higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

ROADS
NQF LEVEL 2

(12030152)

22 November 2018 (X-Paper)
09:00–12:00

This question paper consists of 5 pages.

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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. Keep subsections of question together.
5. Rule off across the page on completion of each question.
6. ALL the work you do not want to be marked must be crossed out clearly.
7. Write neatly and legibly.

ncv

QUESTION 1: BASIC CONCEPTS AND ROAD-BUILDING TERMINOLOGY

1.1 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write 'TRUE' or 'FALSE' next to the question number (1.1.1–1.1.5) in the ANSWER BOOK.

1.1.1. Theodolite is a levelling instrument used to take readings on horizontal and vertical angles.

1.1.2. Liquid limit is the stage at which water starts behaving like ice due to the amount of moisture it contain.

1.1.3. Usually, spreading is done when excavated soil is placed on the ground in order to increase the elevation of the natural ground level.

1.1.4. Emulsion is a mixture of three different fluids.

1.1.5. Tangent is a line that is perfect to the radius of a curve.

(5 × 1) (5)

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

	COLLUMN A		COLLUMN B
1.2.1	A system of grouping soil types into categories according to their properties, such as clay, sand and gravel	A	compaction
		B	degrading material
		C	load-bearing capacity
1.2.2	A process of reducing soil volume by tightly pressing the soil together	D	soil classification
1.2.3	A natural process that breaks down and weakens rocks and earth elements	E	manhole
		F	erosion
1.2.4	An area where suitable soil is taken when soil on site is not suitable for compaction	G	borrow pit
1.2.5	The amount of load that can be accepted before support fails		

(5 × 1) (5)

[10]

QUESTION 2: ROAD SURVEYING

2.1 List SIX different types of surveying concepts. (6)

2.2 Briefly describe the process of setting out a right angle using the 3, 4, 5 method. (5)

2.3 Define the term *horizontal curve* used in road surveying. (2)

2.4 Briefly describe how one uses a spirit level to check out the level surface. (4)

2.5 What is a point of intersection in road construction? (3)
[20]

QUESTION 3: SOILS, GRAVEL AND ROAD-BUILDING MATERIAL

3.1 Briefly define the following terms used in the building of a road:

3.1.1 Degrading material

3.1.2 Liquidity index

3.1.3 Load-bearing capacity

(3 × 2) (6)

3.2 Briefly describe the mechanical properties of the following types of soil that can be used for road construction :

3.2.1 Compaction

3.2.2 Permeability

3.2.3 Grading

(3 × 2) (6)

3.3 List and explain THREE different types of tests used to determine the characteristics of soil. (3 × 2) (6)

3.4 Define the meaning of term *swell.* (2)
[20]

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QUESTION 4: INTRODUCTION TO ROAD DRAINAGE

4.1 Name FIVE important points to be considered when planning road drainage facilities. (5)

4.2 Sub-surface drainage can be used to remove water from the soil.

Name TWO places where sub-surface drainage can be constructed. (2)

4.3 Give another name for sub-surface drainage. (1)

4.4 State FOUR different types of underground drainage. (4)

4.5 Define the following terms used in road drainage.

4.5.1 Catch water drain

4.5.2 Side drain

4.5.3 Mitre drain

(3 × 2) (6)

4.6 What is the difference between *subsurface drainage* and *surface drainage*? (2)
[20]

QUESTION 5: EARTHWORKS

5.1 State FIVE categories of earthworks. (5)

5.2 List FOUR ways in which earthwork materials can be compacted. (4)

5.3 Name FIVE reasons that could cause the sides of an excavation to collapse. (5)

5.4 List THREE different tools that can be used for excavation. (3)

5.5 Explain FIVE aspects of safety in the construction of a road. (5)

5.6 Name THREE different types of plants used to excavate the trench on site. (3)
[25]

QUESTION 6: LAYERWORKS

6.1 Surfacing is a layer of stones and bitumen that waterproof the base and gives a smooth surface to the road.

Give FOUR different types of surfacing that can be used on the road. (4)

6.2 Explain the objective of stabilisation. (1)
[5]

TOTAL: 100

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