higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

ROADS
NQF LEVEL 3

(12030363)

27 November 2023 (X-paper)
09:00–12:00

This question paper consists of 6 pages.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)
ROADS
NQF LEVEL 3
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. Use only a black or blue pen.
5. Write neatly and legibly.

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QUESTION 1

1.1 Choose ONE term from the list below for each of the following descriptions and write it next to the question number (1.1.1–1.1.10) in the ANSWER BOOK.

guard rails; shoulder; speed humps; manholes; earthworks; formed bitumen; scraper; side drain; density; permeability

1.1.1 The ability of water to flow through soil

1.1.2 Plant often used to excavate soft materials from cut and fill operations

1.1.3 The result when hot water and bitumen is mixed

1.1.4 The actions of moving ground to prepare for road building work

1.1.5 An open longitudinal drain situated adjacent to and at the bottom of cut or fill

1.1.6 The area between the outer edge of a road and the boundary of the road

1.1.7 Rails at the edge of the road shoulder that prevent vehicles from veering off the road into oncoming traffic

1.1.8 The underground services chambers that are placed at approximately 50-mm intervals along a storm-water drain pipe system

1.1.9 The mass per unit volume of a substance expressed in kg/m^3

1.1.10 Raised devices, parabolic in shape, placed across the road to slow down traffic

(10 × 1) (10)

1.2 Define the following terms commonly used in road construction works:

1.2.1 Shrinkage

1.2.2 Swell

1.2.3 Sag

1.2.4 Chainage

1.2.5 Modified materials

(5 × 2) (10)
[20]

QUESTION 2

2.1 State FIVE requirements for a good road surface. (5)

2.2 Define the following terms:

2.2.1 Asphalt

2.2.2 Bitumen

2.2.3 Concrete

(3 × 2) (6)

2.3 State FOUR different types of surfacing that can be used during the construction of a road. (4)

[15]

QUESTION 3

3.1 When placing road furniture along a road, there are important requirements that need to be adhered to.

List FOUR of these requirements. (4)

3.2 Explain the function of the following road furniture:

3.2.1 Safety barrier

3.2.2 Reflector

(2 × 2) (4)

3.3 State ONE place where traffic lights would be placed. (1)

3.4 What is the purpose of planting shrub trees in the median section of a dual carriageway of a highway? (1)

[10]

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QUESTION 4

4.1 Name FIVE different types of curve definition diagrams. (5)

4.2 What is the difference between *sight distance* and *stopping distance* in relation to the setting out of a curve? (4)

4.3 Give a brief description of the following terms:

4.3.1 Horizontal alignment of the road

4.3.2 Vertical alignment of the road

(2 × 2) (4)

4.4 Setting out a curve is the process of locating the various points along the length of the curve.

List FOUR basic methods to be used when setting out a horizontal curve. (4)

4.5 List THREE steps to be taken when using the tangent method for setting out a curve. (3)

4.6 List FIVE components of a dumpy level. (5)

[25]

QUESTION 5

5.1 Give TWO examples of the type of plant/machinery that can be used in each of the operations listed below:

5.1.1 Compaction

5.1.2 Spreading

5.1.3 Hauling

5.1.4 Excavation

(4 × 2) (8)

5.2 Name TWO things to be considered when choosing the correct plant when excavating where a road is going to be constructed. (2)

5.3 Give TWO considerations that must be taken into account when choosing the correct plant when materials have to be hauled. (2)

5.4 Briefly explain *optimum moisture content*. (2)

5.5 Briefly explain the purpose of the following tests:

5.5.1 Relative density

5.5.2 Sand replacement

5.5.3 California bearing ratio

5.5.4 Mod AASHTO

(4 × 2) (8)

5.6 Explain what the following soil tests determine:

5.6.1 Shrinkage limit

5.6.2 Liquid limit

5.6.3 Atterberg's limit

5.6.4 Plastic limit

(4 × 2) (8)
[30]

TOTAL: 100

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