NRI INSTITUTE OF INFORMATION SCIENCE & TECHNOLOGY BHOPAL

DEPARTMENT OF CIVIL ENGINEERING

LAB MANUAL

SURVEYING LAB

NIIST BHOPAL		NRI INSTITUTE OF INFORMATION SCIENCE & TECHNOLOGY DEPARTMENT: CIVIL ENGINEERING	FORM NO	NIIST/A/10
BRANCH	CIVIL	LIST OF EXPERIMENTS	REV. NO	0
SEMESTER	III		REV. DT	30/06/2011

SUBJECT / CODE :Advance survey and remote sensing / CE223

SNO	LIST OF EXPERIMENTS
1	Measurement of Distance by Chaining and Ranging.
2	Locating Various Objects by Chain or Cross-Staff Surveying.
3	Measurement of bearings of sides of traverse with prismatic compass and computation of correct induced angle
4	Determination of elevation of various points with dumpy level by collimation plane method and rise and fall method.
5	Fixing bench mark with respect to temporary bench mark with dumpy level by fly levelling and check levelling

SURVEYING LAB

LO	LAB OUTCOMES
LO1	Use of chains and ranging rods will be learnt in the labs.
LO2	Location of various objects can be found by cross staff and chains.
LO3	Measuring the bearings can be done. Use of dumpy level can be learnt along with its setting and calibration
LO4	Fixing of bench marks can be learnt
LO5	Leveling can be done by students along with instruments

EXPERIMENT NO. 01

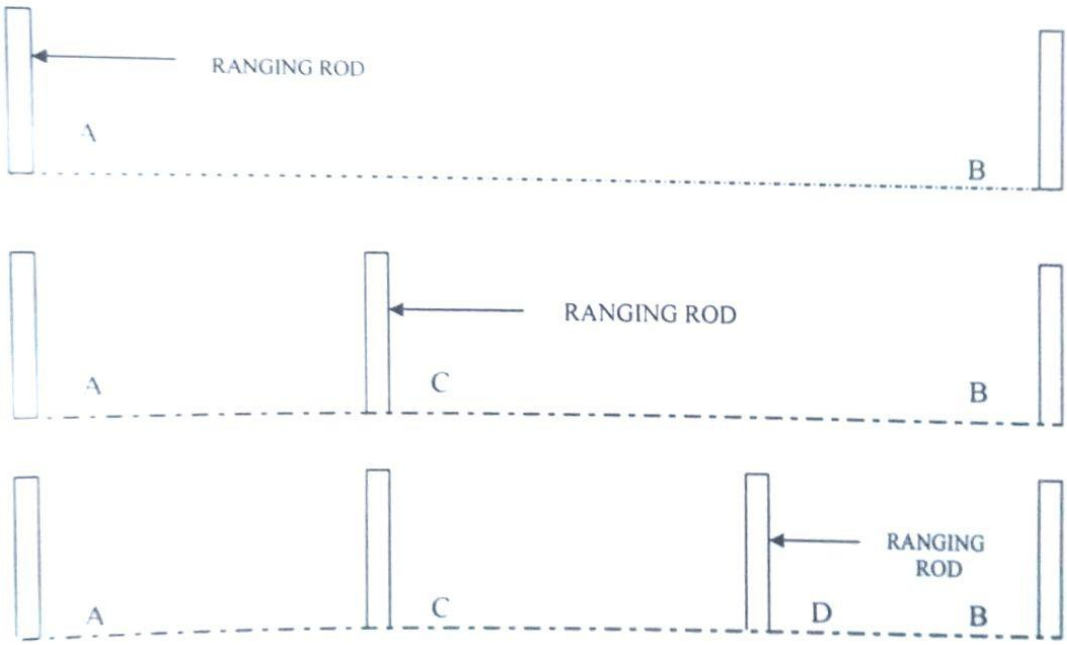
CHAINING A LINE BY DIRECT RANGING

Surveyor:	Date:
Helpers:	Time:

OBJECTIVE: To measure the distance between two points on a level ground by ranging.

INSTRUMENTS:

Chain 20m / 30m	1 No.	Arrows	10 Nos.
Ranging rods	04 Nos.	Pegs	2 Nos.



PROCEDURE:

- Fix the ranging rods at the two given stations, where pegs are already driven on the ground.
- The follower stand behind station A and directs the leader, with ranging rod to come in line with AB by signals of ranging

- When the ranging rod comes in the line of AB the follower directs the leader to fix the ranging rod in position.
- Let the intermediate point be C which should be less than 20m / 30 m .
- Now the leader taken another ranging rod and stands between A and B about 2/3 distance from A
- The follower directs the leader to come in line of AB by using signals of ranging.
- As and when the point is located in the line of AB the follower instructs to fix the ranging rod in position.
- Let the other intermediate position be D which is less than 20 m / 30 m from B
- Now A, B, C and D are in one line.

Now the leader and follower measure the distance by measuring along A, C, D, B.

RESULT: The distance between AB =_____meter.

FIELD APPLICATION:

- It can be extended to measure the lengths of more than two chain lengths.
- By measuring the boundaries of given traverse the areas can be calculated.
- The features can be located either by measuring oblique or perpendicular offset from the chain line.

EXPERIMENT NO. 02

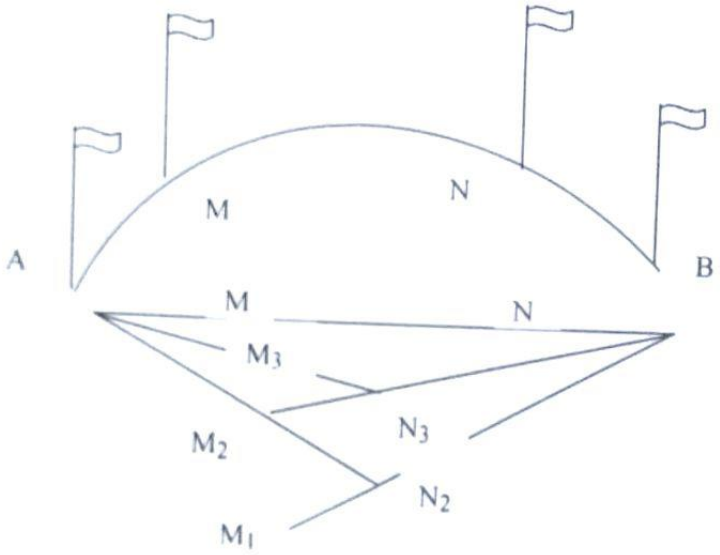
CHAINING A LINE BY INDIRECT RANGING

Surveyor:	Date:
Helpers:	Time:

OBJECTIVE: Chaining a line when a hill or high ground intervenes preventing Intervisibility of ends of line.

INSTRUMENTS:

Chain 20m / 30m 1 No. Arrows 10 Nos.
Ranging rods 04 Nos.



PROCEDURE:

- Fix the two ranging rods at the given stations A and B which are not intervisible due to raising ground
- Select two intermediate points M_1 and N_1 such that from each point both A and B are visible.
- The person at M_1 directs the person at N_1 to move to a new position N_2 in line with M_1B.
- The person at N_2 then directs the person at M_1 to move to a new position M_2 in line with N_2A.
- The person at M_2 directs the person at N_2 to a new position N_3 in line with M_2B.
- The person at N_3 directs the person at M_2 to a new position M_3 in line with N_3A.
- The process is repeated till the points M and N are located in such a way that M finds the person at N in line with AB and the person at N finds the person at M in line with AB.
- After fixing the points M and N, other points are also fixed by direct ranging and the length of the line is measured.

Result:

Length of AM = ____ meter.
Length of MN = ____ meter.
Length of NB = ____ meter.

Therefore distance of AB = distance AM + distance MN + distance NB

EXPERIMENT NO. 03

MEASUREMENT OF AREA BY CHAIN TRIANGULATION

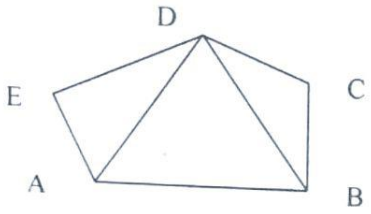
Surveyor:	Date:
Helpers:	Time:

OBJECTIVE: To measure the area of the given field by chain triangulation..

INSTRUMENTS:

Chain 20m / 30m	1 No.	Arrows	10 Nos.
Ranging rods	6 Nos.	Pegs	5 Nos.

SKETCH:



PROCEDURE:

» Let ABCDE be the given field whose area is to be measured, fix the pegs at A, B, C, D & E.

» Divide area into three triangles ADE, ABD and BCD by joining AD and BD.

» Measure the lengths AB, BC , CD, DE, EA, AD and BD.

» Calculate the area of the triangles.

» The sum of the areas of the three triangles is the area of the given field.

FORMULA:

Area of the triangle $\Delta = \sqrt{s\,(s-a)\,(s-b)\,(s-c)}$

Where $S = (a + b + c) / 2$

A, b, c, are the sides of the triangle.

RESULT:

The area of the given field =_____Square meter.

EXPERIMENT NO. 04

CHAIN TRIANGULATION AROUND A BUILDING

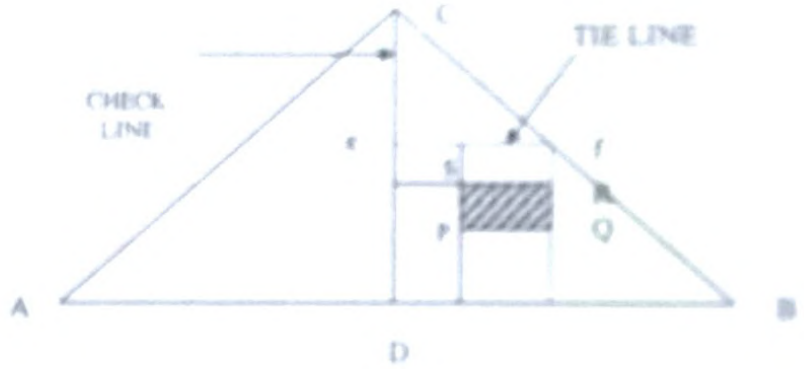
Surveyor	Date
Helpers	Time

OBJECTIVE: To chain around the building to cover small area by chain triangulation

INSTRUMENTS

Chain 20m / 30m	1 No.	Arrows	10 Nos.
Ranging rods	4 Nos.	Pegs	4 Nos.
Tape 20m/30m	1 No.	Cross staff	1 No.

SKETCH



PROCEDURE

- Select three survey stations A, B and C such that from each survey station the other two stations are visible
- Fix the ranging rods at A, B and C
- Fix the intermediate stations along the chain line AB, BC and CA by ranging.
- Measure the offsets of the corners of the building either perpendicular or oblique.
- Each point requires two measurements from two definite reference points on the same line or from two adjacent chain lines.
- Measure the points which are very far away from the main chain lines from tie line i.e., the corners points of building R and S. Measure the check line CD.

RESULT: From the recorded measurements of the building area is plotted.

NOTE: The student should prepare a layout of the given area covering building roads etc.