higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T120**(E)**(A4)T
APRIL EXAMINATION

NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL SURVEYING N4

(8060034)

4 April 2016 (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. 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 Local heights

1.2 Horizontal plane

1.3 Backsight

1.4 Level line

1.5 Collimation line

(5 × 2) **[10]**

QUESTION 2

2.1 Explain the objective of surveying. (5)

2.2 Describe the following methods of surveying:

2.2.1 Tacheometric surveying (3)

2.2.2 Traversing (3)

2.2.3 Compass surveying (2)

[13]

QUESTION 3

3.1 Explain the term *one scale unit*. (3)

3.2 Calculate the distance on a map if the distance between two points on the ground is 1 050 m and the representative fraction is 1 : 2 500.

The answer must be in millimetres. (3)

3.3 Calculate the natural scale if 2 km on the ground is represented by 1 cm on a map. (3)

3.4 Calculate the area of a regular hexagon with sides 3 m long. (6)

3.5 The quadrant bearing of the line AB is S 31° E.

What is the direction of this line AB? (2)

3.6 Name the THREE angular measurements used in surveying. (3)

[20]

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QUESTION 4

4.1 Describe the main characteristics of the South African Co-ordinate System. (8)

4.2 When a steel tape is found to be incorrect, the error can be expressed in three different ways.

4.2.1 Name the THREE different ways. (3)

4.2.2 Briefly describe the THREE different ways mentioned in QUESTION 4.2.1 (3)

4.3 State FIVE points to be observed carefully when booking field notes. (10)
[24]

QUESTION 5

5.1 A length of 90, 6 m was measured horizontally in a catenary. The mass of the tape used is 0,015 kg/m and the tension applied is 7 kgf. The measurement was done in three equal bays.

Calculate the correct distance. (6)

5.2 Calculate the temperature at the time of measurement from the following information:

- Measured distance 53,0 m
- Coefficient of linear expansion 0, 0000113/ºC
- Temperature correction + 0,006 m
- Standard temperature 20 ºC (5)

[11]

QUESTION 6

6.1 Indicate whether the following statements are TRUE or FALSE. Write only 'true' or 'false' next to the question number (6.1.1–6.1.4) in the ANSWER BOOK.

6.1.1 A boning rod is used for grading.

6.1.2 A decrease in staff reading indicates a rise.

6.1.3 Closed surveys are preferred to open surveys.

6.1.4 A dumpy level is more accurate than a tilting level.

(4 × 1) (4)

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6.2 Describe how you would eliminate parallax and finally test if it has been successfully eliminated. (6)

6.3 Describe the correct way to centralise the bubble of a levelling instrument by using the three foot screws. (6)
[16]

QUESTION 7

Certain practices have to be followed when planning to stake out a chain survey over a site.

Name SIX of these practices. **[6]**

TOTAL: 100

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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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