higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T100**(E)**(N22)T

NOVEMBER EXAMINATION

NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL SURVEYING N4

(8060034)

22 November 2016 (X-Paper)
09:00–12:00

Calculators and drawing instruments may be used.

This question paper consists of 5 pages, 1 addendum 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. ALL the diagrams, sketches and drawings should be large and in good proportion, fully and clearly labelled and done in pencil.
5. Write neatly and legibly.

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QUESTION 1

Define the following survey terms:

1.1 Backsight

1.2 Levelling

1.3 Field party

1.4 Topographical surveying

1.5 Vertical plane

(5 × 2) **[10]**

QUESTION 2

2.1 State FIVE qualities of a good surveyor. (5)

2.2 Name FIVE methods of fixing a point. (5)
[10]

QUESTION 3

3.1 In mapping, co-ordinates are used to describe a point.
Draw the South African coordinate system in the ANSWER BOOK showing ALL information on it. (8)

3.2 Calculate the area of a triangle with two sides 5 m and 7 m long respectively and the angle between the sides being 35°. (3)

3.3 Explain how to set out an angle of 38 : 00 : 00 from a base line by using a tape. In your explanation use the chord method and a radius of 8 m on the base line.

Use a diagram to aid your explanation. (8)
[19]

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QUESTION 4

4.1 FIGURE 2 on the ADDENDUM (attached), shows a site with corner posts A, B, C and D.

Explain how you would use the plane table to plot the corner posts by means of the traverse method. (12)

4.2 Steel tapes are brittle and elastic and they rust.

State at least FIVE precautionary measures which must be observed in handling steel tapes. (5)

4.3 A trapezoidal area with a short side of 235 mm, a long side of 376 mm and a perpendicular distance of 135 mm between the sides was measured on a plan.
The scale is 1 : 2 500.
Calculate the ground area in hectares. (5)
[22]

QUESTION 5

5.1 A distance of 180 m was measured between two points at an angle of 6 : 12 : 00.

What is the horizontal distance between the two points? (4)

5.2 A distance of 91 m was measured with a steel tape at a temperature of 20 °C.

Calculate the correct length if the standard temperature of the tape is 25 °C and the coefficient of linear expansion is 1, 13 × 10^{-5}/°C. (4)

5.3 Two points A and B are at the same height but 91 m apart. A tension of 7 kgf was maintained on the tape which has a mass of 0,01 kg/m.

Calculate the correct distance between A and B. (4)
[12]

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QUESTION 6

6.1 FIGURE 1, on the ADDENDUM (attached), shows five different types of instruments. Write the name and use of each instrument next to the question number (6.1.1—6.1.5) in the ANSWER BOOK. (5 × 2) (10)

6.2 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number (6.2.1–6.2.5) in the ANSWER BOOK.

6.2.1 A diaphragm is a small glass disc on which cross hairs are engraved.

6.2.2 A compensator keeps the line of sight horizontal in a tilting level.

6.2.3 The telescope of a dumpy level is rigidly attached to a vertical spindle.

6.2.4 A dumpy level is more accurate than an automatic level.

6.2.5 The hand magnetic compass is accurate within 5' to 10' of a degree.

(5 × 1) (5)

6.3 Name TWO qualities that affect the performance of a telescope. (2)
[17]

QUESTION 7

Name 10 apparatus or equipment used in chain surveying. **[10]**

TOTAL: 100

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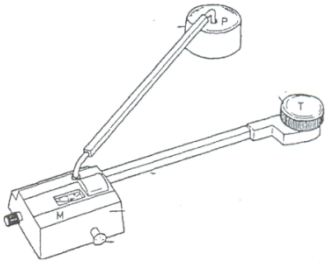
ADDENDUM



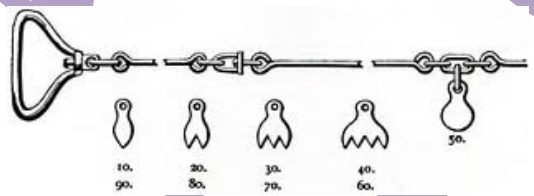
6.1.1



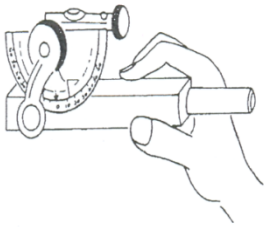
6.1.2



6.1.3



6.1.4



6.1.5

FIGURE 1

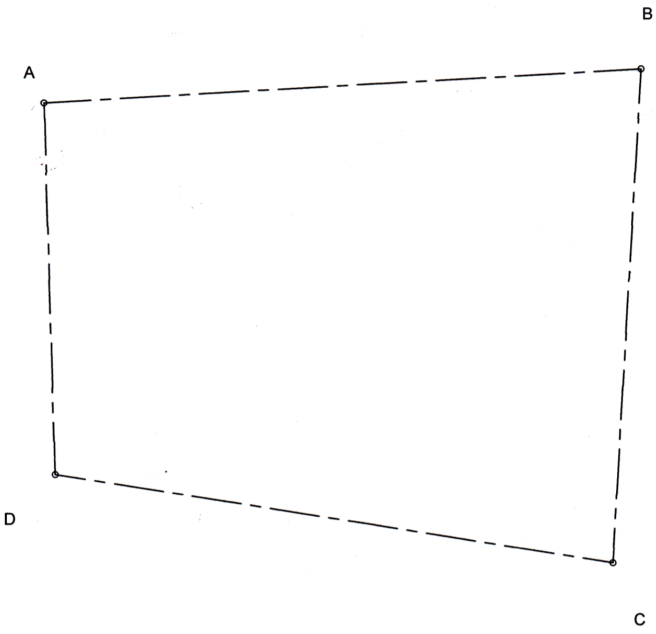


FIGURE 2

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BUILDING AND STRUCTURAL SURVEYING N4

FORMULA SHEET

Any other applicable formula may also be used.

1. $A = ½b \times \perp h$

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

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

4. $A = a \times h$

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

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

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

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

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

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

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

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

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