



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

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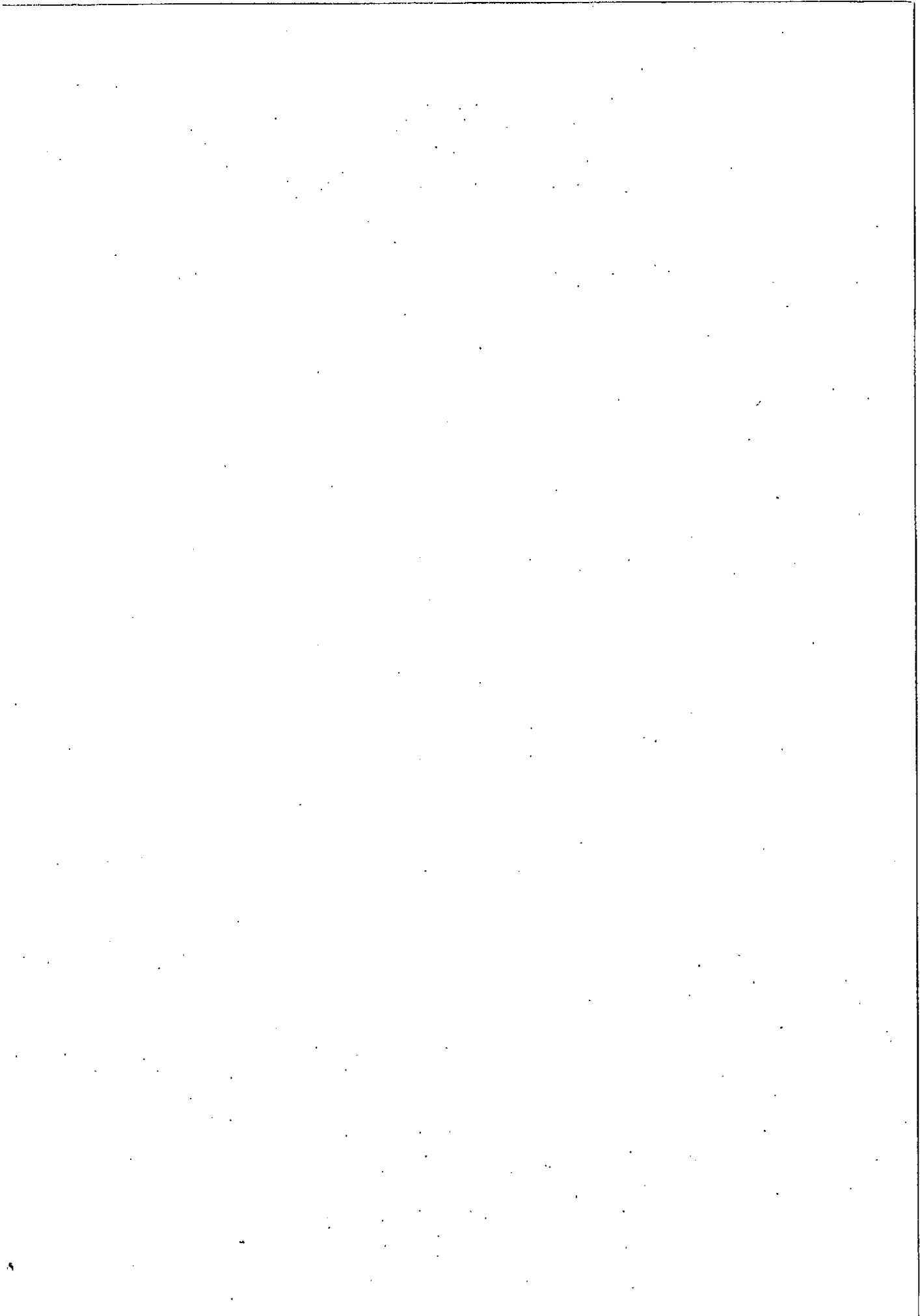
NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL SURVEYING N4

(8060034)

11 November (X-Paper)
09:00 – 12:00

This question paper consists of 4 pages, an addendum and a formula sheet.



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 correctly according to the numbering system used in this question paper.
4. Check ALL calculations.
5. ALL diagrams, sketches and drawings should be large and in good proportion, fully labelled and done in pencil.
6. Write neatly and legibly.

QUESTION 1

Define the following surveying terms:

- 1.1 A benchmark
- 1.2 A level line
- 1.3 Datum
- 1.4 A horizontal line
- 1.5 Isogonic lines

(2)
 (2)
 (2)
 (2)
 (2)
 [10]

P10

QUESTION 2

- 2.1 A triangular-shaped farm was 2,975 ha when bought.
Given: Side BC = 545 and angle BCA = 28° .

(6) Calculate the length of side AC.

- 2.2 The average height of a piece of land in a shape of a trapezium is 225,500 m. Calculate the volume of earth to be filled if the following information is known:
The level is to be reduced to 300,00 m
The long side of the trapezium is 50 m
The short side is 25,00 m
The perpendicular height is 40,00 m

(5)
[11]

QUESTION 3

- 3.1 A measured distance of 98,600 m was obtained between two points with a 100 m long tape that was later found to be 2% short. Calculate the correct length.

(3)

- 3.2 On a map scale of 1:250 000, what distance in metres does 30 mm represent?

(4)

- 3.3 Calculate the distance between two points on the map if the representative fraction on the map is 1:10 000 and the actual ground distance is 1 500 m.

(3)
[10]

QUESTION 4

- 4.1 A measured distance of 97,121 m was obtained with a steel tape 35°C . Calculate the standard temperature if the coefficient of linear expansion is $0,0000112^\circ\text{C}$ and the temperature correction is $+0,0163$ m.

(6)

- 4.2 A length of 92,00 m was measured horizontally in catenary. The mass of the tape used is 0,16 kg and the tension applied is 6,8 kgf. Calculate the correct length.

(4)

- 4.3 A length of 92,00 m was measured between two points at an angle of $+7^\circ25'00''$ from the horizontal. Calculate the horizontal distance between the TWO points.

(4)

- 4.4 A length of 66,66 m was measured with a steel tape at an altitude of 1 200 m above the sea level. Calculate the length at sea level if the radius of the earth is 6 367 000 m.

(4)
[18]

QUESTION 5

- 5.1 Identify the surveying instrument and accessories on the attached ANNEXURE A and state their functions. Write the answer next to the question number (5.1.1 – 5.1.10) in the ANSWER BOOK. (20)
- 5.2 Name FOUR parts of the plane table. (4) [24]

QUESTION 6

- 6.1 Name the various methods by which the position of a point may be fixed in a plane table. (5)
- 6.2 State the information that must be contained in the field book. (5) [10]

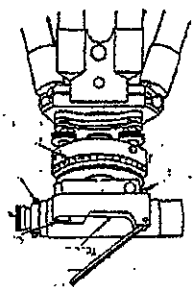
QUESTION 7

- 7.1 Name the FIVE different types of surveying. (5)
- 7.2 Make use of diagrams and explain the following methods of fixing a point:
- | | | |
|-------|----------------------|-----|
| 7.2.1 | Forward intersection | (3) |
| 7.2.2 | Length and direction | (3) |
| 7.2.3 | Ties | (3) |
| 7.2.4 | Resection | (3) |

[17]

TOTAL: 100

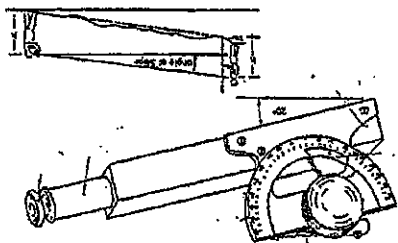
ANNEXURE A



5.1.1



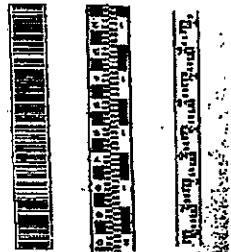
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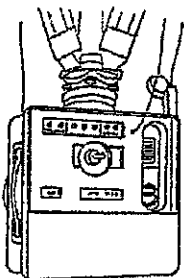
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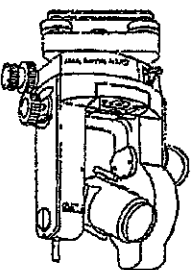
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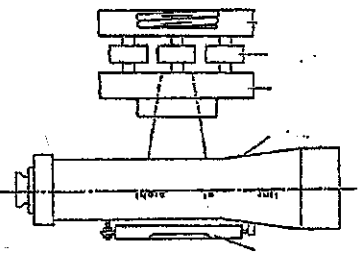
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5.1.7

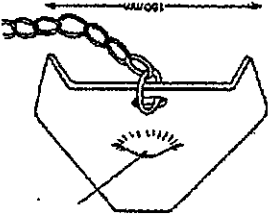


5.1.8

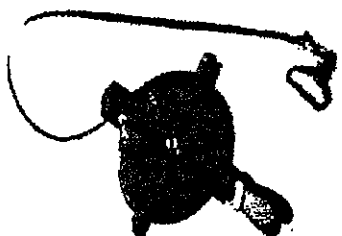


5.1.3

5.1.5



5.1.10



BUILDING AND STRUCTURAL SURVEYING N4

FORMULA SHEET

Any other applicable formula may also be used.

$$1. A = \frac{1}{2}b \times Lh$$

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

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

$$4. A = a \times h$$

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

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

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

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

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

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

$$11. C = \frac{LH}{R}$$

$$12. A = \frac{1}{2}ab \sin C$$

