higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL SURVEYING N4

12 APRIL 2018

This marking guideline consists of 6 pages.

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QUESTION 1

1.1 F
1.2 H
1.3 J
1.4 I
1.5 C
1.6 B
1.7 A
1.8 E
1.9 G
1.10 D

(10 × 1) **[10]**

QUESTION 2

2.1
- Natural scale
- Engineer's scale
- Divided scale
- Scale of map symbol
- Transformation of scale (5)

2.2
- Compass surveying is the location of a point by measuring the compass bearing (angle).
- It is used to ascertain magnetic north or direction. (2)

2.3
- Bearing cannot be obtained to great accuracy.
- Local magnetic attraction may render bearing useless.
- Needles land too deep when they are suspended and point downwards at the end.
- When a magnet is nearby, the needle will spin in a circle.
- Distance is not measured by the compass.
- A compass does not record elevation which could be used for a contour map.
- Errors may also arise due to inaccurate levelling of the compass.

(Any 5 × 1) (5)
[12]

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QUESTION 3

3.1 A building surveyor is involved in the survey of buildings and structures such as residential apartment buildings,✓ parking complexes, schools, hospitals, prisons, factories and houses. The purpose is to draw plans for renovations✓ or extensions of buildings and to ensure compliance with building regulations.✓

A land-surveyor is involved in surveys for the purpose of developing maps,✓ surveying land and buildings for the purpose of defining property boundaries✓ and railways. A land-surveyor is also involved in the mapping of the marine environment (oceanographic survey).✓ (6)

3.2 The instrument is held against a ranging rod and aimed at a distant ranging rod in such a way that the line of sight is parallel to the ground.✓ The bubble is then turned by a large milled-head knob, until the bubble appears in the mirror.✓ When the bubble is centred against the cross wire, the index arm will be pointing to the vertical angle reading for the ground slope.✓ The instrument is taken down from the eye and the angle reading is noted.✓ A vernier scale and also a magnifying glass may be provided for finer reading.✓ (5)

3.3 3.3.1 Official heights are bench marks which have been determined by precise levelling. They are used to express the height of mountains, hills, etc.

Local heights are heights to which an arbitrary height (vale) has been assigned.

3.3.2 A bench mark is a permanent mark showing the known height of that point above mean sea level.

A datum is a point on the surface or line from which heights or levels of points are measured.

3.3.3 Backsight is the first reading taken from a known point after the instrument has been set up.

Foresight is the last reading taken before the instrument is moved.

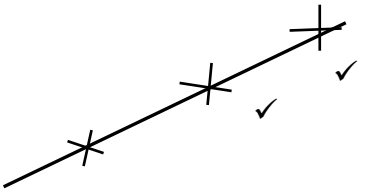
(3 × 2) (6)

[17]

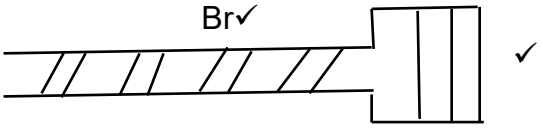
QUESTION 4

4.1 A map is the representation of a large section of the earth's surface on a scale with very little detail, made on a horizontal plane surface (sheet of paper).✓ Although a map has a scale, not everything is drawn to scale.✓ Some parts on the map may be shown by a dot which could in reality, represent a town.✓ (3)

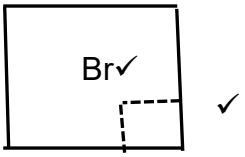
4.2 4.2.1 Fence not on cadastral boundaries



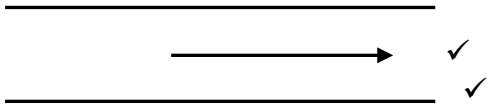
4.2.2 Wall (with pillar)



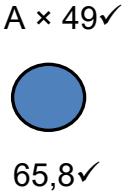
4.2.3 Buildings



4.2.4 Watercourse or open ditch



4.2.5 Traverse station



(5 × 2) (10)
[13]

QUESTION 5

5.1 Theodolite – It is used for measuring direction on the horizontal and vertical plane.

5.2 Tripod – The main function is to hold the instrument during observation.

5.3 Levelling instrument – It is used mainly in the building industry for levelling purposes on construction sites.

5.4 Levelling staff – It is used in conjunction with a levelling instrument or in conjunction with a theodolite for a tacheometric survey.

5.5 Steel tape – This is a main tool for measuring distance.

5.6 Circle hand bubble – It is used to hold the staff vertical during observation by positioning it against the staff.

5.7 Change point/plate – It is used when the surface on which a staff has to be placed is not firm or hard.

5.8 Spring balance – It is used to ensure that the correct or permissible tension is obtained when using a tape measure.

5.9 Abney level – It is used for measuring vertical angles.

5.10 Magnetic compass – It is useful for tracking old surveys. It is also used to measure directions with reference to the magnetic meridian.

5.11 Optical square – It is used for setting out right angles.

(11 × 2) **[22]**

QUESTION 6

6.1
- Fully silvered mirror
- Half silvered mirror
- Case
- Pinhole sight
- Direct line of sight (5)

6.2
- Plumbing fork
- Plane table
- Spirit level
- Paper on board
- Simple alidade
- Parallel ruler
- Box compass
- Tripod
- Plumb bob (Any 5 x 1) (5)

6.3
- Index arm
- Vernier
- Spirit level
- Protector arc
- Telescope OR eyepiece (5)

[15]

QUESTION 7

7.1 $A = r^2 \left[\frac{\emptyset}{360}\ x\ \pi - \frac{1}{2}\ x \sin \emptyset\right]$✓

$= 8^2 \left[\frac{65\ x\ \pi}{360}\ x\ \frac{1}{2}\ x\ \frac{sin65}{2}\right]$ ✓

$= 8^2\ [0{,}567 - 0{,}227]$✓

$= 64\ [0{,}34]$✓

$= 21{,}76\ m^2$✓✓ (6)

7.2 Ct = L × e (tm – ts)

= 104 × 0,0000113 × (15 – 20)

= - 0,006

CD = 104 – 0,006

= 103,995 m (5)

[11]

TOTAL: 100

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