Practical No: 10 **Determine Reduced Level by Height of Instrument Method.**

I. Practical Significance:

If reduced levels of different points are known then it is very easy to know the nature or type of ground. Planning of different construction activities is possible by considering nature of ground. Economical constructions are possible from knowledge of reduced levels. Reduced levels can be calculated by using Height of Instrument method in simple levelling, differential levelling, check levelling, fly levelling, etc. Dumpy level/Auto level is used to measure the elevations of different stations of the surface of the earth. Difference in elevations between different points can also be determined using Levels.

II. Industry/Employer expected outcome(s):

- Calculation of Reduced Levels.

III. Course Level Learning Outcome (COs):

- CO 4- Determine Reduced Level to prepare Contour maps for the given type of terrain.

IV. Laboratory Learning Outcome (LLO):

- LLO 10.1 Undertake differential leveling by Height of instrument method using dumpy level/Auto Level and leveling staff.

V. Relevant Affective Domain related Outcome(s):

- Follow safe practices.
- Practice good housekeeping.
- Efficient application of tools, equipment's and machinery.
- Professional and ethical standards.

VI. Relevant Theoretical Background:

The Height of Instrument method is a technique used in surveying to determine the difference in elevations between two points .It is commonly used in design & construction to create site plans. In height of instrument method height of plane of collimation is calculated by taking back sight on point of known elevation i.e. Datum. Then from HI staff readings taken on Intermediate station points & last station points are reduced to calculate the reduced levels of points. Levelling is the process of measuring vertical distances with respect to given datum. This method is a simple and rapid method of reduction of levels.

VII. Required resources/equipment:

Sr. No.	Resource required	Particulars	Quantity
01	Dumpy/Auto level with tripod stand	As per standard Specification	1 nos.
02	Levelling staff	4m	1 nos.
03	Field book for recording readings	As per standard norms of field book page	1 nos.

VIII. Precautions to be followed:

1. Perform temporary adjustments precisely.
2. Hold the staff truly vertical.
3. Read staff reading accurately.
4. Record the reading accurately in the level book.

IX. Procedure:

1. First collect the all instruments as per mentioned in point no VII from the survey lab.
2. Mark the staff stations on the ground whose elevations are to be found.
3. Set up the level approximately midway between the stations and perform temporary adjustments.
4. Swing the telescope towards the staves and observe and record the staff readings in the appropriate columns of the level book.
5. Find the elevations of the points by HI method.
6. Return the instruments to survey store.
7. Record field book page.

X. Observation Table:

Inst. Station	Staff Reading			Height of Instrument	Reduced Level	Remark
	BS	IS	FS			
	1.265			101.265	100	
		2.345			98.92	
		2.420			98.845	
	0.365		3.625	98.005	97.64	CP1
	1.265		3.285	96.015	94.75	CP2
		2.380			93.635	
			3.215		92.8	

XI. Result:

1. Elevation of A=
2. Elevation of B=

XII. Interpretation of results:

by using dumping level we have found reduce level by HI method

XIII. Conclusions:

By using dumpy level we have found reduce level by HI method.

XIV. Practical Related Questions:

1. State the situation where HI method is adopted.
2. Write arithmetic check used in HI method.

Space for Answer

Q. 1 ⟶ ?

Ans:- The Height of instrument (HI) method, also known as the collimation method is adopted in Surveing and levelling when there are numerou Intermediate station and few instrument shifts Particularly for task like contour Surveys, sma area leveling fly leveling profile leveleing and establishing benchmarks.

Q. 2 ⟶ ?

Ans:- the erthmatic check used in HI method

$\Sigma BS - \Sigma FS = \Sigma Rise - \Sigma Fall = last\ RL - First\ RL$