higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

# NATIONAL CERTIFICATE (VOCATIONAL)

## CONCRETE STRUCTURES
### NQF LEVEL 3

(1201053)

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

**This question paper consists of 6 pages.**

371Q1N2216

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**TIME: 3 HOURS**
**MARKS: 100**

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

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## QUESTION 1: THE THEORY AND USE OF REINFORCED CONCRETE

1.1 Indicate whether the following statements are TRUE OR FALSE by writing only 'True' or 'False' next to the question number (1.1.1–1.1.10) in the ANSWER BOOK.

1.1.1 A compressive force is a pushing or a squashing force that tries to push the molecules in a material.

1.1.2 The compressive strength of concrete is its ability to carry a heavy load.

1.1.3 A tensile force is a stretching force that tries to push the structures in material further apart.

1.1.4 The tensile strength of concrete is its ability not to break when it is being pulled apart.

1.1.5 Bond failure occurs because of the aggregates used for concrete.

1.1.6 When concrete is contaminated with the oil on the form face material, it will increase the strength of concrete.

1.1.7 Concrete cracks when exposed to tensile stress caused by a load.

1.1.8 Corrosion is the process that helps concrete to cure.

1.1.9 A specification is a detailed document that shows the site view and elevation of structures.

1.1.10 Bearing failure can occur when the bearing (or support) area is too small or too weak to carry the load.

(10 × 1) (10)

1.2 Make a neat, labelled drawing of a raft foundation under a vertical load. (5)

1.3 A retaining wall gives support to a slope or where the ground level has to step.

Make a neat, labelled sketch of a cantilever retaining wall under a load. (5)

1.4 Make a neat, labelled drawing of a pile foundation under a vertical load. (5)

**[25]**

## QUESTION 2: REINFORCED CONCRETE IN CONSTRUCTION

2.1 Describe the reason for cutting reinforcing bars into short lengths. (2)

2.2 Discuss the following terms related to cold-drawn and cold-rolled steel:

2.2.1 Drawing

2.2.2 Deep drawing

2.2.3 Cold rolling

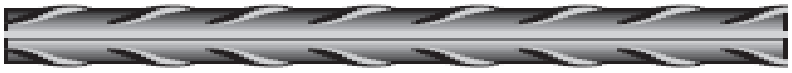
2.2.4 Pressing

2.2.5 Cold working

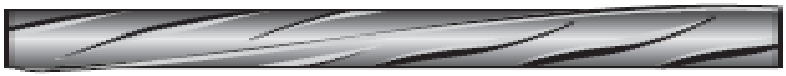
(5 × 2) (10)

2.3 Discuss the patterns of high-tensile and deformed mild steel bars made in South Africa shown below.

2.3.1



2.3.2



2.3.3



(3 × 2) (6)

2.4 Briefly explain what you understand by the term *welded steel.* (1)

2.5 List THREE advantages and THREE disadvantages of using steel mesh. (6)

**[25]**

## QUESTION 3: REINFORCING DOCUMENTATION

3.1 Explain the following terms:

3.1.1 Bar mark

3.1.2 Member

3.1.3 Shape code

3.1.4 Bending schedule

3.1.5 Convention

(5 × 1) (5)

3.2 Redraw the following table. Draw the lines and fill in the missing information.

| NO. | DESCRIPTION | LINE | GENERAL APPLICATION |
|---|---|---|---|
| 3.2.1 | Continuous thick lines | (a) … | (b) … |
| 3.2.2 | Continuous thin lines | (c) … | (d) … |
| 3.2.3 | Broken lines | (e) … | (f) … |
| 3.2.4 | Chain dotted lines | (g) … | (h) … |
| 3.2.5 | Shaded portions or hatched areas | (i) … | (j) … |

(10)

3.3 With the help of neat drawings, show examples of the following symbols:

3.3.1 EW

3.3.2 ABR

3.3.3 ALT

3.3.4 STG

3.3.5 TOG

(5 × 2) (10)
**[25]**

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## QUESTION 4: FABRICATION OF REINFORCING STEEL

| | | |
|---|---|---|
| 4.1 | List THREE documents that are commonly used in the steelyard. | (3) |
| 4.2 | Explain the step-by-step procedure that is used for cutting steel. | (7) |
| 4.3 | When the steel arrives from the mill, the steel cutter cuts it according to the customer's specification.<br><br>List FOUR duties of the steel cutter that must be performed before cutting the steel. | (4) |
| 4.4 | Describe SEVEN duties of a steel fixer in the steelyard. | (7) |
| 4.5 | Give TWO reasons why spacers are important in fixing reinforcement. | (2) |
| 4.6 | Give TWO reasons why reinforcing steel should be cleaned before it is assembled. | (2) |
| | | **[25]** |
| | **TOTAL:** | **100** |

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