higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

ROADS
NQF LEVEL 4

(12030534)

17 November 2022 (X-paper)
09:00–12:00

This question paper consists of 5 pages.

517Q1N2217

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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 question on a new page.
5. Use only a black or blue pen.
6. Write neatly and legibly.

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QUESTION 1: ROAD DRAINAGE

1.1 State TWO reasons why surface drainage is an important element in road construction? (2)

1.2 How will aquaplaning occur on a surfaced road? (2)

1.3 Identify TWO reasons that can determine the amount of spray created by a vehicle in wet conditions on a surfaced road. (2)

1.4 What is the purpose or use of the following road drainage systems?

1.4.1 Longitudinal side drains (2)

1.4.2 Cross drains (2)

1.4.3 Fords (2)

1.5 Certain steps are necessary to follow when assembling and erecting gabions on site.

1.5.1 Explain how to unpack and unfold each gabion. (2)

1.5.2 Explain how to place the sheets of geotextile at each contact between the soil foundation and gabion structure. (4)

1.6 Identify TWO sources of water that can cause damage to the foundation or underlying layers of the road? (2)

1.7 Explain what the sole purpose of sub-surface drainage in a road structure is? (3)

1.8 It is important that a sub-surface drainage system functions and works properly.
Name THREE main activities that consist of and form part of the maintenance process of a sub-surface drainage system. (3)

1.9 Describe what is a slotted agricultural drain? (2)

1.10 Name TWO primary uses for geofabric in the road industry. (2)

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QUESTION 2: ROAD PAVEMENT

2.1 Name the TWO types of materials a semi-rigid pavement will consist of. (2)

2.2 Describe how a section of the manually operated fixed-form pavement method will be utilized when constructing a labour-intensive concrete pavement. (3)

2.3 Explain why it is necessary to form contraction joints between the different segments of a concrete pavement? (2)

2.4 Concrete paving blocks are categorized into TWO classes.
Identify the TWO classes and state where each one is specified to be used in terms of traffic loads. (4)

2.5 Concrete block paving consists of different types of layers, each one consisting of a specific type of material.
What type of material will be used for the types of layers listed in 2.5.1 - 2.5.3

2.5.1 Sub-grade (1)

2.5.2 Sub-base (1)

2.5.3 Bedding (1)

2.6 Select the correct steps that need to be followed when using a plate compactor to vibrate the concrete paving blocks into place? (3)

2.7 Explain how to vibrate the jointing sand into the joints of the paving blocks when using a plate compactor. (3)

2.8 Name TWO PPE items to prevent personal injuries when working with hot bitumen on the road. (2)

2.9 Bitumen and aggregate is substance used to manufacture asphalt

2.9.1 Describe what is bitumen (2)

2.9.2 What is bitumen made off or obtained from? (2)

2.10 Identify TWO potential hazards tar can have to the environment. (2)

2.11 Explain how the grading of pen grade bitumen will be determined during testing? (3)

2.12 List TWO positive aspects the correct viscosity of bitumen will result to when compacting asphalt roads. (2)

2.13 Name the type of plant used for placing the asphalt on the road. (1)

2.14 Give THREE reasons why seals are used on asphalt roads (3)

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2.15 State THREE main reasons for using slurry seal coatings on existing road surfaces. (3)

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QUESTION 3: ROAD MAINTENANCE AND REHABILITATION

3.1 Differentiate between the following:

3.1.1 Preventative maintenance (2)

3.1.2 Routine maintenance (2)

3.2 Edge breaks can be one of many surface failures to asphalt roads.

3.2.1 Describe where edge break damage will occur. (1)

3.2.2 Identify TWO causes why edge breaks occur? (2)

3.3 Name TWO types of damage or failures where patching will be used as a repair method to repair a surfaced road? (2)

3.4 Lane closure during road works requires effective traffic management.

3.4.1 During what type of road works will lanes on the road be closed? (2)

3.4.2 Outline how traffic will be managed during lane closure on a double lane road or multi lane highway? (2)

3.5 State THREE important aspects why road reserve works will be implemented during and after construction of the road. (3)

3.6 Identify THREE activities that can be considered as a road maintenance. (3)

3.7 Road rehabilitation can be a cost-effective alternative to replacement.

3.7.1 Explain what road rehabilitation involves. (3)

3.7.2 When or at what stage will road rehabilitation be necessary? (2)

3.8 What does the acronym SANRAL stand for? (2)

3.9 What is the purpose for the following asphalt overlays?

3.9.1 Structural overlays (2)

3.9.2 Non-structural overlays (2)

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TOTAL: 100

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