higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

ROADS
NQF LEVEL 2

(12030152)

17 November 2022 (Y-paper)
13:00–16:00

This question paper consists of 6 pages.

515Q1N2217

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TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer all the questions.
2. Read all the questions carefully.
3. Number the answers according to the numbering system used in this question paper.
4. Start each section on a new page.
5. Use only a black or blue pen.
6. Write neatly and legibly.

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QUESTION 1

1.1 Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (1.1.1–1.1.5) in the ANSWER BOOK.

1.1.1 Profiles are specifically designed for accurate base course level control.

1.1.2 Dense, graded and unweathered crushed gravel can be classified as a G2 class material.

1.1.3 The roadbed comprises in situ material or extra soil or gravel from borrow pits.

1.1.4 Wheelbarrows are ideally used for haulage between distances of 100 m to 200 m.

1.1.5 Lime can be used to control the plasticity index of destabilised gravel.

(5 × 1) (5)

1.2 Choose a term from COLUMN B that matches a description in COLUMN A. Write only the letter (A–H) next to the question number (1.2.1–1.2.5) in the ANSWER BOOK.

COLUMN A		COLUMN B	
1.2.1	Equipment often used to excavate soft material in cut and fill operations	A	sand
1.2.2	Hand-packed structures often used to control storm-water flow in open drains	B	scrapers
1.2.3	Generally used equipment that is erected along the edge of an embankment leading towards a bridge	C	shoulder
1.2.4	A fine-grained, gritty, non-cohesive type of soil	D	gabions
1.2.5	The part of a road that will provide a place for vehicles when broken down	E	sandbags
		F	guard rail
		G	service road
		H	clay

(5 × 1) (5)

[10]

QUESTION 2

2.1 Define the following surveying terms:

2.1.1 Road surveying

2.1.2 Chainage

2.1.3 Gradient

2.1.4 Setting out

(4 × 2) (8)

2.2 Name TWO hand tools that will be used to set out a horizontal curve when using the radius method. (2)

2.3 Briefly explain the importance of topographic maps to road construction contractors. (2)

2.4 Distinguish the main functional difference between a *dumpy level* and a *theodolite.* (2)

2.5 Describe step by step how you would use a line level to transfer a horizontal line between two profile points. (6)

[20]

QUESTION 3

3.1 Define the term *grading of soil*. (3)

3.2 List the essential mechanical properties of the following types of soil:

3.2.1 Sand (4)

3.2.2 Clay (4)

3.3 Name THREE Atterberg limits that are used to determine the extent to which a specific soil (gravel) can be affected by moisture change. (3)

3.4 Define the term *density of soil* and explain how it is measured. (3)

3.5 A sample of wet soil with a mass of 967 g has been oven-dried overnight to a new dry mass of 880 g. Calculate the moisture content of the soil. (3)

[20]

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QUESTION 4

4.1 Explain why it is essential to drain off storm water as quickly as possible from a carriageway. (3)

4.2 4.2.1 Define the term *longitudinal drain*. (2)

4.2.2 Describe TWO longitudinal drains that can discharge collected storm-water runoff to vacant land beside a road. (2)

4.3 Give TWO reasons for building a smaller (flatter) gradient into earth drains. (2)

4.4 Give FOUR reasons for planting grass next to a road. (4)

4.5 List FOUR reasons why subsurface drains are required on the surface next to a road. (4)

4.6 Give THREE suitable solutions that can be followed when a low water table is encountered. (3)
[20]

QUESTION 5

5.1 List FOUR measures to reduce rock fall to improve the safety of motorists during construction work. (4)

5.2 Describe how to safeguard excavations from collapsing. (4)

5.3 List THREE main objectives of the Occupational Health and Safety Act. (3)

5.4 List TWO important safety factors that the inspection team should consider when planning an effective traffic safety control system during construction work. (2)

5.5 List TWO types of equipment that are used in excavating soft soils. (2)

5.6 Define the term *free haul*. (4)

5.7 List FOUR procedures to be followed when spreading and levelling materials across a roadway using shovels, rakes or spreaders. (4)

5.8 5.8.1 What is the procedure followed when spreading and levelling materials? (1)

5.8.2 What is the average load capacity of a donkey cart? (1)
[25]

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QUESTION 6

6.1 Define the term *stabilisation of road layers*. (3)

6.2 Name TWO materials that are commonly used in the cementation or stabilisation of non-cohesive soils. (2)
[5]

TOTAL: 100

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