higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

ROADS
NQF LEVEL 2

17 November 2022

This marking guideline consists of 6 pages.

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QUESTION 1

1.1
1.1.1 False
1.1.2 True
1.1.3 True
1.1.4 True
1.1.5 True

(5 × 1) (5)

1.2
1.2.1 B
1.2.2 D
1.2.3 F
1.2.4 A
1.2.5 C

(5 × 1) (5)
[10]

QUESTION 2

2.1 2.1.1
- An investigation into the road site to find facts required in planning for road construction
- Establishing references points and markers that will guide the construction of new structures such as roads or buildings

2.1.2 The staggered and measured distance along the centre line of the road or railway

2.1.3 An incline or decline to the horizontal plane, which is expressed as a ratio or percentage

2.1.4 The transfer of measurements from the working drawing to the actual ground; involves driving in pegs and stretching string lines on the ground

(4 × 2) (8)

2.2
- Steel/Synthetic tape measure
- Steel/Wooden peg
- String line
- Club hammer

(Any 2 × 1) (2)

2.3
- It gives them an idea of the land form.
- It helps them determine geographical features such as dams and rivers through which the road will pass

(2)

2.4 A dumpy level can check horizontal angles only, while a theodolite can check both horizontal and vertical angles. (2)

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2.5
- Mark out the required level at the first profile point and fix the line on the first profile point.
- Stretch the line across to the second profile point.
- Place the level in the centre of the line.
- Check the bubble of the level to see whether it is in the centre of the line.
- If the bubble is not at the centre of the glass tube, adjust the line until the bubble is centred or level.
- If the line level is in the centre of the line and shows level, mark off the required point on the second profile. (6)

[20]

QUESTION 3

3.1 The separation or passing of soil through a number of sieves into various sizes (3)

3.2 3.2.1
- Fine-grained non-cohesive soil
- Coarser than silk
- Gritty
- Does not stick together when dry
- Moves easily under tyre load when wet or dry
- Densely compacted sand can a carry fairly heavy load
- Particles are angular, round or flat (Any 4 × 1) (4)

3.2.2
- Course-grained non-cohesive soil
- Can carry a heavy load if compacted
- Strength depends largely on the shape of particles, namely angular, round of flat
- Interlocking particles give higher strength
- Difficult to excavate due to stony nature
- Difficult to enter and drag with shovel or pick (Any 4 × 1) (4)

3.3
- Liquid limit (LT)
- Plastic limit (PL)
- Plasticity index (PI) (3)

3.4 Mass of the soil per unit volume measured or expressed in kilograms per cubic metre (m^3) (3)

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3.5 Moisture content of soil:

Given: Wet mass of soil is 967 g
Dry mass of soil is 880 g

Solution: Wet mass – dry mass
967 g – 880 g
= 87 g

Moisture content = mass of water lost × 100/mass of dry soil
= 87 × 100/880
= 9,89% (3)
[20]

QUESTION 4

4.1
- Standing water on a carriage way is a safety hazard to motorists, as road markings may not be visible.
- High-speed traffic will aquaplane across the road if water does not drain off fast enough.
- Water seeping into pavement layers leads to soft spots in soil materials.
- Soft spots due to water result in potholes and the breaking up of surfacing.

(Any 3 × 1) (3)

4.2 4.2.1 A drain that collects storm-water runoff from the road and runs parallel to or along the length of the road

4.2.2
- Mitre drains running at an angle to the road
- Cross drains, e.g. culverts and drifts

(2 × 2) (4)

4.3
- Water flows slowly
- Water does not erode the soil in the drain (2)

4.4
- Should be encouraged to grow, as it prevents erosion
- Low-growing kind that spreads out provides good ground cover
- Long upright-growing grass causes obstruction to the flow of water
- Decreases the level of landscape damage (4)

4.5
- To remove storm water or free water from the subgrade, i.e. remove water from below the foundation layer
- To remove water from the subbase
- To remove water from the base
- To remove water from the prism of the road
- To remove water from adjacent areas of the road (Any 4 × 1) (4)

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4.6
- The road may have to be raised by means of an embankment.
- Elevate the road above the water table.
- Provide subsoil drainage to dispose of water. (3 × 1) (3)

[20]

QUESTION 5

5.1
- Remove all loose rock from the cutting face.
- Inspect and stabilise unstable rock.
- Bar down the rock slope or face during excavation.
- A team of labourers should pry out all cracked and loose rock with crowbars.
- A ditch will prevent rocks from rolling into the road.
- Wire mesh netting can be used against the surface of the slope to prevent loose rocks from falling onto the road. (Any 4 × 1) (4)

5.2
- By law, safety precautions must be taken for every excavation deeper than 1,5 m.
- Sides and slopes must be supported with planks and struts.
- Excavated soil must be placed at a safe distance away from the trench.
- Do not stack heavy pipes or other materials with a heavy load close to the excavation. (4)

5.3
- To provide for the health and safety of people at work
- To provide for the health and safety of people during the use of plant and machinery
- To protect people other than employees against hazards and safety risks

(3)

5.4
- The effectiveness of the signs
- The delineation arrangement
- Driver and public obedience under adverse weather conditions
- Driver and public obedience during dusty conditions and at night (Any 2 × 1) (2)

5.5
- Scraper
- Front-end loader (2)

5.6 The distance specified in the contract document for which the contractor is paid a specific price per m^3 for excavating, hauling and dumping the materials. For small works, free haul is about 500 m. If the haul distance exceeds the free haul, the contractor will be paid an additional rate for overhaul. (4)

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5.7
- Spread the moist mixed material across the roadway.
- Level the moist soil to a loose height at least 1,5 times the compacted height.
- The spread height depends on the soil type and moisture content.
- The spread height cannot be calculated precisely.
- The spread height can be checked from the quantity of material on the road.
- If there is material left over when spread 1,5 times the compacted thickness, the spread height must be increased.
- If there is not enough material used to spread across the spread height, the spread height can be decreased. (Any 4 × 1) (4)

5.8 5.8.1 Distance up to 2 km or 3 km
5.8.2 Between 0,50 m^3 and 2,0 m^3
(2 × 1) (2)
[25]

QUESTION 6

6.1 Stabilisation is the process whereby properties of soils and gravels may be altered or improved to make them more useful. (3)

6.2
- Ordinary Portland cement
- Portland blast furnace cement (2)
[5]

TOTAL: 100

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