Experiment Details

Department Name	Department of Civil Engineering
Class	S.Y.B.Tech
Semester	III
Subject Name	Engineering Survey
Experiment No.	01
Experiment Name	Study of Levelling Instruments

Version History

Sr. No.	Version Number	Created By	Approved By	Date
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AIM:

To find accurate relative difference of two widely separated intervisible points, between which a level cannot be set.

THEORY:

Reciprocal leveling is employed to determine the correct difference of level between two points which are quite apart and where it is not possible to set up the instrument between the two points for balancing the sights. It eliminates the errors due to the curvature of the earth, atmospheric refraction and collimation.

To find accurate relative elevations of two widely separated intervisible points (between which levels cannot be set), reciprocal leveling is being used, especially when balancing of sight is not possible.

PRE TEST:

1. The line of sight is also called _____
   a) axis of telescope
   b) line of centre of axis
   c) line of collimation
   d) line of objective

Answer: c

2. The operation of forming or bringing the clear image of the object in the plane of cross hairs is known as
   a) Centering
   b) Adjusting
   c) levelling
   d) Focusing

Answer: d

3. By which of the following, the difference in elevation between two points can be calculated by taking a difference between the two readings and no correction for the inclination of the line of sight is necessary?
   a) Levelling
   b) Centering
   c) Contouring
   d) Balancing

Answer: d

4. In the long sights, the horizontal line of sight doesn't remain straight but it slightly bends downwards having concavity towards earth due to _____
   a) Refraction
   b) Radius of earth
   c) Curvature of earth
   d) Parallelism

Answer: a

5. The line of collimation method of reduction of levels, does not provide a check on
   (A) Intermediate sights
   (B) Fore sights
   (C) Back sights
   (D) Reduced levels

Answer :a

PROCEDURE:

1. To find the difference in elevation between two points, say X and Y, a level is set up at L near X and readings (X1 and Y1) are observed with staff on both X and Y respectively.
2. The level is then set up near Y and staff readings (Y2 and X2) are taken respectively to the near and distant points.
3. The work is to be carried out within a short period of time to avoid time lag due to refraction and other errors.
4. If the differences in the set of observations are not same, then the observations are having errors and need to be corrected.
5. The errors may arise out of the curvature of the earth or intervening atmosphere (associated with variation in temperature and refraction) or instrument (due to error in collimation) or any combination of these.
6. The difference of level between X and Y is given by = $\Delta h = \frac{(X1-Y1)+(X2-Y2)}{2}$

POST TEST:

1. The reciprocal levelling method is adopted when there is an obstacle in the centre in the form of water body or valley .
   (A) True
   (B) Reduced levels

Answer :A

2. The reciprocal levelling method is generally adopted when the following method is not possible
   (A) Differential Levelling
   (B) Fly Levelling
   (C) Balancing of sight
   (D) Profile Levelling

Answer :C

3. In Reciprocal levelling method, true difference is obtained by taking a _____of the two differences from each observations
   (A) Difference
   (B) Mean
   (C) Sum
   (D) multiplication

Answer :B

4. In Reciprocal levelling method, true error is obtained by taking a _____of the two differences from each observations
   (A) Mean Difference
   (B) Mean Sum
   (C) Division
   (D) multiplication
   Answer :A

5. In Reciprocal levelling method, min no of Instrument positions for observation required are
   (A) One
   (B) Two
   (C) Three
   (D) Four
   Answer :B

REFERENCES:

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