

University of Salaheddin- Erbil

Time Allowed : 90 min.

College of Engineering

Subject : Basic Surveying Instruments

Geomatics (Surveying) Engineering Dept.

Examiner : Azad Arshad Hawezi

Date of Exam: 10 /5 / 2023

Note :

- 1- Draw necessary sketch's without scale if required
- 2- Round of decimals to centimeter

Question 1) (20 mark)

Calculate the corrected staff reading for a sight of distance 555 m if the staff reading is 1.763 m .

Solution :

Length of sight =555 m =555m/1000=0.555 Km

Correction for curvature and refraction = $0.0673L^2 = (0.0673 \times (0.555)^2$

= 0.021 m

Observed staff reading =1.763 m

Correction = -0.021 m

Correct staff reading =1.763 m -0. 0.021 m =1.742 m

Question 2) (30 mark)

Calculate the allowable misclosure of the loop proceed by DNA digital level the starting elevation of control point (B.M) is 402.110 m and the ending elevation of the (B.M) after closing the loop is 402.101 m, the total distance of the level loop is 543.21 m and decide if the procedure need to be rerun or not?

Solution:

The difference in elevation assumed and measured = 402.110 m - 402.101m= 0.009 m

543.21 m /1000 = 0.54321 km

Allowable misclosure = $0.008 \times \sqrt{\text{total distance in kilometers}}$

= $0.008 \times \sqrt{0.54321 \text{ km}} = 0.006 \text{ m}$

that's mean the Misclosure < difference between two elevations $0.006 < 0.009$

so the procedure is not acceptable and need to rerun

Question 3) (50 mark)

For KOLIDA ET theodolite write in steps The inspections and adjustments of Vertical index difference (I angle) and vertical index zeroing .

Solution :

Vertical index difference (I angle) and vertical index zeroing

Inspection

- (1) Set up the instrument and turn the power on. Then, sight at a reference A and obtain the vertical angle (L). *Left*
- (2) Reverse the telescope and sight at the object A again and obtain the vertical angle (R) *Right*
- (3) If vertical angle is zero at zenith, then, $I = (L + R - 360^\circ) / 2$; If vertical angle is zero at horizon, then, $I = (L + R - 180^\circ) / 2$ or $(L + R - 540^\circ) / 2$.
- (4) If $|I| \geq 10''$, vertical index zeroing should be set again.

Adjustment (Setting up vertical index zeroing)

- (1) After leveling the instrument, press and hold $\odot \text{SET}$ key until three beeps. The instrument displays that:

V 0SET SET--1

- (2) In normal position, turn the telescope around near the horizontal direction until vertical angle appears. Sight at a clear and stable object A, which is nearly the same height as the instrument. Press $\odot \text{SET}$ key, displaying:

V 90° 20' 30" SET--2

- (3) Reverse the telescope and sight at the object A again. Press $\odot \text{SET}$ key to finish vertical index zeroing setting. The instrument returns back to angle measurement mode.
- (4) Repeat the inspection procedure. If $|I| \geq 10''$, check if anything wrong in operation and repeat the adjustment again.
- (5) If the vertical index difference does not meet the standard yet after being adjusted repeatedly, the instrument should be send to factory to be repaired.