INSTITUTE OF TEXTILE TECHNOLOGY

CHOUDWAR

SUB-LS-II

BRANCH-CIVIL ENGG.

SEM-5th

PREPARED BY

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① what do you mean by sureveying?

Sureveying is the art of determining the relative position on different object on the surface of the eareth by measureing the horizontal distan between them.

② what is leveling?

leveling is the aret of determining the relative vertical distance of different points on the surface on the eareth, therefore in leveling measurement are taken vertical plain.

Tacheometry

Introduction:-

(i) It is the branch of sureveying in which horiz -ntal & vertical distances are determine by taking angular observation with an instumen known as a tacheometer

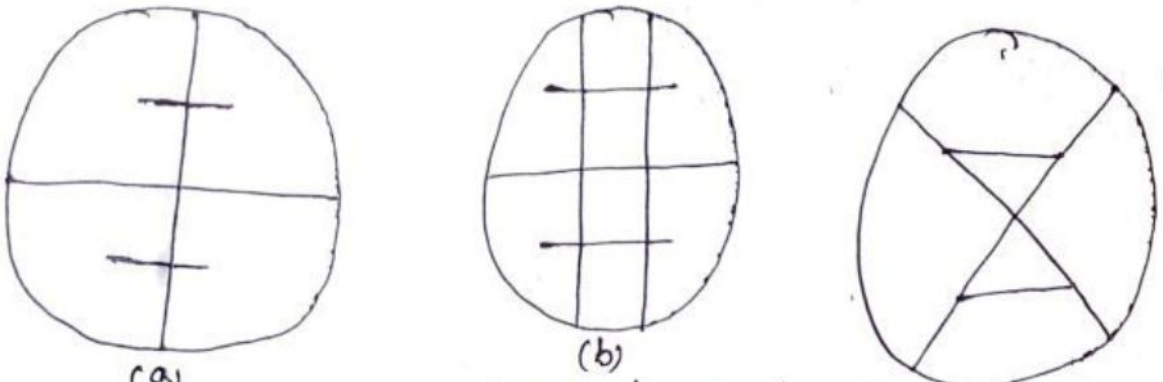
(ii) The channing opereation is completely elemina in such a sureveying.

(iii) It is also used in location surevey fore railw road. etc.

(iv) It is very reappid. & can be prepared for investigation worek within a short time.

Instument used in tacheometry:-

(i) Tacheometere:- It is nothing but a trav theodlight fitted with a staddia diaphragm annalatic lence.



* Stadiarod & leveling staff :-

fore shoret distance ordinarey leveling staff is used, the leveling staff noremaly 4m long & can be folded in to 3 path. the greadantion are so mareked minimum deading 0.005 or 0.001 m. fore long sides a specially design greaguated rod is used which is known as stadia rod is it also 4m long the minimum reading can be taken 0.001m.

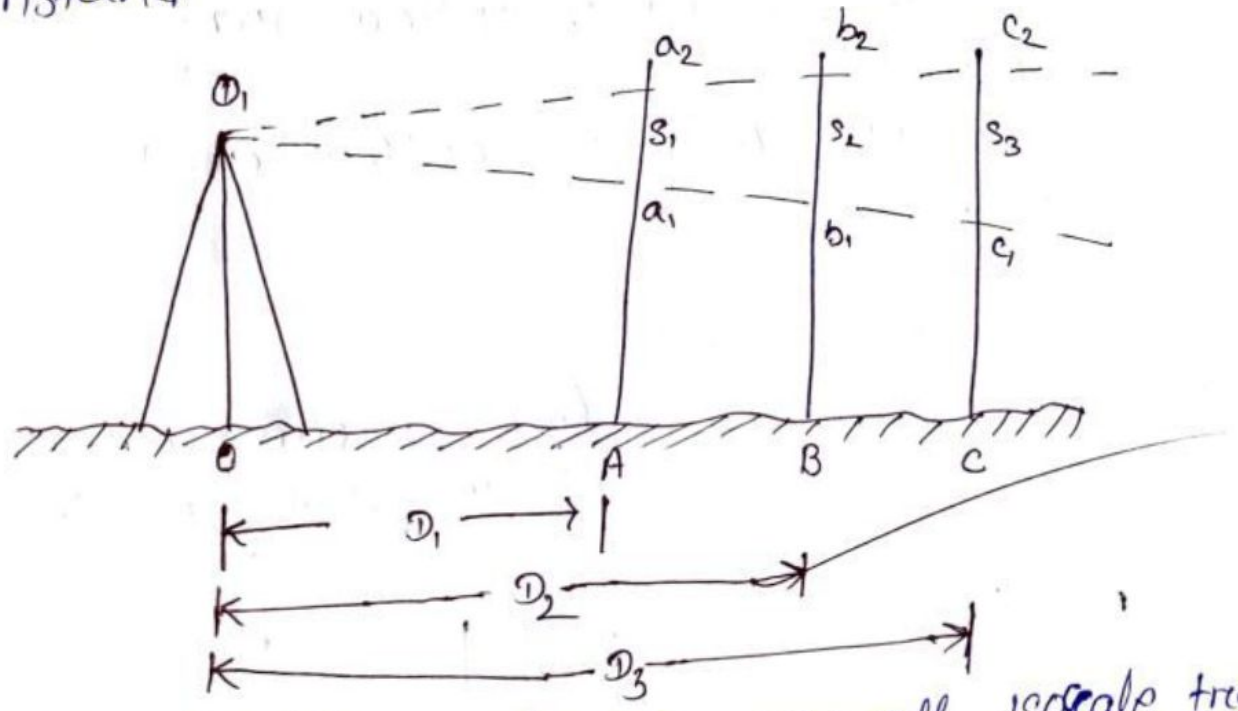
Characctrict of tachnometere :-

- The volume of multipling constand F/i should be 100.
- The telescope should be powerefull & having a magnification 20-30 dia.
- The appareater of the objective should be of 35-45 mm dia. Fore breight image.
- The teliscope should be fitted with an annaladick lence to make to additive constant f+d Exacately 0.
- The eye pish should be bettere magnafin powere so that it is possible to often a cleare staff reading.

→ f = focal lance of the objective.
i = stadia intere shape
d = distance between obtical centere & vertical axis of instument.

* Principle of trachnometric :-

→ The principle of trachnometric which based on the propterety isoscale trangle, where the reatio of the distance of the base from the apach & the length of the based is allways constand.



ΔOAa_2, $\Delta O_1 b_1 b_2$ & $\Delta O_1 C_1 C_2$ are all isoscale trangle where D_1, D_2, D_3 are the distance fore the based to appic & S_1, S_2, S_3 are the length of the based, soaccoreding to this principle $D_1/S_1 = D_3/S_3 = F/i$

* Deterc mination of trachrometric ore stadia constand The constand may be deteremenate by
(1) laborcatorey measureement
(2) Fild measurument

(i) Labotory measurement :- The Focal length (f) of the lance can be determinat by means of an optical bench accoreding to the Equation

$$1/f = 1/u + 1/v$$

The stadia interset (i) can be measure for the diforegream with the verener callipere.

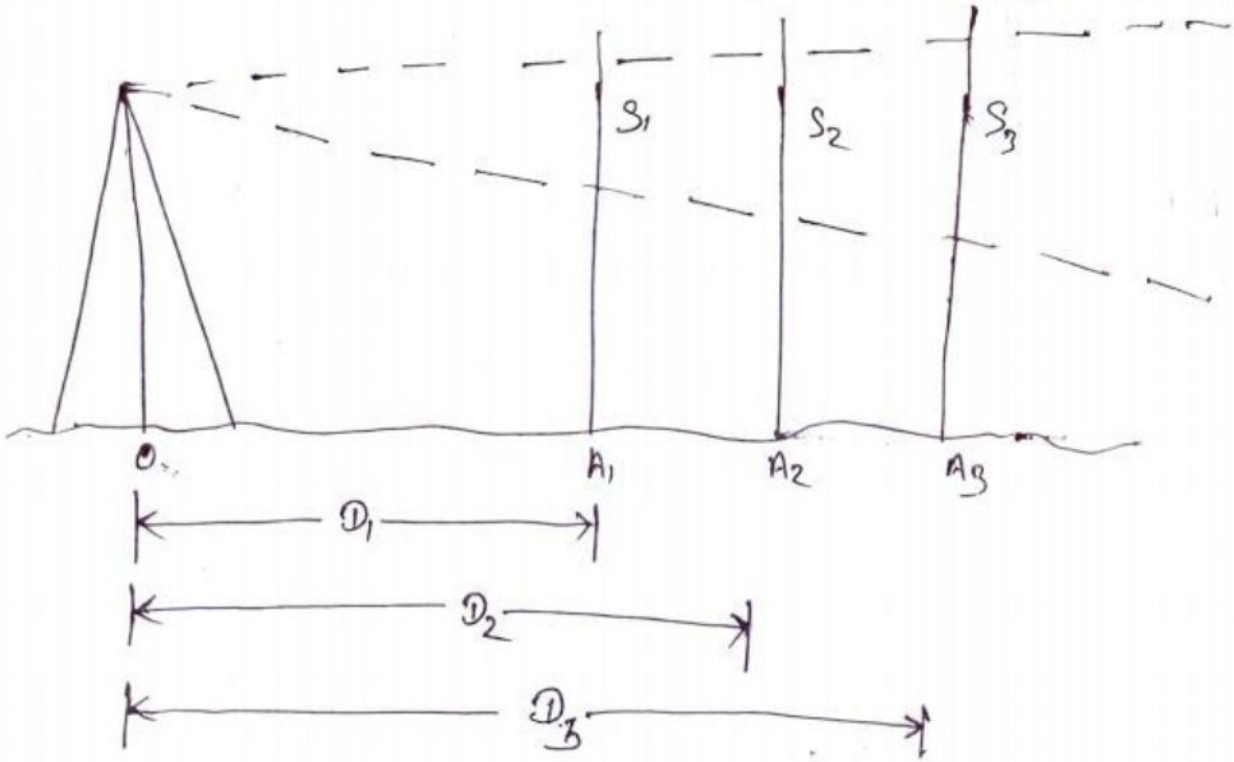
→ The distance (d) between the optical centere of the veretical axis instimant can also be measure in this menner the multiplying & additing f.t.d constand can be calculated.

u = Distance between optical centere up to staff

v = Distance between optical centere upto image.

(ii) Fild measuremement :-

Fild measuremement a level ground is selected the tachnometere is set up at the point "O"



→ The staff intereset arre noted at each of the peg, let the intercset arre S_1, S_2 & S_3

→ The horeizontal distance of the peg freom 'O' orre accureately measurred.

let this should be D_1, D_2, D_3

the sabstituting the vallue $D_1, D_2 \ldots D_n$ & S_1, $S_2 \ldots S_n$ is inthe genereal equation

$$D = (f/i)s + (f+d)$$

D = Distance.

* method of tachnometreic

Tachnometreic invalbe in 2 methods

(1) Stadia method.

(2) trangistinal method.

* Stadia method:-

In this method the diaphreagm The tichnometere with preovide with two stadia hairs looking throw the telescope the stadia heaire heading arre taken the difforeance in this reading gives the staff intere shape. to determine the distance betweer the station & the staff, the staff intere shape is multiplay the staff intere set shape is onalteplaying $f/i = 100$. the stadia method op be 2 king.

(1) fixed haire method

(2) movable haire method

① Fixed haire method:-

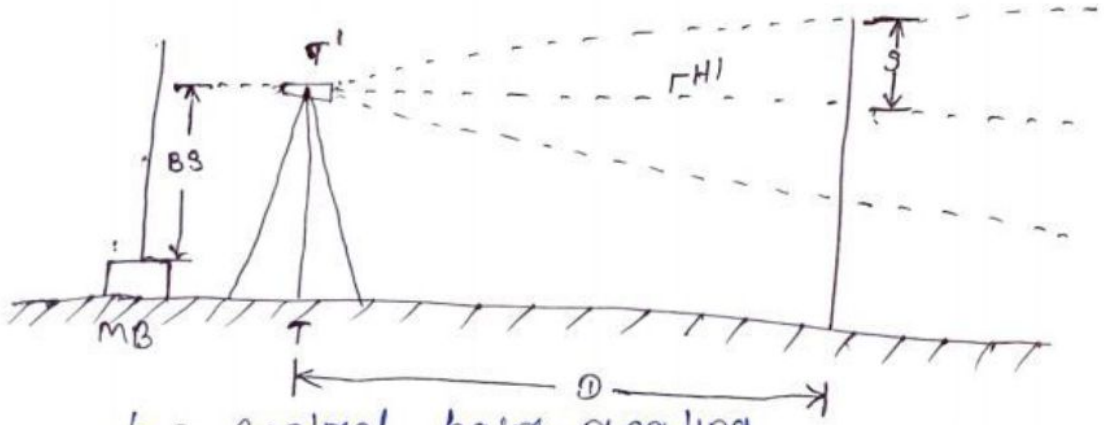
The distance between the stadia haire is fixed in this method, which is one commonly used. when the staff is sitted throow the telescope the sutton pereson of the staff is intereseted by the uppere & lowere stadia the value of staff interset vareries the differend between the station & staff can be often by the multiplying the staff interest by stadia constand.

(2) movable haire method:-

The stadia haire are not fixed in this method this can be move or adjested by micreow meter schreoo the staff is provided 2 tragets known distance. appared during absubation the distance between stadia haire is so adjested that the uppere haire by set the lowere treanget

case-1

Fixed haire method:- when the line of side horizontal & staff is head vertical



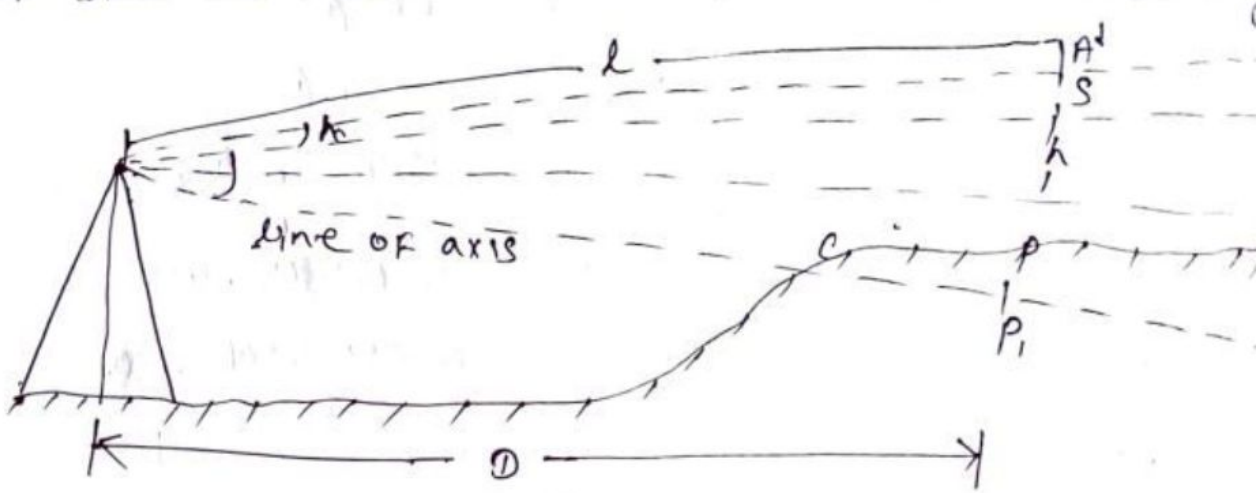
h = central haire reading.

when the line of site is horizontal the general tracumatric equation is given by D = F/i (S) + (F+b)

where f/i = multipling constand = 100
f+d = additing constand = 0
HI = R.L of banch mark + BS

case - 2

considering the angle of elevation, where the line of side is inclined but staff is head vertical



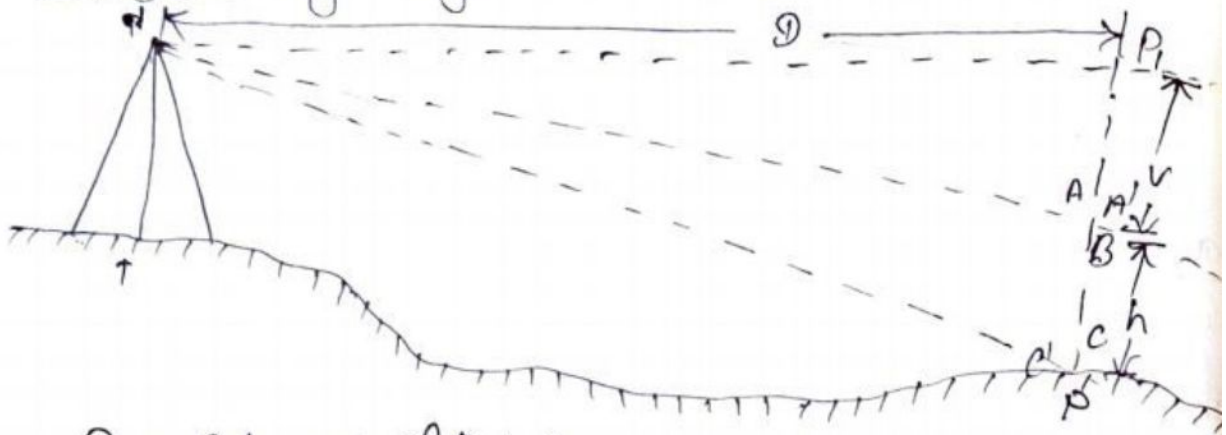
S = AC = staff intercept
h = central hair reading
v = vertical distance between instrument axis & central hair
D = horizontal distance between instrument & staff

$D = (f/i) \times S \cos^2\theta + (f+d)\cos\theta$

$V = (D \tan\theta)$ or $= \frac{f}{i} \times \frac{S \times \sin 2\theta}{2} + (f+d)\sin\theta$

Finally R.L of staff station (P) = R.L of Axis instrument + v - h

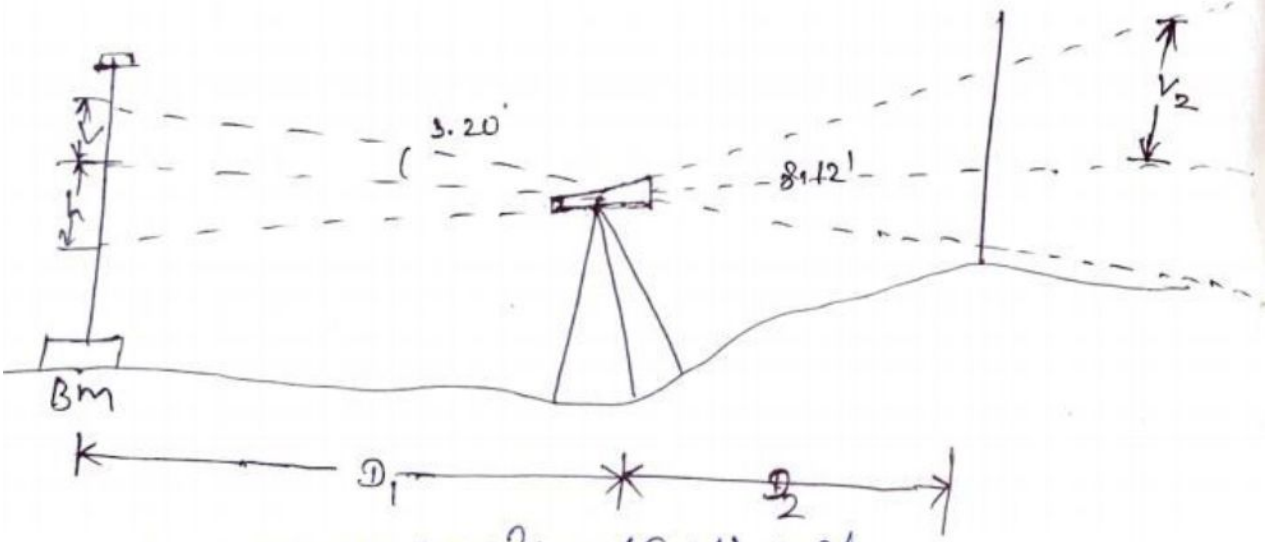
* considering angle of depression "-"



$$D = f/i \times \cos^2\theta + (F+D)\cos\theta$$

$$V = \frac{f}{i} \times \frac{S \times \sin 2\theta}{2} + (F+d)\sin\theta$$

Inst. station	Staff station	vertical angle	Hair readings (m)	Remarks
C	BM	$-5^\circ 20'$	1.50, 1.800, 2.450	750.50
C	D	$+8^\circ 12'$	0.750, 1.500, 2.250,	



$$D = f/i \times S(\cos^2\theta + (F+d)\cos\theta$$

$$V = f/i \times S \times \frac{\sin\theta}{2} + (F+d)\sin\theta$$

Here, in the 1st observation,

$f/i = 100$, $f+d = 0.15$

$S_1 = 2.450 - 1.150 = 1.300\,m$

$\theta_1 = 5^\circ 20'$ (depression)

$$V_1 = 100 \times 1300 \times \frac{\sin 10^\circ 40'}{2} + 0.15 \times \sin 5^\circ 20'$$

$$= 12.045\,m$$

In the 2nd observation $S_2 = 2.250 - 0.750 = 1.1500$

$\theta_2 = 8.12'$ (depression)

$V_2 = 100 \times 1.500 \cos 8°12' + 0.15 \times \cos 8°.12'$

R.L. formation = LL of BM + $h_1 + V_1$

$750.500 + 1.800 + 12.045 = 764.345$

R.L of D = RL of inst axis + $V_2 - h_2$

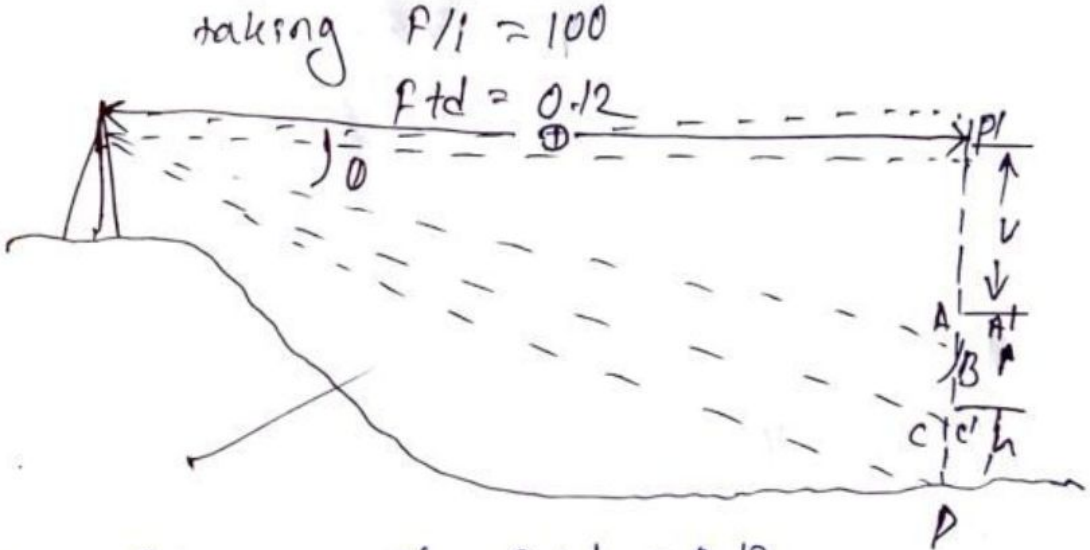
$= 764.345 + 21.197 - 1.500 = 7890.42$

So, the distance CD = 147.097 m & RL of D

= 784.042 m

(2)

Instrument station	staff station	vertical angle	Haire reading (m)	Remark
C	BM	12°10'	2.050, 2.210, 2.540	R.L of BM 620 m



Take f/i = 100 & f+d = 0.12

$S = 2.540 - 2.050 = 0.49$

$\theta = 12° 10'$

$V = f/i \times S \times \frac{\sin 2\theta}{2} + f+d \times \sin\theta$

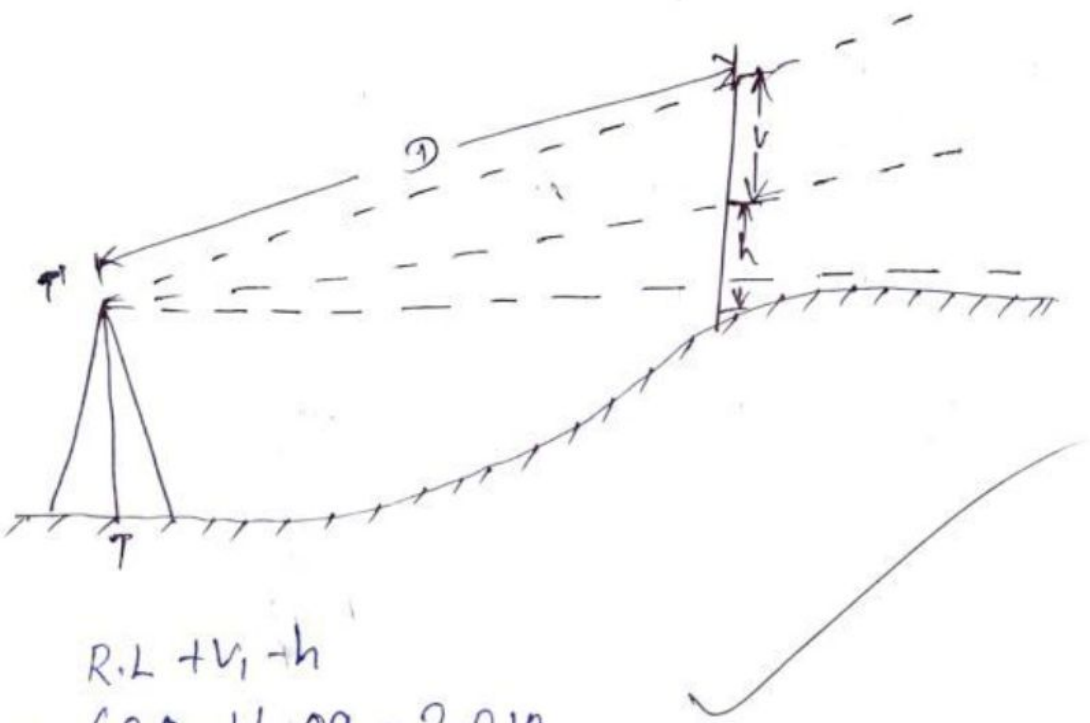
$= 100 \times 0.49 \times \frac{\sin 2 \times 12°10'}{2} + 0$

$= 1.09$ m

$$D = f/i \times \cos^2\theta + f + d \times \cos\theta$$
$$= 100 \times \cos^2 12°10' + 0 \times \cos\theta$$
$$= 95.6m$$

$$620 - v - h$$
$$= 620 - 1.09 - 2.210$$
$$= 616.7$$

(3)



$$R.L + V_1 - h$$
$$= 620 + 1.09 - 2.210$$
$$= 618.88m$$

* what is Tychnometere ?

Tychnometere is the branch of surveying in which horizontal & veretical distance are veretical membere are making observation with a tachnometere.

Difference between theodlight and tachometere :-

Tacheometere	Theodlight
(i) when theodlight is fitted with an annolitic lence is known as a tracheometer	(i) without analitic lance the instrument is called a single treanget theodlight.

* why use analatic lance in trachometere ?

→ The analitic lence is preovided in trachometere to make addative constant is zero.

* what is the principle of tachenometric ?

→ The principle of trachenometric is isoscale triangle.

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* movable haire method :-

→ In this method the staff interc shape is constand but the distance between the stadia waires is variable. the staff is provided with 2 treanget a known distance apparet.

→ The type of theodlight is known as suptence theodlight. the diaphream consist of a centreal where fixed with the axis of teleschope. the uppere & lowere stadia haires can be moved by micrometere screws in a veretical plane.

when the line of stadia of horeizontal, the distance (d) is given by

$$D = \frac{C \times S}{n} + (f + d)$$

where, C = constant varing 600 - 1000
h = sum of the reading in the micrometer
S = staff intereset

* when line of side inclined

$$D = \frac{C \times S \times \cos^2\theta}{n} + (f+d)\cos\theta$$

Q① The micrometere reading is of a sipstance theodlight are 3.455 & 3.405, the distance intereset is 3m, the constand 600 of an 0.5m & calculate the distance between instument & staff.

C = 600
f+d = 0.5
S = 3m
n = 3.455 + 3.405 = 6.86

$$D = \frac{C \times S}{n} + (f+d)$$

$$= \frac{600 \times 3}{6.86} + (0.5)$$

$$= 262.89\ m$$

② The micrometere reading of removable theodlight aree 2.211, 7.898. the staff interset is 5m. the constand of instument are 750 are 0.3m. dalculate distance.

C = 750
f+d = 0.3m
S = 5m
n = 4.105

$$D = \frac{C \times S}{n} + (f+d)$$

$$= \frac{750 \times 5}{4.105} + (0.3)$$

$$= 913.82\ m$$

③ The micrometer of A Supstance theodlight are 5.100 & 4.686, the angle of Aleuti $5^{\circ}30'$, the distance between the targets 4m, the constant of instrument 1006 & 0.3 Calculate Distance?

Given data,

$C = 1000$

$n = 9.79 = 5.100 + 4.686'$

$S = 4m$

$f+d = 0.3$

$\theta = 5^{\circ}30'$

$$= \frac{C \times S \times \cos^2\theta}{n} + (f+d)\cos\theta$$

$$= \frac{1000 \times 4 \times \cos^2 5^{\circ}30'}{9.79} + (0.3)\cos 5^{\circ}30'$$

$$= 405.13m$$

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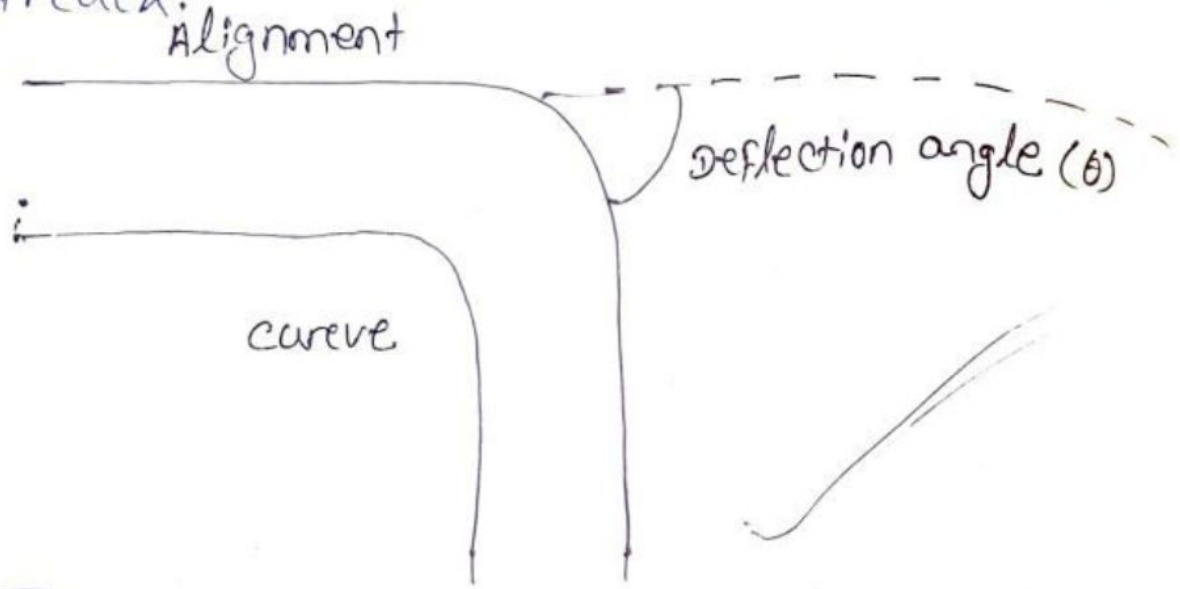
curve

During the survey of a alinment involvi road & railways the direction of line may change due to some on avadiable sorcume stands. the angle of change in direction is known as the deflection angle. Fore it to be posible fore a vehicle to rcum easily along a rod ore a railway track.



→ The cureve is provided in the horeizontal plane It is known as a horeizontal cerve

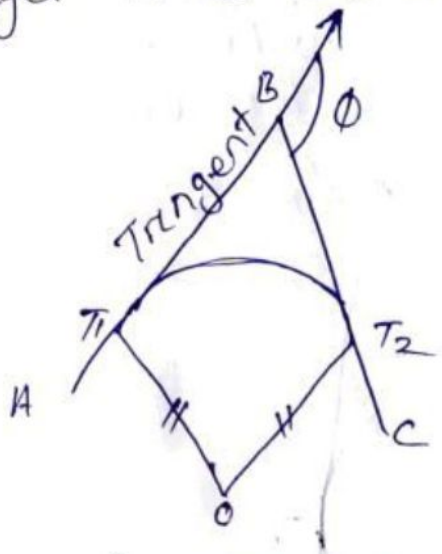
→ The nature of gradient may not be uniforem along the alinment of any prosect & may consist of Different gradiant in such case a pareabolic cureved path is provided in veretical planning the gradin fore easy moment of vehicle, the cureve is vertical cureve.

curve

- Horizontal curve
  - Simple curve
  - compound curve
  - reverese curve
  - trangitinal curve
  - Lemniscate curve
- vertical curve

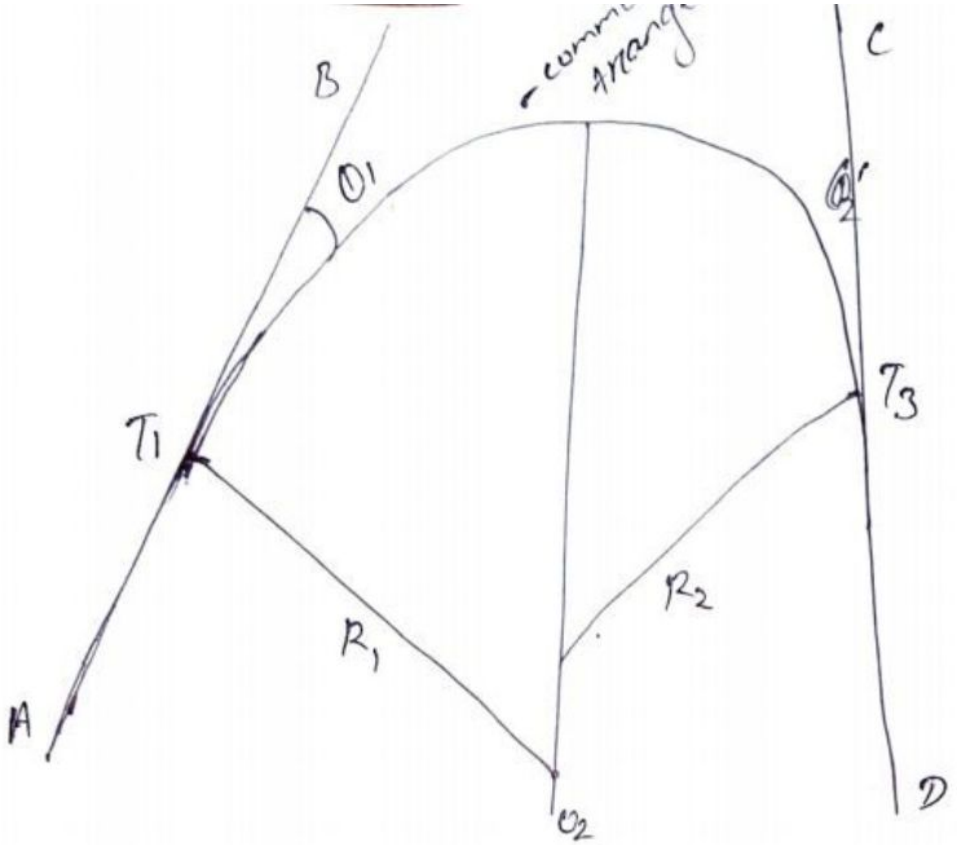
→ Simple curve :-

when a curve consist of a single arc with a constand radious connecting the 2 Tranget it is called Simple curve.



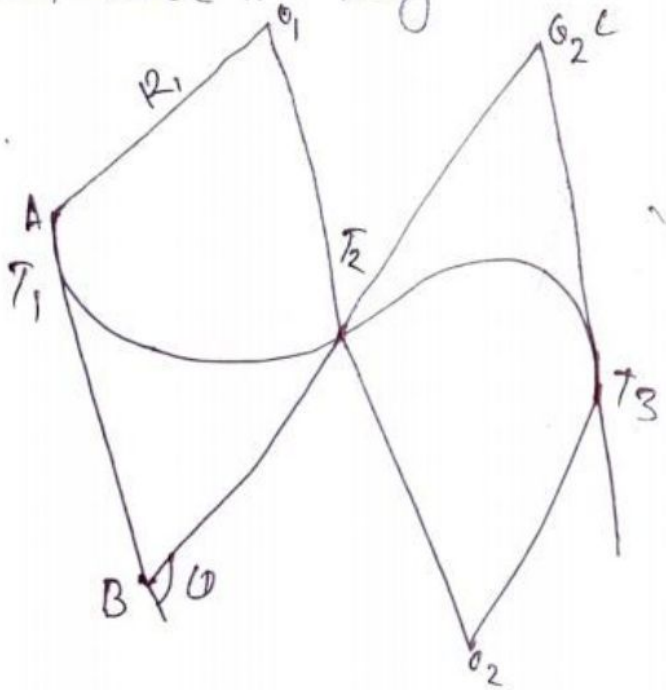
→ compound curve :-

when a curve consist of two ore more arc with different radious it is called a compound curve. this curve likes on the same size of a common trangent & centre of the difforance arc lie on the same side



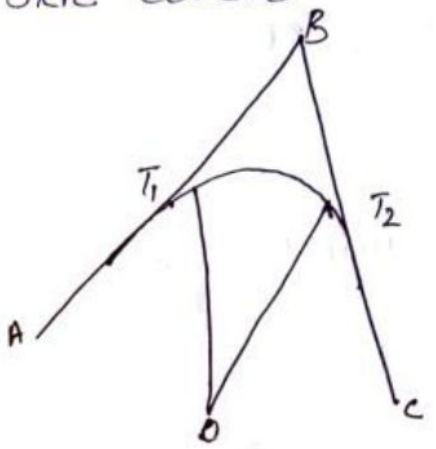
(3) Reverse curve :-

A reverse curve consist of 2 arcs bend in opposite direction, the centre is opposite direction. there radi may be either equal or different. They have one common tangent



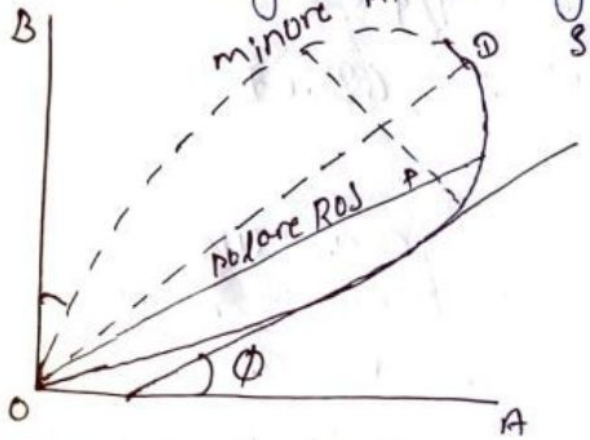
(4) Trangtion curve :-

A curve of varable radious is known as trangation curve. It is also known as spirial curve. In railways such a curve is provided both side curve to minimise super elevation.



(5) Lemniseapp curve :-

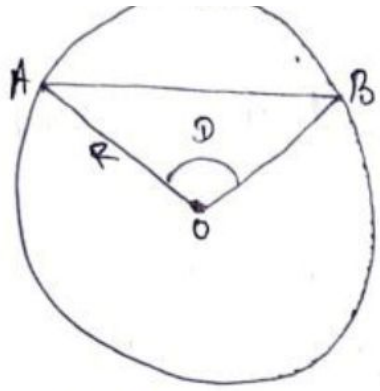
It is similare to a transition curve & generally adopted city rods where the deflection angle is large.



* Degree of curve :-

The angle unit chored of 30m length subtane at the centere of the curecle Freomed by the curve is known as degree of curve.

> A curve may be design accoreding to the radious or degreee of curve when the unit cut subtanded an angle of 1° it is called as 1° curve. It may be calculated that readious of a one degreee curve 1719m



* Relation between radious & curve

$R = 1719/D$

Q1) A curve having the radious 27cm. Find the degree of curve?

Given data :-

curve radious (R) = 27cm

Degree (D) = ?

$$R = \frac{1719}{D}$$

$$\Rightarrow 27 = \frac{1719}{D}$$

$$\Rightarrow 2719/27 = 63.67$$

* Super elevation :-

when a particle moves in a surcial path then a force is acting open it & trance to put it away from the center similarly when a vehicle moves from a strength to a curve path the centrifugare path tence to puss the vehicle away from the road ore flat. this is because there is no component force to countree balance to centree-fugare force.

$$e = \frac{Gv^2}{gr}$$

Centrefugal ratio :- the ratio between centrifugal ratio weat of vehicle is known as centrifugal ratio

centrifugal ratio $= \frac{v^2}{gr}$

* Properties of simple surcilar cureve :-

1) If the angle of interesection given deglection angle $\theta = 180 - I$
2) If the radious not given then $R = 1719/D$
3. Treanget length $= R \tan\frac{\theta}{2}$ m
4. Length of cureve $= \frac{\pi R\theta}{180}$ m ore $\frac{30\theta}{D}$, where 'D' is given.
5. Length of long chored $= 2 \times R \times \sin\frac{\theta}{2}$ m
6. Apex Distance $= R \times \left(\frac{\sec\theta}{2} + 1\right)$
7. Veresed sign of cureve $= R \times \left(1 - \cos\frac{\theta}{2}\right)$
8. Chanage of 1st treanget point = chanage of Interset point - treanget length.
9. Chanage of 2nd treanget point - chanage of 1st treanget point + cureve length.
10. mid ordinate $= O_o = R - \sqrt{R^2 - \left(\frac{L}{2}\right)^2}$

Q1 Two trangent AB & BC intereset at a point B at 150.5 m chainage, let calculate all the necessary data for setting out a carculare cureve of 100m radious & deflection angle 30° by the method of offset from the long - chored.

Given data :-

chainage = 150.5 m

cureve radious (R) = 100 m

Deflection angle (θ°) = 30°

(i) Treanget length = $R \tan \frac{\theta}{2}$

$= 100 \times \frac{\tan 30°}{2}$

$= 26.79$ m

(ii) length of cureve = $\frac{\pi R \theta}{180}$

$= \frac{\pi \times 100 \times 30°}{180}$

$= 52.35$ m

(iii) length of long chored = $2R \sin \frac{\theta}{2}$

$= 2 \times 100 \times \sin \frac{30°}{2}$

$= 51.76$ m

(iv) Apex Distance = $R \times \left(\sec \frac{\theta}{2} - 1\right)$

$= 3.52$ m

(v) chainage of 1st intereset point =

chainage of intereset point - treanget length

$= 150.5 - 26.79$

(viii) chanage of T_2 = chanage of T_1 + cureve length

$123.71 + 52.36 = 176.07$m.

In long chord method.

$O_5 = \sqrt{R^2 - x^2} - (R - O_0)$

$= \sqrt{100^2 - 5^2} - (100 - 3.41)$

$= 3.28$m

$O_{10} = \sqrt{R^2 - x^2} - (R - O_0)$

$= \sqrt{100^2 - 10^2} - (100 - 3.41)$

$= 2.91$m

$O_{15} = \sqrt{R^2 - x^2} - (R - O_0)$

$= \sqrt{100^2 - 15^2} - (100 - 3.41)$

$= 2.28$m

$O_{20} = 20 = \sqrt{100^2 - 20^2} - (100 - 3.41)$

$= 1.39$m

$O_{25} = \sqrt{100^2 - 25^2} - (100 - 3.41)$

$= 0.23$m

$O_{25.88} = \sqrt{100^2 - 25.88^2} - (100 - 3.41)$

$= 0.00$m

Q2

Two tranget AB & BC Interset at a point 'B' a 200m channage letes calculate all the neces- -ary data setting out a curculare curve of 80m radious & deflection angle 40° by the method of long chored.

Given data :-

interset point, chanage length = 200m

Radious of curcve(R) = 80m

Deflection angle (θ) = 40°

(i) Tranget length = $R \times \tan\frac{\theta}{2}$

$= 80 \times \tan\left(\frac{40°}{2}\right)$

$= 29.12\,m$

(ii) Length of longchored = $2 \times R \sin\frac{\theta}{2}$

$= 2 \times 80 \times \sin\left(\frac{40°}{2}\right)$

$= 54.72\,m$

$O_0 = R - \sqrt{R^2 - \left(\frac{L}{2}\right)^2}$

$= 80 - \sqrt{80^2 - \left(\frac{54.76}{2}\right)^2}$

$= 4.82\,m$

$O_9 = \sqrt{R^2 - n^2} - (R - O_0)$

$= \sqrt{802.92} - (80 - 4.82)$

$= 4.31\,m$

$O_{18} = \sqrt{R^2 - n^2} - (R - O_0)$

$= \sqrt{80^2 - 18^2} - (80 - 4.82)$

$= 2.77\,m$

$O_{27} = \sqrt{R^2 - x^2} - (R - O_0)$

$= \sqrt{80^2 - 27^2} - (80 - 4.82)$

$= 0.13\ m$

$O_{27.36} = \sqrt{R^2 - x^2} - (R - O_0)$

$= \sqrt{80^2 - 27.36^2} - (80 - 4.82)$

$= 0.00\ m$

Q3

Two tranget PQ & QR intercset at a point of Q at 200m chainage, calculate all the necessary data for setting out a cacrular curve of 150m radious & deflection angle 50° by the method of offset by long chord.

⇒ Given data -

chainage length = 200m

Radious of curve (R) = 150m

Deflection angle (θ) = 50°

Tranget length = $R \tan\frac{\theta}{2}$

$= 150 \times \tan\left(\frac{50^\circ}{2}\right)$

$= 69.95\ m$

length of long chord = $2R \sin\frac{\theta}{2}$

$= 2 \times 150 \times \sin\frac{50^\circ}{2}$

$= 126.79\ m$

1st tranget point = $200 - 69.95\ m$

$= 130.05\ m$

length of curve = $\frac{\pi R\theta}{180} = \frac{\pi \times 150 \times 50^\circ}{180} = 130.90$.

chainage of T_2 = T_1 + curve length

= 130.05 + 130.90

= 260.95 m

$O_0 = R - \sqrt{R^2 - (\frac{l}{2})^2}$

$= 150 - \sqrt{150^2 - (\frac{126.79}{2})^2}$

= 14.05 m

$O_{30} = \sqrt{R^2 - x^2} - (R - O_0)$

$= \sqrt{150^2 - 30^2} - (150 - 14.05)$

= 11.02 m

$O_{45} = \sqrt{R^2 - x^2} - (R - O_0)$

$= \sqrt{150^2 - 45^2} - (150 - 14.05)$

= 7.14 m

$O_{60} = \sqrt{R^2 - x^2} - (R - O_0)$

$= \sqrt{150^2 - 60^2} - (150 - 14.05)$

= 1.53 m

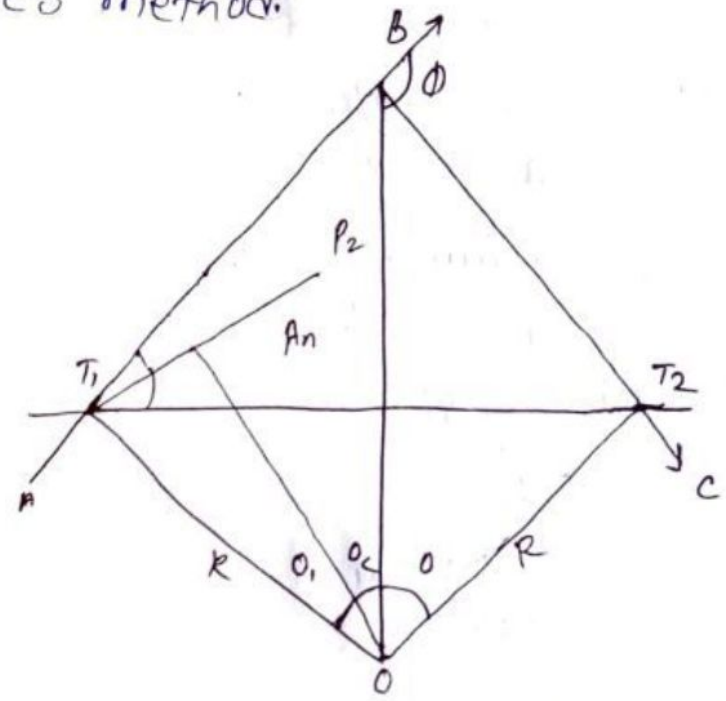
$O_{63.40} = \sqrt{R^2 - x^2} - (R - O_0)$

$= \sqrt{150^2 - 63.40^2} - (150 - 14.05)$

= 0.00 m

Instrumental method :-

Horizontal setting by deflection angle method or rankine's method.



Let AB & BC two tranget interc setting at B the deflection angle Φ, the tranget length is calculated T1 & T2 are marek.

$$\delta_1 = 1718.9 L_1/R$$
$$\delta_2 = 1718.9 L_2/R$$
$$\delta_3 = 1718.9 L_3/R$$
$$\delta_4 = 1718.9 L_4/R$$
$$\delta_n = 1718.9 L_n/R$$

If the degree cover D is given δ_1 =

$$\delta_1 = DL_1/60$$
$$\delta_2 = DL_2/60$$

Arcrithmetacal check = $\delta_1 + \delta_2 + \delta_3 \dots + \delta_n = \frac{\theta}{2}$

Q1

Two treanget interset at a chanage of 1250 m The angle of intersection is 150° lefts calculation all the data nessecery for setting out a curve of 250m radious by deflection angle method the peg intervad may be taken as 20m

Treanget interset chanage = 1250m

Deflection angle(θ) = 180°-150° = 30°

~~Interest~~ Radious = 250m

Treanget length = $R \tan\frac{\theta}{2}$

= $250 \times \tan 15°$

= 67m

Length of chored = $2R\sin\frac{\theta}{2}$

= $2 \times 250 \times \sin 15°$

= 129.41m

Length of cureve = $\frac{\pi R\theta}{180}$

= $\frac{\pi \times 250 \times 30}{180}$

= 130.90m

1st treanget point - Interset point - treanget length

1250-67 = 1183

2nd treanget point = 1st treanget + cureve

= 1183 + 130.90

= 1313.92m

δ_1 = 1718.9 x L_1/R = 1718.9 x 7/250 = 0°48'13"

δ_2 = 1718.9 L_2/R = 1718.9 x 3.92/250 = 0°26'95"

(v) Obastacle accureing Accross the cureve, supporet a bulding comes accross the cureve Forem T_1 points $P_1, P_2, P_3 \ldots\ldots P_5$ arce marked. the total deflection angle Fore P_5 is set up let the deflection angle is θ, then the length of long chored $T_1, P_5 = 2R \sin\theta$

* Basic on scale & Basic of maps :-

• what is Fractional orc ratio scale ?

- A Fractional scale maps shows the Fraction of an object orc land Freasorc of the map & also reprea sent the object & land marek

Linearc scale :-

A leanerc scale shows a distance between 2 orc moree land marek, This scale uses the chanes in distance to determine the position of the object.

* Greaphical scale :-

It is shown greaphicaly on a maps & also shows directly on the maps the currecsponding greound distance this scale is most useful scale if the maps will be reproduce & change inside.

maps :—

→ The reelative position of points in a plan arce repreasent by a maps

→ The process of location the relative position of the point in a plan is known as maping.

→ A maps is a repreesentation of a dreowing of the surface of the earth orc a pared orc dreaw on flat Surfa according to a scale.

* Map scale :-

Map scale reports to the relation ship between distance on a map & on corresponding distance on the ground.

Ex – 1 in 100000 (1 : 100000)

* map projection :-

→ A map projection is one of many method use to represent the 3 dimensional surface of the eareth ore others round body on a two dimensonal plane.

* map coveg location & Extend :–

→ A map Extend is the limit of a physical areea i.e represeent on the map tab or in map windows

→ The areea of a map i.e digpled is called map extend.

* MAP convey curecteristic of freetures :–

→ A map can not content duplicate key & Each key one map at most one value,

* The oredere of map betweens specigic imporetance

→ map convey spatial :– map dreaw attension to spatial reelation ship.

Ex – to distiribution a resoree overe time or in reelation to othere factere such as the presen such as greow fore haman settling

classification of map:-

1) physical map:-

A physical map shows the physical features of an area. It gives information of the tropography the height, depth, shape of feature, physical map identify mounte deseared, waterc bodies & othere land freoms; physical map are design to show the natureal land-scape fiturec fiturees on eareth.

2) Tropography map:-

Tropography map are a detel record of a land area giving geographic position & elevation for both natureal & monmad fiturec this fiturec include, roads etc.

3) Road map:-

Road maps are use in business for planning & communication. Road map show people how they can travel one place to another

politic map:-

This map doesnit show physical feature they show state & national country & capitical & measure cities. It is a type of map that represent political division boundirees, of the world.

* Climent map:-

This map shows the geogreaphy distrubation monthly & abrage value i.e temprature, prespection, humidity, wind & direction etc.

* Thematic map:-

→ It is a kind of map desienged to shown to distrubution of human ore natural features ore data.

→ weather., preopulition density & Geological map aree the example of the matic map.

Total Station :-

It preovids new & battere type of Imforemation at lowere cost, & in a fraction of time recored. It is a combination of elocdren theod light & elotreonic distance method.

Features :-

(1) multiple measure angle measureement
(2) multiple Distance measureement
(3) computs horizontal, veretical sloping distance
(4) correction forc temprature & teressume-himadity.
(5) Data treansporming 1st ly
(6) memorey cared, USB, cused in thic.

Function :-

(1) co-oredinate measureement
(2) co.oredinate relative to a known oredinate can be using the total station as long as a direct line of site can be establised between two points.

Angle measureement :-

morden total station instument measure angles by means of elotreo optical scanning of extreinly are within the instument.

- Distance measurement:-

Distance is measured with modulated microweave, the modulation factere in the reeturening single is reate. the distance is determined by treanming & reeiving & Frequency weave length.

Data processing:-

when data is downlood from a total station on to a computere application software is use to compeent resulis

- part of total station:-

(1) Autofocus
(2) Dual axis compaction
(3) larege graphic display.
(4) large storeage capacity
(5) eye sheat
(6) supereiore optic
(7) Non-prismedm
(8) Handgreip
(9) prism reflectere
(10) micreo processere
(11) Treipod
(12) Bactary
(13) optical & leasere plumbob

Q/ Two streght intereset at a chanage 800m deflection angle being 40°, calculate value of offset from tranget 10m interval by method of radial perependicalare off-set the radious of simple scorcular curve is 120m. /

chanage = 800m
deflection angle(Θ) = 40°
offset tranget length = 10m
coreve Radious (R) = 120m

tranget length = $R \tan\frac{\theta}{2}$
= 120 x tan 40°/2
= 43.68m

coreve length = $\frac{\pi R\theta}{180}$
= π x 120 x 40°/180
= 83.78m

chanage of T_1 = chanage - tranget length
= 800 - 43.68
= 756.32m

T_2 = coreve length + T_1
= 83.78 + 756.32
= 840.10m

by radial method
$Y_{10} = \sqrt{R^2 + x^2} - R$
$\sqrt{120^2 + 10^2} - 120$
= 0.42m

$$Y_{20} = \sqrt{R^2+x^2} - R$$
$$= \sqrt{120^2+20^2} - 120$$
$$= 1.66m$$

$$Y_{30} = \sqrt{R^2+x^2} - R$$
$$= \sqrt{120^2+30^2} - 120$$
$$= 3.69m$$

$$Y_{40} = \sqrt{R^2+x^2} - R$$
$$= \sqrt{120^2+40^2} - 120$$
$$= 6.49m$$

GPS	DGPS
(i) GPS stands fore Global positioning system	(i) Deferrcial Global positior
(ii) GPS Frequency Farryes From 1.1GHz to 1.5 GHz	(iv) DGPS Frequency verey fore engency requirement.
(iii) GPS is only one recivere is taken place	(iv) DGPS two recevers are taken place.

*Rovere GPS system :-

→ A Rovere is a small GPS receivere with data collecity & data transmiting.

→ Rovere calculate greade & find the exad locatio & elevation measure greand.

* Diforent between position & location :-

→ position refarce to the co-ordinates that specific where one each.

→ position is absolute.

• Location :-

→ It reforece to where one is with respect to objects arcund them.

→ location is relative.

* method of GPS measureement :-

(1) static GPS baseline
(2) real time kinematic obsureatation
(3) continously opereating refrence station.
(4) siquence to post process GPS Data.

(1) Aftere you arce finished collecting GPS Data fore the day you go back to the office & downlod youre data to youre computere, post Processing reequireds special softwareS, that Softwore will allow you to surch the internet fore the closest GPS based system. they use as a source of GPS currection.

Survey of India map series:-

→ Open series map:-

Open seresse map are daraught by "SOI" (survey of India) fore supporting & development activitie. It beare different map set numberes & both hared copy & disital forem it use to show the location & estend of each map seresse.

→ Series map are most likely to be produced by Goverement maping engency.

Defence seresse map:-

→ This scale used fore difences forces of india fore supporeting national secureity requirement.

→ This seresse of map fore the entaire country will be clasified as appreuprate & the guidelines reagrading there use will be foremulated by ministry of Difence.

* map nomencnature:-

A map nomencnature is single is a greaphical deviced used to visual represent real-world. Feature map

* Quadrangle name:-

(1) A quadrangle is a topographic map produced by the unitate state geological survey covereing the us.

(ii) The map are usually nomed after local feasiographic features.
(iii) This maps have to distinctive features:
(iv) 7.5 min length & Breadth at 1:24000 scale.

* 7.5 Quadrangle maps:-

→ It is because each covere 7.5 min of latitude & 7.5 min of longitude on the eareth surface
→ on the ground this is approsomently Equal to 8 miles/6 mile.
→ The map sereese nam is found in the upper left marjine.
→ It usually includes a group of similare maps at the same scale & ore the same sheet lines desined to covere a geogreaphical areea.

Quaddigreal angle.	quadrilatercal.
It is a geometric shape with 4 angle & 4 streats sites.	It is a poligan with 4 sides.

* Countre line:-

The countre joint the points at the same elevation above a given lable, ses such as mean sea leable.
→ The counture map is a map illistated with countre ines:-
) on imaginarey line on the ground sureface joining the point of equal reduce lable. & a sureface

is interseted by a lable surface. This line on a map represent a countoure line.

∴ → It help to read the shape of the earth surface.

*Chareastrictic of countours :-

(1) must close on themselfs
(2) Perepundiculare to the direction of maximum slope.
(3) Slope between them isasumed uniforem.
(4) the distance between them indicates the sticking of the slope, gentile, stick,
(5) Regulare signific the rugh surface, Smoath sygnafie greasual slope.

constric close counture lines are depression.
· They do not creush each other.

* uses of countoure line :-
countoure line show all the places that all the same height above sea lable.

· They tall us about the slope of land.

*Types of countoure lines :-
Theree aree 3 types of countoure lines :
(1) Index line
(2) Intere oneadate line
(3) suplimentary line.

Index line :-
These are the thickes countoure line & are usualy labled with 1 point along the line this tells you the elevation above the sea lable.
these are the thinnese more common lines between the Index line, they usualy have a

numbere lable. noremaly 1 index line offeres fore every five intermeaded lines.

(v) Suplimentary lines :-
This lines appires dated lines indicated factere terrai

Zero countoure line :-
If elevation of that line is verry negable ore Appreosmently Zero. Is known as zero couture line.

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Countoure Interval :-
The verctical distance between consucative countoures is known as countoure interval.

→ contoure lines of 90m, 89m, 88m & so on. the contoure intereval is 1, contoure intereval is defends upon the nature of Ground Scale of The map & Propose of Surevey.

Horizontal equivalent :-
The horeizontal distance between any two consucative countoures is known as horeizontal equavalent. It varies from point to point depending upon the nature & profite of the terain.

use of contour lines :-

use of contoure lines to find out nature of ground surface, Interc visibility between two station can be established.

fore locating the economical sites of work such as Road, Ralway, cannal, pipe lines, dams & reserevoire estination on volume of reaserverc storage, volume of eareth work, cutting, & envanment,

military operation can be plan with the help of contoure maps.

useful fore opetaning data used in design & construction on ercigation structure. such as dams, to know the dranage characteristic of the area & helps to select sites fore colvet, dranage.

Method of contoring :-

contoring requireds the planning metreic position of the points whose elevation & whose determine by leveling.

→ The method of locating contours depending open the instument dree used to determine the horizontal & veretical position of Ground point in the area,

→ The method can be devided in 2 places direct method :-

(2) Indirect method.

Direct method :-

In this method position & elevation on points on a contoure line aree located the ploting of contours is done by joining this point. It is very accurate method & its slow & tedious. It is used fore only small areas where accureacy is not propose, espensive & not suitable for hilly areas,

this method are less expensive, less time consuming & less tidious as compaire with the direct method this method are commonly employed in small scale survey of large area, sweatable for hilly area for & during the work calculation are requared.

→ In direct method contoreing are divided into 3 classes

(1) Grided method
(2) Cross-sescoring method.
(3) Radial line method.

contoure greadiant :-

Road survey in hilly area the fixing the point along the greadiant. the line joining the point is known as contoure greadiant this point are marked on the greound by instument dompy lable & them accorately fixed by a leveling instument.

Plotting of a contoure map :-

before ploting the contoure map sweatable scale is selected.

→ A horizontal line is done as the centre line the chanage are marked along the horizontal line, according to the scale. ground lable are marked along the chanage.

→ The cross section alree also platted at each of the chanage.

→ by intere colluction joint by smooth curve.

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*Aretcibute data management :-

(1) It is store in tables,
(2) An aretcibute table an organised by Row & colamb
(3) Each Row Represent a spatial features & each colamb describe a charcactristic & the Intersection of a colamb & Row shows the value of a pereticulare chareastristic fore a pereticular feature.

* Feature of aretibute table :-

(1) Feature of aretibute table has to the has to the spatial data, every vector data sate. must be a featuree of aretibute table.

(2) Fore a geo reelational data model the feature Aretircbute table uses the Feature id to leave to the features geometry

(3) Fore the object best data model the feature Aretibute table has a field that storees the Feature geometry.

* meta data managment :-

meta data is a data that prodives information about othere data but not the content of the data such as the test of a massay ore the image it self

Ex- A colection of Inforemation like the othere, file size, the data, the document was created & key wareds the descricbe the documenth

* Hrepaire data & Adding to Arck map :-

If we are data to an arck map we can use the add data ~~bacdback~~ on the arck map tool bar to add data to youre map.

* Organising data as layers :-

(1) 1st you have to creat content,
(2) open map classic, click details & click contents
(3) Organic youre layers in any of the following way
(4) To rename a layers, browse to the feature layers click to the moree option, click rename entaire a new layers name.
(5) To rename a layers browsers to the feature layers click more options & click remove
(6) To change oredere of the layers in the map browsers to the feature layers. click 'more' options & click move up & move down. you can also click & drag the layers to record it. Icons indicats wheathere or nut you can droup the layers, in a specific location, on the map content
(7) click to safe youre changes to the map.

Editing the layers :-

In editing to up loading data layers you can also creat a new layers by following by steps.

(1) Select the layere tab
(2) & edd new layere dropdown menue.
(3) chose & entaire the data that the layers you have.

* Table name :-

Entaire the name of youre new data layere

*Geometric type :-

Select point. line. multiline. polygon ore multiline ors youre feature type.

Projection :-

Select a new projection ore select an editing one being used in the

overe right If exict :-

You have the option the overe right an data layere if it beares the same name as youre new data layere.

Atricbuts :-

Entaire the desiree field name fore youre new data layere. & defined the field type.

Streing :-

Input any test.

Real :- Input numberes containing A decimal point

layere editing :-

A layere can be editing through layere properetie there are severeal wease to access layere properetie

- double click in the layere in the layer list
- Select a layere & edit layere tool from the layere tap :-

select edit layere function from youre dropdour menue.

Switching to layout view :-

→ The data view is used fore expoloring & editing the data layere

→ ARC map also has a layout view. which is used to view & set up the maps exporting & printing.

→ To asses the lay out view, click on views on the menu bare along the top of the arc map window.

→ Select lay out view.

→ the layout tool bare will appiere & the map display area will change to show the pase lay out with rooolers along the top of sites

→ you can also access the layout tool bare from, tool bares lay out

* change pase orientation :-

→ To access the pase & print set up, write click any-where in back-ground of the lay out view.

→ select page & print set up.

→ you can also access page & print set up from the file menu.

→ make sure that undere map page size the option to use printere papere setting is ont tick.

→ you will then beabole to select a page size & Papere orientation,

→ you do not have to select a printere at this stage.

→ Set the lay out page site & layout page size & oreiatantion undere the map page size.

→ The option at the bottom at the window scale map element proporsonaly changes in papere size will re-scale youre data to fit youre new page side.

→ when you are happy with youre settings click ok

→ The lay-out page & Rulare an change accoreding to the new pages size.

→ In this case the paper size has been increa-sed & the oreiantation has been change from potract to landscape.

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* Removing borders :-

- There are others option to costomise a dat a frame, which can also be accessed in the data frame properties

→ To access this options Right click data freams name in the table of content & celect properti

→ Then click on the freame top

* Adding & editing map imforcmation :-

→ map others spiled their map to infild their map layers & conflegation needed to achive the propose of the map.

→ when one of the proposes of map is to gatherc comunity the map others includes edatable featarce layercs in the layerc.

* Finalizing the map :-

→ converting map elements to greaphic

→ It is imporetant to note that once you converet a map element into a greaphic it is no longerc conected to its oreiginal data & will not respond to changes made to the map

→ It will have to be deleted & rebuild again

→ Therefore it's a good idea to converet elements to greaphic only ofterc youre map area, layere & symblisied & are finalised

* Concept & use of survey software :-

GPS field obsurebation :-

→ Before starting a gps survey the follow points should be kept in mind

(1) A satalight sky plot visibility chart should be prepare each site.

(2) obsurbation time is decided when the satalight visibility is maximum

Selection of site :-

→ The posible location of GPS contoure point to be established are selected on map

→ Stareting & closing stations are also selected

→ Distance between two station should not be larege & should be kept within 50 km as fore as posible.

→ A 15° clearance fore horeizontal to sky should be avalable

→ NO radio signal transmitere should be opereationat in the vicinity of GPS point.

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—— x —— END —— x ——