

ASSIGNMENT: 1 PLANE TABLE SURVEYING

- Q.1 Enlist various instruments used in plane table survey and briefly explain any three of them with sketch.
- Q.2 What are the methods of plane tabling? Describe any two of them with sketch.
- Q.3 State the advantages and disadvantages of plane table survey
- Q.4 Describe with neat sketch, the method of intersection use for plane table survey. When it is used?
- Q.5 Draw the sketch of following & write their function
(i) Alidade (ii) U-Fork (iii) Trough compass
- Q.6 Describe various accessories required for Plane table surveying and discuss its functions. Also discuss the steps required for setting up a plane table.
- Q.7 Explain the procedure of Radiation, Intersection and Traversing methods of plane table surveying.
- Q.8 Explain the procedure of setting up of plane table
- Q.9 Describe resection and intersection method applied to plane table surveying.
- Q.10 What are the different sources of errors in plane table survey? How are they eliminated?
- Q.11 Distinguish between resection method and intersection method of plane table survey.

ASSIGNMENT: 2 PLANE TABLE SURVEYING

- Q.1 Define following terms for the vernier transit theodolite:
(i) The vertical axis, (ii) Plunging, (iii) Swinging. Also, explain with sketch temporary adjustments of vernier transit theodolite.
- Q.2 What are the fundamental lines of a transit theodolite? What are the desired relations between them? Describe the procedure of permanent adjustment of
(i) Horizontal cross hair, and (ii) Horizontal axis of transit theodolite.
- Q.3 Explain different methods of adjusting closing error in theodolite traverse
- Q.4 Draw sketch of Transit vernier theodolite and mention component parts and
Enlist different axis of theodolite
- Q.5 Explain temporary adjustment of theodolite
- Q.6 Enlist different type of permanent adjustments needed in theodolite

- Q.7** Define latitude and departure. Differentiate between the consecutive and independent coordinates
- Q.8** Define, theodolite traversing and discuss loose needle and fast needle methods of theodolite traversing.
- Q.9** Describe the permanent adjustment of a theodolite to make the vertical axis truly vertical.
- Q.10** Define the following in reference to the theodolite:
(1) Transiting (2) Axis of level tube (3) Telescope normal (4) Changing Face
- Q.11** Discuss Repetition method of horizontal angle measurement using theodolite.
- Q.12** What is meant by balancing a traverse? State the various rules used to do this
- Q.13** Explain the repetition method to measure horizontal angles and how readings are recorded? What are the advantages of this method?
- Q.14** Explain :- Methods of taking horizontal angles with vernier transit Theodolite.
- Q.15** How will you adjust closing error of traverse by graphical method & by Transit rule?
- Q.16** Discuss various methods of the theodolite traversing.
- Q.17** Define the following terms in relation to theodolite
(1) Face left observation (2) Face right observation (3) Transiting
(4) Line of collimation (5) Axis of level tube (6) Swinging
- Q.18** Following are the bearings and length of a Traverse ABCD. Find out closing error of traverse.

Line	AB	BC	CD	DA
Length(m)	105.8	142.5	188.8	188.9
Bearing	319 ⁰ 15'	51 ⁰ 30'	131 ⁰ 45'	256 ⁰ 45'

- Q.19** In a closed traverse ABCDEA, the lengths of the lines DE and EA could Not be measured due to an obstruction. Determine the lengths from the following data.

Line	Length (m)	Bearing
AB	480	99 ⁰ 00'
BC	625	31 ⁰ 05'
CD	470	301 ⁰ 20'
DE	?	235 ⁰ 00'
EA	?	153 ⁰ 25'

- Q.20** Following readings were taken for a closed traverse ABCDE, find out the missing Quantities

Line	Length (m)	Bearing
AB	194.1	85 ⁰ 30'
BC	201.2	15 ⁰ 00'
CD	165.4	285 ⁰ 30'
DE	172.6	185 ⁰ 30'
EA	?	?

- Q.21** The following data were obtained for a closed traverse ABCDEA which was run in the clockwise direction.

Line	Length (m)	Bearing	Included angle
AB	186	30 ⁰ 25'	∠A 118 ⁰ 20'
BC	164		∠B 82 ⁰ 10'
CD	303		∠C 137 ⁰ 00'
DE	162		∠D 73 ⁰ 44'
EA	240		∠E 128 ⁰ 36'

Compute corrected consecutive co-ordinates using Gale's traverse table. Use Bowditch's rule for balancing of the traverse.

- Q.22** The latitudes and departures of the lines of a closed traverse ABCD are given below. Calculate the area of the traverse by Coordinate method.

Line	Latitude (m)	Departure (m)
AB	-164.5	162.1
BC	217.8	59.8
CD	168.1	-105.6
DA	-221.4	-116.3

- Q.23** Prepare Gale's traverse table to adjust the closing error of the closed traverse ABCDA for the following data:

Line	Length (m)	Corrected W.C.B
AB	110	110 ⁰
BC	80	170 ⁰
CD	95	250 ⁰
DA	160	350 ⁰

- Q.24** In a closed traverse PQRSTP the bearings of the lines RT and TP could not be measured due to an obstruction. Determine the bearings from the following data.

Line	Length (m)	Bearing
PQ	488	99 ⁰
QR	666	33 ⁰
RS	477	300 ⁰
ST	675	?
TP	355	?

ASSIGNMENT: 3 TRIGONOMETRIC LEVELLING

- Q.1** Derive an expression for the distance and height for the trigonometric levelling case of ‘object inaccessible and instruments axes at different levels’.
- Q.2** Explain trigonometric leveling on the steep ground.
- Q.3** Derive the expression for computing the horizontal distance and elevation in trigonometrical levelling while base of the object is inaccessible and instrument axis is at very different level.
- Q.4** Derive formula for height h and distance D in trigonometric leveling when two instruments are set at same level .
- Q.5** Derive an expression for ‘ D ’ & ‘ h ’ in case of Trigonometric leveling when base of object is inaccessible, Instrument station in same vertical plane with the elevated object for (i) Instrument axes at same level (ii) Instrument axes at different levels
- Q.6** To determine the height of a chimney, a Theodolite was kept at Two stations I1 & I2 200m apart. I1 being nearer to the chimney. The reading at the BM of RL 1020.375m were 1.35m from station I1 & 2.15 from I2. The vertical angles to the top of the chimney were $19^{\circ}30'$ & $8^{\circ}15'$ from stations I1 & I2 respectively. Find the horizontal distance & RL of the top of the chimney.
- Q.7** An instrument was set at P and the angle of depression to a vane 2 m above the foot of staff held at Q was $5^{\circ}36'$. The horizontal distance between P and Q was known to be 3000 m. Determine the RL of the staff station Q, given that staff reading on a BM of elevation 436.050 was 2.865 m.
- Q.8** Derive the equation to find out the elevation of the object , if the base of the Object is inaccessible, the instruments stations and elevated object are in the same vertical plane and instrument axes are at the same level. Also find out elevation of a hilltop based on the following data set.

Instrument station	Staff Reading	Vertical Angle	RL of BM
O1	1.655	26°	181.212m
O2	1.655	18°	

Distance between O1 and O2 is 123m.

- Q.9** Determine the height of the pole above the ground on the basis of the following angles and elevation from two instruments station A and B in line with the pole angles of elevation from A to the top of bottom of pole = 29° and 20° Angles of elevation of B to top of bottom of pole = 36° and 27° Horizontal distance $AB = 35$ m . The readings observed of staff at the B.M. with the two instrument settings are 1.38 and 1.19 m respectively what is horizontal distance of the pole from A ?

- Q.10** Derive the equation to find out the elevation of the object, if the base of the object inaccessible, the instruments stations and elevated object are in same vertical plane and the instrument axes at same level. Also find out elevation of a hilltop based on the following dataset.

Instrument station	Staff Reading	Vertical Angle	RL of BM
O1	1.545 m.	28°42'	101.505m
O2	1.545 m.	18°06'	

Distance between O1 and O2 is 100 m.

- Q.11** A theodolite was set up at a distance of 150 m from tower. The angle of elevation to the top of the parapet was 10° 8' while the angle of depression to the foot of the wall was 3° 12'. The staff reading on the B.M of RL 50.217 with the telescope horizontal was 0.880. Find the height of the tower and the RL of the top of the parapet

ASSIGNMENT: 4 CURVE

- Q.1** Define a Curve. State various types of curves with sketch? Draw the neat sketch of simple circular curve showing various elements of it.
- Q.2** Define 1) Back Tangent 2) Forward tangent 3) Point of intersection 4) Point of curve 5) Point of Tangency 6) Intersection angle 7) Deflection Angle 8) Tangent distance 9) External Distance 10) Length of Curve 11) Long Chord 12) Normal Chord 13) Sub chord 14) Versed Line 15) Right Hand Curve 16) Left Hand Curve
- Q.3** Write a short note on Two Theodolite method
- Q.4** Write a short note on Tacheometric method
- Q.5** What is Super elevation Explain in Brief with Figure.
- Q.6** What is vertical curve. Write advantages of vertical curve and also types of vertical curve explain in detail
- Q.7** Enlist the types of transition curve and explain in detail.
- Q.8** Enlist the different methods of setting out simple circular curve, Explain any one linear method in detail.

ASSIGNMENT: 5 AREA & VOLUME

- Q.1** What is use of planimeter ? what is the zero circle.? Under what condition do the zero circles get traced by the tracing point? How you can find the area of zero circles?
- Q.2** What are the general methods of calculating area? Explain double meridian distance (DMD) method in detail.
- Q.3** Enumerate different types of methods for measuring the volume and explain any one method in brief.
- Q.4** Derive an expression for prismoidal formula for volume. Compare it with the trapezoidal formula.

- Q.5** Derive equation for Trapezoidal and Simpson's rule to find out area of an irregular boundary.
- Q.6** Discuss Prismoidal formula, Prismoidal correction and Curvature correction for computation of volumes from cross sections.
- Q.7** Discuss in brief the various methods of measurement of area by offsets from the baseline. State the relative merits and demerits of each methods
- Q.8** Determine the capacity of reservoir for the following observations of contour area map. A planimeter was used to measure the area of contours. The anchor point was kept outside the figure. Scale of map was 1cm = 10m and multiplying constant M = 10sq. cm for the planimeter. Use Prismoidal formula to calculate the volume.

Contour (m)	Reading on Planimeter		
	Final Reading	Initial Reading	Value on N
100	2.022	5.134	+1
102	3.168	9.025	+2
104	4.864	1.739	+2
106	5.972	8.238	+3
108	6.787	3.127	+3

- Q.9** Area enclosed between the dam and upstream contours at a reservoir are as follows
- | | | | | | |
|----------------------|-----|------|-------|-------|--------|
| Contour level (m) | 63 | 65 | 67 | 69 | 71 |
| Enclosed area (sq m) | 711 | 6512 | 52705 | 79500 | 374555 |
- If the bottom level 63m and F.R.L and is 71m Determine the capacity of the reservoir by trapezoidal and simpson's formula.

- Q.10** An embankment of width 12 m and side slope 1.5:1 is required to be made on a ground which is in level in a direction transverse to the centre line. The centre height at 42m interval is as follows. 1.02, 1.23, 2.22, 2.35, 1.87, 1.33, and 0.97. Calculate the volume of earthwork according to trapezoidal and Simpson's rule.

- Q.11** The following are the values of offsets taken from a chain line to an irregular boundary. Calculate the area included between chain line and irregular boundary by Simpson's rule.

Distance (m)	0	50	100	150	200	250	300	350	400
Offset (m)	10.6	15.4	20.2	18.7	16.4	20.8	22.4	19.3	17.6

- Q.12** A canal is running in cutting , bed width of canal is 10m and side slope 1 :1 , if depth of cutting of canal at 30 m intervals are 1.1, 1.3, 1.4, 1.35, 1.45 ,1.6, 1.9, 1.8 , 2.1 . Calculate volume of cutting by trapezoidal and prismoidal formula.

Q.13 Compute the area of the cross-section if the formation width is 10 m, side slope is 1 to 1, average height along the centre-line is 5 m, and transverse slope of the ground is 10 to 1.

Q.14 Area enclosed between the dam and upstream contours at a reservoir site are as follows:

Contour Level (m)	54	56	58	60	62
Enclosed area (Sq. m)	714	6512	52700	79000	374000

If the bottom level is 54 m and the F.R.L is 62 m, determine the capacity of the reservoir by trapezoidal and prismoidal formula. Also compute prismoidal correction.

Q.15 A road embankment is 8m wide & 200m in length at the formation level, with a side slope of 1.5(H) :1(V). The embankment has a rising gradient of 1 in 100m. The ground levels at every 50m along the centre line are as follows

Distance (m)	0	50	100	150	200
Ground RL (m)	164.5	165.2	166.8	167	167.2

Take formation level of zero chainage is 166m calculate the volume of earth work by Trapezoidal rule & Prismoidal rule.

ASSIGNMENT: 6 TACHEOMETRIC SURVEY

- Q.1** Derive the expression for the horizontal and vertical distances in the fixed hair method when the staff is held vertically and the measured angle is that of elevation.
- Q.2** What is tacheometric surveying ? What are the advantages of tacheometric surveying ? Explain various methods of tacheometry.
- Q.3** What is tangential method of tacheometry? Derive the expressions for horizontal and vertical distances by the tangential method when both the angles measured are those of elevation.
- Q.4** Explain principle of stadia method.
- Q.5** The following observations were taken using a tacheometer fitted with an anallatic lens, the staff being held vertically. The constant of tacheometer is 100.

Inst. st.	Height of axis	Staff station	Vertical Angle	Hair readings	Remarks
P	1.45	B.M	- 6° 12'	0.98,1.54,2.10	R.L of B.M = 384.25 m
Q	1.45	Q	+ 7° 5'	0.83,1.36,1.89	
R	1.57	R	+12° 21'	1.89,2.48,3.07	

Determine the distances PQ and QR and the R.Ls of P,Q and R

Q.6 During the course of a tacheometric survey, the following readings were recorded

Inst. st.	Height of axis	Staff station	Vertical Angle	Hair readings	Remarks
O	1.750	B.M	- 8° 24'	1.250, 1.600, 1.950	R.L of
O	1.650	CP	- 7° 12'	1.430, 1.580, 1.730	B.M
P	1.570	CP	+9° 36'	1.670, 1.950, 2.230	=312.670m

The tacheometer was anallatic and the multiplying constant was 100. The staff was held vertical. Calculate the RL of station P.

Q.7 To determine the gradient between two points P and Q, a tacheometer was set up at another station R and the following observations were taken, keeping the staff vertical.

Staff at	Vertical Angle	Hair readings
P	+4° 40'	1.210,1.510,1.810
Q	- 4° 40'	1.000,1.310,1.620

If the horizontal angle PRQ is 36°20', determine the average gradient between P and Q. Take A=100, B=0 and RL of HI=100 M.

Q.8 The following readings refer to a closed traverse ABCDA run by a tacheometer fitted with analyticlens. The constant of the instrument was 100 and the staff was normal.

Line	Bearing	Vertical Angle	Staff interception
AB	40° 20'	+ 4°00'	1.750
BC	310° 40'	+ 3°10'	1.480
CD	220° 00'	+ 2°20'	1.670

Find the length and bearing of DA.

Q.9 Find the gradient from P to Q using the data given in Table

Inst. at	Staff at	Line	Bearing	Vertical Angle	Hair readings
A	P	AP	84° 36'	3° 30'	1.35, 2.10, 2.85
A	Q	AQ	142° 24'	2° 45'	1.9555, 2.875, 3.765

ASSIGNMENT: 7 GEODETIC SURVEYING

- Q.1** What is triangulation? What are the factors that affect the selection of triangulation stations?
- Q.2** What is meant by triangulation? How will you select base line and triangulation stations? Explain strength of figure.
- Q.3** What is spherical triangle? State the properties of spherical triangle.
- Q.4** Write short note on “ station marks”.
- Q.5** What are the factors that affect the selection of triangulation stations? What considerations you would have while selecting the site for the base line?
- Q.6** What are the various corrections for the base line? Discuss in brief.
- Q.7** Discuss (i) Selection of triangulation station (ii) Reduction to centre in geodetic triangulation.
- Q.8** State the various points to be broadly considered in selection of base line.
- Q.9** What is spherical triangle? State the properties of spherical triangle.
- Q.10** Explain the extension of base with neat sketch.

ASSIGNMENT: 8 THEORY OF ERROR

- Q.1** Explain the theory of least squares.
- Q.2** Explain “ Laws of Weights”.
- Q.3** What are the various types of errors in surveying measurements? Give one example of each. Define weight of a quantity.
- Q.4** Explain the method of correlates. What are its advantages over the normal equation method?
- Q.5** Define : (i) True Error (ii) Most Probable error (iii) Residual error.
- Q.6** Define accidental error, true value, direct observation, conditioned quantity, most probable value, true error, normal equation.
- Q.7** Determine the most probable values of the angles of a triangle ABC, given by the following data.
 $\angle A = 62^{\circ} 14' 12''$ Weight = 1
 $\angle B = 48^{\circ} 12' 14''$ Weight = 3
 $\angle C = 69^{\circ} 33' 28''$ Weight = 2

Q.8 The observed values of an angle are given below :

Angle	Weight
85° 40' 20"	2
85° 40' 18"	2
85° 40' 19"	3

Find (i) probable error of single observation values of unit weight

(ii) probable error of weighted arithmetic mean

(iii) Probable error of single observation of weight 3.

Q.9 The following are the angles observed at a triangular traverse along with their probable errors. Determine correct values of angles

$$\angle A = 64^\circ 12' 12'' \pm 02''$$

$$\angle B = 50^\circ 48' 30'' \pm 04''$$

$$\angle C = 64^\circ 59' 08'' \pm 05''$$

Q.10 Enlist the rules should be applied for the distribution of errors of the field measurements. The following are the three angles observed at a station closing the horizon, along with their probable errors of measurements. Determine their corrected values.

$$A = 85^\circ 13' 10'' \pm 2'' , B = 130^\circ 49' 30'' \pm 3'' , C = 143^\circ 57' 10'' \pm 4''$$

ASSIGNMENT: 9 MODERN SURVEYING INSTRUMENT

Q.1 Explain the basic principle of EDM. Write a brief note on Electromagnetic spectrum.

Q.2 Write a short note on Total station.

Q.3 What is the principle of E.D.M.? Discuss electromagnetic waves and electromagnetic spectrum.

Q.4 What is the principle of E.D.M.? Discuss electromagnetic waves and electromagnetic spectrum.

Q.5 Classify the Electromagnetic distance measurement instruments depending upon the type of carrier wave employed. Write a short note on Geodimeter.

Q.6 Explain electromagnetic spectrum.