higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

ROADS
NQF LEVEL 4

(12030534)

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09:00–12:00

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)
ROADS
NQF LEVEL 4
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: ROAD DRAINAGE

1.1 Inadequate surface drainage can lead to excess of water collecting or standing on the road carriageway.
This can lead to dangerous, unsafe and hazardous conditions to the road user in a vehicle which can cause the vehicle to aquaplane.

1.1.1 Explain what will occur between the tyres of a vehicle and the road surface during aquaplaning? (2)

1.1.2 What type of dangerous, unsafe and hazardous driver conditions can aquaplaning lead to? (3)

1.2 Identify where the following surface drainage systems will be constructed or found.

1.2.1 Kerbs (2)

1.2.2 Drifts (2)

1.3 Name any THREE parts or panels of a gabion unit. (3)

1.4 Outline FOUR important aspects that need to be in place when preparing the foundation for gabions before placing the gabions. (4)

1.5 Soil compaction is the process where a load or vibration is applied to the soil.
Differentiate between the following in terms of soil behavior.

1.5.1 Soil strength (2)

1.5.2 Voids (air space) and moisture content in the soil. (2)

1.6 State FOUR primary maintenance processes / activities a sub-surface drainage system will consist of? (4)

1.7 Name TWO different design shapes that are used to construct manhole shafts. (2)

1.8 What are the FOUR primary uses for geofabrics in sub-surface drainage systems? (4)
[30]

QUESTION 2: ROAD PAVEMENT

2.1 Name the primary type of road surfacing material that will be used for the following types of road pavements.

2.1.1 Rigid pavements

2.1.2 Flexible pavements

(2 × 2) (4)

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2.2 Before casting concrete one has to perform a quality test of the concrete. What will the slump test check and test for in the quality concrete? (2)

2.3 Name the THREE commonly used concrete block paving patterns that are used to lay interlocking block pavements. (3)

2.4 Concrete block paving consists of different types of layer works. What are the material requirements for bedding sand? (2)

2.5 State FOUR important functions of an edge restraint. (4)

2.6 State FIVE precautionary measures to consider when replacing and removing damaged concrete block paving for maintenance. (5)

2.7 List THREE personal protective clothing items that must be worn to minimize the risk of burns when working with heated asphalt. (3)

2.8 The composition and/or manufacturing of bitumen and tar is very different from one another.

2.8.1 Describe what is bitumen? (2)

2.8.2 Outline how bitumen is obtained from a petroleum production plant. (3)

2.9 State FOUR advantages of gap-graded asphalt. (4)

2.10 Name TWO types of plant that are used in the manufacture of asphalt. (2)

2.11 Explain what the process of re-sealing or seal coating an existing asphalt road surface will consists of. (2)

2.12 State FOUR reasons why it is necessary to seal an asphalt road. (4)

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QUESTION 3: ROAD MAINTENANCE AND REHABILITATION

3.1 Explain and differentiate between the following types of road damages or failures that can occur to a road surface.

3.1.1 The type of damage caused by edge breaks.

3.1.2 The type of damage caused by potholes

3.1.3 The type of failures where partial patching will be applied.

(3 × 2) (6)

3.2 When working on roads can be hazardous and dangerous while vehicles are passing through the designated work area of a traffic control management system.
Identify FOUR purposes that temporary road furniture will serve and provide to the motorist during such a traffic control management system. (4)

3.3 Name FIVE types maintenance activities that can be done inside the road reserve. (5)

3.4 Differentiate between the following concepts:

3.4.1 Road maintenance

3.4.2 Road rehabilitation

3.4.3 Road reconstruction

(3 × 2) (6)

3.5 Apart of road maintenance and road rehabilitation, what is the top priority of SANRAL in terms of the road user in SA? (2)

3.6 PPC overlays or “white topping” is a rehabilitation method used on flexible pavements.
Briefly outline what an overlaid PPC layer will provide to a flexible pavement. (3)

3.7 In what type of situations will full depth repair of concrete roads be done? (2)

3.8 Name TWO reasons why joints are necessary in concrete roads. (2)

[30]

TOTAL: 100

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