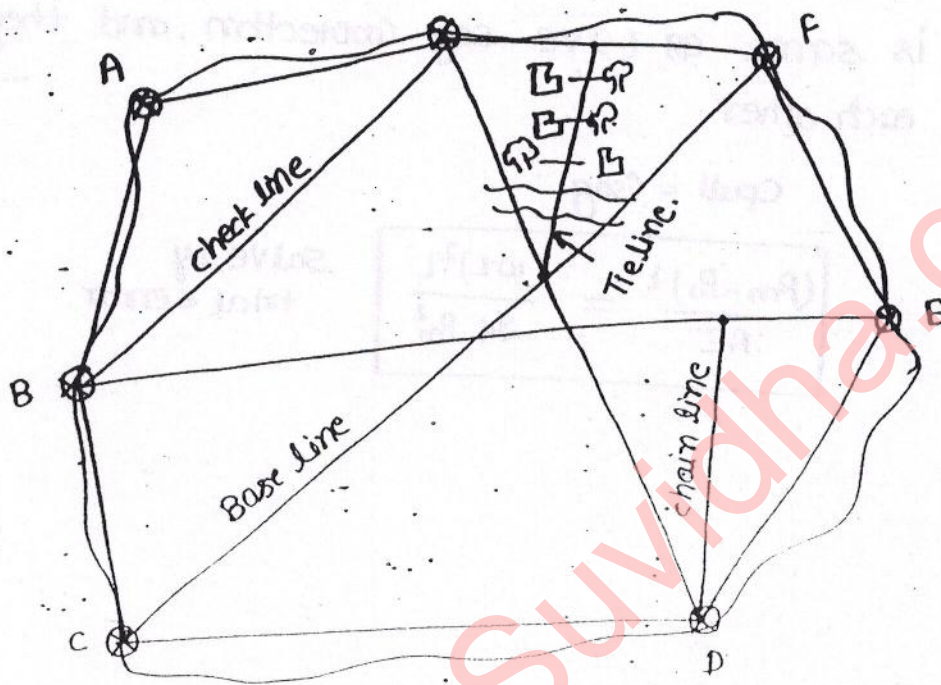


CHAIN SURVEY

⑧ Limiting length of offset :-

Important Points of chain survey :-



(1) Main stations :- Major control points to divide the area are called main stations.

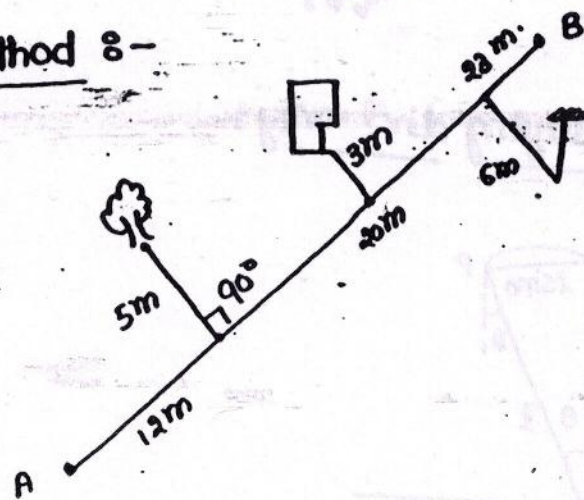
(2) Main lines :- Lines joining main stations.

(3) Base lines :- The longest line in the area that divide the total area almost in two parts.

(4) check line :- check lines are measured to check the accuracy of survey work done.

(5) Tie line :- Any line drawn to collect more information about different objects in area (for collecting details.)

(#) offset Method :-

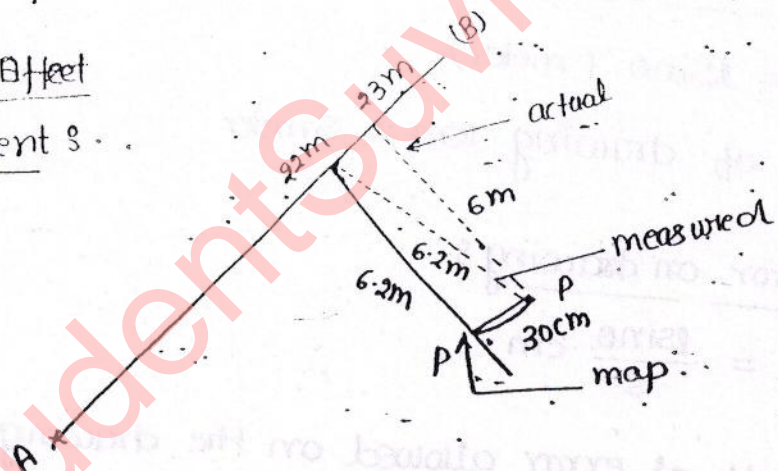


Field Book

	△ B	
	23m	
	20m	
	12m	
	△ A	

Error In Offset

Measurement



∴ error
 $\pm 0.025 \text{ cm}$
 $\pm 0.25 \text{ mm}$

∴ scale $1 \text{ cm} = 20 \text{ m}$

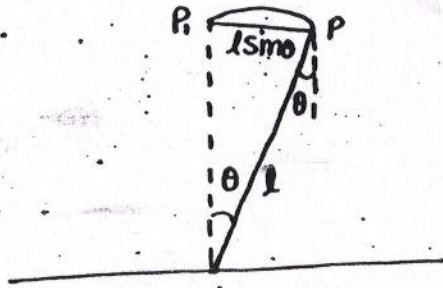
$$30 \text{ cm} \Rightarrow \frac{30 \text{ m}}{20 \text{ m}} = 0.015 \text{ cm} = 0.15 \text{ mm}$$

∴ scale $1 \text{ cm} = 2 \text{ m}$

$$30 \text{ cm} \Rightarrow \frac{0.36}{2} = 0.15 \text{ cm} = 1.5 \text{ mm}$$

Limiting length of offset :-

Case (i) If the error is in laying dirⁿ only :-



P = actual location of point on the ground.

P₁ = Plotted position of point on the drawing.

θ = error in laying direction.

Length of error on ground

$$= l \sin \theta \text{ (meter)}$$

if scale of drawing 1 cm = S meter

Length of error on drawing :-

$$= \frac{l \sin \theta}{S} \text{ cm}$$

Max^m. length of error allowed on the drawing = 0.25 mm

$$= 0.025 \text{ cm}$$

$$\text{So, } \frac{l \sin \theta}{S} \text{ cm} = 0.025 \text{ cm}$$

$$l = \frac{0.025 S}{\sin \theta}$$

limiting length of offset

Ques: (i) If scale of drawing is

(i) $1\text{cm} = 60\text{m}$

(ii) $1\text{cm} = 5\text{m}$

For above cases, find out the limiting length of offset, if max^m error allowed in laying dirⁿ of the offset is 6° .

Solution:

max^m error in dirⁿ $\theta = 6^\circ$

If limiting length of offset = $l\text{m}$.

$$\text{max}^m \text{ error} = l \sin \theta \text{ m}$$

Case (i) scale $\Rightarrow 1\text{cm} = 60\text{m}$

$$\text{Length of error on the drawing} = \frac{l \sin \theta}{60} \text{ cm} \approx 0.025 \text{ cm}$$

$$l = \frac{0.025 \times 60}{\sin 6^\circ} \text{ meter}$$

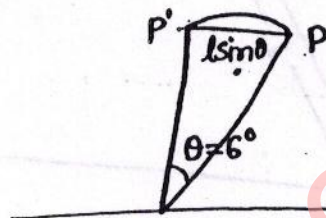
$$\boxed{l = 14.35 \text{ m}}$$

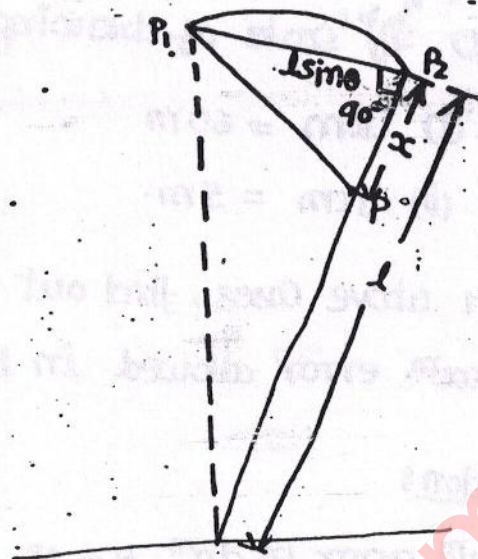
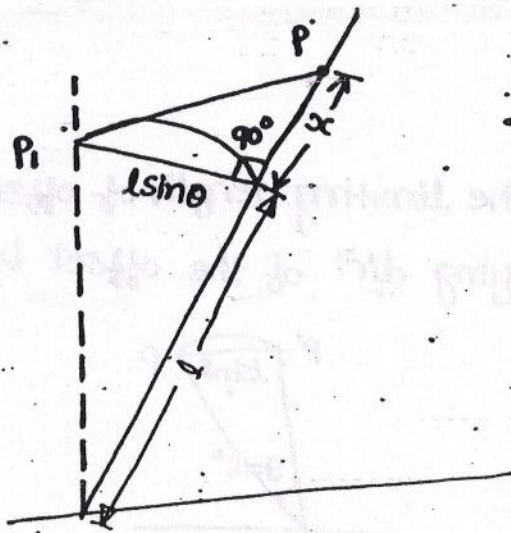
Case (2) If scale $\Rightarrow 1\text{cm} = 5\text{m}$

$$l = \frac{0.025 \times 5}{\sin 6^\circ} \text{ meter}$$

$$\boxed{l = 1.19 \text{ m}}$$

Case (3) When the error in laying dirⁿ as well as in length measurement also :-





P = Actual position of point on ground.

P_1 = Plotted position of point on drawing.

$PP_2 = x$ = Error in length measurement.

$PP_2 = l \sin \theta$ = Error due to wrong direction.

Total length of error on the ground

$$PP_1 = \sqrt{PP_2^2 + P_1P_2^2} = \sqrt{(l \sin \theta)^2 + x^2}$$

Length of error on the drawing (if scale is $1 \text{ cm} = 5 \text{ meter}$)

$$= \frac{\sqrt{(l \sin \theta)^2 + x^2}}{5} \text{ cm} \pm 0.025 \text{ cm}$$

$$(l \sin \theta)^2 + x^2 = (0.025s)^2 \quad \text{--- (A)}$$

Ques (2) If max^m length of an offset allowed is 20m & max^m error allowed in length measurement is 25cm, scale of drawing is $1 \text{ cm} = 50 \text{ m}$. Find out max^m error that can be allowed in laying dirⁿ of offset. - Max^m error on drawing = 0.025cm.

Solⁿ:

$$x = 25 \text{ cm} \\ = 0.25 \text{ m}$$

$$\theta = ?$$

$$l = 20 \text{ m}$$

Scale of drawing is $1 \text{ cm} = 50 \text{ cm}$

$$(l \sin \theta)^2 + x^2 = (0.0255)^2$$

$$(20 \sin \theta)^2 + (0.25)^2 = (0.025 \times 50)^2$$

$$\sin \theta = 0.061$$

$$\theta = 3.51$$

$$\therefore \boxed{\theta = 3^\circ 30' 39''}$$

If $\theta = 5^\circ$

$$l = ?$$

$$x = 25 \text{ cm} = 0.25 \text{ m}$$

$$\boxed{1 \text{ cm} = 50 \text{ m}} \text{ — scale}$$

$$(l \sin 5^\circ)^2 + (0.25)^2 = (0.025 \times 50)^2$$

$$\therefore \boxed{l = 14.05 \text{ m}}$$