**Practical No: 14** **Undertake differential levelling by using dumpy level/Auto Level and levelling staff for Installation of irrigation pipelines.**

**I. Practical Significance:**

On the site field situations are different. Depending the object survey method of levelling is selected. When two points whose difference in elevation is to find these points may be located at great distance or difference in level is more. Differential levelling is adopted by using Dumpy level or Auto level.

**II. Industry/Employer Expected Outcome(s):**

- Selection of appropriate method of levelling for installation of irrigation pipelines.

**III. Course Level Learning Outcome (COs):**

- CO4 - Determine Reduced Level to prepare Contour maps for the given type of terrain.

**IV. Laboratory Learning Outcome (LLO):**

- LLO 14.1- Undertake differential levelling operation for agriculture land.

**V. Relevant Affective Domain related Outcome(s):**

- Demonstrate working as a leader/a team member.
- Practice good housekeeping.
- Efficient application of tools, equipment's and machinery.
- Professional and ethical standards.

**VI. Relevant Theoretical Background:**

This method is used in order to find the difference in elevation between two points. (i) If they are too far apart, or (ii) if the difference in elevation between them is too great, or (iii) if there are obstacles intervening in such a case, it is necessary to set up the level in several positions and to work in a series of stages. The method of simple levelling is employed in each of the successive stages. The process is also known as compound of continuous levelling

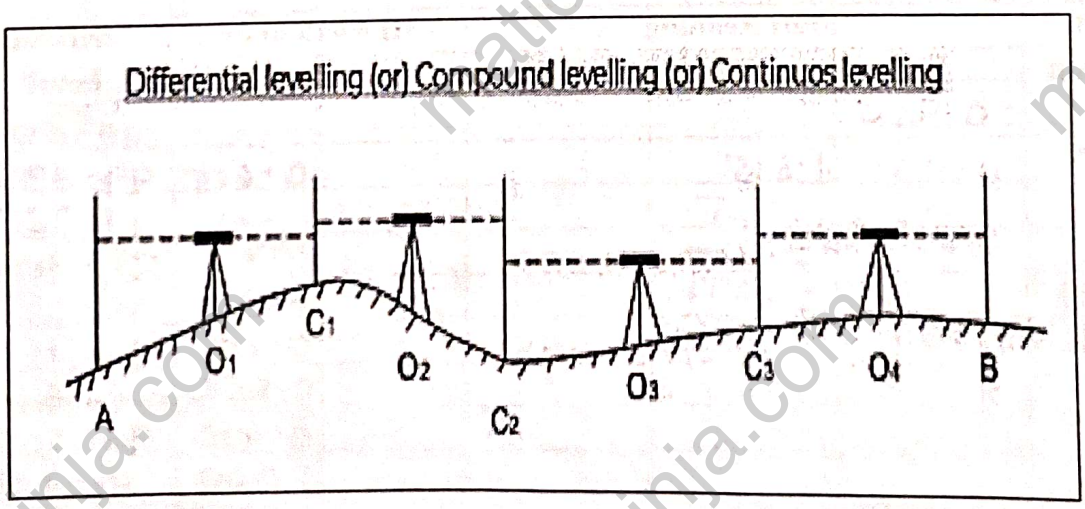


Figure 14.1 differential levelling

**VII. Required Resources:**

| Sr. No. | Resource required | Particulars | Quantity |
|---|---|---|---|
| 01 | Dumpy/Auto level with tripod stand | As per standard Specification | 1 nos. |
| 02 | Levelling staff | 4m | 2 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. Enter the staff readings correctly 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 at a point from where BM is visible and perform temporary adjustments
4. Swing the telescope towards the staves and observe and record the staff readings in the appropriat columns of the level book.
5. Shift the instrument to new position when it is not possible to take readings fron that position. Last reading from the earlier station will be FS and first reading fron the new instrument position is the BS.
6. Continue the procedure till the readings on the last station is recorded.
7. Find the elevations of the points by **HI** or rise and fall method.
8. Return back the instrument to survey store.
9. Rule out a page of filed book.

**X. Observation Table:**

| Inst. Station | Staff Reading | | | HI Method or | | Reduced Level | Remark |
|---|---|---|---|---|---|---|---|
| | BS | IS | FS | Rise | Fall | | |
| 0 | 0·950 | | | | | 100·000 | BM |
| 25 | | 1·615 | | | 0·665 | 99·335 | |
| 50 | | 1·925 | | | 0·31 | 99·025 | |
| 75 | | 2·515 | | | 0·59 | 98·435 | |
| 100 | | 2·898 | | | 0·38 | 98·055 | |
| 125 | 1·125 | | 3·495 | | 0·60 | 97·455 | CP1 |
| | | | | | 0·855 | 96·600 | |
| 150 | | | | | 0·470 | 96·130 | |
| 175 | | | | | 1·300 | 94·830 | |
| 200 | 0·925 | | | | 0·530 | 94·300 | CP2 |
| 225 | | 1·455 | | | 0·295 | 94·050 | |
| 250 | | 1·750 | 2·850 | | 1·100 | 92·905 | |
| 275 | | | | | 7·095 | | |

| Inst. Station | Staff Reading | | | HI Method or | | Reduced Level | Remark |
|---|---|---|---|---|---|---|---|
| | BS | IS | FS | Rise | Fall | | |
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Arithmetic Check:

**XI. Result:**

The result is 38.76

**XII. Interpretation of Results:**

**XIII. Conclusions:**

Diffrential leveling by using dumpy level.

**XIV. Practical Related Questions:**

1. Explain the function of vertical clamp screw and vertical tangent screw.
2. What is angle of depression and angle of elevation?

**Space for Answer**

Q. 1) ⟶ ?

Ans:- The Verticle clamp screw locks the telescope in a specific verticle position preventing it from moving. the Verticle tangent screw allows for fine, precise adjustments of the telescope's verticle position, once it's clamped.

Q. 2) ——————> ?

Ans:- The angle of elevation is the angle formed when looking upwards from a horizontal line to an object above. Conversely, the angle of depression is the angle formed when looking downwards from a horizontal line to an object below.

**XV. Assessment Scheme**

| Sr. No. | Performance Indicators | Weightage | Marks Obtained |
|---|---|---|---|
| **A.** | **Process Related (15 marks)** | **60%** | |
| 1. | Handling of equipment's & Survey Conduction | 40% | |
| 2. | Accuracy in length measurement. | 20% | |
| **B.** | **Product Related (10 marks)** | **40%** | |
| 3. | Conclusion of practical | 20% | |
| 4. | Practical Question Answer | 20% | |
| **C.** | **Total marks (25 marks)** | **100%** | |