VALLIAMMAI ENGINEERING COLLEGE
Department of Civil Engineering
CE6304 SURVEYING –I
Questions Bank

UNIT-I
FUNDAMENTALS AND CHAIN SURVEYING

Part A

1) Define surveying.
2) What are the types of surveying? What are the primary divisions of surveying ?
3) State the principle of surveying.
4) Why not "part to whole" Explain.
5) Differentiate plan and map?
6) What are source of errors?
7) What are the kinds of errors? Give example?
8) Classify surveying based on accuracy?
9) Mention the different types of chain
10) Which type of areas is best suited for chain surveying?
11) What are accessories used in chain surveying?
12) What are errors in chaining?
13) Define Ranging?
14) What are the types of Ranging?
15) Defines check lines
16) Define tie stations
17) What is cross staff? Mention its types?
18) What are the types of optical square?
19) What are the well conditioned and ill conditioned triangles?
20) What is mean by representative fraction of scale?
21) Why is it necessary to draw a scale on the map at the time of Plotting?
22) Calculate the sag correction for a 100m tape weighting 1.3kg and used under a pull of 9 kg in equal spans of 25m each.
23) A 100m tape is held 2m out of a line. What is the true length?

Part B

1. Explain the principles of surveying? With a simple sketch state the construction and use of a cross staff
2. a. Explain the different method of ranging with neat sketch.

   b. What are the accessories for a chain survey? Explain the functions of each.

3 How chain can be done on an uneven ground or sloping ground? Point out the advantages and disadvantages of this method.

4 Explain different corrections that can be applied to chain or tape.

5 Explain in details how a chain traversing can be done.

6 The distance between two points measured with a Gunter's chain was found to be 7500 links. The same distance was measured with an Engineers chain and was found to be 4930 feet. If the Gunter's chain was 0.25 Link too short, what was error in engineer's chain?

7 A chain was tested before starting a survey and was found to be exactly 20m and 20cm. The area of the plan drawn to a scale 8cm to 1cm was 220sq.cm. Find the true area of the field.

8 A 30m chain was found to be 0.1m too long after chaining 2400m. If the chain was correct before commencement of the work, find the true distance.

9. A 30m steel tape was standardized on the flat and was found to be exactly 3mm under no pull at 66°F. It was used in catenar to measure a base of 5 bays the temperature during the measurement was 92°F and the pull exerted during the measurement was 10kg. The area of the cross section of the tape was 0.08 sq.cm and the specific weights of steel is 7.86 g/cc. A = 0.0000063 per 1°F and e = 2.109 x 10 ^{6} kg/sq.cm. Find the true length of the line.

10 A steel exactly 30m long at 18°C when supported throughout its length under a pull of 8 kg, A line was measured with a tape under a pull of 12 kg and found to be 1602 m. the mean temperature during the measurement was 26 C. Assuming the tape to be supported at every 30m, calculate the length of the line, given that cross sectional area of the tape is 0.04 sq.cm, the weight of 1 cc = 0.0077 kg, the co efficient of expansion = .000012 per 1°C, and the modulus of elasticity = 2.1 x 10 ^{3} kg / sq.cm

UNIT-II
COMPASS SURVEYING

Part-A

1. Mention different types of compasses?
2. Define the terms
    a. Bearing
    b. Meridian
    c. Types of bearing and meridian
3. State the conversion rule for W.C.B to R.B
4. What is different between fore bearing and back bearing?
5. Convert
    i. 124°30' to RB
    ii. N10°48'W to W.C.B
6. Find the bearing of line AB whose FB is 14°48' and S14°40'E
7. Define dip.
8. How dip eliminated?
9. Define magnetic declination. What are the types?
10. Find the magnetic declination at a place if the magnetic bearing of the sun at noon is
    i) 184°00'

11. How local attraction can be eliminated?

12. Define traverse?

13. Define agonic and isogonic lines

14. How local attraction can be detected?

15. What are the types of traverse?

16. What is local attraction?

17. What are errors in compass survey?

18. Define the variation of declinations?

19. What is different between magnetic bearing and true bearing?

20. What are the temporary adjustments in compass?

Part – B

1. Explain with neat sketches the different types of compasses.
2. Differentiate prismatic and surveyor compass.
3. How closing error can be adjusted by using graphical method?
4. Examine the following notes on a compass survey for local attraction. Determine correct bearings. Also determine the included angles at A,B,C,D and E.

Station	FB	BB
A	S10°0'W	N85°0'E
B	S77°0'E	N10°0'E
C	N05°0'	N75°0'W
D	N54°0'W	S02°0'
E	S88°0'W	S50°0'

5. The following angles were observed in clockwise direction in an open traverse angle ABC = 124°15', angle BCD = 156°30' angle CDE = 102°0' angle DEF = 95°15' angle EFG = 215°30' magnetic bearing of line AB was 241°30'.what would be the bearing of line FG = ?.

6. Explain different method of plotting a compass traverse?

7. The following are the magnetic bearings of a closed traverse ABCD carried out in an area under the influence of local attraction. Find the correct magnetic bearings, if the magnetic declination for the area is 1°45'E,find also the true bearings.

Line	Magnetic bearing	
	FB	BB
AB	21°14'	202°30'
BC	138°20'	318°20'
CD	202°18'	23°23'
DA	293°41'	111°20'

8. The bearing of one side of a regular pentagon was found to be N300E. Find bearings of other lines. The following angles were observed in clockwise direction in an open traverse angle ABC = 124°15', angle BCD = 156°30' angle CDE = 102°0' angle DEF =

95°15' angle EFG = 215°30' magnetic bearing of line AB was 241°30'.what would be the bearing of line FG =?.

9. Explain different method of plotting a compass traverse?

The following are the magnetic bearings of a closed traverse ABCD carried out in an area under the influence of local attraction. Find the correct magnetic bearings, if the magnetic declination for the area is 1°45'E, Find also the true bearings.

Line	Magnetic bearing	
	FB	BB
AB	21°14'	202°30'
BC	138°20'	318°20'
CD	202°18'	23°23'
DA	293°41'	111°20'

The bearing of one side of a regular pentagon was found to be N300E. Find bearings of other lines.

UNIT-II
PLANE TABLE SURVEYING

Part-A

1. What is plane tabling?
2. Mention the suitability and unsuitability of plane tabling?
3. What are the equipments used in plane tabling?
4. What are the methods of plane tabling?
5. What are the accessories of plane tabling?
6. State two point problem and three-point problem.
7. What are the temporary adjustments in plane tabling?
8. State any two lahman's rule.
9. What is resector and resection?
10. When strength of fix is good?
11. When strength of fix is bad?
12. What are the errors in plane tabling?
13. What is back ray method?
14. What is triangle of error?

Part – B

1. Explain radiation method of plane tabling.
2. Explain intersection method of plane tabling.
3. Explain traversing method of plane tabling.
4. Explain two-point problem.
5. Explain three-point problem.
6. Explain strength of fix.

UNIT-III
LEVELING

Part – A

1. Define leveling.
2. What is the principle of leveling?
3. Mention the types of level.
4. Mention the types of leveling staves.
5. What are back sights and fore sights?
6. Define height of instrument.
7. Define intermediate sight.
8. Define change point.
9. Define BM. Explain its classification.
10. Define parallax. How is it eliminated in a level?
11. Mention the temporary adjustments of leveling.
12. Define level book.
13. Mention the method of reduction of levels.
14. Mentions the arithmetical check in rise and fall method and height of collimation method.
15. The observed staff reading on a staff held at A was 2.625m. the staff was found to be 15cm off the vertical through its bottom. Find the correct staff reading.
16. The staff reading on a certain peg is 3.820 when the staff is held 0.25m out of plumb bob in its total length of 4 m.find the correct staff reading for staff held VL.
17. How leveling can be done when the staff station was too long or too high?
18. How to level cross a pond or a lake?
19. How it's possible for leveling, if the BM lies above the line of collimation.
20. Mention the different types of leveling errors.
21. Find the refraction correction for a distance of 6000m.
22. Find the curvature correction for a distance of 9000m.
23. Calculate the combined correction for value 6000m & 9000m.
24. Find the distance of visible horizon from the top of the light house, 30.48m high.
25. What is reciprocal leveling? Mention the advantages?
26. Mention the permanent adjustments of a dumpy level.
27. Why is it necessary to bring the bubble to mid run just before taking the reading?
28. What is the need for balancing the fore sight and back sight distances?

Part – B

1) Explain the different types of levels and staves with neat sketches.

2) a) Mention the differences between height of collimation method and rise and fall method
   b) Record the following observations in the form of a leveling field book and obtain the reduced level of the each point. Give the necessary checks.
   Reading on inverted staff on point A whose reduced level is 52.345 = 3.565
   Reading on staff on point B natural ground = 0.855

Change of instruments position.
Reading on staff on point B on ground = 1.210
Reading on inverted staff on point C = 3.975
Use rise and fall method and height of collimation method.

3) The following consecutive readings were taken along AB with a 4m leveling staff on continuously slowing ground at intervals of 20m : 0.34m on A, 1.450,2.630,3.875,0.655,1.745,2.965,3.945,1.125,2.475,3.865 on B.
The elevation A was 60.350. enter the above readings in a level book form and work out RLs by rise and fall method. Also find the gradient of the line AB.

4) Explain, in details, the different types of leveling.

5) Insert the missing enters and rebook by rise and fall method. Apply usual checks.

BS	IS	FS	HI	RL	Remarks
X			279.080	277.650	OBM
	2.010			X	
	X			278.070	
3.370		0.400	X	278.680	
	2.980			X	
	1.410			280.640	
		X		281.370	TBM

6) What is sensitiveness? How is it measured? Explain.

7) The following notes refer to reciprocal levels taken with one level.

Inst.at	Staff Reading on		Remarks
	A	B	
P	1.820	2.740	Dist PQ = 1010m
Q			RL of P = 126.380

Find (a) true RL of Q (b) Combination for curvature and refraction (c) Angular error in collimation adjustment of the inst.
What will be the difference in answers are interchanged?

8) Two points A and B are 1200m apart across a wide river. The following reciprocal levels are taken with one level.

Inst station	Staff reading on	
	A	B
A	1.485	2.365
B	1.035	1.402

The error in the collimation adjustment of the level is +0.008m in 60m. Calculate the true difference of level between A and B and the error due to refraction only.

9) In testing a dumpy level for the collimation error, the following observations were obtained.

Level at	Staff readings on		Remarks
	A	B	
C	1.465	2.005	C' Is exactly midway between A &B
D	1.310	1.660	'D' Is midway between A & C and in same St. line as A,C &B. Dist between A &B = 80m

Find out the staff readings on A and B in order that the line of collimation is truly Hl when the instruments was at D.

10) The following reciprocal level were taken during the testing of a dumpy level.

Level at	Staff reading on	
	A	B
A	1.370	2.105
B	1.140	1.765

Is the line of collimation adjustments? Find the true readings.

UNIT-IV

LEVELLING APPLICATIONS

Part – A
1. Define contouring and contours.
2. Defines topographic maps.
3. Define contour interval and horizontal equivalent.
4. What are the factors on which the choice of contour interval depends?
5. How a hill and a depression can be differentiated using contouring?
6. Define horizontal and vertical control.
7. Mention the different methods of contouring.
8. Mention the methods of interpolating contouring.
9. Define contour gradient.
10. What are the uses of contour maps?
11. Define LS and CS.
12. What are the uses of contours?
13. Mention the graphical methods of determining areas.
14. State mid ordinate and average ordinate rules.
15. State trapezoidal and simpson's rule.
16. Define median and double median distance.
17. How areas are computed by map?
18. Why simpson's rule is used for odd number of ordinates only?
19. What is the uses of planimeter?
20. What are the methods adopted for estimating volume?
21. define prismoid.
22. State prismoidal rule and average and end area method.
23. Mention the curvature correction for 2 level sections.
24. How Volume is estimated using contouring plan?

25. What is mass haul diagram?
26. Define lead and lift.

Part – B
1. Explain the characteristics of contours.
2. Explain the methods of locating contours.
3. Explain the interpolation of contours with neat sketch
4. Explain the uses of contours maps.
5. Explain about the Mass hall Diagrams with neat sketch.
6. Derive the formulas for calculation of areas and Volumes.
7. Drive on expression for simpson's rule and trapezoidal rule.
8. The following offsets were taken from a chain line to a hedge.

Distance in m	0	6	12	18	24	36	48	60	72	81	90
Offsets in m											

Calculate the area using (i) Simpson's rule (ii) trapezoidal rule

9. Certain field has three straights sides PQ, QR, RS and an irregular side PS. Calculate the area Of the field from the following data.

PQ = 130m, QR =200m, PS = 150m, PR = 230m. Offset taken outwards from PS to the irregular boundary at chain ages 0,30,60,90,120 and 150 Have values 0,3.2,1.6,6.8,4.0 and 0

10. The following perpendicular offsets were taken at 10 metres intervals from a survey line to a an irregular boundary line. 3.25,5.60,4.20,6.65,8.75,6.20,3.25,4.20,5.65. calculate the area using average ordinate rule, trapezoidal rule and simpson's rule .
11. A railway embankment is 10m wide with side slopes 2:1. Assuming the ground to be level in a direction traverse to the centerline , calculate the volume contained in a length of 150m, the central heights at 30m intervals beings 2.5,3.00,4.00,3.75, and 2.75 respectively.

UNIT-V
THEODOLITE SURVEYING
Part-A
1. What is tacheometric surveying?
2. List out the different methods of tacheometry.
3. Define stadia method of tacheometry.
4. List out the different stadia methods.
5. What are the three types of telescope used in stadia surveying?
6. What are the advantages of an anallatic lens used in tacheometer?
7. Compare tangential and stadia method.
8. What are the advantages and disadvantages of subtense method over stadia method?
9. What are the errors that may arise in stadia?
10. Give the precision of stadia survey.
11. Define stadia intercept.
12. What is the principle of stadia method?
13. What is tacheometry?

14. Give the use of Analytic lens.
15. What is the difference between theodolite and tacheometer?
16. Movable hair method is not adopted generally, why?
17. What is multiplying constant and additive constant?
18. Give the expression for RL of staff above the station in stadia fixed, when line of sight is inclined and staff normal to it.
19. Give the expression for V in tangential method.
20. What is a subtense bar?
21. In the fixed hair method, the line of sight is horizontal and staff is held vertically. If additive constant is zero, multiplying constant is 100 and distance two hairs is 2.7m, determine the horizontal distance between the two stations.

22. What is theodolite?
23. Mention the Classification of Theodolites.
24. Mention the parts of Theodolites
25. What is the use of peep sight and plummet?
26. Define the following terms: -
    a. Vertical axis
    b. Horizontal axis
    c. Line of sight / line of collimation.
    d. Axis of level tube
    e. Centering
    f. Transiting
    g. Swinging the telescope
    h. Face left / face right observation
    i. Telescope normal
    j. Telescope inverted
    k. Changing face.
27. What are the temporary adjustment of theodolite?
28. What are the advantage of method of repetition?
29. What is direction method?
30. What are the fundamental lines of a transit theodolite?
31. What are the sources of errors in theodolite?
32. Define latitude and departure
33. What is northing and southing?
34. What is easting and westing?
35. Define closing error.
36. What are methods of balancing the traverse?
37. What is the use of Gale's traverse table?
38. Mention some cases of omitted measurements.
39. How omitted measurements can be calculated?
40. What is trigonometric levelling?

Part-B

1. The following readings were taken on a vertical staff with a tacheometer fitted with an analytic lens and having a constant of 100.

Staff station	Bearing	Staff readings			Vertical angles
A	47°10'	0.940	1.500	2.060	8°0'
B	227°10'	0.847	2.000	3.153	-5°0'

Calculate the relative level of the ground at A and B and the gradient between A and B.

2. How do you calculate the horizontal and vertical distances between a instrument station and a staff station when the line of collimation is inclined to the horizontal and the staff is held vertically.

3. Explain the procedure of estimating the horizontal and vertical distances where the line of collimation is inclined to the horizontal and the staff is held normal to the line of collimation

4. The following notes refer to a line levelled tacheometrically with an anallatic tacheometer, the multiplying constant being 100:

Inst. station	Height of axis	Staff station	Vertical angles	Hair readings	Remarks
P	1.5	B.M	-6°12'	0.963, 1.515, 2.067	R.L of B.M.
P	1.5	Q	7°5'	0.819, 1.341, 1.863	= 460.65 m
Q	1.6	R	12°27'	1.860, 2.445, 3.030	staff held vertically.

Compute the reduced levels of P.Q and R and the horizontal distances PQ and QR.

5. A tacheometer is setup at an intermediate point at on a traverse course PQ. The Following observations are made on the vertically held staff.

Staff Station	Vertical Angle	Staff Intercept	AxialHair reading
P	8°36'	2.350	2.105
Q	6°6'	2.055	1.895

The Instrument is fitted with an analytic lens and the constant is 100- compute the length of PQ and R-C of Q that of P being 321.5m.

6. Calculate the horizontal and vertical distances using tangential tacheometry when Both the observed angles are angle of elevation and angle of depression.

7. A theodolite has a tacheometric multiplying constant of 100 and an additive constant of zero. The centre reading on a vertical staff held at point B was 2.292 m when sighted

from A. If the vertical angle was +25° and the horizontal distance AB 190.326 m, calculate the other staff readings and show that the two intercept intervals are not equal. Using these values, calculate the level of B if A is 37.950 m angle of depression and the height of the instrument is 1.35 m.

8. Explain the different between tangential and stadia tacheometry. How will you determine the stadia constants?

9. Two points A & B are on opposite sides of a summit. The tacheometer was set up at P on top of the summit, and the following readings were taken.

Inst. station	Height of axis	Staff station	Vertical angles	Hair readings	Remarks
P	1.500	A	-10°	1.150, 2.050, 2.950	RL of P = 450.500m
P	1.500	B	-12°	0.855, 1.605, 2.355	

10. The following observation were made using a tacheometer fitted with an anallatic lens, the multiplying constant being 100.

Inst. station	Height of axis	Staff station	WCB	Vertical angles	Hair readings	Remarks
O	1.550	A	30°30'	4°30'	1.155, 1.755, 2.355	RL of O = 150.00
		B	75°30'	10°15'	1.250, 2.00, 2.750	

Calculate the distance AB, and the RLs of A and B. Find also the gradient of the line AB.

11. Two observations were taken upon a vertical staff by means of a theodolite, the reduced level of its trunnion axis being 160.95. In the case of the first, the angle of elevation was 4°36' and the staff reading 0.75. In the case of second observation, the staff reading was 3.45 and the angle of elevation 5°48'. Calculate the reduced level of the staff station and its distance from the instrument.

12. A staff was held vertically at distance of 45m and 120m from the centre of a theodolite fitted with stadia hairs and the staff intercepts with the telescope horizontal were 0.447m and 1.193m respectively. The instrument was then set over a station P of R .L 500.25m and the height of the instrument was 1.45m. The hair readings on a staff held vertically at station Q were 1.20, 1.93 and 2.66m while the vertical angle was -9°30'. Find the distance PQ and the RL of Q.

13. Explain the permanent adjustment of theodolite?

14. Explain the parts of theodolite?

15. How horizontal angles are measured using repetition a reiteration method?