higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T110(E)(N24)T

NOVEMBER EXAMINATION

NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL SURVEYING N4

(8060034)

24 November 2014 (Y-Paper)
13:00–16:00

Calculators may be used.

This question paper consists of 5 pages, 1 diagram sheet and 1 formula sheet.

ENGLISH

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
BUILDING AND STRUCTURAL SURVEYING N4
TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
2. Read ALL the questions carefully.
3. Number the answers according to the numbering system used in this question paper.
4. ALL the diagrams, sketches and drawings should be clear, large and in good proportion.
5. ALL the diagrams must be fully labelled and be done in PENCIL.
6. Write neatly and legibly.

ENGINEERING

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QUESTION 1

Define the following survey terms:

1.1 A plan (2)

1.2 Isogonic lines (2)

1.3 A plane (2)
[6]

QUESTION 2

2.1 Name SIX surveying methods. (6)

2.2 Describe the TWO main objectives of surveying. (4)
[10]

QUESTION 3

3.1 What is meant by the term *one scale unit*? (2)

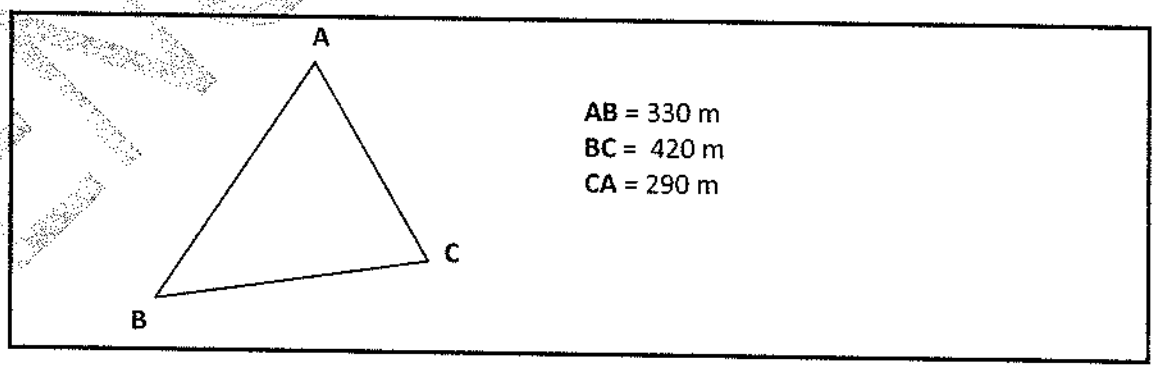
3.2 Errors and mistakes affect any measurement and are derived from three separate sources.

Name the THREE sources. (3)

3.3 Name the FOUR factors that will influence the accuracy of a map. (4)

3.4 The following diagram shows a triangular shaped plot.

Calculate the area of the plot in hectares.



(5)

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3.5 The average height of a piece of land in the shape of a trapezium is 250,5 m.

Calculate the volume of earth to be removed if the following information is known:

The level is to be reduced to 240,0 m
The long side of the trapezium is 46,0 m
The short side is 32,0 m
The perpendicular distance between the TWO sides is 44,0 m (8)
[22]

QUESTION 4

4.1 It is required to set off an exact distance of 175,0 m with a steel tape known to be 0,85% too short.

Calculate the distance to be measured off with this incorrect tape. (4)

4.2 A positive correction of 0,015 m was found when measuring a certain distance with a steel tape.
The standard temperature is 20 °C
The temperature at the time of measurement is 33 °C.
The coefficient of linear expansion is 0, 0000113/ °C.

Calculate the corrected distance. (6)

4.3 The horizontal distance between two points is exactly 110 m.

Calculate the slope distance if the vertical angle between the TWO points is 8° 28' 40". (4)

4.4 A horizontal length of 35,5 m was measured in catenary using a 100 m tape. A tension of 7 kgf was maintained on the tape which has a weight of 2 kg.

Calculate the correct distance. (6)
[20]

QUESTION 5

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5.1 State FIVE factors that can make a tape temporarily incorrect. (5)

5.2 A basic surveying telescope consists of the components as shown in DIAGRAM SHEET 1, FIGURE 1.

Write the name of each component next to question number (5.2.1–5.2.7) in the ANSWER BOOK. (7)

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5.3 DIAGRAM SHEET 1, FIGURE 2 shows a level set at **A** and a staff held at **B** and **C**.

The benchmark at **B** is 156, 6 m.

5.3.1 What is the *collimation height*? (2)

5.3.2 What is the *reduced level* at point **C**.? (2)

5.4 Staffs are manufactured for different purposes.

List THREE of these staffs. (3)

5.5 Name FIVE properties of a good staff. (5)
[24]

QUESTION 6

6.1 Describe how you would adjust the dumpy level to ensure that the bubble stays in the center of its run even if the instrument is rotated. (8)

6.2 Choose an item or a description from COLUMN B that matches a term/word/ in COLUMN A. Write only the letter (A–G) next to the question number (6.2.1–6.2.6) in the ANSWER BOOK.

COLUMN A	COLUMN B
6.2.1 Foresight	A used to keep excavations to an even gradient
6.2.2 Clinometer	B 180°
6.2.3 Catenary	C used for measuring ground slopes
6.2.4 Local attraction	D the sag of a tape
6.2.5 Radians	E the last reading taken after the instrument has been set up.
6.2.6 Boning rod	F an influence which prevents the compass needle pointing to magnetic north
	G 57° 17' 44.8"

(6 x 1) (6)

6.3 Name the FOUR methods of plane table surveying. (4)
[18]

TOTAL: 100

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DIAGRAM SHEET 1

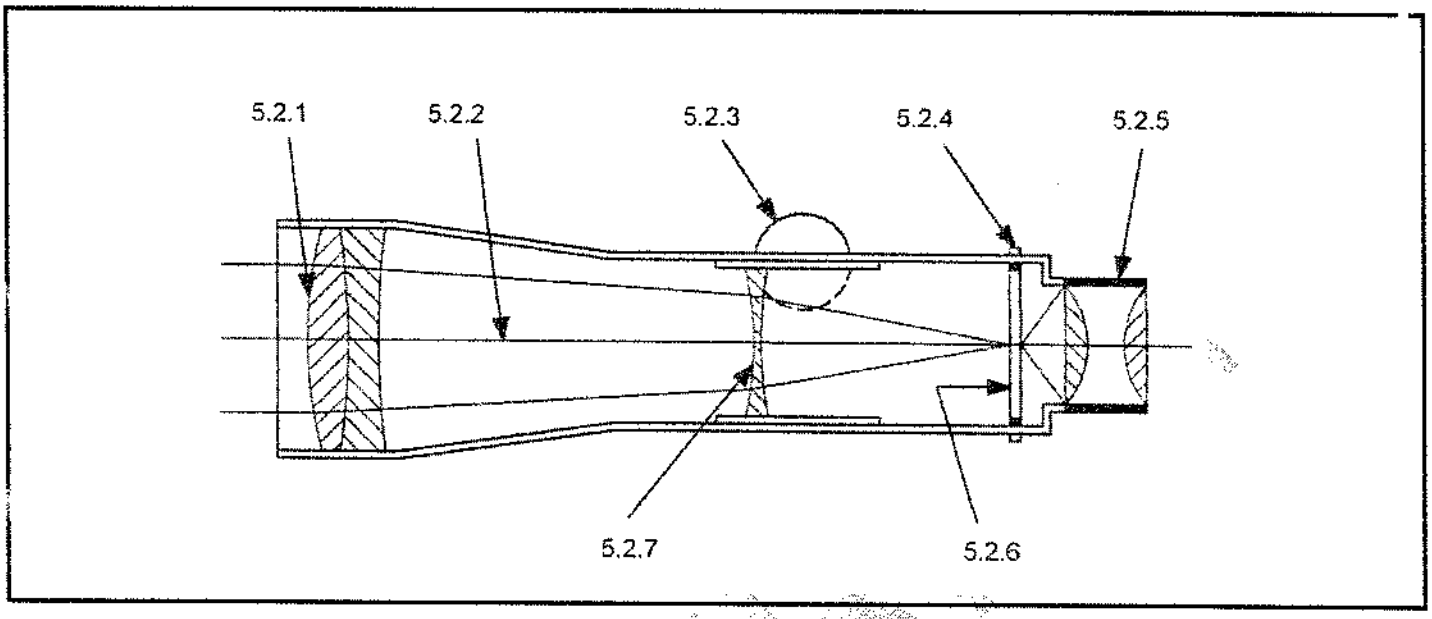

FIGURE 1

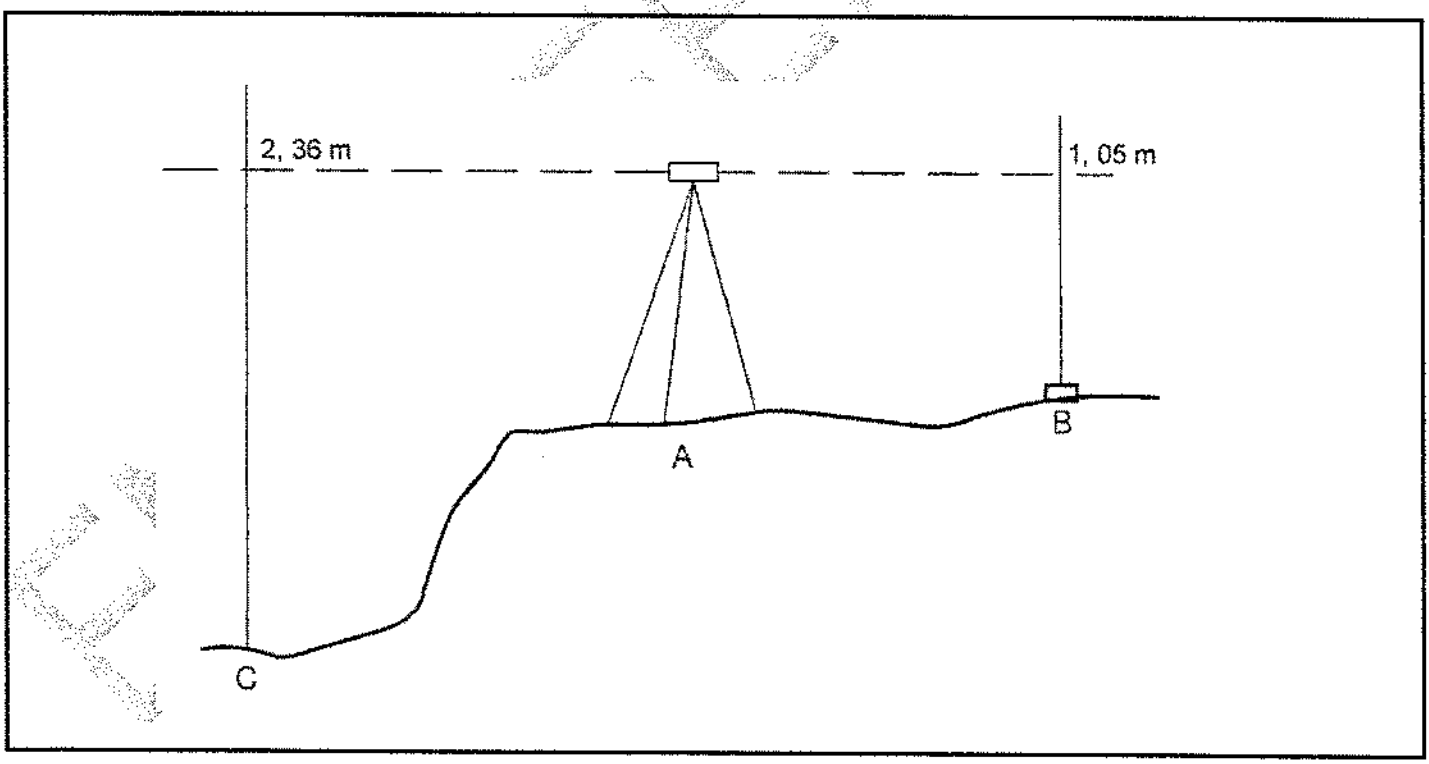

FIGURE 2

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FORMULA SHEET

Any other applicable formula may also be used.

1. $A = \frac{1}{2}b \times \perp h$

2. $A = \sqrt{s(s-a)(s-b)(s-c)}\ ,\ s = \frac{a+b+c}{2}$

3. $A = \frac{(a+b) \times h}{2}$

4. $A = a \times h$

5. $A = \frac{d}{3}\left[(y_1 + y_n) + 2(y_3 + y_5 + \ldots + (y_{n-2})) + 4(y_2 + y_4 + \ldots + y_{n-1})\right]$

6. $A = d\left[\left(\frac{y_2 + y_n}{2}\right) + y_2 + y_3 + \ldots + y_{n-1}\right]$

7. $C = L \times e \times (t_m - t_s)$

8. $C = \frac{w^2 L^3}{24\,T^2}$

9. $C = L(1 - \cos\theta)$

10. $C = H(\sec\theta - 1)$

11. $C = \frac{L.H}{R}$

12. $A = \frac{1}{2}\,abSinC$

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