



Birla Institute of Technology & Science, Pilani

Hyderabad Campus

First Semester 2022-2023

CE F213 Surveying

Mid-semester Examination

Weightage: 30%

Maximum Marks: 30

Duration: 1.5 Hours

Date: 2.11.2022

Nature of Exam: Closed Book

Instructions

- Answer All Questions
- Draw diagrams wherever necessary
- Report the values up to 3 decimal points wherever is applicable

Section-1

1. Differentiate between the following.

[1*4=4 M]

- Triangulation vs Trilateration
- EGM vs UTM
- Standard error vs Most probable error
- Ridge vs valley contour lines

2. State true or false and justify your answer.

[1*5=5M]

- The correction due to sag is always additive for tape correction.
- The error for the whole-to-part survey is always less compared to the part-to-whole survey.
- The increase in spacing between contour lines shows the transition from a mild slope to steep slope terrain.
- The angle between mirrors of an optical square is 90 degrees.
- The total station that you have used calculates distance based on the time difference between the transmitted and received signals

Section-2

- Find out the hypotenusal allowance per chain of 30 m length if the angle of the slope is $12^{\circ}30'$.
[1M]
- The plan of an old survey plotted to a scale of 10 cm to 1 m carried a note stating that the chain of 30 m nominal length which was used for the survey was 16 cm too short. It was also found that the plan has shrunk so that a line originally 10 cm long was 9.77 cm. The area of the plot on the available plan was found to be 58.2 cm^2 . What is the correct area on the ground? Report your answer in hectares.
[2M]
- Find the maximum length of the offset so that the displacement of the point on the paper from both sources of error should not exceed 0.25 mm. It is given that the offset is measured with an accuracy of 1 in 50 and the scale is 1 cm = 8 m.
[2M]

Section-3

1. Determine the reduced level of a top of a flag post (C) from the following observations taken from two stations A and B, 50 m apart. **[4M]**

Angle BAC = 60° and angle ABC = 50°

The angle of elevation from A to the top of the flag post (C) = 30°

The angle of elevation from B to the top of the flag post (C) = 29°

Reduced level of Bench Mark (BM) = 25 m

Staff reading from A on BM = 2.5 m

Staff reading from B on BM = 0.5 m

Calculate the reduced level of point C with reference to station A. Draw the corresponding diagram.

2. A compass traverse PQRSP was conducted along the boundaries of a football ground. The partial table regarding the survey readings (without local attraction corrections) were shown in the table below. It was observed that stations P and R were not affected by local attraction effects. The local attraction error reported at stations Q and S were $-20'$ (minus twenty minutes) and $-10'$ (minus ten minutes) respectively. Calculate the missing values. Estimate the corrected FB of all lines. **[3M]**

Line	FB	BB
PQ	$123^\circ 20'$?
QR	?	$224^\circ 15'$
RS	$324^\circ 10'$?
SP	?	$35^\circ 20'$

3. The following table shows the measurements obtained after executing the differential levelling survey using a levelling staff of 4 m for a continuously sloping downward terrain. Fill the missing cells in table using the rise and fall method. It is also given that the gradient of the line joining the first and last station is 1 in 65.454 m. **[5M]**

Write relevant steps for each answer. It is not required to rewrite the table in the answer sheet.

Note: The gradient is mentioned with respect to the horizontal distance.

The distance between the stations given in table also corresponds to the horizontal distance.

Distance (m)	Station	BS (m)	IS (m)	FS (m)	Rise (m)	Fall (m)	RL (m)	Remarks
0	1	1.535					216	BM
60	2		? (b)			0.895	? (a)	Intermediate station
120	3	1.155		? (c)		? (d)	? (e)	Turning point
180	4			? (f)		0.805	? (g)	Last station

4. The following observations were taken in a reciprocal leveling. **[4M]**

Instrument at	Staff reading at	
	A (m)	B (m)
A	1.625	2.545
B	0.725	1.405

Determine the reduced level of B, if that of A is 100.105 m. Also, calculate the angular error in collimation (with reference to the instrument at A) if the distance between A and B is 1000m.

-----All the Best-----