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education

Department:
Education
REPUBLIC OF SOUTH AFRICA

**T170(E)(A1)T
APRIL 2010**

NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL SURVEYING N4

(8060034)

**1 April (X-Paper)
09:00 – 12:00**

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

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

QUESTION 1

Define the following survey terms:

- 1.1 Gravity
- 1.2 Agonic lines
- 1.3 Bench mark
- 1.4 Level line
- 1.5 Magnetic north
- 1.6 Plan
- 1.7 Parallax
- 1.8 Geodetic surveying
- 1.9 Horizontal plane
- 1.10 Collimation line

(10 x 2) [20]

PTO

QUESTION 2

- 2.1 State TWO functions of a surveyor. (2)
- 2.2 State THREE qualities of a good surveyor. (3)

[5]

QUESTION 3

The following refers to the South African National co-ordinate system:

Complete the following paragraph by filling in the correct missing word(s) chosen from the list below. Write only the word(s) next to the question number (3.1 – 3.10) in the ANSWER BOOK. Some words may be used more than ONCE.

2°; y-axis; even; y-axis; longitude; x-axis; boundary; x-axis; odd; central

Lines of (3.1) ... are used instead of the equator. The system is a rectangular grid with the (3.2) ... running parallel to the equator. The (3.3) ... runs from the north to south. The system consists of belts (3.4) ... of longitude width. Each belt consists of one (3.5) ... meridian which is an (3.6) ... meridian and two (3.7) ... meridians which are (3.8) ... meridians. The (3.9) ... is positive west and negative east of the central meridian. The (3.10) ... is positive south of the equator.

[5]

QUESTION 4

- 4.1 State FOUR advantages of a plane table. (4)
- 4.2 Name THREE scales used in surveying. (3)
- 4.3 Name FOUR methods of fixing a point in surveying. (4)
- 4.4 Name THREE angular measurements used in surveying. (3)

[14]

QUESTION 5

- 5.1 A plot has the shape of a trapezium. The long side of the trapezium is 104 m. The short side is 47 m. The perpendicular distance between the two sides is 22 m. Calculate the area of the plot in hectares. (4)
- 5.2 Calculate the area of a segment in a circle with a radius of 9 m. The included angle is 62°. (6)

[10]

PTO

QUESTION 6

- 6.1 State FIVE advantages of a chain. (5)
- 6.2 State FIVE factors that can make a tape permanently incorrect. (5)

[10]

QUESTION 7

- 7.1 A tape is 0.74% too short. Calculate the correct distance to be measured with the tape so that the base line is exactly 400 m long. (4)

- 7.2 Distance measured 220 m
Standard temperature 21 °C
Coefficient of linear expansion 0.0000113/°C
Temperature at the time of measurement 25 °C
Calculate the correct distance. (4)

- 7.3 Distance A to B : 42 m
Tension : 7 kgf
Mass of tape : 0.015 kg/m
Calculate the correct distance A to B. (4)

[12]

QUESTION 8

- 8.1 An area has to be surveyed by means of chain surveying. State FIVE important factors in determining the selection of triangles. (5)

- 8.2 8.2.1 Name ONE type of liquid used in a bubble tube. (1)

- 8.2.2 Why is this type of liquid used? (1)

- 8.2.3 Is a bubble tube curved? (1)

- 8.2.4 What is the reason for the answer in QUESTION 8.1.3? (1)

- 8.2.5 Why is a number of small lines engraved on the bubble tube? (1)

[10]

QUESTION 9

FIGURE 1, DIAGRAM SHEET 1 (attached), shows a level set up at A and a staff held at B and C.

- 9.1 What is the collimation height? (2)
- 9.2 What is the reduced level at C? (2)
- [4]

QUESTION 10

FIGURE 2, DIAGRAM SHEET 1 (attached), shows FIVE instruments used by a surveyor. Give the name and use of each of these instruments.

[10]

TOTAL: 100



BUILDING AND STRUCTURAL SURVEYING N4

FORMULA SHEET

Any other applicable formula may also be used.

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

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

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

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

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

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

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

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

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

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

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

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