higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL SURVEYING N4

(8060034)

22 April 2021 (X-paper)
09:00–12:00

Calculators and drawing instruments may be used.

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

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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. Sketches should be large, neat and fully labelled. Sketches could be done in pencil.
5. Use only a black or blue pen.
6. Write neatly and legibly.

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QUESTION 1

Choose a term from COLUMN B that matches a description in COLUMN A. Write only the letter (A–J) next to the question number (1.1–1.10) in the ANSWER BOOK.

COLUMN A		COLUMN B	
1.1	The construction of maps with the aid of aerial photos	A	horizontal plane
1.2	Determining the relative elevations of points using a dumpy level and staff	B	local height
1.3	The line at right angles to the direction of gravity at one point only	C	magnetic north
1.4	The reading between the backsight and fore-sight	D	closure error
1.5	Involves the location of a point by measuring distance and angle	E	prismatic compass
1.6	The difference between the elevation determined from the levelling survey and a known bench mark elevation	F	photographic survey
1.7	An instrument which gives the direction of a horizontal sight, with reference to the magnetic meridian	G	transit survey
1.8	The direction in which a freely suspended compass needle points	H	intermediate sight
1.9	This involves the location of a point by the measurement of the distance from two known points to new points	I	levelling
1.10	Height to which an arbitrary height (value) has been assigned	J	taping survey

(10 × 1) **[10]**

QUESTION 2

2.1 Explain the following main operations of field work:

2.1.1 Reconnaissance (5)

2.1.2 Measuring distance and angles (4)

2.1.3 Recording field notes (3)

2.2 Differentiate between the following:

2.2.1 Open traverse

2.2.2 Closed traverse

(2 × 2) (4)
[16]

QUESTION 3

3.1 Draw a diagram to explain how you would carry out each of the following methods by doing plane table surveying:

3.3.1 Radiation

3.3.2 Triangulation

(2 × 4) (8)

3.2 State FIVE operations in which plane table surveying is used. (5)
[13]

QUESTION 4

4.1 Calculate the distance between two points on a map if the RF is 1:1 200 and the actual ground distance is 660 m.

4.2 If the distance between two points on a map is 83 mm and the RF is 1:5 000, what is the true distance on the ground?

4.3 Name FOUR factors that influence the accuracy of a map or plan.

(3 × 4) **[12]**

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QUESTION 5

5.1 Make a neat, labelled sketch of a horizontal section through an optical square and explain how you would use it to set out a right angle. (2 × 5) (10)

5.2 Explain the term *magnetic needle*. (2)

5.3 State FIVE requirement of the needle. (5)

5.4 Name FOUR parts of an Indian clinometer. (4)
[21]

QUESTION 6

6.1 Calculate the horizontal distance AB if the slope is 15°54' and the measured distance is 2 056,40 m.

Temperature = 38 °C
Standard temperature = 20 °C
Coeficient = 1,13 × 10^{-5}/ °C

6.2 Distance AB was measured at 14 °C and found to be 456,51 m and the observed vertical angle was 82°10'50".

Calculate the horizontal distance if the tape was standardised at 22 °C and e = 1,12 × 10^{-5}/°C.

(2 × 6) **[12]**

QUESTION 7

Define the following surveying terms:

7.1 Geological survey (2)

7.2 Hydrographic survey (2)

7.3 Topographic survey (3)

7.4 Alidade (5)

7.5 Plumbing fork (4)
[16]

TOTAL: 100

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FORMULA SHEET

Any other applicable formula may also be used.

1. $A = {}^{1}/_{2}\, bx \perp h$

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

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

4. $A = a \text{ x } h$

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

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

7. $C = L \text{ x } e\ (t_m - t_s)$

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

9. $C = L\ (1 - \text{Cos}\theta)$

10. $C = H\ (\text{sec} - 1)11.C = \frac{LH}{R}$

11. $A = \frac{1}{2} abSinC$

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