higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

APRIL EXAMINATION

BUILDING AND STRUCTURAL SURVEYING N4

4 APRIL 2014

This marking guideline consists of 7 pages.

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QUESTION 1

1.1 For preparation of plans showing legal boundaries

1.2 Representing upon a map the natural and artificial features of the earth's surface such as hills, rivers, valleys, lakes, roads. houses, etc

1.3 Is one at which every point in it is at right angles to the direction of gravity.

(3 × 2) **[6]**

QUESTION 2

2.1
- Horizontal distance
- Vertical distance
- Horizontal angle
- Vertical angle

(4 × 1) (4)

2.2
- All calculations and preparations are done that may be necessary to reduce the field measurements to a form suitable for plotting.
- The plotting, that is, drawing to scale of the measurements obtained.
- Obtaining any further required information from the plan by means of calculation or direct measurement.
- The surveyor liaises with the Engineer during construction of works.
- The surveyor supplies the engineer with the necessary data to enable him to design the proposed construction.
- He has to keep his instruments in good working condition

(Any 5 × 2) (10)
[14]

QUESTION 3

3.1
- Control
- Scale
- Speed and cost
- Skill and experience

(4 × 1) (4)

3.2
3.2.1 Plane table on tripod
3.2.2 Paper attached to board
3.2.3 Simple alidade
3.2.4 Spirit level
3.2.5 Plumbing fork
3.2.6 Box compass

(6 × 1) (6)

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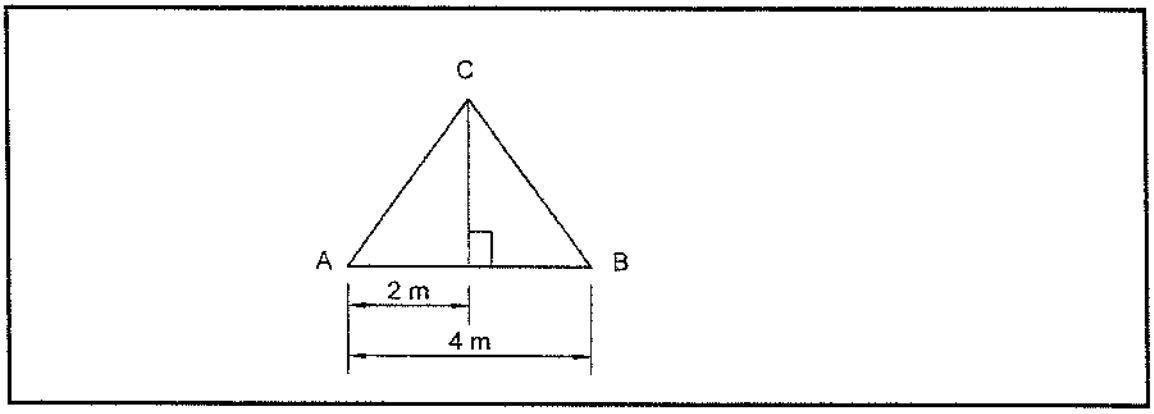
3.3



Central angle = 360/5 = 72° √

$\pi A = \pi B = \frac{180-72}{2} = 54° \surd$

$\text{Tan } 54E = \frac{\perp h}{2}$

$\perp h = 2 \tan 54° \surd$

Area of Δ = $^1/_2$ base x $\perp h$

$= {}^1/_2\ 4 \times (2 \tan 54°) \surd$

$= 5{,}506\ m^2 \surd$

5 $\Delta^{'s}$ $= 5 \times 5{,}506\ m^2$

$= 27{,}53\ m^2 \surd$

(6 × 1) (6)

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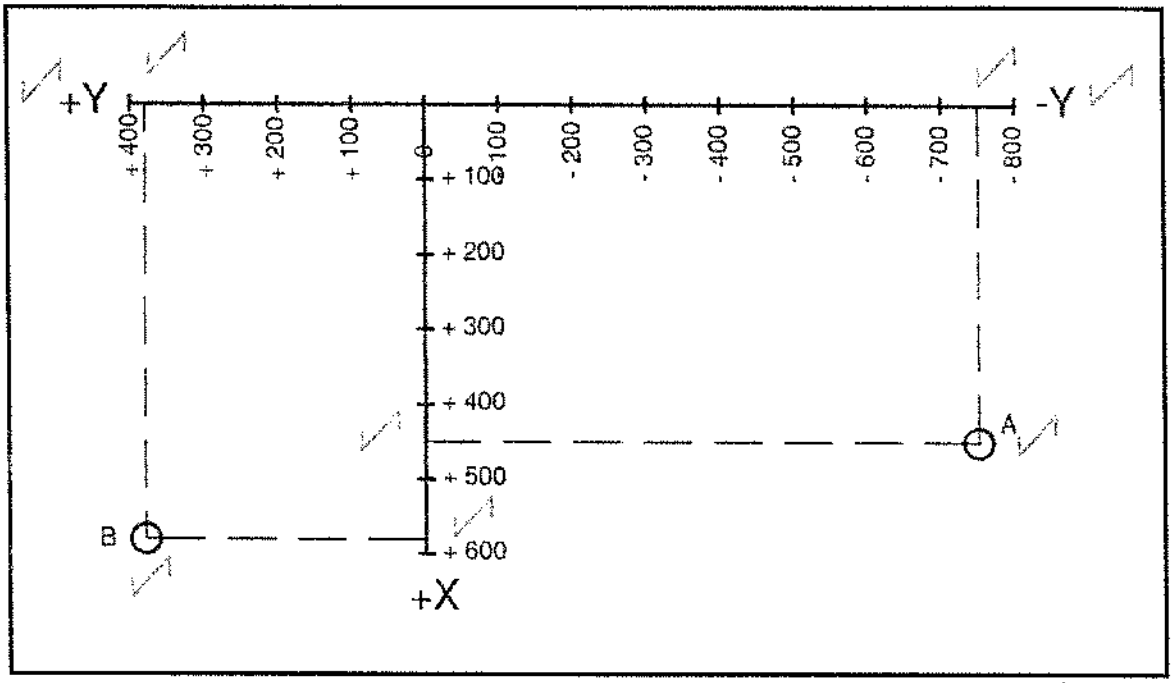
3.4



(½ × 8) (4)
[20]

QUESTION 4

4.1
- A chain is a robust instrument.
- The chain can be dragged around over the ground.
- The chain is easily read.
- The chain is easily cleaned.
- The chain is easily repaired.
- It can be read from both sides. (4 × 1) (4)

4.2 $Ct = L\ x\ E\ x\ (Tm - Ts)\ \sqrt{}$

$+0,012 = L\ x\ 0,0000113\ x\ (25 - 20)\ \sqrt{}$

$$L = \frac{+0,012}{0,0000113\,x\,5}\ \sqrt{}$$

$L = 212,389\,m\ \sqrt{}$ (4)

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4.3 $Csl = \frac{w^2 l^3}{24 t^2}$

1 bay = $^{75}/_{3}$ = 25 m

$Csl = \frac{(0,015)^2 25^3}{24(7)^2}$ √

$Csl = 0,003\,m$ √

Correct distance 1 bay = 25 – 0,003 √

= 24,997 m√

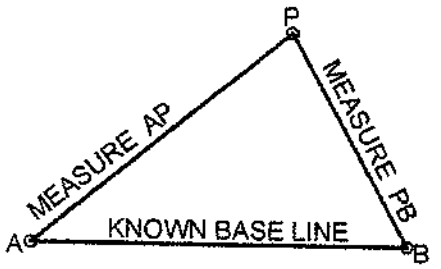
Correct total distance = 3 x 24, 997 m√

= 74, 991 m√

(6 × 1) (6)

4.1 4.4.1

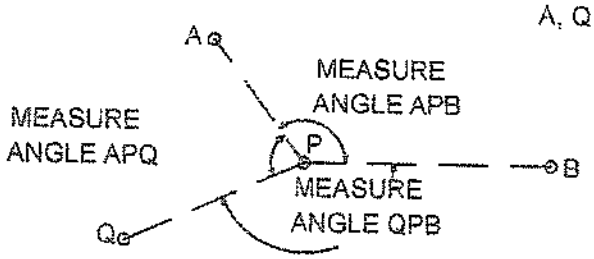
Sketch √



A and B are the known points.
Measure length AP.√
Measure length PB.√

(3 × 1) (3)

4.4.2



Sketch√

Measure angle APQ√
Measure angle APB√
Measure angle BPQ

Any of the two angles plus the sketch (3)

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4.5
- Setting out precise distances.
- Setting out can be performed from a single fixed point.
- Setting out operations are simplified - uneven ground is not an obstruction.
- Traverse distances are measured with a great degree of accuracy.
- Measuring over a ravine or river for bridge building is accurately performed.
- In urban areas where traffic would interfere with tape measurements an EDM presents no hold-ups
- A reduction in the crew size required for most measurements
- The ability to establish better control for construction works.

(Any 5 × 1) (5)
[25]

QUESTION 5

5.1
5.1.1 3,08
5.1.2 3,055
5.1.3 3,015

(3 × 1) (3)

5.2 In a vertical position. (1)

5.3
5.3.1 Target√ Used with tripod to elevate hidden or low survey points.√
5.3.2 Tripod√ Used for mounting of instruments.√
5.3.3 Theodolite√ For setting out of angles√
5.3.4 Tilting level√ For levelling operations√
5.3.5 Spring balance√ To measure the tension applied to the tape√

(5 × 2) (10)

5.4 The line joining the intersection of the cross hairs and the optical centre of the object glass. (2)

5.5 The instrument is held against a ranging rod and aimed towards a distant rod√ so that the sight line is parallel with the ground.√

Turn the milled knob√ so that the bubble is centered√ against the cross-wire.

The index arm will point to the vertical angle and the angle is noted.√ (5)
[21]

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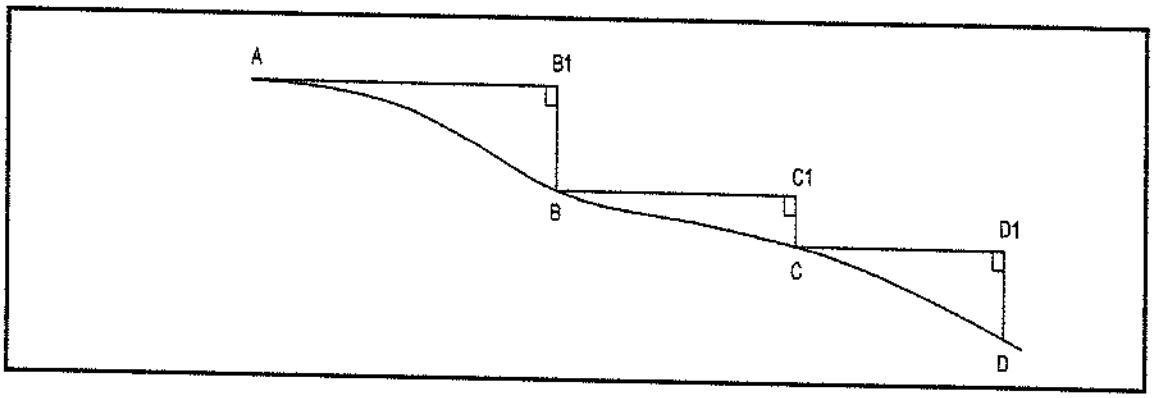
QUESTION 6

6.1



Sketch 1√

The method is as follows
Three men are required, a follower, a leader and an observer.√
The follower keeps the end of the tape or chain at AA@ and lines the leader who keeps the other end of the tape at a suitable distance at AB1@.√
The observer lines the tape horizontally and once horizontal, the leader drops a plumb bob from AB1'to AB@ on the ground.√
The observer will note the measurement in his book.√
The follower then moves the tape end to AB@ and line the leader who drops from the observed horizontal tape a plumb bob from 'AC1' o meet the ground at AC@.√
The observer again books this measurement.√
This process is repeated until the required distance is obtained.√

The summation of the distances measured will produce the required horizontal distance.√

(8 × 1) (8)

6.2 Is when the survey is done from a known point to another known point√ or from a particular point and back to that same point.√? (2)

6.3
6.3.1 True
6.3.2 False
6.3.3 True
6.3.4 False

(4 × 1) (4)
[14]

TOTAAL: 100

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