

The Papua New Guinea University of Technology

Department of Surveying and Land Studies

Second Semester Examination – 2022

BACM/1

CM126: construction Surveying

(Marks – 100)

TIME ALLOWED: 3 HOURS

INFORMATION FOR STUDENTS:

1. Mobile phones and other recording devices are not allowed in the examination room.
2. All candidates must display their ID Cards on their desks for the Invigilator to check.
3. **SILENCE** must be maintained in the examination room.
4. Candidates may not leave the examination room within the first half hour.
5. Before answering any questions, fill in the information required.
 - i. Candidates are not to be allowed to bring in bilums or any types of bags into examination room.
 - ii. Reference books / materials are **strictly not allowed** in the examination hall.
 - iii. Before entering examination room students must remove jackets.
 - iv. Candidates must ensure that their hands and legs are free of any written information, scribbling marks, etc. which are related to the subject examined.
 - v. Candidates will not be allowed to go out for any purpose except for a medical emergency while in the middle of a session. Hence those wish to use toilets must do so before commencing the session.
6. Write on one side of the paper only.
7. Do not write in the margins; these must be kept clear.
8. Rough works should be done on the last sheets of each booklet and **should be crossed out before the examination ends**. Do not remove any sheets from this book.
9. If you use two or more booklets then place the second and succeeding booklets behind the first, and hold them together with the clip provided.
10. Graph paper, diagrams and other loose sheets should be fastened in the appropriate place with the clip provided.
11. Write the question and division of each question at the top of each page. Begin the answer to each question on a new page.

No of Pages: 4

EXAMINER

CO-EXAMINER

CHIEF EXAMINER

17/10/22

17/10/22

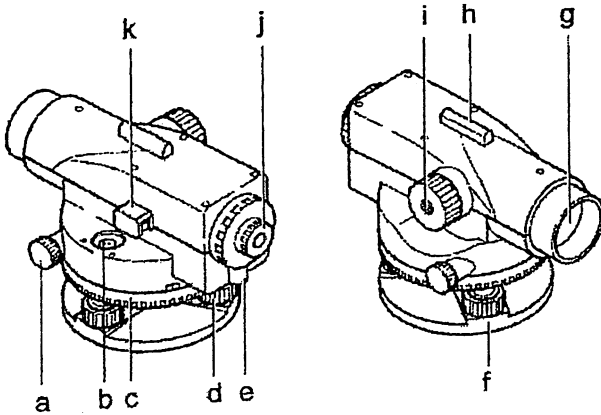
QUESTION 1

- a) What is the principle of Leveling? Use Diagram to illustrate. (10 marks)
- b) Give full definition of the following general terms used in leveling. (10 marks)
- Level Datum
 - Reduce Level
 - Level Line
 - Temporary Bench Mark (TBM)
 - Horizontal Plane
- c) What do you understand by the term PARALLAX in a leveling or Total Station instrument? (3 marks)
- d) How will you detect parallax in any leveling or surveying instrument? (2marks)

(Total 25 marks)

QUESTION 2

- a) Name the parts of the automatic level on diagram below from (a) to (j). (10marks)



- b. For a level to give reliable results the compensator must be correctly adjusted, the collimation error will almost certainly produce levelling of unacceptable accuracy. The test to check for collimation error is known as? (1mark)
- c. Explain what do you understand by COLLIMATION ERROR? (7 marks)
- d. Explain in detail what do you understand about the leveling staff? (7 marks)

(Total 25 marks)

QUESTION 3

- a. Name three sources of equipment errors when carrying out leveling and clearly explain how we can eliminate these errors? (6 marks)
- b. Name four field or on site errors when performing a leveling and explain the source and how we can reduce or eliminate these errors? (12 marks)
- c. How do we reduce the chance of errors occurring in any leveling exercise? (7 marks)

(Total 25 marks)

QUESTION 4

- a) Reduce the following levels and apply the necessary checks

(10marks)

| B.S. | I.S | F.S | RISE | FALL | R.L. | REMARKS |
|------|------|------|------|------|-------|---------|
| 1.07 | | | | | 15.13 | B.M. |
| | 0.85 | | | | | A1 |
| | 0.50 | | | | | A2 |
| | 0.60 | | | | | A3 |
| | 1.10 | | | | | A4 |
| 3.92 | | 0.03 | | | | C.P. |
| | 3.00 | | | | | B1 |
| | 2.95 | | | | | B2 |
| | 2.95 | | | | | B3 |
| | 3.10 | | | | | B4 |
| | 3.35 | | | | | B5 |
| | 2.25 | | | | | B6 |
| | 2.45 | | | | | B7 |
| | 2.65 | | | | | B8 |
| | 3.65 | | | | | B9 |
| | 4.45 | | | | | C1 |
| 3.85 | | 0.67 | | | | C.P. |
| | 4.00 | | | | | C3 |
| | 3.90 | | | | | C4 |
| | 1.03 | | | | | C5 |
| | 0.60 | | | | | C6 |
| | 0.80 | | | | | C7 |
| | 3.74 | | | | | C8 |
| | 2.07 | | | | | C9 |
| | | 4.90 | | | | B.M. |

b) Readings obtain from a two-peg test where the two pegs are 60m apart.

With the level midway between A and B

Staff reading at A = 1.383 Staff reading at B = 0.960

Level position 6 m from peg B on line AB extended

Staff reading at A = 1.712 Staff reading at B = 1.319m

Task:

- i. Calculate the collimation error of the level per 60m sighting distance? (5 marks)
- ii. What should be the reading observed on the staff reading at A with the leveling instrument positioned 6m from B? (3 marks)
- iii. Is the errors calculated falls within the allowable limit? (3 mark)
- iv. Calculate the apparent difference? (2 mark)
- v. Calculate the true difference? (2 mark)

Total 25 marks

End!!!