higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

NOVEMBER EXAMINATION

BUILDING AND STRUCTURAL SURVEYING N4

24 NOVEMBER 2014

This marking guideline consists of 6 pages.

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QUESTION 1

1.1 A plan is the representation (projected vertically) of features onto a horizontal plane surface, and may be looked upon as a large scaled detailed map of a small area. (2)

1.2 Isogonic Lines: They are imaginary lines joining places on the earth's surface where the magnetic declination is the same at a given time. (2)

1.3 A plane is the surface on which any straight line joining two points on it will touch the plane completely. (2)
[6]

QUESTION 2

2.1
- Chain surveying
- Direct levelling
- Indirect levelling
- Plane table
- Traversing
- Compass surveying
- Tacheometric surveying
- Barometric surveying
- Hydrographic surveying
- Photographic surveying
- Triangulation

(Any 6 x 1) (6)

2.2
- To construct maps, plans or profiles showing the relative positions and heights (or elevations) of existing features. (2 x 1) (2)
- To set out or establish the required positions and heights of new features in accordance with a predetermined plan. (2 x 1) (2)

[10]

QUESTION 3

3.1 It is the measured unit used to refer to the map and to the actual and true distance it represents. (2)

3.2
- Defects in the equipment √
- Observers natural disabilities √
- External conditions √

(3 x 1) (3)

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3.3

- Control or framework √
- Scale √
- Speed and cost √
- Skill and experience √

(4 x 1) (4)

3.4

$$S = \frac{a+b+c}{2}$$

$$S = \frac{420+290+330}{2} \quad \surd$$

$$S = 520 \quad \surd$$

$$A = \sqrt{s(s-a)(s-b)(s-c)}$$

$$A = \sqrt{520(520-420)(520-290)(520-330)} \quad \surd$$

$$A = \sqrt{2272400000} \quad \surd$$

$$A = 4,77\,ha \quad \surd$$

(5 x 1) (5)

3.5

$$A = \frac{(a+b)\times \perp h}{2}$$

$$A = \frac{(46+32)\times 44}{2} \quad \surd$$

$$A = 1716\,m^2 \quad \surd$$

Vertical difference = Ground level - Required level √

= 250, 5 m - 240, 0 m √

= 10, 5 m √

V = A x h √

V = 1 716 m^2 x 10, 5 m √

V = 18 018 m^3 √

(8 x 1) (8)
[22]

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QUESTION 4

4.1

$$Correct\ dis\tan ce = MDx\left(\frac{actual\ tape\ length}{graduated\ tape\ length}\right)\surd$$

$$175\ m = MDx\left(\frac{100-0,85}{100}\right)\surd$$

$$175\ m = MD\ x\ (0,9915)$$

$$\frac{175}{0,9915} = MD\ \surd$$

$$MD = 176,5\ m\ \surd$$

(4 x 1) (4)

4.2 $Ct = L\ x\ E\ x\ (Tm - Ts)\ \surd$

$$+0,015 = L\ x\ 0,0000113\ x\ (33-20)\surd$$

$$L = \frac{+0,015}{0,0000113\,x13}\surd$$

$$L = 102,110\,m\ \surd$$

CD = 102, 110 + 0, 015 √

CD = 102, 125 m √

(6 x 1) (6)

4.3

$$\cos\alpha = \frac{horizontal\ dis\tan ce}{sloping\ dis\tan ce}\surd$$

$$sloping\ dis\tan ce = \frac{horizontal\ dis\tan ce}{\cos\alpha}\surd$$

$$sloping\ dis\tan ce = \frac{110}{\cos 8°28'40"}\surd$$

$$sloping\ dis\tan ce = 111,215\,m\ \surd$$

(4 x 1) (4)

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4.4 $w = \frac{2kg}{100m}$ √

w = 0. 02 kg/m √

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

$Cct = \frac{(0,02)^2 (35,5)^3}{24(7)^2}$ √

$Cct = 0,015\ m$ √

Correct distance = 35, 5 – 0, 015 √

= 35, 485m √

(6 x 1) (6)
[20]

QUESTION 5

5.1
- Expansion or contraction caused by variations in temperature.
- When a tape is suspended in catenary and supported only at the ends.
- Uneven pull
- When the tape is not tight and straight.
- Errors in reading and booking.

(5 x 1) (5)

5.2.
- Object lens
- Collimation line
- Focusing screw
- Diaphragm adjusting screws or capstan adjusting screws
- Eyepiece
- Diaphragm
- Focusing lens

(7 x 1) (7)

5.3 5.3.1 156, 6 + 1, 05 = 157, 65 m √√ (2)
5.3.2 157, 65 – 2, 36 = 155, 29 m √ √ (2)

5.4
- Levelling staff
- Invar staff
- Tacheometric staff

(3 x 1) (3)

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5.5
- It must be robust
- It must be precise
- It must be possible to read without doubt
- It must be of high quality
- It must be highly visible
- It must be light
- It must be easy to carry around
- It must be of narrow section
- It must be rigid

(Any 5 x 1) (5)
[24]

QUESTION 6

6.1
- Position the telescope over two foot screws.
- Adjust the foot screws to bring the bubble to the centre of its run.
- Turn the telescope 90° over the third foot screw
- Adjust the foot screw to bring the bubble to the center of its run.
- Turn the telescope a further 90° if the bubble does not return to the centre note the amount it is off center and use the two foot screws to turn it halfway back to center.
- Turn the telescope a further 90° if the bubble does not return to the centre note the amount it is off center and use the third foot screw to turn it halfway back to center.
- Adjust the bubble adjusting screws to centralize the bubble.
- When complete, check again and repeat adjustment if necessary.

(8 x 1) (8)

6.2
6.2.1 **E**
6.2.2 **C**
6.2.3 **D**
6.2.4 **F**
6.2.5 **B**
6.2.6 **A**

(6 x 1) (6)

6.3
- Radiation
- Traversing
- Intersections
- Resection

(4 x 1) (4)
[18]

TOTAL: 100

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