higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL SURVEYING N6

(8060056)

27 November 2023 (X-paper)
09:00–12:00

Nonprogrammable calculators may be used.

This question paper consists of 4 pages, 2 addenda and 1 formula sheet.

094Q1E2327

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
BUILDING AND STRUCTURAL SURVEYING N6
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. Start each question on a new page.
5. Use only a black or blue pen.
6. Write neatly and legibly.

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QUESTION 1

1.1 Explain the term *benchmark* and state its purpose during levelling. (4)

1.2 Name FOUR means of checking the verticality of buildings. (4)

1.3 State any TWO practical uses of contours. (4)

1.4 State any FOUR factors influencing the accuracy of maps. (4)
[16]

QUESTION 2

2.1 FIGURE 1, ADDENDUM 1 (attached), represents the plan of an area to be excavated to a depth of 45 m.
Surface levels at the corner of the grid are given.
The sides of the excavation are vertical.
The bulking factor is 10%.

Calculate the volume of ground to be carted away in cubic meters. (10)

2.2 Represent FIGURE 1, ADDENDUM 1 (attached) in the ANSWER BOOK to a scale 1:500.

Calculate and plot the 85 m contour line. (10)
[20]

QUESTION 3

The coordinates of the boundary corner beacons of a farm are:

A	- 150, 45	- 120,20
B	- 50,00	- 400,00
C	- 250,10	+ 200,50
D	- 120,00	+ 500,20
E	+ 120,09	+ 420,80

3.1 Calculate the area of the farm in hectares. (10)

3.2 Calculate the joint A-D. (NOTE: Calculation to be done in joint sheet.) (10)
[20]

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QUESTION 4

The following information refers to observations from P in a tacheometric survey.

The elevation of survey station A2 is 3 092,00 m and the theodolite is 1,70 m above A. The booked vertical angles are zenith distances.

STAFF STATION	HORIZONTAL ANGLE	VERTICAL ANGLE	STADIA READINGS	
A1	120:10:30	96:20:09	1,90	1,20
A2	160:23:20	84:12:30	2,60	1,40
A3	200:12:40	97:50:09	2,10	1,60
A4	220:50:00	84:09:10	2,20	1,10

Use the above information to complete the tacheometric sheet on the attached ADDENDUM 2. **[20]**

QUESTION 5

A road curve is to be staked out with the point of intersection (PI) at Chainage 5 090,90 m. The radius of the curve is 200,00 m and the angle of intersection is 45:00:00. The curve is to the left.

5.1 Calculate and tabulate the full setting out data from the beginning of the curve to the end of the curve. (18)

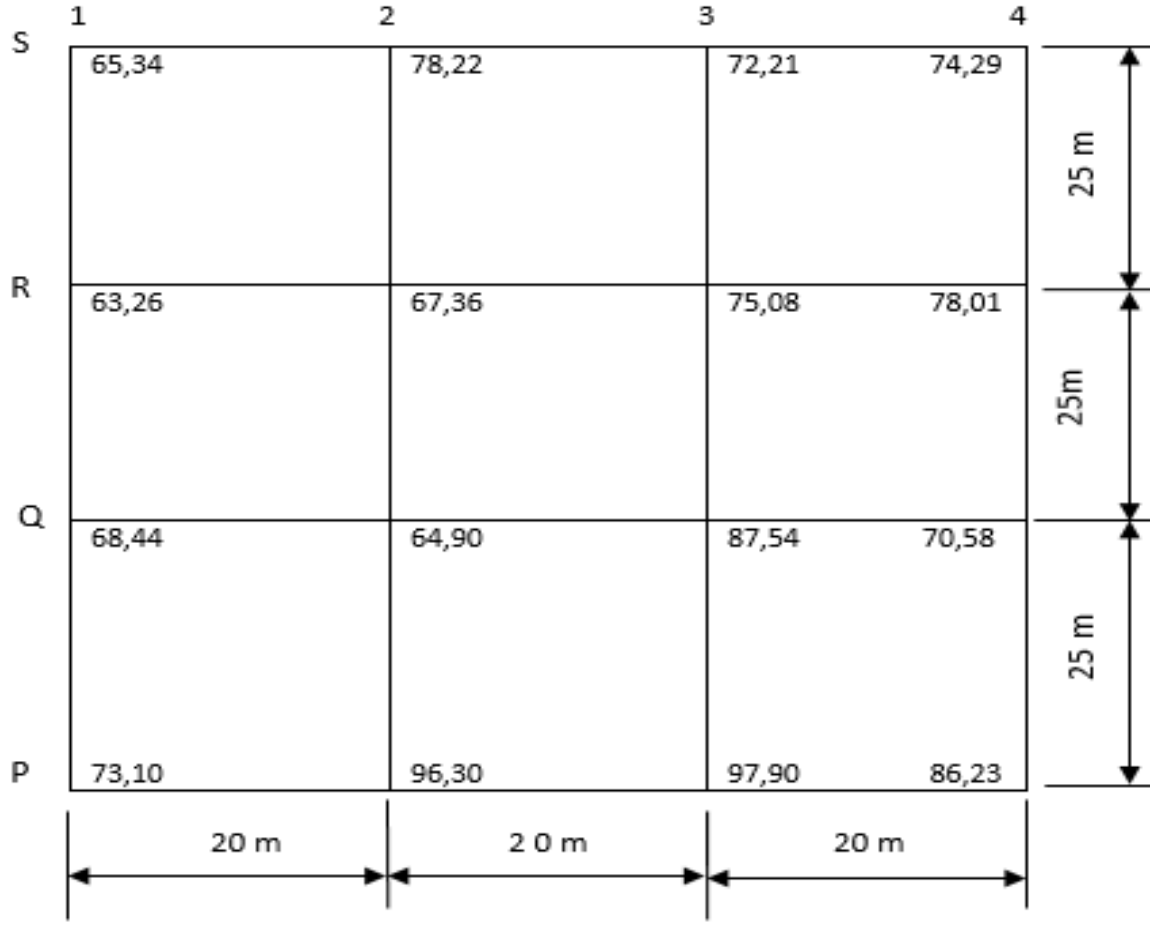
5.2 Calculate the crown distance from the point of intersection. (3)

5.3 Calculate the long cord. (3)

[24]

TOTAL: 100

ADDENDUM 1



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ADDENDUM 2 **EXAMINATION NUMBER:** | | | | | | | | | | | | | |

QUESTION 2

Station		Distance		HI or Middlehair MH	Angles		HI – MH + -	Height Component + -	Height Difference + -	Elevation of point	Remarks
From	To	Stadia	Hor		Hor	Vert					

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(8060034)

BUILDING AND STRUCTURAL SURVEYING N6

FORMULA SHEET

Any applicable formula may be used.

$\alpha = \tan^{-1} \frac{\Delta y}{\Delta x}$

$\alpha = \tan^{-1} \frac{\Delta y}{\Delta x} + 90°$

$\alpha = \tan^{-1} \frac{\Delta y}{\Delta x} + 180°$

$\alpha = \tan^{-1} \frac{\Delta y}{\Delta x} + 270°$

$S = \frac{\Delta y}{\sin \alpha}$

$S = \frac{\Delta x}{\cos \alpha}$

$\Delta y = s.sin\alpha$

$\Delta x = s.cos\alpha$

$C = \frac{Distance}{Total\ distance}$ X

$\Delta h = 50I \sin 2\theta + HI - MH = 100I \sin 2\theta + HI - MH$

$HD = 100I\ cos^2\theta$

$T = R \tan \frac{\Delta}{2}$

$La = \frac{\pi.\Delta.R}{180}$

$\vartheta = \frac{1718.9.\alpha}{R}$

$Cd = T.tan\ \frac{\Delta}{4}$

$Lc = 2.R.\sin \frac{\Delta}{2}$

$W_1 = \frac{g\ (a+hs)}{g-s}$

$W_2 = \frac{g\ (a+hs)}{g+s}$

$A = \frac{W1.W2-a^2}{S}$

$a^2 = b^2 + c^2 - 2bc.CosA$

$b^2 = a + c^2 - 2ac.CosB$

$c^2 = a + b^2 - 2ab.CosC$

$\frac{SinA}{a} = \frac{SinB}{b} = \frac{SinC}{C}$

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