20130 4T 031

higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T160(E)(A2)T
APRIL EXAMINATION

NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL SURVEYING N4

(8060034)

2 April 2013 (X-Paper)
09:00–12:00

Calculators may be used.

This question paper consists of 5 pages, 1 addendum and a 1-page formula sheet.

Copyright reserved

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 diagrams, sketches and drawings should be large and in good proportion, fully and clearly labelled and done in pencil.
5. Write neatly and legibly.

Copyright reserved

QUESTION 1

Define the following survey terms:

1.1 Engineering survey

1.2 Geodetic surveying

1.3 Horizontal plane

(3 × 2) **[6]**

QUESTION 2

2.1 Name FOUR qualities of a good surveyor. (4)

2.2 Name FIVE types of information that must appear in a field book. (5)
[9]

QUESTION 3

3.1 Name the THREE scales used in surveying. (3)

3.2 On a map scale 1 : 200 000, what distance in metres does 30 mm represent? (3)

3.3 Calculate the distance between two points on the map if the representative fraction on the map is 1 : 25 000 and the actual ground distance is 2 400 m. (3)

3.4 A triangular area with a base of 350 mm and a perpendicular height of 180 mm was measured on a plan.

Calculate the ground area in hectares. The scale is 1 : 2 000. (4)

3.5 Briefly describe systematic errors. (4)

3.6 Define *orientation* with regard to plane tabling. (3)
[20]

QUESTION 4

4.1 State FOUR advantages of chain surveying. (4)

4.2 State FOUR disadvantages of steel tapes. (4)

4.3 Make use of a diagram and explain how to fix a point by method of resection. (3)

Copyright reserved

4.4 It is required to set off an exact distance of 150,0 m with a steel tape known to be 0,75% too short.

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

4.5 A negative correction of 0,003 m was found when a distance of 60,0 m was measured with a steel tape, which has a standard temperature of 20EC and a coefficient of expansion of $1,13 \times 10^{-5}$/EC.

Calculate the temperature at the time of measurement. (4)

4.6 The horisontal distance between two points is 94,596 m.

Calculate the required sloping distance if the angle between the two points is 7°40' 20" from the horizontal. (3)

4.7 Name the THREE main operations of the surveyor in the field. (3)
[25]

QUESTION 5

5.1 Name FOUR conditions that affect the sensitivity of the bubble tube. (4)

5.2 Describe the hand signals a surveyor will use to convey the following instructions:

5.2.1 Move well to the right.

5.2.2 Hurry.

5.2.3 Keep the staff steady in position.

5.2.4 Continue to move to the left. (4 × 2) (8)

5.3 What is a parallax error? (3)

5.4 What is a collimation error? (3)

5.5 Name TWO types of liquid that are used in a bubble tube. (2)
[20]

QUESTION 6

The field book, ADDENDUM 1, gives details of a chain survey.

ALL measurements are given in metres.

In your ANSWER BOOK, plot the stations, lines and detail using a scale 1 : 500. [10]

Copyright reserved

QUESTION 7

Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number (7.1–7.10) in the ANSWER BOOK.

7.1 Isogonic lines are lines joining points of nil magnetic declination.

7.2 Stepped chaining is used to find the horizontal distance.

7.3 The Abney level is used to measure horizontal angles.

7.4 45° is the same angle as 50 grades.

7.5 Tachometry is when distances are measured by optical means.

7.6 Azimuth of a line is the angle which a line makes with the north-south meridian measuring clockwise from south.

7.7 Meridians are parallel to the equator.

7.8 The direction of N12°W is 168°.

7.9 Sag correction may be positive or negative.

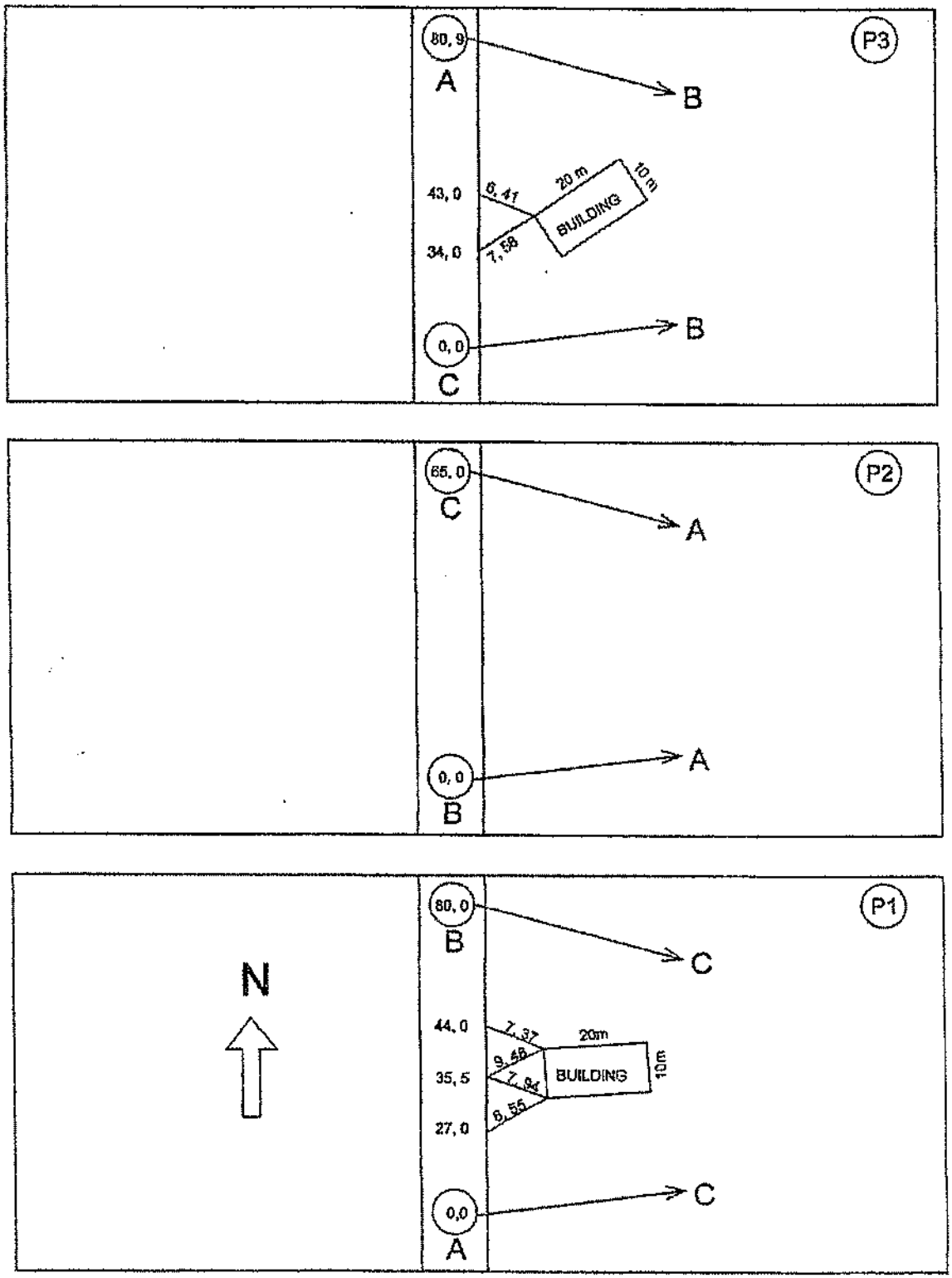
7.10 Local attraction denotes any influence preventing the needle from pointing to magnetic north in a given locality.

(10 × 1) **[10]**

TOTAL: 100

Copyright reserved

ADDENDUM 1



Copyright reserved

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

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

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

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

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

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

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

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

Copyright reserved