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

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

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QUESTION 1: ROAD DRAINAGE

1.1 Various options are given as possible answers to the following question. Choose the answer and write only the letter (A-C) next to the question number (1.1.1 – 1.1.5) in the ANSWER BOOK

1.1.1 Drainage refers to the _____ removal of surface water from a specific area.

A eroded
B natural
C aquaplain

1.1.2 The cut-off drain can also be used as a _____ drain.

A road camber
B scour
C catch water

1.1.3 _____ means when water slowly erodes away soil around the base or support column of a bridge.

A Scour
B Chainage
C Pave

1.1.4 _____ directs or channels storm water away from the road surface to a suitable collection point away from the road.

A Cross fall
B Road drainage
C Erosion control

1.1.5 _____ is a woven fabric that will allow water to pass through it but will prevent soil from passing through it.

A Geotextile fabric
B Perforation
C Slotted pipe

(5 × 1) (5)

1.2 List THREE major elements that a proper road drainage system should consist of. (3)

1.3 Describe the type of environment and where the following types of longitudinal side drains will be used:

1.3.1 V-shaped drain (3)

1.3.2 Flat bottom drain (3)

1.3.3 Covered drains (2)

1.4 Road safety is of utmost importance to the road user during wet conditions.

1.4.1 Explain what causes a vehicle to aquaplane on a wet road surface. (2)

1.4.2 What are the unsafe vehicle driving consequences that aquaplaning may lead to? (2)

1.5 A bridge is a structure built to span a valley, road, rail road, body of water or other physical obstacle in order to provides passage over the obstacle. (3)

State THREE design factors the bridge will depend on.

1.6 State THREE essential functions of a gabion. (3)

1.7 Name TWO types of filler material that can be placed around a slotted agricultural drain pipe in an underground drainage system. (2)

1.8 Explain the function of a manhole. (2)

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QUESTION 2: ROAD PAVEMENTS

2.1 The pavement structure of a flexible pavement consists of several courses or layers of materials, which provides the pavement with the required stiffness.

2.1.1 List the characteristics the surface course of a flexible pavement will provide. (3)

2.1.2 Name the type of aggregates the base course is usually constructed from. (3)

2.1.3 What is the function of the sub-base course? (3)

2.2 List the THREE basic courses/layers that a rigid pavement will consist of. (3)

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2.3 Describe the type of plant/equipment that can be used to construct the following type of pavements:

2.3.1 Fixed-form pavement (2)

2.3.2 Slip-form pavement (1)

2.4 Describe the different shapes of the following types of concrete paving blocks commonly used in South Africa:

2.4.1 Type 5-A (2)

2.4.2 Type 5-B (2)

2.4.3 Type 5-C (2)

2.5 List FOUR examples of applications where concrete blocks can be used for commercial projects. (4)

2.6 List THREE common health and safety risks when working with hot bitumen. (3)

2.7 Name THREE types of bitumen binders that are commonly used during road construction. (3)

2.8 List THREE types of asphalt commonly used as surfacing material. (3)

2.9 Name TWO different types of plant and equipment that are used in placing and compacting asphalt. (3)

2.10 State THREE advantages of using surfacing seals when resealing existing bituminous roads. (3)

[40]

QUESTION 3: ROAD MAINTENANCE AND REHABILITATION

3.1 Differentiate between the following two non-structural failures on roads:

3.1.1 Surfacing failures (2)

3.1.2 Potholes (2)

3.2 An example of the structural failures on roads is pavement failures.

Explain what these pavement failures may consist of. (3)

3.3 List any FIVE areas/zones that will form part of a stop-and-go traffic management system while road works are in progress. (5)

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3.4 What does culvert cleaning during road maintenance involve or consist of? (3)

3.5 Discuss the aim or reason for the following:

3.5.1 Road maintenance (2)

3.5.2 Road rehabilitation (2)

3.6 State FOUR main reasons why it is important to control and maintain grass cutting along the verge of a road. (4)

3.7 Explain FOUR criteria to consider when deciding whether to use thin composite white-topping as rehabilitation alternative. (4)

3.8 When is remixing required during the process of asphalt recycling? (3)

[30]

TOTAL: 100

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