NESA NATIONAL EXAMINATION AND SCHOOL INSPECTION AUTHORITY

LSV – Operating Surveying Instruments

T106

Tuesday, 20/7/2021

08:30 – 11:30 AM

Names: .....

Index number : .....

TVET NATIONAL EXAMINATION, RTQF LEVEL 5, 2020-2021

QUESTIONS and ANSWERS BOOKLET

OPTION/TRADE: **LAND SURVEYING**

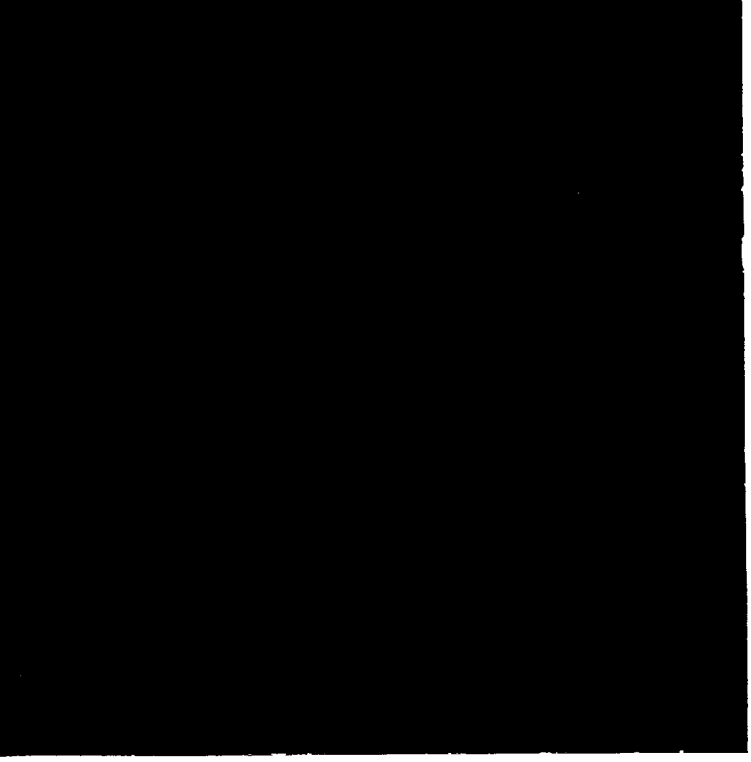
SUBJECT: **Operating Surveying Instruments**

ACADEMIC YEAR: **2020-2021**

Read carefully the instructions on page (i) & (ii).

FOR EXAMINER'S USE ONLY

QUESTIONS	1	2	3	4	5	6	7	8	9	10	Total
Marks											
QUESTIONS	11	12	13	14	15	16	17	18	19	20	Total
Marks											
QUESTIONS	21	22	23	24	25	26	27	28	29	30	Total
Marks											



TVET NATIONAL EXAMINATION, RTQF LEVEL 5, 2020-2021

INSTRUCTIONS TO CANDIDATES: PART I (Answer Booklet)

1. A candidate should fill in the actual names and the index number on the cover of this questions and answer booklet on the provided place (Black Box).

2. It is illegal for a candidate to write any of his/her names, index number or a school name inside the answer booklet.

3. A candidate should check if all pages of the answer booklet are complete. No candidate should remove or tear any pages or part of it from the answer booklet.

4. A candidate should answer in the language in which the examination is set. (See page ***(ii)***)

5. A candidate should sign on the sitting plan when submitting the answer booklet. He/she has also to check if the answer booklet is well sealed.

6. No extra paper is allowed in the examinations room. If a candidate is caught with it his/her results will be nullified.

7. No candidate is allowed to write answers not related to the subject being sat for, otherwise it will be considered as a cheating case.

8. Write your answers on the 12 lined pages (From page 1 of 12 to page 12 of 12).

9. Use the last non-lined pages as draft.

10. Results for any candidate who is caught in examination malpractices are nullified. The cheating can be recognized during examinations administration, marking exercise or even thereafter.

TVET NATIONAL EXAMINATION, RTQF LEVEL 5, 2020-2021

OPTION/TRADE: LAND SURVEYING

SUBJECT: Operating Surveying Instruments

DURATION: 3 hours

INSTRUCTIONS TO CANDIDATES: PART II (Question Paper)

The paper is composed of two (2) Sections as follows:

Section I: Attempt all the Twelve (12) questions **(60 marks)**

Section II: Attempt any Four (4) questions out of Six (6) **(40 marks)**

Allowed materials:

- Ruler or square
- Calculator

Note:

Every candidate is required to carefully comply with the provided assessment instructions.

Section I : Attempt all the Twelve (12) questions **(60 marks)**

01. Classify any five (5) users of Total Station. **5 marks**

02. a) Explain the function of the EDM instrument.
b) List down three (3) types of EDM instrument. **5 marks**

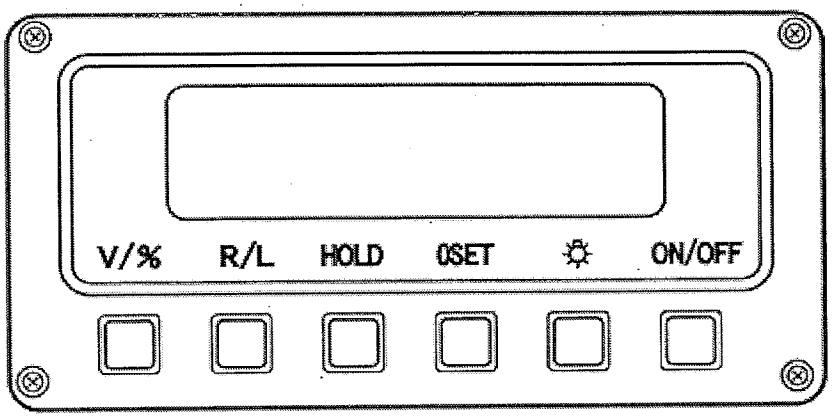
03. Identify any five (5) disadvantages of using GPS in surveying measurement. **5 marks**

04. Enumerate any five (5) "advantages" of using total station instrument. **5 marks**

05. The full GPS consists of three distinct segments/ components: Space Segment, Control Segment, and User segment or GPS receivers. Explain the above components. **5 marks**

06. Provide any three (3) precautions should be taken on Theodolite battery. **5 marks**

07. After observing following Theodolite's keyboard, discuss on the function of these key operations. **5 marks**



08. Explain the function of the following parts of digital Theodolite:

a) Optical plummet
b) Leveling screw
c) Bottom plate
d) Handle
e) Keyboard. **5 marks**

09. Describe the types of theodolite. **5 marks**

10. Describe the types of errors in surveying measurement. **5 marks**

11. Differentiate horizontal from vertical angles measured by Theodolite. **5 marks**

12. Explain the steps involved in the storing of theodolite instrument **5 marks**

Section II: Attempt any Four (4) questions out of Six (6) (40 marks)

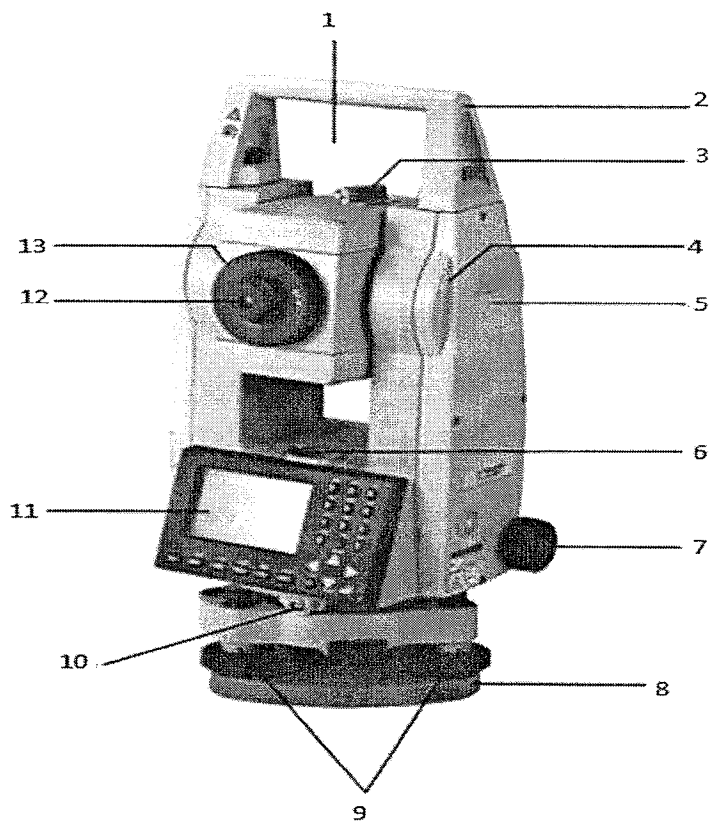
13. **(a)** Differentiate accuracy from precision in surveying measurement.

3 marks

(b) Mention any seven (7) applications of total station instrument.

7 marks

14. Complete names of the following parts indicated by the numbers in the figure below: **10 marks**



15. The following consecutive readings were taken with a level and a 4 meters leveling staff on a continuous sloping ground at common intervals of 30 m:

At **station A:** 0.855, 3.115, 2.335, 1.545, 3.825, 0.455, 1.380, 2.855, 2.055, 3.455, 0.585, 1.015, 2.755 and 1.850; **station B** located at 3.845. The stations are changed at sixth and eleventh position. The reduced level of A was 380.500:

a) Make the entries in a level book and apply the usual checks.

b) Determine the gradient of AB. **10 marks**

16. The height of the tacheometer at *A* above the ground was 1.55 m. Determine the elevations of *P* and *Q* if the elevation of *A* is 75.500 m. The stadia constant *k* and *c* are 100 and 0.00 respectively:

Staff at	Vertical angle	Staff reading		
		Upper	Middle	Lower
P	– 5°12′	1.388	0.978	0.610
Q	+ 27°35′	1.604	1.286	0.997

10 marks

17. Spirit leveling is any means of leveling that used a spirit level (bubble), similar to the Bubble in a carpenter's level, as part of the procedure. It is the term usually applied to the traditional use of level and staff in obtaining differences in height.

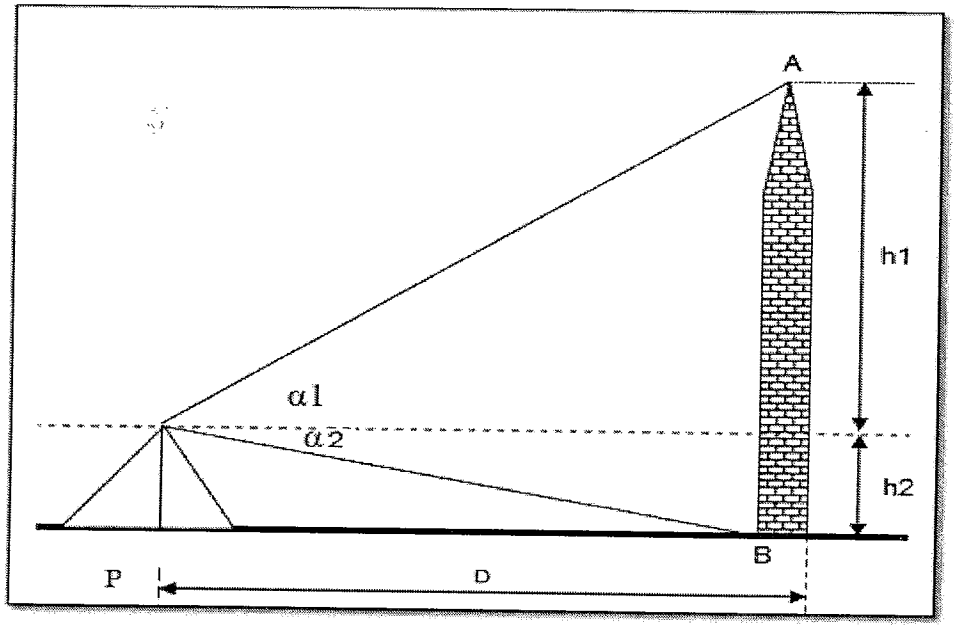
The term Differential Leveling is also used to describe the same process. Explain the following terms:

a) Level Line
b) Horizontal Line
c) Level Datum
d) Bench Mark (BM)
e) Reduced Level (RL)
f) Back sight
g) Foresight
h) Intermediate Sight
i) Line of Collimation
j) Change Point.

10 marks

18. A surveyor wants to know the height of a brick wall **AB**. He sets up a Theodolite at point **P** and starts to measure the vertical angles; Zenith angles at point **A and B** respectively are 71°01'45"and 102°25'40". Also the Rod readings at point **B** upper, middle and lower Rod readings 1.456, 1.406 and 1.356 are recorded respectively.

After calculating the distance **D** between Theodolite and the brick wall and also the vertical angles **α1** and **α2** as angle of elevation and depression angle respectively; how does he get the total height of the wall?



10 marks