# Scheme & Solution

## Advanced Surveying – 18CV45

## IAT-1. Date: 21/05/2021

**Qn 1:** (i) **Swing:** It is the direction of rotation of the instrument about the vertical axis in the horizontal plane. (2M)

(ii) **Transit:** Process of rotating the telescope about vertical axis in the horizontal plane by 180°. (2M)

(iii) **Face left:** Vertical circle to the LHS of observer at the time of Sighting. (2M)

(iv) **Face right:** Vertical circle to the RHS of observer at the time of Sighting. (2M)

(v) **Axes:** Horizontal axis, Trunnion axis, Collimation axis, plate level axes are Collectively called axes. (2M)

**Qn: 2:** **Temporary adjustments:** These are done at every set up of the instrument. (2M)

They are: (i) Setting up

(ii) Fixing & levelling

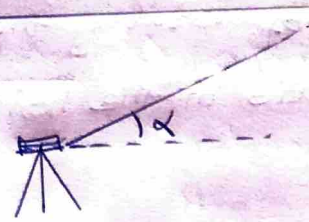
(iii) Elimination of parallax (2M)

(i) **Setting up:** Instrument attached to tripod and placed over station for adjustment and levelling (2M)

(ii) fixing & leveling: Instrument is fixed & made level w.r.t. the mean ground at the station. (2M)

(iii) Elimination of parallax: Adjustment made such that the image of the bisected object is made to fall on cross hairs. (2M)

Qn: 3:




Angle of elevation


angle of depression (3M)

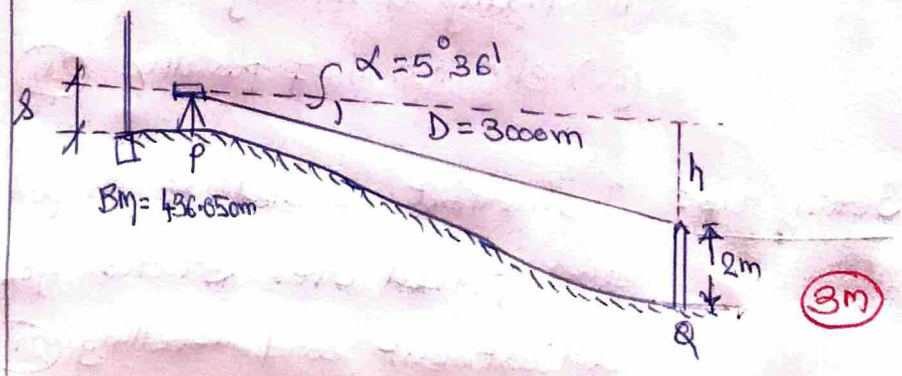
Procedure: (a) Perform temporary adjustment

(b) Release VCS, VCS and set 0-0 on vertical circle vernier. (2M)

(c) Bisect object in vertical plane and take face left & face right reading (2M)

(d) Repeat procedure a, b, c for 3 more trials and take mean value of the observed readings. (3M)

Qn: 4:




(3M)

$h = D \tan\alpha = 3000 \tan(5^\circ 36') = 294.153\text{m}$

$C_1$ = Correction = $0.06735 (D')^2 = 0.06735 (3)^2$

$= -0.606\text{m}$

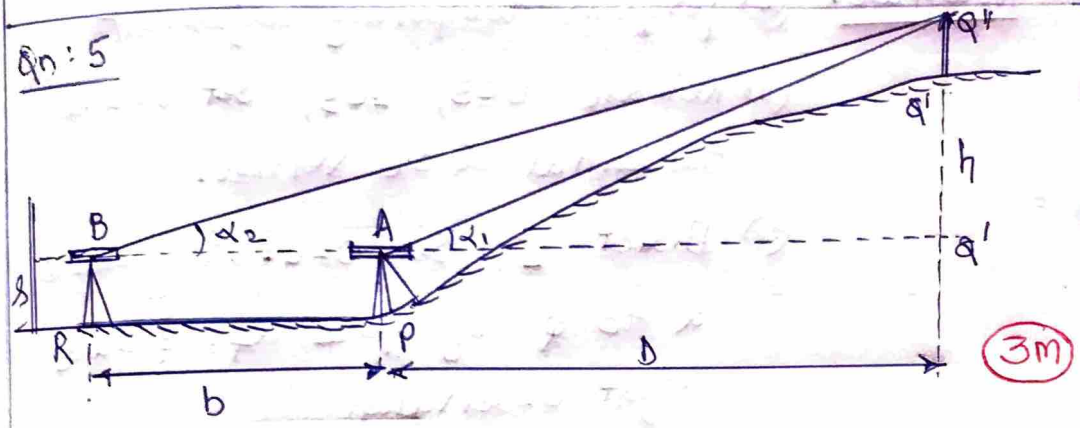
(4m)

RL of Q = RL of BM + S + (h) + (c) + (-2)

$= 436.050 + 2.865 - 294.153 - 0.606 - 2$

$= 143.369\text{m}$. (3m)

Qn: 5




(3m)

$\Delta^{le}$ $AQ'Q''$, $h = D \tan\alpha_1$ ---(i)

$\Delta^{le}$ $BQ'Q''$, $h = (b+D)\tan\alpha_2$ ---(ii)

Solving, $D = \dfrac{b \tan\alpha_2}{\tan\alpha_1 - \tan\alpha_2}$ ---- (3m)

**Procedure:** (a) Perform temporary adjustment @ P.

(b) Vertical angle $\alpha_1$ by repitition method.

(c) Measure Known distance 'b'.

(d) Perform temporary adjustment @ R

(e) vertical angle $\alpha_2$ by repetition method.

(f) Calculation.

RL of Q = RL of BM + S + $h_1$.

or

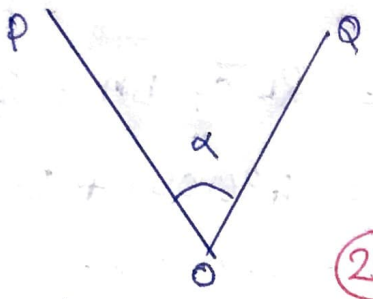
= RL of BM + S + $h_2$ (4m)

Scheme and Solution 18CV45 - IAT#1 (2021)

Qn: 6 : figure — 5m

Mention & explain parts — 5m

Qn #7:




2m

Procedure: (a) perform temporary adjustment

(b) Release UCS, LCS, Set 0-0 on Horizontal circle vernier.

(c) Bisect P, Set 0-0. Read angle α to Q by face left & face right observation

(d) Repeat procedure a, b & c for 3 more trials and take mean value of observed readings. 4*2m = 8m

End of Scheme