

Name:	Academic Number:
Level (7): Civil Engineering:	Time allowed: 2 hrs.

**Question #1:**

(10 marks)

2.1) Wild DI instrument is used to measure a distance equals 3000 m If the accuracy of the instrument is  $\mp (1 \text{ mm} + 3 \text{ ppm})$ . Compute the total error, then what is the distance measured corresponding to 6 mm total error?

(ULO#1/CLO#1/k-kpi#43 =2 marks)

2.2) Theodolite is set up at one end of a level base line 120 m long. The line is marked by stakes every 30m and a stadia rod is held at each stake. The **stadia difference** at each location is observed as follows: 0.297, 0.596, and 0.895 and 1.192 meters, respectively. Compute the stadia interval factor (K) (**use 3 decimal points**) for each distance and also determine the average value of K. Assume  $e = 0.4\text{m}$

(ULO#3/CLO#2-b-Kpi#5- 3marks)

2.3) It is required to determine the horizontal distance between points A and B by stadia method. A theodolite at point C between the two points, while it is used to sight a level rod at A the telescope was horizontal and the rod readings were:  $u = 1.68$ ,  $l = 0.98$ . and when it is used to sight a rod at point B, the vertical angle was  $10^\circ 38'$  and the stadia readings were 2.46, 2.13, 1.80.

Find:

- a) The horizontal distance  $H_{CA}$
- b) The horizontal distance  $H_{CB}$
- c) Total horizontal distance  $H_{AB}$
- d) If the elevation at the instrument station "C" is 25.00 m. Find the elevation of point B

Known that  $K = 100$  and  $e = 32$  cm and  $h_i = 1.56$  m. (use 4 digits)

(ULO#3/CLO#3-e-Kpi#20- 5 marks)

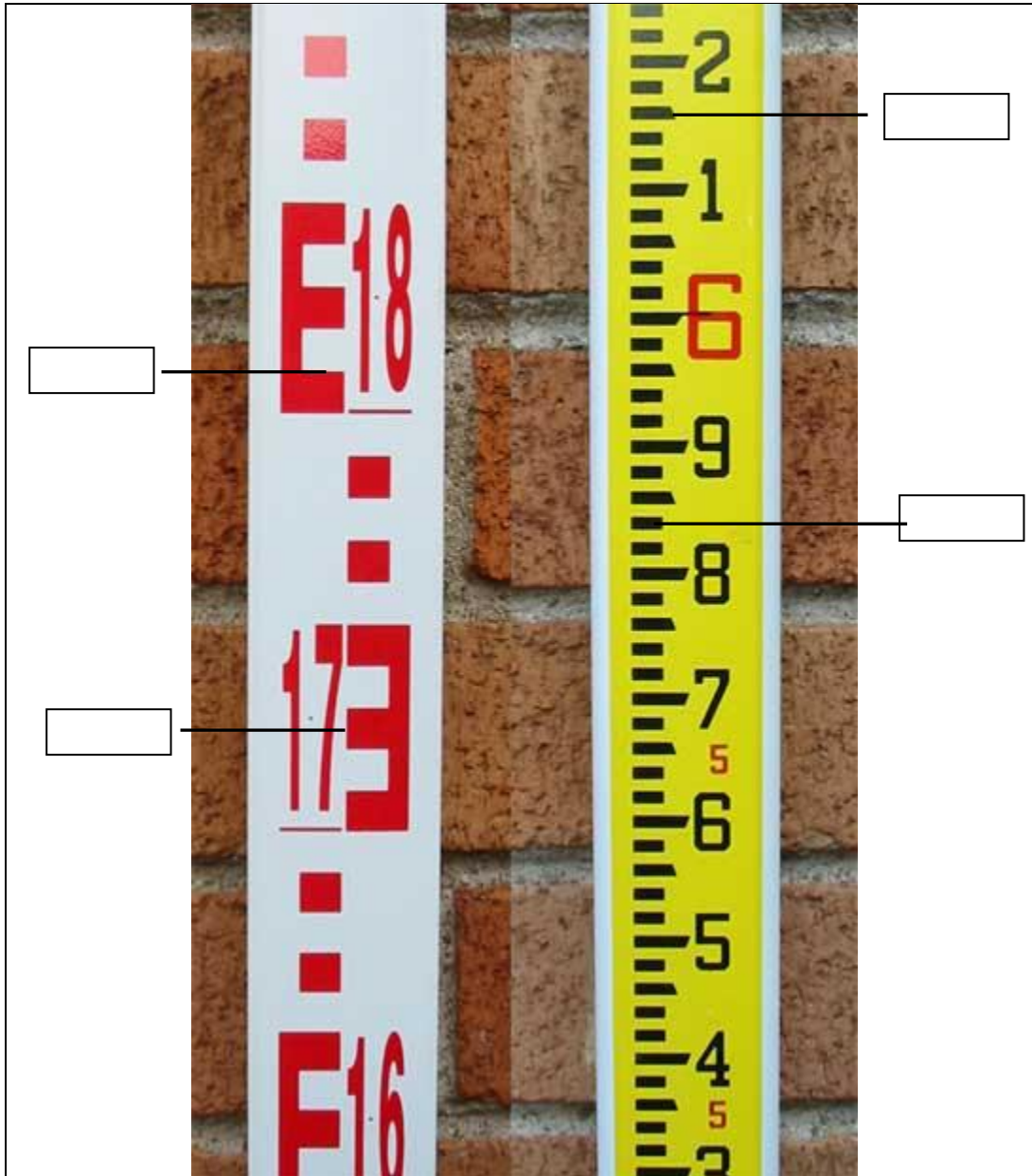




**Question #2:**

(8 marks)

2.1) Determine the rod readings indicated on the foot and metric rods shown in the figure below. [ULO2/CLO#2 / a-kpi#3=2 marks]



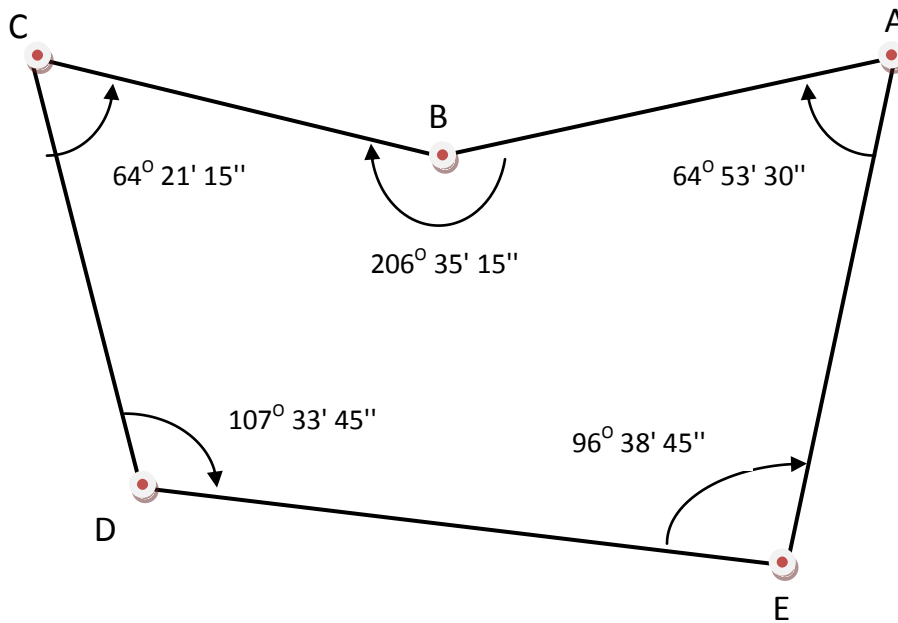
2.2) Estimate the value of the Right hand reading if the vertical angle at point A is calculated as:  $08^{\circ} 40' 55''$  (-ve)

(ULO#2/CLO#2 a-kpi#4 =2 marks)

Occ. Point	Target point	Reading of Left hand face VI.	Reading of Right hand face VI.	Angle
○	A	$98^{\circ} 40' 50''$		$08^{\circ} 40' 55''$ (-ve)

2.3) Compute the angular error and adjust the angles of the given traverse

(ULO#4/CLO#4 / b-kpi#8 =4 marks)





**Question #3:**

(12 marks)

**3.1) Convert the following WCB into Reduced Bearings.** Neat sketches are required.

(ULO#4/ CLO#4/ c-kpi#11 =4 marks)

a)  $214^{\circ} 23'$  =

b)  $027^{\circ} 48'$  =

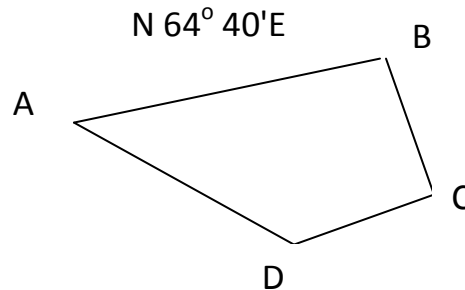
c)  $193^{\circ} 20'$  =

d)  $311^{\circ} 16'$  =



3.2) The four -sided, closed traverse has the following angles and distances:

Angle	Distance
A = 51° 23'	AB = 713.93 ft
B = 105° 39'	BC = 606.06 ft
C = 78° 11'	CD = 391.27 ft
D = 124° 47'	DA = 781.18 ft



The bearing of AB is N 64° 40'E

- Perform check for angular closure.
- Compute the azimuths (Whole Circular Bearing) for all sides
- Compute the latitudes and departures. (use 4 digits)
- Compute the linear error of closure and precision ratio

(ULO#3/CLO#3/e-kpi#18 = 8 marks)





Extra answer Sheet

ABET						%eg	%eg
Knowledge	a	j				13.3	10
	4						
Skills	b	c	e	k	h	86.7	80
	7	4	13	2			
Competence	g	f	i	d			10
				-			

*Good luck*