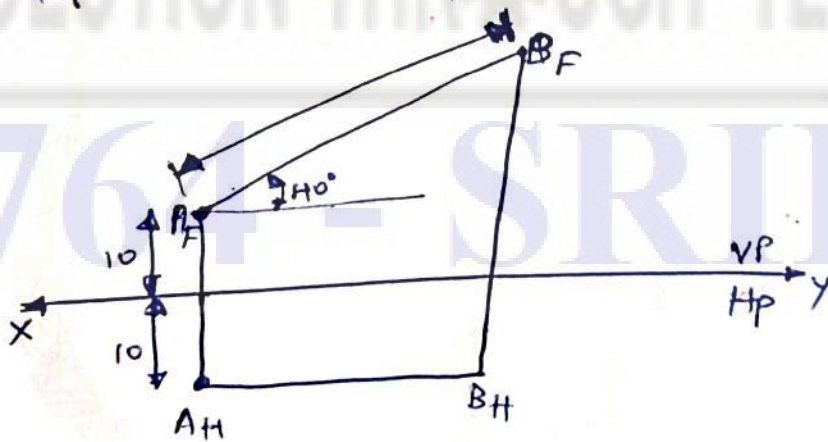
2) Line $AB = 65\text{mm}$ in length which is inclined to HP by 40° & parallel to VP . Complete its projection when point 'A' is 10mm above HP and in front of VP .

Ans ②:



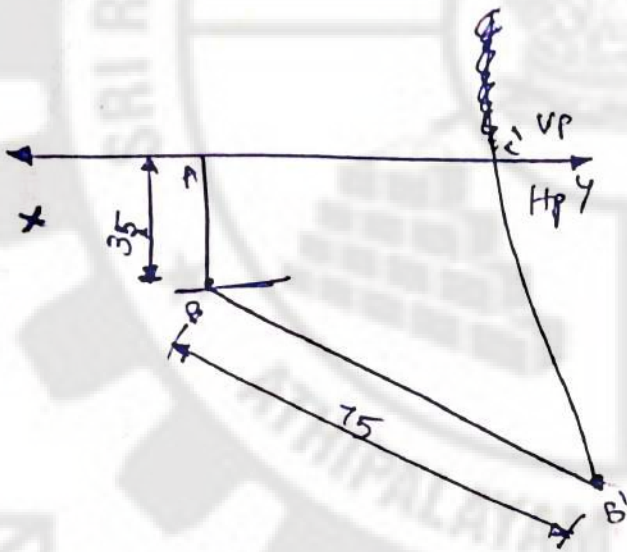
1) Line $PQ = 55\text{mm}$, inclined to VP by 35° & parallel to HP . Complete its projection when point 'A' is 10mm above HP and in front of VP .

2.) Line $AB = 65\text{mm}$ in length, inclined to HP by 40° & parallel to VP . Complete its projection when point 'A' is 10mm above HP and in front of VP .

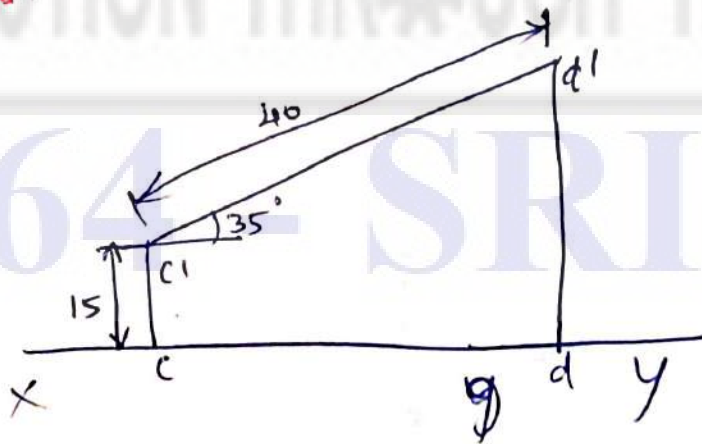


exam problem

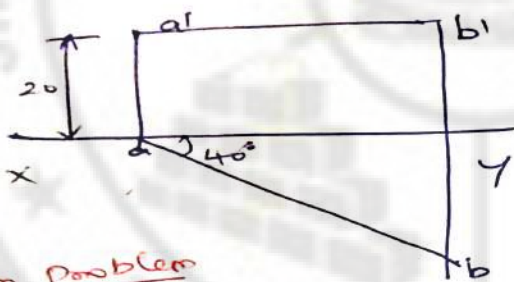
④ A line AB 75 mm long is in HP and makes an angle θ with the VP, its end A is 25 mm in front of VP. Draw its Projections.



⑤ A line CD 40 mm long is in VP and inclined at 35° to HP. The end C is 15 mm above H.p. Draw the Projections.



6) A line AB of 50mm long is on HP and inclined at 40° to VP. The end A is 20mm in front of VP. Draw the projections.



exam problem

7) The pictorial view of the sample component is given in fig 2. Draw the front view, top view & right side view. P.No. 4-15

REVOLUTION THROUGH TECHNOLOGY

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Hypocycloid

is an hypocycloid of diameter 50 mm and describing circle of radius 90 mm having a generating circle of radius 90 mm



$$\theta = \frac{r}{R} \times 360$$

$$\theta = \frac{25}{90} \times 360$$

$$\theta = 100^\circ$$

Hypocycloid

