higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL SURVEYING N4

7 AUGUST 2018

This marking guideline consists of 5 pages.

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QUESTION 1

1.1 A plumb bob is a cord from which a metal weight is suspended pointing directly to the earth's centre of gravity.✓ It is used to determine the vertical from a given point.✓

1.2 A levelling staff is simply a large ruler available in lengths of 3, 4 or 5 meter.✓ They are usually made of aluminium with a telescopic section and locking to ensure that the accurate full extension of the length is maintained.✓

1.3 A plan is the representation of features onto a horizontal plane surface✓ and is drawn to large scale showing more details.✓

1.4 Compass surveying is the location of a point by measuring compass bearing (angles).✓ It is used to ascertain magnetic north or direction.✓

1.5 Optical squares are small hand-held instruments used in setting off a right angle.✓ It consists of two mirrors at an angle of 45° to each other.✓

1.6 An Abney level is a small hand-held weight instrument used for measuring vertical angles✓ when the slope is measured instead of the horizontal distance.✓

1.7 Steel tape is made of a steel ribbon of widths varying from 6 to 16 mm.✓ It is used to measure linear distance and is available in different lengths, marked in meters, centimetres and millimetres.✓

1.8 A plane table is an intricate instrument used mainly for accurate measurement of horizontal and vertical angles.✓ It involves the measurement of distance and angles while the plotting of these observations is done simultaneously in the field.✓

1.9 A theodolite is a surveying instrument used to measure vertical and horizontal angles.✓ It consists of a small tripod-mounted telescope that is free to move in both the horizontal and vertical planes.✓

1.10 An automatic level is an optical instrument used to establish or verify points in the horizontal plane.✓ It is used in surveying and building with a vertical staff to measure height difference and to transfer, measure and set heights.✓

(10 × 2) **[20]**

QUESTION 2

2.1 longitude
2.2 y-axis
2.3 x-axis
2.4 2°
2.5 central
2.6 odd
2.7 boundary
2.8 even
2.9 y-axis
2.10 x-axis

(10 × 1) **[10]**

QUESTION 3

3.1
- Reconnaissance
- Measuring distance and angles
- Recording field notes (3)

3.2
- The best positional fix is done from the nearest control point.
- The orientation must be checked onto another point.
- The best orientation is to the longest and clearest point.
- The orientation should be checked periodically whilst at the station and always before leaving the station. (4)

3.3
- Take readings.
- Set up the tripod firmly.
- The tripod head should be level with the eye.
- Place the instrument on the tripod head and tighten the mounting bolts.
- Using the tripod legs, adjust the legs to centralise the circular bubble provided on the instruments.
- Using the foot screw accurately to centralise the circular bubble by first positioning the telescope over two foot screws, then turn to 90° over the third foot screw and centralise.
- Repeat by turning the next 90° again over the two foot screws and end by lastly positioning over the third foot screw.
- Revolve the eyepiece focus till the diaphragm lines are clear and distinct.
- Direct the telescope to the object and focus.
- Adjust the tilting screw until the main spirit level is in coincidence. (10)

[17]

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QUESTION 4

4.1 HC = RcosΘ✓
HC = 35cos36°✓
HC = 28,32 N✓

VC = RsinΘ✓
VC = 35sin36°✓
VC = 20,57 N✓ (6)

4.2 GU = $\frac{MU}{RF}$✓

Convert cm to m:

$\frac{29,5}{100}$ cm = 0,295 m✓

GU = $\frac{0,295}{1/2\ 000}$✓

= 0,295 × 2 000✓

= 590 m✓ (5)

4.3 Area = L × B✓
= 6 × 6✓
= 36 m^2✓ (3)
[14]

QUESTION 5

5.1
- Vertical circle
- Telescope
- Micrometer knob
- Telescope-focusing knob
- Inverter knob
- Plate level
- Horizontal circle screw
- Circular bubble
- Vertical circle screw
- Circle-reading eyepiece
- Telescope eyepiece
- Telescope vertical clamp
- Illuminating mirror

(Any 10 × 1) (10)

5.2
- Light and compact
- Easy to read
- Fairly accurate
- Light and easy to handle
- May wound and unwound with ease (5)

5.3
- Radiation
- Triangulation (intersection)
- Traversing
- Resection (4)

[19]

QUESTION 6

6.1 $\mathrm{A} = \left(\frac{a}{2} + S + \frac{b}{2}\right)$✓

$= \left(\frac{5,5}{2} + 32,1 + \frac{5,4}{2}\right)$✓

$= 4(2,75 + 32,1 + 2,27)$✓

$= 4(37,55)$✓

$= 150,2\ \mathrm{m}^2$✓

$\mathrm{V} = \mathrm{A} \times \mathrm{L}$✓
$= 150,2 \times 6 \times 4$✓
$= 150,2 \times 24$✓
$= 3\,604,8\ \mathrm{m}^2$✓✓ (10)

6.2
6.2.1 Levelling instrument
6.2.2 Ranging rod
6.2.3 Metallic tape
6.2.4 Abney level
6.2.5 Dumpy level
6.2.6 Steel tape
6.2.7 Electronic distance measurements
6.2.8 Theodolite
6.2.9 Levelling staff
6.2.10 Change plate

(10 × 1) (10)

[20]

TOTAL: 100

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