

371

Aparil-24
Page no-13

SCHEME OF VALUATION

Subject Code - 2011

SURVEYING - 1

PART - A

1. The operation of keeping the table at each of the successive stations parallel to the position which it occupied at the first station is called orientation
2. True meridian an imaginary line joining the north and south pole of earth through that point
3. Magnetic meridian :- It is the directions obtained at any point by a truly suspended magnetic needle
4. Self reading staff and target staff self reading staff may be either folding 4m staff or telescopic staff with staff .
5. Height of collimation method
(b) Rise and fall method
6. The process of spacing the contours proportionately between the plotted ground points

PART - B

1. Each line should be recorded on separate page
2. All measurements should be recorded as soon as they are taken
3. Explanatory notes and references to other pages where necessary should be added
4. They should be neat and contain all information for plotting the survey
5. There should not be any over writing
6. Keep the field book in safe custody and are only permanent and original record

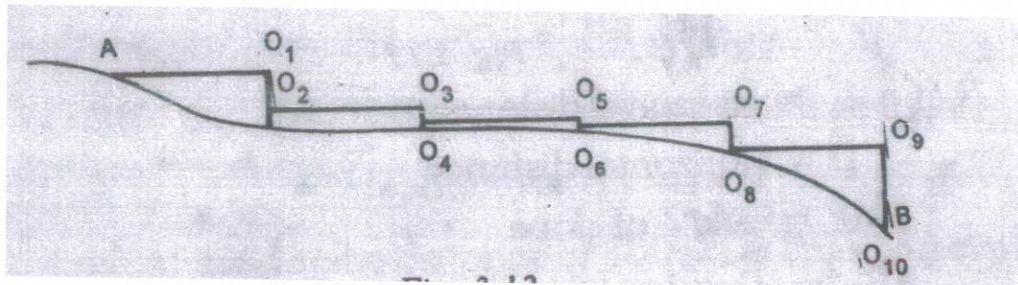
Direct Method

Horizontal distances are directly measured on the ground by process of stepping which consists in measuring line on horizontal length

The follower hold the zero end of the chain at A on the ground while the leader hold it at suitable length and stretch it horizontally the follower range the leader

Measure AO1 O2, O3, O4, O5 etc

The distance AB is equal to the sum of the length of steps



3. W.C.B Bearing of a line is measured clock wise from the north point of reference meridian towards the line round the circle . Angle measured from magnetic meridian to the line under consideration values varies from $0 \rightarrow 360^{\circ}$. Bearing obtained by prismatic compass are whole circle bearing .

Quadrantal bearing : The bearing of the line observed either from the north or souths measured clock wise or anti clockwise direction towards east or west which is nearer to survey line is known as reduced bearing, its values varies from $0 - 90^{\circ}$ surveyor's compass gives reduced bearing .

4. A freely suspended magnetic needle points towards north south. If there are external influence which prevent the needle from pointing towards north south. The effect is due to the presence of iron ore steel structures, cable carrying electricity , knife , iron buttons etc. Such influencing force is called local attraction .

If forebearing and back bearing table bearing differ by 180° there is no local attraction if otherwise there is local attraction.

5.Arbitrary bench mark

These are bench marks whose elevations are arbitrarily assumed for small leveling work. The assumed elevations are do not refer any fixed or permanent benchmarks

Temporary Benchmark

If the leveling operations are not completed in a single day, a bench mark is to be established on a permanent object near the site and the work should be closed on that bench mark. Next day levelling work to be started from such temporary benchmark.

6. Errors in levelling

1. Instrumental errors
 - a. Defective bubble tube
 - b. Imperfect adjustment
 - c. Error on division of staff
 - d. Faulty focusing
2. Error of manipulation
 - a. Errors in sighting
 - b. Error due to settlement of leveling staff
 - c. Error due to staff not being held to plumb
 - d. Common mistakes in leveling
3. Error due to natural causes
 - a. Effect of sun and wind
 - b. Settlement of tripod
 - c. Curvature of earth and refraction

7. Profile Levelling

Also known as longitudinal levelling. The object is to determine the undulations of the ground surface along a predetermined line. Fly levels may be run from permanent bench mark.

The chainage of the staff point is continuous from beginning to the end back sight and foresight distances should be approximately equal. In profile leveling procedure starts from a benchmark and end on a benchmark

Cross sectioning

Cross sections are sections right angles to the centre line and on either side of it for the purpose of determining the lateral outline of ground surface. The length depends on nature of work. Profile leveling and cross sections are done simultaneously. The levels of each cross section should be recorded on separate page .

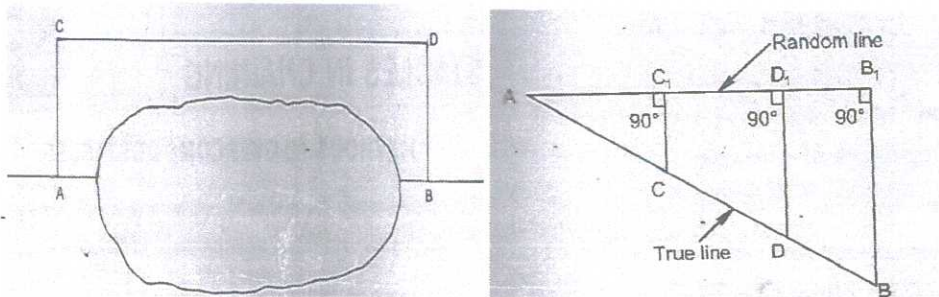
PART C

III. Obstacles in chaining

(a)

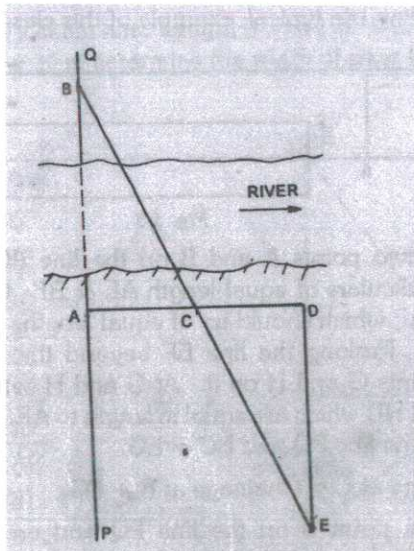
(1) Chaining free but vision obstructed

$$AB = \sqrt{(AB_1)^2 + (BB_1)^2}$$

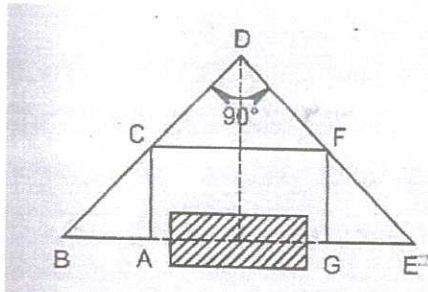


(b) Chaining obstructed vision free. Erect equal perpendiculars AC and BD by optical square measure the length CD

$$AB = CD$$

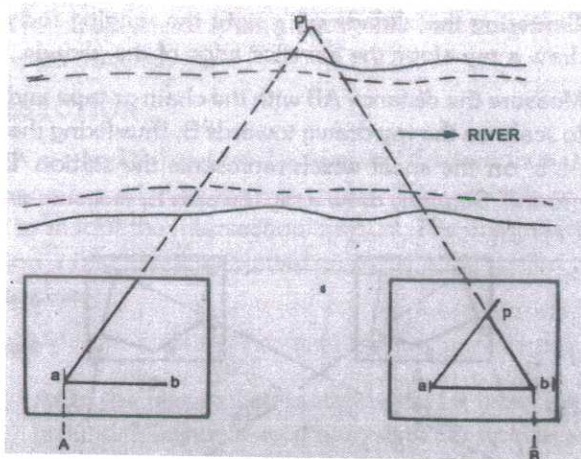


© Chaining and vision both obstructed, Choose two points E & T erect perpendiculars EG and FG equal to that of AC or BD. Join GH and prolong it. Measure DE BG=DE



III (b) In this method the point is fixed on plan by intersection of the rays drawn from two instrument stations. The lines joining the points AB is called base line. Setup the table on A and level it. Plot the point 'a' on the sheet using 'U' frames and plumb bob. Using alidade, sight to B and draw a ray and mark point 'b' by measurement. Draw a ray 'p' along the edge by sighting the point P shift the table to B and level it. Orient the plane table by back sighting pivot the alidade on b and sight the station P and draw a line bp along p.

The intersection of the ray 'AP' and 'bp' gives the position of the point P. More points can be located by this method by drawing rays from station.



IV Selections of Stations

- (1) Main stations should be mutually visible
- (2) Working from whole to part should be strictly observed
- (3) If possible long chain line should run roughly through the centre of the whole area
- (4) All triangles should be well conditioned

- (5) A number of tie line should be run to locate the details and to avoid long offsets
- (6) The survey line should run on level ground as far as possible
- (7) The survey line should avoid obstacles to chaining and ranging

IV (b) (i) Orientation by magnetic needle

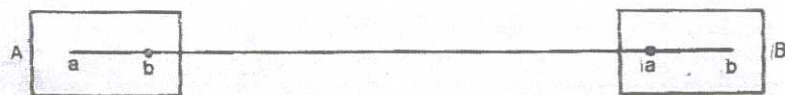
(ii) Orientation by back sighting

(i) Orientation by magnetic needle

To orient the table the trough compass placed along the line representing the magnetic meridian which has been drawn on the paper at the first station and the board is turned until the ends of the needle are opposite the zero of the scale. The board is clamped in position

(ii) Orientation by back sighting

This is done back sighting to the previous station. The plane table is set up at station B on the line AB which has been previously plotted as 'ab' on the paper when the table was setup at A. The alidade is placed along the line 'ba' and the plane table is rotated until the line of sight bisect the ranging rod at A. The plane table is clamped in that orientation.



UNIT - II

V (a) Dip

Due to magnetic influence of the earth the magnetic needle will not remain horizontal. This inclination of the needle to the horizontal is known as Dip of the needle

In northern hemisphere, north end of the needle deflected downward. In southern hemisphere south end deflected downward.

To counteract the dip a sliding weight in the form of coil is placed over the higher end of the needle to maintain horizontal position.

Declination

Declination is the horizontal angle subtended between the true meridian and magnetic meridian.

The declination will not be same at all the places. A chart is prepared by survey of India. The variations are

Scalar variation - Magnetic variation over a number of years

Annual Variation - Deviation during a year

Diurnal Variation - Deviation during a day

Irregular variation - Due to sudden disturbance of the earth

V (b)

$$\angle A = \text{BB of CA} - \text{FB of AB} = 95 - 40 = 55^\circ$$

$$\angle B = \text{B.B of AB} - \text{FB of BC} = 220^\circ - 110^\circ = 110^\circ$$

$$\angle C = \text{BB of BC} - \text{FB of CA} = 290^\circ - 275^\circ = 15^\circ$$

Sum of the angles in triangle ABC

$$= 55 + 110 + 15 = 180^\circ$$

VI a. Before starting plotting work bearing are to corrected for local attraction.

Following methods and used for plotting compass traverse

- (i) By Parallel meridians
- (ii) By included angle method
- (i) By parallel Meridian

After fixing starting point A line representing magnetic meridian is drawn through it. The bearing of the line AB is plotted with protractor and length is marked off with scale and fix point B. Through B draw meridian, bearing of BC and length is marked off and fix C. The process is repeated at each station until all are drawn.

By included Angle : Meridian is drawn through A . Bearing of AB and its length is plotted fix B. At B the included angle ABC and length is marked of and fix C. The procedure is repeated at each of the successive stations

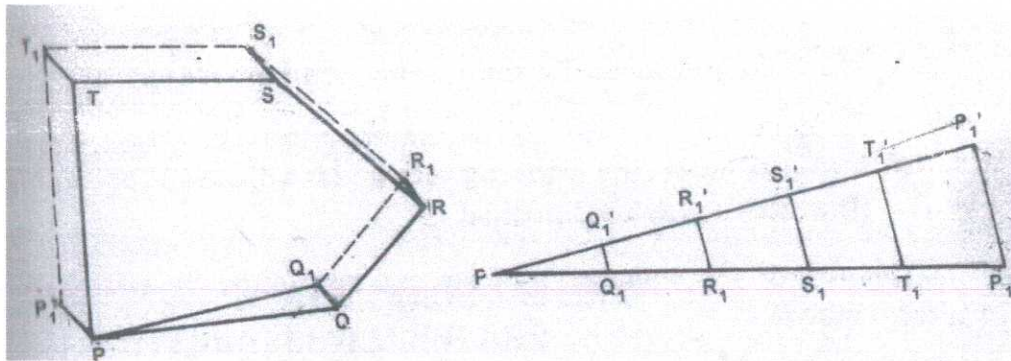
VI b.. The distance by which the last point of traverse falls short of the first point in the closed traverse is known as error of closure

When there is an error of closure , it can be adjusted by Bowditch's Graphical Method

Let the closed traverse after plotting be shown as P , Q₁,R₁,S₁,T₁,P₁ . Theoretically the point P₁ should have coincide with P. The distance P , P₁, is the closing error .

The horizontal line equal to the perimeter of the traverse is drawn to convenient scale and the corresponding points P,Q₁,R₁,S₁,T₁, P₁ are marked draw PP₁ at P₁, join P P₁'. Draw parallel lines from Q₁, R₁,S₁,T₁.

Then Q Q₁' R₁ R₁' S₁ S₁' , and T T₁' , are marked in proper direction and are joined to give a closed traverse PHRS T.P.



UNIT -III

VII a. Height of collimation method

b. Rise and fall method

Height of Collimation method	Rise and fall method
The method is simple and easy	The method is more tedious
Visualization is not necessary regarding nature of ground	Visualization is necessary
Reduction of level is easy	Reduction of level takes more time
	Complete check for all readings

There is no check for intermediate sight reading Generally used profile leveling and having works with number of less change points	Preferable for check leveling where number change points are more
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VII(b)

Station	B.S	I.S	FS	H.C	R.L	Remarks
1	0.680			81.430	80.750	
2		1.455			79.975	
3		1.855			79.575	
4		2.330			79.110	
5		2.885			78.545	
6	1.055		3.380	79.105	78.050	Change point
7		1.860			77.245	
8		2.265			76.840	
9	0.835		3.540	76.40	45.565	Change point
10		0.945			75.455	
11		1.530			74.870	
12			2.250		74.150	
	2.570		9.170			

Check

$$\Sigma \text{BS} - \Sigma \text{FS} = \text{Last R.L} - \text{First RL}$$

$$2.570 - 9.170 = 74.150 - 80.750$$

$$6.6 = 6.6$$

Hence ok

$$\text{Total distance} = 330$$

$$\text{Gradient} = 6.6/330 = 1/50$$

VIII In leveling vertical distances are to be measured from an assumed surface or line called datum

Types of Benchmark

1. Great trigonometrical survey bench mark

These bench marks are established throughout India by survey of India department. Their position and elevation are shown on G T S maps.

Permanent bench mark.

These benchmarks are established from G T S bench marks by the state Government agencies in their own state on well defined permanent object such as top of parapet wall of bridges and basement level of building etc.

Arbitrary bench mark

These are fixed points near the site taken as reference point and their elevation is assumed arbitrarily.

Temporary bench mark.

In leveling operation, at the end of a day's work an object is selected and a benchmark is established and close the work. Next day levelling work has to be started from such temporary benchmark.

VIII (b) As the ground is continuously slopping the reading should go on decreasing, but after 4th and 9th reading there is rise in staff reading. So it indicate that instrument was shifted after 4th and 9th readings.

Station	Back sight	Intermediate sight	Foresight	Height of collimation	Reduced level	Remarks
1	3.555			503.555	500.000	BM
2		2.225			501.300	
3		1.830			501.725	
4	3.445		0.675	506.325	502.880	CP1
5		2.885			503.440	

6		1.635			504.690	
7		1.115			505.210	
8	3.775		0.775	505.550	505.550	CP2
9			2.935		506.390	
	$\sum BS=10.775$		$\sum FS=4.385$			

Arithmetical check

$$\begin{aligned} \sum BS - \sum FS &= \text{Last RL} - \text{First RL} &= & 10.775 - 4.385 = 506.390 - 500.000 \\ & &= & 6.390 = 6.390 \end{aligned}$$

Hence check is correct.

UNIT -IV

IX (a) Interpolation of contours.

(1) By estimation

This method is rough and is used on small scale maps. The position of contour points between the two ground points are estimated and the contour lines are then drawn through these points.

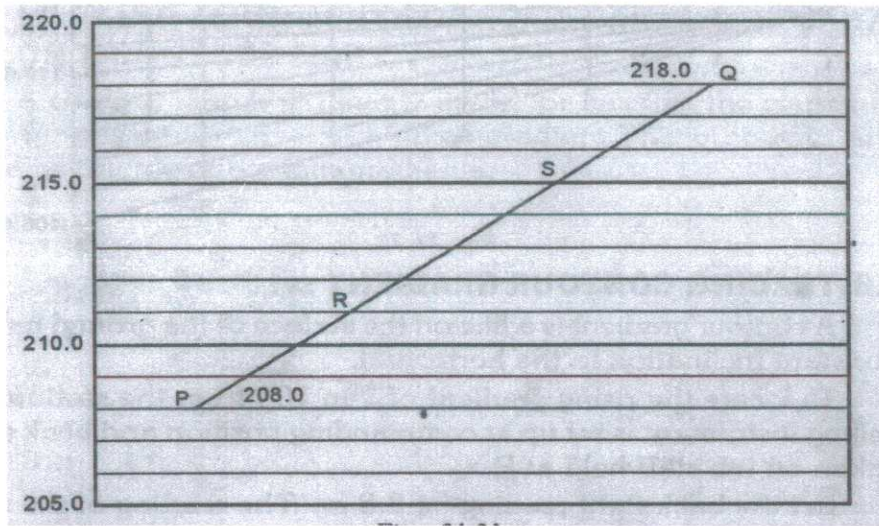
By arithmetical calculation.

This method is time consuming. The position of contour points between the guide points are located by arithmetic calculation. Similar triangle principle is used to calculate the exact location of contour.

Graphical method

In the graphical method, the interpolation is done with the help of a tracing paper or a tracing cloth

On a piece of tracing cloth several lines are drawn parallel to each other at constant interval. Locate the point on the tracing cloth by counting the interval.



IX(b) The distance to the visible horizon is given by $D = \sqrt{h/0.0673}$

The height of the top of the light house above the sea level = $h = 40\text{m}$

ie The distance with visible horizon = $(40/0.0673)^{1/2} = 24.39\text{km}$

(b) The dip of the horizon = D/R radian
 = $(24.39/6371) \times (180/\pi) \times 60$
 = 13.15m

X(a) i. The contour lines are closed curves. However they may close on the map itself or outside.

ii The spacing between the contour lines depend upon the slope of the ground.

iii If the contour lines are parallel, straight and equally placed, they represent a plane surface

iv If the contour lines are equally spaced it indicate uniform slope.

v A ridge line is indicated when the values inside the bend or loop are higher where as a valley line indicate lower value inside the loop.

vi Two contour line never intersect except in the case of overhanging cliff.

vii When horizontal equivalent between the contour line is zero they coincide and indicate vertical cliff

viii A series of closed contour line on the plan or map indicate either a hill or depression

ix Irregular contours indicate rough rugged terrain, smooth contours denote gradual slope.

X(b). The capacity of reservoir can be determined from the contour map. The contour line of F.R.L is drawn on the contour map. This line begins and ends at the dam.

The area enclosed by various contours can be measured by planimeter or by graphical method. The of water between two consecutive contours is equal to the average area of the two contours multiplied by the contour interval

Volume can be computed by Trapezoidal formula

$$V = h \{ (A_1 + A_n) / 2 + A_2 + A_3 + \dots + A_{n-1} \}$$

Or by Prismoidal formulæ

$$V = h/3 \{ A_1 + A_n + 4(a_2 + A_4 + \dots + 2(A_3 + A_5 + \dots)) \}$$

Prismoidal formulæ can be applied when n is an odd number.