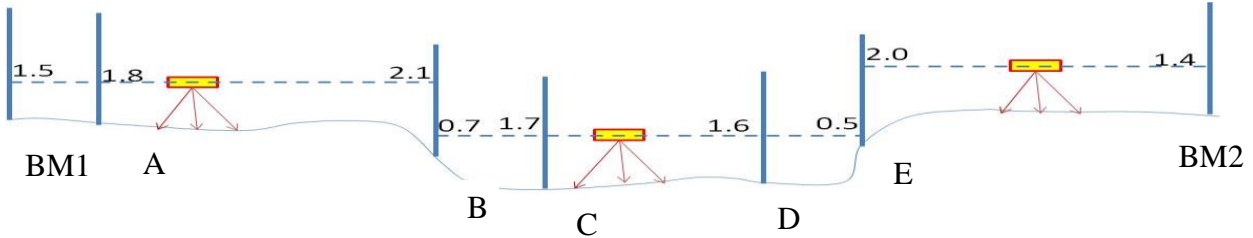




**Homework Assignment No. 5  
Levelling Tables & Computation**

1. The following are levelling readings, –arrange the them is suitable leveling table format and mention number of turning points .



| B.S. | I.S. | F.S. |  |  |  | REMARKS |
|------|------|------|--|--|--|---------|
|      |      |      |  |  |  |         |
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|      |      |      |  |  |  |         |
|      |      |      |  |  |  |         |
|      |      |      |  |  |  |         |

2. The following are levelling readings, 1.22, 1.67, 1.39, 1.92, 2.04, 1.85, 2.23, 2.74, 2.11, 1.63, 1.90 if underlined readings are backsights Arrange the data in suitable leveling Table and then find number of turning points

| BS | IS | FS |  |  |  |  |  | Remarks |
|----|----|----|--|--|--|--|--|---------|
|    |    |    |  |  |  |  |  |         |
|    |    |    |  |  |  |  |  |         |
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|    |    |    |  |  |  |  |  |         |
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|    |    |    |  |  |  |  |  |         |
|    |    |    |  |  |  |  |  |         |

3. Arrange the following data in standard levelling table format if points number 2,5,6 are Intermediate points :1.52, 1.65, 1.82, 1.75, 1.43, 1.93, 2.12, 1.79, 1.34, 1.45, 1.60

| BS | IS | FS |  |  |  | Remarks |
|----|----|----|--|--|--|---------|
|    |    |    |  |  |  |         |
|    |    |    |  |  |  |         |
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4. Arrange the following data in standard levelling table format if points number 3,5,6 are change points: 1.52, 1.65, 1.82, 1.75, 1.43, 1.93, 2.12, 1.79, 1.34, 1.45, 1.60

| BS | IS | FS |  |  |  |  | Remarks |
|----|----|----|--|--|--|--|---------|
|    |    |    |  |  |  |  |         |
|    |    |    |  |  |  |  |         |
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|    |    |    |  |  |  |  |         |
|    |    |    |  |  |  |  |         |
|    |    |    |  |  |  |  |         |

5. For the following staffs reading, reduce the level and check the accuracy of the readings using Rise and fall method.:

| B.S.  | I.S.  | F.S.  | RISE | FALL | REDUCED LEVEL | ADJ. | FINAL LEVEL | REMARKS |
|-------|-------|-------|------|------|---------------|------|-------------|---------|
| 1.767 |       |       |      |      |               |      | 28.684      | BM-1    |
|       | 1.885 |       |      |      |               |      |             |         |
| 2.018 |       | 1.612 |      |      |               |      |             |         |
| 0.988 |       | 2.243 |      |      |               |      |             |         |
|       | 1.881 |       |      |      |               |      |             |         |
|       | 1.065 |       |      |      |               |      |             |         |
| 1.255 |       | 0.912 |      |      |               |      |             |         |
|       | 1.467 |       |      |      |               |      |             |         |
| 1.019 |       | 1.776 |      |      |               |      |             |         |
|       |       | 1.393 |      |      |               |      | 27.803      | BM-2    |

- Calculate the reduced levels for all the points and perform arithmetic check.
- Calculate the closing error for levelling loop.
- Calculate the allowable closing error.
- Calculate the adjusted reduced levels for all points

**6. For the following staffs reading, reduce the level and check the accuracy of the readings using Rise and fall method.:**

| B.S.  | I.S.    | F.S.  | RISE | FALL | REDUCED LEVEL | ADJ. | FINAL LEVEL | REMARKS                     |
|-------|---------|-------|------|------|---------------|------|-------------|-----------------------------|
| 1.276 |         |       |      |      |               |      | 24.760      | BM-A                        |
|       | (2.535) |       |      |      |               |      |             | ; upside-down staff, point1 |
| 0.891 |         | 1.942 |      |      |               |      |             | CP1                         |
|       | 2.149   |       |      |      |               |      |             | d                           |
| 1.938 |         | 0.853 |      |      |               |      |             | CP2                         |
|       | (3.091) |       |      |      |               |      |             | ; upside-down staff,point2  |
|       | (3.324) |       |      |      |               |      |             | upside-down staff,point3    |
| 1.283 |         | 1.946 |      |      |               |      |             | CP3                         |
|       |         | 1.782 |      |      |               |      | 23.634      | BM-B                        |

- Calculate the reduced levels for all the points and perform arithmetic check.

- Calculate the closing error for levelling loop.

- Calculate the allowable closing error.

- Calculate the adjusted reduced levels for all points

**7. Fill in the missing data in the sample differential level run below:**

| BS                  | IS | FS              | HPC   | Reduced Level | Remarks |
|---------------------|----|-----------------|-------|---------------|---------|
| 2.692               |    |                 | ----- | -----         | BM1     |
| 0.100               |    | 2.721           | ----- | -----         | CP      |
| 3.121               |    | 3.214           | ----- | -----         | CP      |
| -----               |    | 1.765           | ----- | 94.969        | CP      |
| 1.610               |    | -----           |       | 97.616        | CP      |
|                     |    | 2.470           |       | -----         | BM2     |
| =10.382<br>$\Sigma$ |    | $\Sigma$ =----- |       |               |         |

8. The extract given below is for levels taken between two TBMs. Calculate adjusted reduced levels for all entries in the book.

| BS    | IS      | FS    | HPC | Reduced Levels | ADJ. | Final Level | Remarks            |
|-------|---------|-------|-----|----------------|------|-------------|--------------------|
| 1.592 |         |       |     |                |      |             | TBM (RL = 31.317m) |
| 1.675 |         | 2.052 |     |                |      |             | Change point       |
| 1.354 |         | 1.704 |     |                |      |             | Change point       |
| 1.326 |         | 0.907 |     |                |      |             | A                  |
|       | 1.379   |       |     |                |      |             | B                  |
|       | 1.384   |       |     |                |      |             | C                  |
| 0.940 |         | 1.315 |     |                |      |             | D                  |
| 0.832 |         | 1.507 |     |                |      |             | Change point       |
|       | (2.938) |       |     |                |      |             | 1                  |
|       |         | 1.550 |     |                |      |             | TBM (RL=30.007 m)  |

Note : The readings in brackets ( ) were taken with an inverted staff.

- Calculate the reduced levels for all the points and perform arithmetic check.
  
- Calculate the closing error for levelling loop.
  
- Calculate the allowable closing error.
  
- Calculate the adjusted reduced levels for all points