higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL SURVEYING N4

(8060034)

3 August 2021 (X-paper)
09:00–12:00

Drawing instruments and nonprogrammable calculators may be used.

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

162Q1G2103

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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. Start each question on a new page.
5. Only use a black or blue pen.
6. Write neatly and legibly.

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QUESTION 1

1.1 State SIX qualities of a good surveyor. (6)

1.2 An area has to be surveyed by means of chain surveying.

State FIVE important factors in determining the selection of triangles. (5)

1.3 Name FOUR methods of measurement. (4)

[15]

QUESTION 2

Choose a term from COLUMN B that matches a description in COLUMN A. Write only the letter (A–J) next to the question number (2.1–2.10) in the ANSWER BOOK.

COLUMN A		COLUMN B	
2.1	Survey that measures the elevation of points on a particular piece of land, and presents them as contour lines on a plot	A	chain survey
2.2	Survey of a small area where all the measurements are made or reduced to either a horizontal or vertical plane	B	closed traverse
2.3	Type of surveying is done in order to execute works such as roads, railways or bridges	C	plane surveying
2.4	Used in the survey of boundary lines. It starts from a known point and ends up at the same point	D	collimation line
2.5	Construction of maps with the aid of aerial photographs	E	topographic survey
2.6	Involves the location of points by the measurement of the distance from two known points to new points with the aid of a measuring tape	F	traverse survey
2.7	Point where the instrument is moved and the position of the previous foresight is used as the new backsight reading	G	photographic survey
2.8	Involves the location of a point by measuring distance and angles	H	cadastral surveying
2.9	Type of surveying done for preparation of plans showing legal boundaries	I	engineering surveying
2.10	A line joining the intersection of cross hairs and the optical centre of the object glass	J	change point

(10 × 1) **[10]**

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QUESTION 3

Define the following surveying terms:

3.1 Surveying

3.2 Levelling

3.3 Compass surveying

3.4 Map

3.5 Planimeter

3.6 Plan

(6 × 3) **[18]**

QUESTION 4

4.1 The dimensions of a rectangular plot are 450 m × 90 m.

Calculate the area of the plot. (3)

4.2 Calculate the area of a triangular plot with side AB 380 m, AC 450 m and angle BAC = 44: 23: 26.

Give your answer in hectares. (5)

4.3 The volume of a concrete slab is 2,64 m^3. The length is 8 m and the breadth is 5,5 m.

Calculate the height in mm. (6)

[14]

QUESTION 5

Show, by means of simple sketches, how the following details are shown on a detailed map.

5.1 Earthen embankment

5.2 Hedges

5.3 Government Trig. Beacon Station

5.4 Cadastral beacons

5.5 Buildings

(5 × 2) **[10]**

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QUESTION 6

6.1 The FIGURE below is a schematic view showing the principle of a tilting spirit level. Label the parts numbered (6.1.1–6.1.4). Write only the name of the part next to the question number (6.1.1–6.1.4) in the ANSWER BOOK.

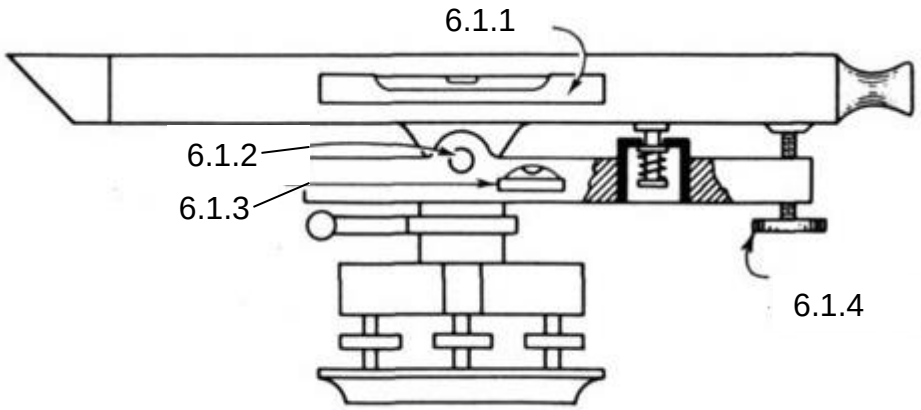

FIGURE (4)

6.2 Describe SIX means of maintenance and handling of steel tapes. (6 × 2) (12)

6.3 Describe THREE different ways of expressing a permanent error on a tape.

Give TWO examples of each. (9)
[25]

QUESTION 7

7.1 Define the term *accuracy.* (3)

7.2 A measurement distance of 90,5 m was recorded between two pegs with a steel tape known to be 0,02% too short.

What is the correct distance? (5)
[8]

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

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

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

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

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

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