higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T180**(E)**(J30)T

NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL SURVEYING N6

(8060056)

30 July 2018 (X-Paper)
09:00–12:00

Calculators may be used.

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

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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. Label sketches neatly and clearly.
6. Start each question on a NEW page.
7. Write neatly and legibly.

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QUESTION 1

1.1 Name FOUR tools which can be used to check the verticality of buildings. (4)

1.2 Name FOUR characteristics of a contour line. (4)

1.3 Explain the survey term *grid north*. (2)
[10]

QUESTION 2

2.1 Explain how to set out a rectangular site along a road if the road is used as a reference on the site plan. (5)

2.2 A line A measures 5 cm from a datum line on a vertical section of scale 1:20. A second line B measures 6 cm from the same datum on the same vertical scale. The two lines are 20 cm apart on a horizontal scale of 1:100.

Find the gradient between A and B as a ratio and a percentage (%). (5)
[10]

QUESTION 3

A road curve is to be staked out from the BC (beginning of the curve) to the EC (end of the curve). The radius is 190 m. The angle of intersection is 52:24:38. Chainage at the beginning of the curve is 2 152,66 m. Chainage at the end of the curve is 2 326,46 m. The curve is to the left. Pegs are required at every full 20 m chainage.

3.1 Calculate and tabulate the full setting-out data from BC to EC. (13)

3.2 Calculate the chainage at the intersection point. (5)

3.3 Calculate the crown distance. (2)
[20]

QUESTION 4

A theodolite was set up at station F and readings were taken to spot shots F1, F2, F3 and F4. ADDENDUM A (attached) contains ALL relevant information.

Complete the tacheometric field sheet on ADDENDUM A and hand it in with the ANSWER BOOK. **[20]**

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QUESTION 5

Given information:

OBSERVED ANGLES	
FGH	75:23:16
GHI	243:24:22
HIJ	230:25:44
IJK	166:14:16
JKL	88:55:48

DISTANCES	
GH	168,86 m
HI	288,34 m
IJ	248,94 m
JK	239,84 m

COORDINATES	
G	+366,28 +1 251,08
K	-270,86 +1 628,66

DIRECTIONS	
GF	147:24:56
KL	231:43:42

5.1 Calculate the oriented directions in the ANSWER BOOK. (10)

5.2 Use the oriented directions to calculate the traverse on ADDENDUM B (attached) and hand it in with the ANSWER BOOK. (20)
[30]

QUESTION 6

Explain each of the following terms used in surveying:

6.1 Contour line

6.2 Vertical interval

6.3 True meridian

6.4 Angle of direction

6.5 Closed traverse

(5 × 2) **[10]**

TOTAL: 100

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ADDENDUM A **EXAMINATION NUMBER:** | | | | | | | | | | | | | |

QUESTION 4

Station		Distance		HI or middle hair MH	Angles		HI – MH + -	Height component + -	Height difference + -	Elevation of point	Remarks
From	To	Stadia	Hor		Hor	Vert					
F				1,48							
	F1	3,98 1,26			84:34:00	97:38:00					
	F2	2,84 1,24			182:46:00	80:46:00					
	F3	4,26 1,48			268:02:00	85:24:00					
	F4	3,98 1,28			344:44:00	99:16:00				679,94	BM 1

(20)

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ADDENDUM B **EXAMINATION NUMBER:**

QUESTION 5.2

NAME	JOIN	ΔY	ΔX	NAME	Y	X
G				G		
H				H		
I				I		
J				J		
K				K		

(20)

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FORMULA SHEET

Any applicable formula may also be used.

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

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

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

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

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

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

$$\Delta y = s.\sin\alpha$$

$$\Delta x = s.\cos\alpha$$

$$C = \frac{\text{Distance}}{\text{Total distance}}\ X_1$$

Ah = 50I sin 22 + HI – MH = 100I sin2 cos2 + HI – MH

HD = 100I $\cos^2 2$

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

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

$$\theta = \frac{1\,718{,}9.a}{R}$$

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

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

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

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

$$A = \frac{W_1.W_2 - a^2}{S}$$

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

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

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

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

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