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higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T230(E)(N11)T
NOVEMBER 2010

NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL SURVEYING N6

(8060056)

11 November (X-Paper)
09:00 – 12:00

Calculators may be used.

This question paper consists of 4 pages, a 1-page formula sheet and 3 answer sheets.

PTO

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 correctly according to the numbering system used in this question paper.
4. Test ALL calculations.
5. Write your EXAMINATION NUMBER on the ANNEXURES and place them in the ANSWER BOOK.
6. Write neatly and legibly.

QUESTION 1

Combine the following circle-left and circle-right horizontal angle observations which were taken from T and find the oriented directions T-D and T-F. Use the co-ordinates of T and E.

	At T	
	Circle left	Circle right
D	200:20:40	20:20:20
E	305:18:50	125:18:26
F	115:36:12	295:35:42
D	200:20:18	20:20:12

	Co-ordinates	
T	+ 644,36	+ 1 646,88
E	- 824,64	+ 2 700,12

[10]

QUESTION 2

Given the following data:

Co-ordinates

R	+ 1 382,28	+ 1 046,62
S	+ 1 531,62	+ 876,48

Line	Direction	Distance (m)
R-F1	95:12:04	168,26
F1-F2	195:42:30	200,00
F2-F3	260:30:50	176,62
F3-S	72:28:44	218,66

Use ANNEXURE 1 (attached) to do the necessary calculations to find the final co-ordinates of F1, F2 and F3. Adjustments must be made according to Bowditch Rule. **[20]**

QUESTION 3

A theodolite was set up at station K and readings were taken to spot shots K1, K2 and K3. All relevant information was booked in field book form as shown on ANNEXURE 2 (attached).

Complete the tacheometry field sheet ANNEXURE 2 (attached). **[15]**

QUESTION 4

ANNEXURE 3 (attached) shows a contour plan on which a road is to be built.

A - B is the centre line of the proposed road.
The formation width of the road is 13 m.
The formation height of the road is 34 m.
The side slope is 1: 2,5 (1 vertical)

Plot the road width and embankment line on ANNEXURE 3 (attached). **[10]**

QUESTION 5

A right circular curve connects two straight lines which deflects at an angle of 38:16:12.
The coordinates at the point of intersection is + 2 970,20 + 2 383, 60.
The coordinates at the point of zero chainage, on the first straight line is + 1 681,30 + 4 316,42.
The radius of the curve is 236,30 m.
The standard chord length is a full 20 m.

Calculate and tabulate the setting out data. **[26]**

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QUESTION 6

The co-ordinates of the boundary corner beacons of a farm are:

P1	+ 2 835,67	+ 1 360,56
P2	+ 2 352,88	+ 1 228,28
P3	+ 2 106,00	+ 1 530,56
P4	+ 2 450,28	+ 1 970,66
P5	+ 2 716,74	+ 1 820,44

Calculate the area of the farm in hectares. **[10]**

QUESTION 7

Plot the following co-ordinates to scale 1: 5 000 in the ANSWER BOOK.

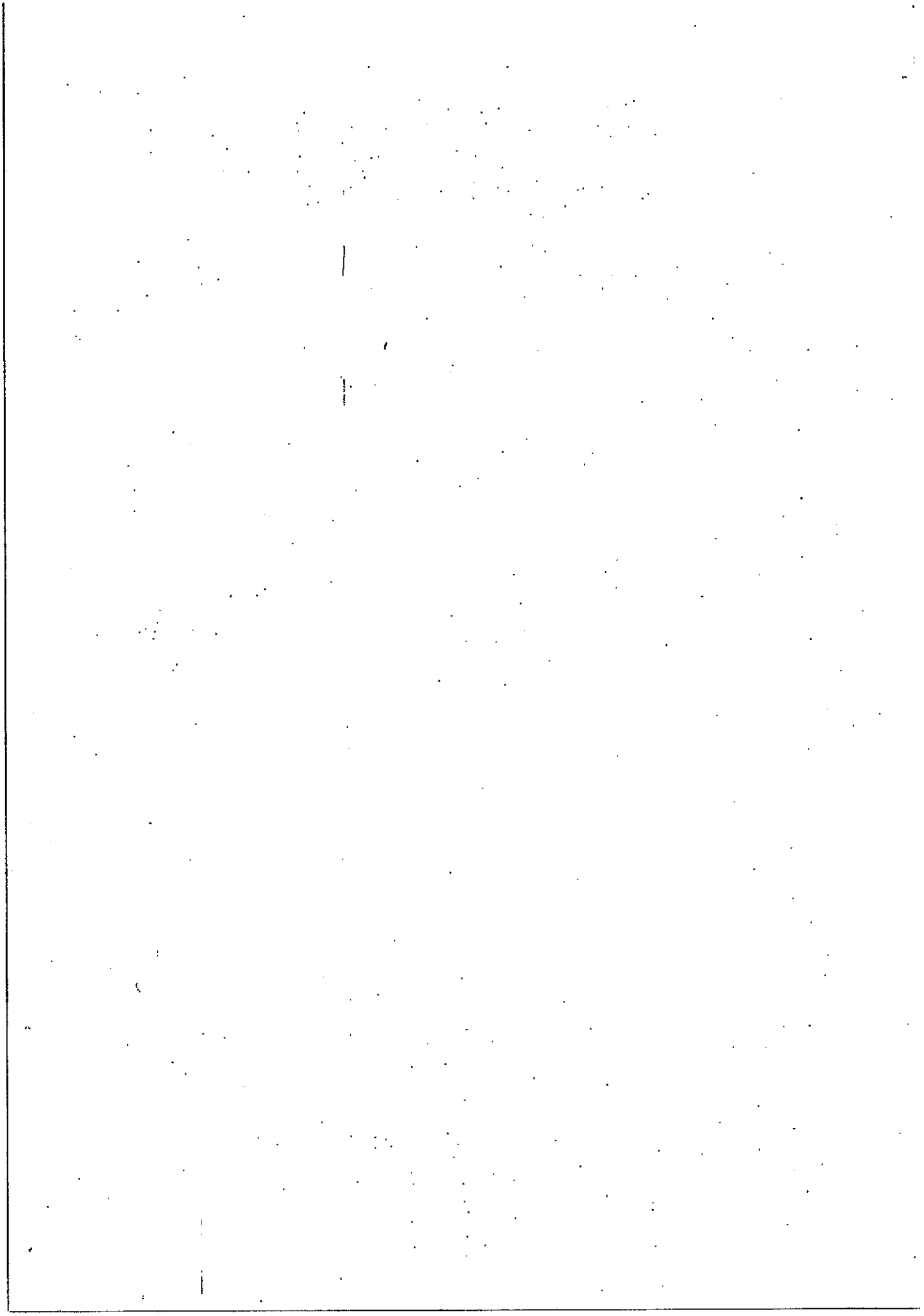
A	- 125,50	+3 255,60
B	+170,50	+3 425,80
C	+230,26	+3 610,25
D	- 375,50	+4 050,10

Clearly show the direction of true north. **[7]**

QUESTION 8

Explain the term *closed traverse* as used in surveying. **[2]**

TOTAL: 100



BUILDING AND STRUCTURAL SURVEYING N6

FORMULA SHEET

Any applicable formula may also be used.

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

$$\alpha = \tan^{-1}\frac{\Delta x}{\Delta y} + 90^0$$

$$\alpha = \tan^{-1}\frac{\Delta y}{\Delta x} + 180^0$$

$$\alpha = \tan^{-1}\frac{\Delta x}{\Delta y} + 270^0$$

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

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

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

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

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

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

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

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

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

$$\vartheta = \frac{1718{,}9.a}{R}$$

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

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

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

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

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

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

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

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

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

EXAMINATION NUMBER:

ANNEXURE 1

NAME	JOIN	ΔY	ΔX	NAME	Y	X

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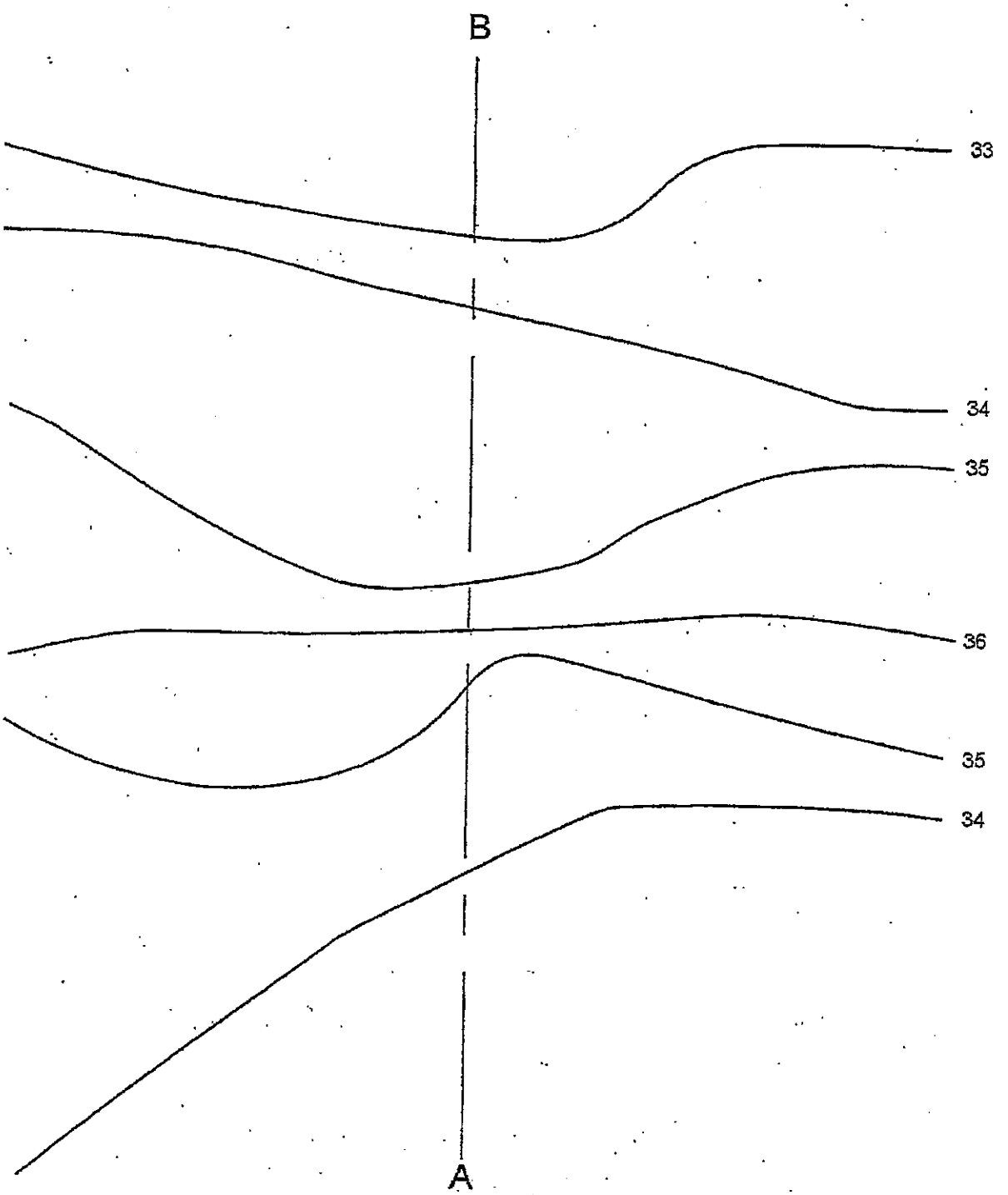
EXAMINATION NUMBER:

ANNEXURE 2

Station		Distance		HI or middle hair MH	Angles		HI – MH + -	Height component + -	Height difference + -	Elevation of point	Remarks
From	To	Stadia	Hor		Hor	Vert					
K				1,50							
	K1	1,36 0,80			166:28:54	96:12:10					
	K2	1,26 0,74			236:18:40	98:04:30					
	K3	2,84 1,64			277:35:46	81:50:06				212,96	BM 1

EXAMINATION NUMBER:

ANNEXURE 3



SCALE 1:250