th nov,
NDAY

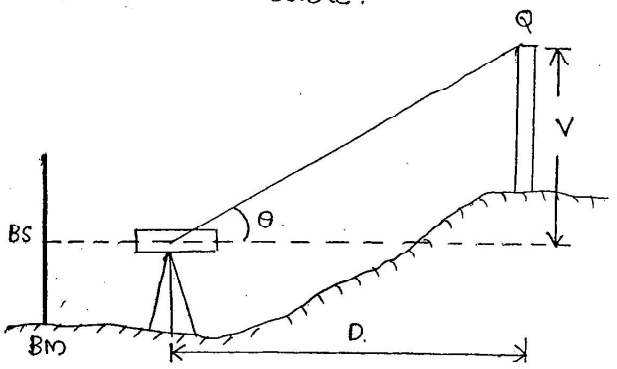
TRIGONOMETRICAL LEVELLING

It is an indirect levelling in which heights and distances can be calculated by measuring vertical angles.

Case 1: When the base of object is accessible.

$$V = D \tan\theta$$

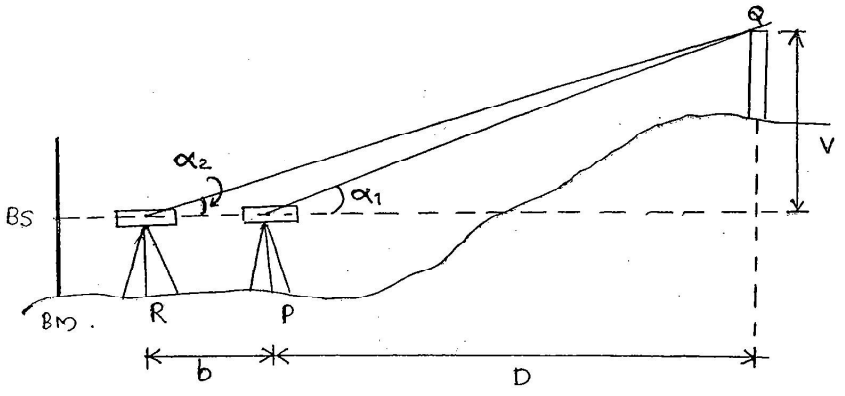
RL of Q = RL of BM + BS + V.



Case 2: Base of object is inaccessible.

Instrument stations & Object must be in same vertical pl

a) Instrument axes are at the same level.



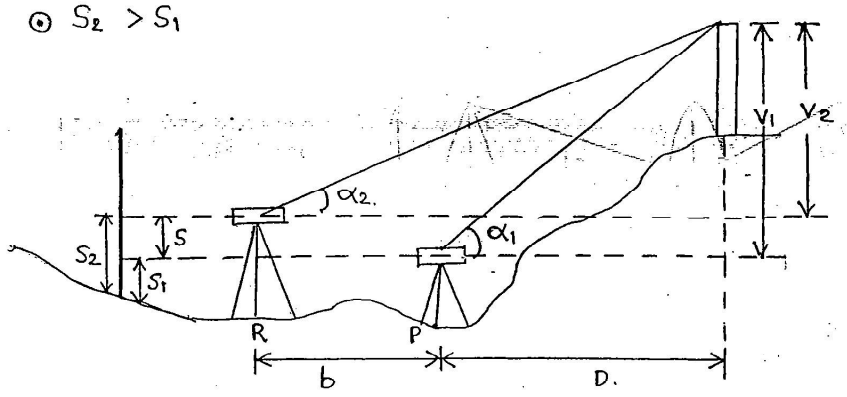
$$V = D \tan\alpha_1 = (D+b)\tan\alpha_2$$

$$D = \frac{b \tan\alpha_2}{(\tan\alpha_1 - \tan\alpha_2)}$$

RL of Q = RL of BM + BS + V_1

b) Instrument axes are at different levels

⊙ $S_2 > S_1$



$S_2 - S_1 = S = V_1 - V_2$

$= D\tan\alpha_1 - (D+b)\tan\alpha_2$

$$D = \frac{S + b\tan\alpha_2}{\tan\alpha_1 - \tan\alpha_2}$$

RL of Q = RL of BM + S_1 + V_1 (or)

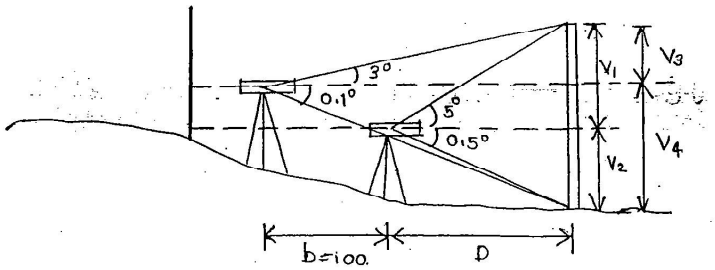
RL of BM + S_2 + V_2

⊙ $S_2 < S_1$

$$D = \frac{S - b\tan\alpha_2}{\tan\alpha_2 - \tan\alpha_1}$$

Q Horizontal distance blw 2 stations P & Q is 100 m. The vertical angles from P & Q to the top of a vertical tower. at T are 3° & 5° above horizontal respty. The vertical angle from the P & Q to the base of tower are 0.1° & 0.5° below horizontal respty. Stations P & Q and tower are in the same vertical plane, and also P & Q being on the same side of T.

Neglecting combined correction, height in m of tower is_?



$$h = V_1 + V_2 = V_3 + V_4$$

$$\Rightarrow D\tan 5^\circ + D\tan 0.5^\circ = (100+D)\tan 3^\circ + (100+D)\tan 0.1^\circ$$

$$0.0962\,D = 5.415 + 0.054\,D.$$

$$0.042\,D = 5.415$$

$$D = 128.78\ m$$

$\therefore$ Height of object $= D(\tan 5 + \tan 0.5)$

$$= 12.39\ m$$