

ASSIGNMENT: 3 TRIGONOMETRIC LEVELLING

- Q.1** Derive an expression for the distance and height for the trigonometric levelling case of ‘object inaccessible and instruments axes at different levels’.
- Q.2** Explain trigonometric leveling on the steep ground.
- Q.3** Derive the expression for computing the horizontal distance and elevation in trigonometrical levelling while base of the object is inaccessible and instrument axis is at very different level.
- Q.4** Derive formula for height h and distance D in trigonometric leveling when two instruments are set at same level .
- Q.5** Derive an expression for ‘ D ’ & ‘ h ’ in case of Trigonometric leveling when base of object is inaccessible, Instrument station in same vertical plane with the elevated object for (i) Instrument axes at same level (ii) Instrument axes at different levels
- Q.6** To determine the height of a chimney, a Theodolite was kept at Two stations I1 & I2 200m apart. I1 being nearer to the chimney. The reading at the BM of RL 1020.375m were 1.35m from station I1 & 2.15 from I2. The vertical angles to the top of the chimney were $19^{\circ}30'$ & $8^{\circ}15'$ from stations I1 & I2 respectively. Find the horizontal distance & RL of the top of the chimney.
- Q.7** An instrument was set at P and the angle of depression to a vane 2 m above the foot of staff held at Q was $5^{\circ}36'$. The horizontal distance between P and Q was known to be 3000 m. Determine the RL of the staff station Q, given that staff reading on a BM of elevation 436.050 was 2.865 m.
- Q.8** Derive the equation to find out the elevation of the object , if the base of the Object is inaccessible, the instruments stations and elevated object are in the same vertical plane and instrument axes are at the same level. Also find out elevation of a hilltop based on the following data set.

Instrument station	Staff Reading	Vertical Angle	RL of BM
O1	1.655	26°	181.212m
O2	1.655	18°	

Distance between O1 and O2 is 123m.

- Q.9** Determine the height of the pole above the ground on the basis of the following angles and elevation from two instruments station A and B in line with the pole angles of elevation from A to the top of bottom of pole = 29° and 20° Angles of elevation of B to top of bottom of pole = 36° and 27° Horizontal distance $AB = 35$ m . The readings observed of staff at the B.M. with the two instrument settings are 1.38 and 1.19 m respectively what is horizontal distance of the pole from A ?

Q.10 Derive the equation to find out the elevation of the object, if the base of the object inaccessible, the instruments stations and elevated object are in same vertical plane and the instrument axes at same level. Also find out elevation of a hilltop based on the following dataset.

Instrument station	Staff Reading	Vertical Angle	RL of BM
O1	1.545 m.	$28^{\circ}42'$	101.505m
O2	1.545 m.	$18^{\circ}06'$	

Distance between O1 and O2 is 100 m.

Q.11 A theodolite was set up at a distance of 150 m from tower. The angle of elevation to the top of the parapet was $10^{\circ} 8'$ while the angle of depression to the foot of the wall was $3^{\circ} 12'$. The staff reading on the B.M of RL 50.217 with the telescope horizontal was 0.880. Find the height of the tower and the RL of the top of the parapet

