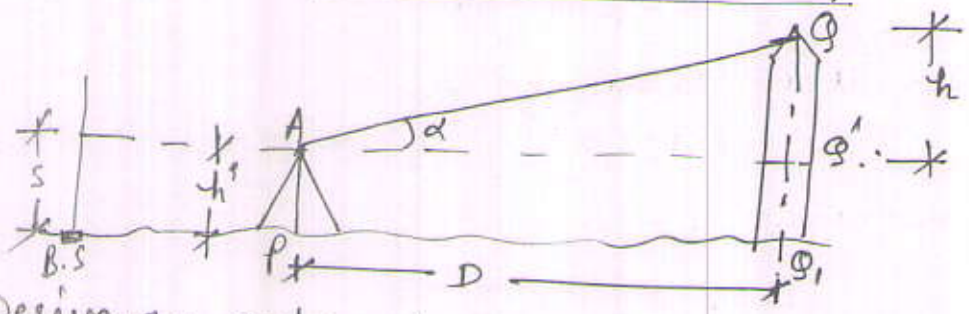
SURVEYING-II, CE-304

Q.1.



Derive an expression to find the R.L of point Q in the given fig.

Ans: In the given fig P → instrument station, Q → point to be observed
A → centre of instrument, Q' → projection of Q on horizontal plane
D = AQ' = horizontal distance bet^n point P & Q.
h' → height of the instrument at P.
h = QQ', S → Reading of staff kept at B.M, with line of sight horizontal.
α → angle of elevation

From triangle AQQ' ⇒ h = D tan α

R.L of Q = R.L of instrument axis + D tan α

If the R.L of 'P' is known,

R.L of Q = R.L of P + h' + D tan α

If the reading on the staff kept at the B.M is S, with the line of sight horizontal,

R.L of Q = R.L of B.M + S + D tan α.

(7½)

Q.2 An instrument was set up at P and the angle of elevation to a vane 4.0 m above the foot of the staff held at Q was 9°30'. The horizontal distance between P & Q was known to be 2000 meters. Determine the R.L of the staff station Q, given that the R.L of the instrument axis was 2650.38 m. Consider earth curvature.

Ans: Height of vane above the instrument axis

= D tan α = 2000 tan 9°30'

= 334.68 meters.

Correction for curvature & refraction combined

$= \frac{6}{7}\frac{D^2}{2R} = 0.06735\,D^2$ met., D → in Km.

Ans 2. Cont → $= 0.06735\left(\frac{2000}{1000}\right)^2$

$= 0.2694 \simeq 0.27\ m\ (+ve)$

Height of vane above instrument axis

$= 334.68 + 0.27 = 334.95\ m$

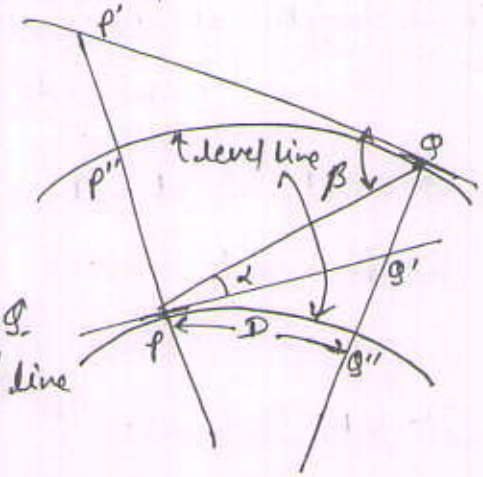
R.L of vane $= 334.95 + 2650.38 = 2985.33\ m$

R.L of Q $= 2985.33 - 4.0 =$ **2981.33 m**

Q2 OR

Q 2. Derive an expression to find the R.L of a point, when distance is bit large & earth curvature is considered.

Ans



In the fig shown.

PP''P' is the vertical line through P

QQ'Q'' is the vertical line through Q.

P'' → projection of P on level line through Q.

P' → projection of P on the horizontal line through Q.

Q' & Q'' → Projection of Q on horizontal & level line through P.

If the distance bet^n P & Q is not very large, we can take

$PQ' = PQ'' = D = QP'' = QP'$

and $\angle QQ'P = \angle QP'P = 90^\circ$ [apx.]

Then $QQ' = D \tan\alpha$

But since the true difference in elevation between P & Q is QQ''

Hence the combined correction for curvature & Refraction = Q'Q''

This Q'Q'' must be added to QQ' to get the true diff. in elevation QQ''

R.L of Q = R.L of B.M + S + $D\tan\alpha + 0.06735D^2$, D → in Km.

On the other hand if observation is taken from Q.

R.L of P = R.L of B.M + S + $D\tan\beta - 0.06735D^2$, D → in Km.

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Lect - civil