



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL SURVEYING N4

20 November 2020

This marking guideline consists of 5 pages.

QUESTION 1

- 1.1 C
- 1.2 D
- 1.3 B
- 1.4 A
- 1.5 A
- 1.6 A
- 1.7 C
- 1.8 D
- 1.9 B
- 1.10 D

(10 × 1) **[10]****QUESTION 2**

- 2.1 Sight rule with sighting vanes at both ends or fitted with telescope, ✓ used for sighting the direction of distant target. ✓ Edge of alidade acts as straight edge, ✓ used to rule lines, ✓ parallel to observed sight direction on paper. ✓ (5)
- 2.2 Errors of which magnitude ✓ and sign depend on external circumstances such as temperature changes, ✓ slope of land and which tend to produce a cumulative effect. ✓ These errors can be avoided by not observing under such conditions. ✓ (4)
- 2.3 2.3.1 Setting up at convenient height for working over ground station. ✓ With legs spread well apart and firmly fixed to ground ✓ table is approximately levelled judging by eye. ✓ Plane table is centred exactly over ground station by means of plumbing fork and plumb bob. ✓ (4)
- 2.3.2 Done by spirit level. ✓ Bubble of spirit level brought to centre in two directions ✓ which are at right angles to each other ✓ and is done by moving the legs. ✓ (4)
- 2.3.3 Positioning plane table so that lines on paper are parallel ✓ to lines on the ground which they represent. ✓ Orientation of plane table can be done by using orientation of magnetic needle method or by back sighting. ✓ (3)

[20]

QUESTION 3

$$3.1 \quad \text{ATL} = 100 - 0,03 = 99,97 \text{ m} \checkmark$$

$$\text{CD} = \text{MD} \times \frac{\text{ATL} \checkmark}{\text{GLT}}$$

$$= 82,400 \times \frac{99,97 \checkmark}{100}$$

$$= 82,375 \text{ m} \checkmark \quad (4)$$

$$3.2 \quad \text{Ct} = L \times e (T_m - T_s) \checkmark$$

$$= 136,40 \times 0,000113 (20 - 25) \checkmark$$

$$= -0,077 \text{ m} \checkmark$$

$$\text{CD} = 136,40 - 0,077 \checkmark$$

$$= 136,323 \text{ m} \checkmark \quad (5)$$

$$3.3 \quad \text{MU} = \text{RF} \times \text{GU} \checkmark$$

$$= \frac{1}{1200} \times 450 \checkmark$$

$$= \frac{450 \checkmark}{1200}$$

$$= 0,375 \text{ m (or 37,5 cm)} \checkmark \quad (4)$$

[13]**QUESTION 4**

4.1 Telescope of tilting level is not fixed as that of dumpy level ✓ and can be tilted a little on vertical plane ✓ on a hinge mounted beneath telescope. ✓ (3)

- 4.2
- 4.2.1 Focusing knob
 - 4.2.2 Circular bubble
 - 4.2.3 Horizontal motion screw
 - 4.2.4 Levelling screw
 - 4.2.5 Pedestal
 - 4.2.6 Object lens focus

(6 × 1) (6)

- 4.3
- Spirit level
 - Telescope
 - Eyepiece
 - Tilting screw
- (4 × 1) (4)
[13]

QUESTION 5

- 5.1
- Use straight pull drawing out tapes housed in cases
 - Pull tape out and re-wind it in line with opening
 - Tape sticking in case can be freed by tapping side of case
 - Detach reel from tape when using full length
 - Avoid stepping on or driving over tape on the ground
 - Never leave tape lying on ground for longer than necessary
 - Before straightening tape remove all kinks
- (Any 6 × 2) (12)
- 5.2
- Centre instrument as accurately as possible over instrument station
 - Orient on farthest possible points consistent with good visibility
 - Orient on object which can be sighted with utmost accuracy
 - Ensure sighting object is truly vertical
 - Keep lines of sight well clear of ground to minimise effect of irregular refraction
 - When possible make small mark on top of peg so that sighting object may be held at same spot each time
 - Sight at least one additional known point to check orientation setting
 - Upon completion of observation orienting point must again be sighted to ensure that instrument has not moved accidentally
- (Any 6 × 2) (12)
[24]

QUESTION 6

6.1

$$A = \frac{a + b}{2} \times h \checkmark$$

$$= \frac{52 + 24}{2} \times 11 \checkmark$$

$$= 38 \times 11 \checkmark$$

$$= 418 \text{ m}^2 \checkmark$$

$$\frac{10000}{10000} = 0,042 \text{ ha} \checkmark$$

(5)

6.2

$$\text{Area of segment} = \frac{\theta}{360}(\pi R^2) - \frac{R^2 \sin \theta}{2} \checkmark \checkmark$$

$$= \frac{69}{360}(\pi \times 15^2) - \frac{15^2 \sin 69}{2} \quad \checkmark \checkmark$$

$$= 135.481 - 105.028 \checkmark$$

(6)

$$= 30,453 \text{ m}^2 \checkmark$$

6.3

$$A = \frac{S^2 N}{4 \tan \left(\frac{180}{10} \right)}$$

$$= \frac{32^2 \times 10}{4 \tan \left(\frac{180}{10} \right)} \checkmark$$

$$= \frac{10240 \checkmark}{1,2997}$$

$$= 7878,741 \text{ m}^2 \checkmark$$

(4)
[15]

QUESTION 7

- 7.1
- Radiation
 - Triangulation (intersection)
 - Traversing
 - Resection
- (Any 4 × 1) (4)
- 7.2 Aligning plane table with magnetic north (1)
[5]
- TOTAL: 100**