higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

CONCRETE STRUCTURES
NQF LEVEL 3

(12020343)

27 November 2023 (X-paper)
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)
CONCRETE STRUCTURES
NQF LEVEL 3
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.
6. Draw all diagrams neatly.

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QUESTION 1: THE THEORY AND USE OF REINFORCED CONCRETE

1.1 Illustrate by means of TWO sketches the difference between a cantilever beam and a cantilever retaining wall. Show the following:

- Tensile forces
- Compressive forces
- Tension steel reinforcement (18)

1.2 Below is a list of reasons why concrete cracks or collapses.

Give a short description for each of the following reasons:

1.2.1 Corrosion (2)

1.2.2 Restraint (2)

1.2.3 Settlement (1)

1.2.4 Thermal shrinkage (2)

[25]

QUESTION 2: REINFORCED CONCRETE IN CONSTRUCTION

2.1 Choose an item or word from COLUMN B that matches a description in COLUMN A. Write only the letter (A−F) next to the question number (2.1.1−2.1.5) in in the ANSWER BOOK.

COLUMN A		COLUMN B	
2.1.1	A process of increasing the strength of concrete by installing steel bars or wire mesh or strands of glass reinforced plastic in the concrete or before casting concrete	A	cold rolling
2.1.2	Steel that has high carbon context and high strength, but the steel is very brittle	B	reinforcement concrete
2.1.3	Steel that is made up of iron with less than 30% carbon and that can be easily cut, bent or welded	C	high-yield steel
2.1.4	Changing the shape and size of a metal at room temperature	D	mild steel
2.1.5	Metalwork process in which metal is changed by passing it through rollers at a low temperature	E	cold working
		F	sheet metal drawing

(5 × 1) (5)

2.2 Define the term *cold working.* (2)

2.3 Name and briefly discuss FOUR methods of cold working. (4 × 2) (8)

2.4 Give FIVE methods to protect reinforced steel in concrete against corrosion. (5)

2.5 Name FIVE disadvantages of using steel mesh as reinforcement. (5)
[25]

QUESTION 3: REINFORCING DOCUMENTATION

3.1 Write out each one of the symbols mentioned in 3.1.1 and 3.1.2 in full where reinforcing bars should be placed. Write only the answer next to the question number (3.1.1–3.1.2) in the ASWER BOOK.

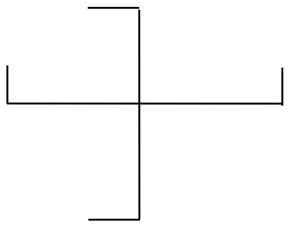
3.1.1 ABR

3.1.2 B

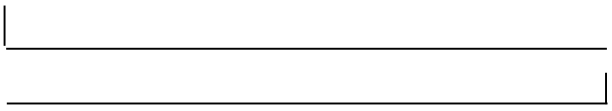
(2 × 1) (2)

3.2 The following symbols are used when reinforcement bars have to be placed. Write down the meaning of each symbol in full:

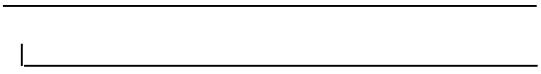
3.2.1



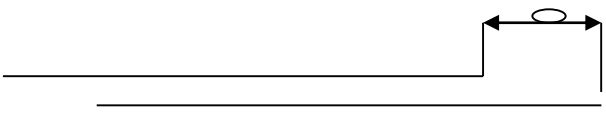
3.2.2



3.2.3



3.2.4



(4 × 2) (8)

3.3 Use the information given in FIGURE 1 below and make TWO neat cross-sectional drawings of the concrete beam at AA and BB to show the hidden bars and detail in FIGURE 1. The drawings must include the placing of the beams. All the details and labels must be included.

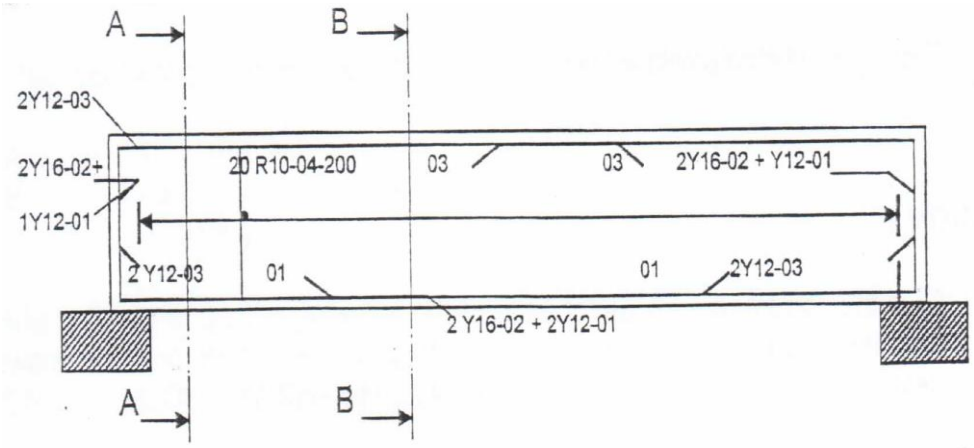


FIGURE 1

(15)
[25]

QUESTION 4: FABRICATION OF REINFORCING STEEL

4.1 Explain step-by-step the correct procedure used for cutting steel. (7)

4.2 Make TWO neat drawings to show the TWO methods of splicing recommended by the SANS 10144. (10)

4.3 Study the bar label in FIGURE 2 carefully and answer the questions related to the figure:

No: 08 **No, labels: 4**
Cutting Sheet No: H25251
WALL FOOTINGS
ABC Contractors **Contract: 7707**
HAT
Dom REIF.
Drawing No: 04
Bar Mark:137

243 R16 4250



FIGURE 2

4.3.1 Who is the buyer?

4.3.2 What is the bar mark?

4.3.3 How many steel bars are there?

4.3.4 What is the shape code number of this steel profile?

4.3.5 What is the grade and diameter of the steel?

4.3.6 What is the cutting length of the steel?

4.3.7 Where will you place these bars in the building project?

(7 × 1) (7)

4.4 When the steel arrives from the mill, the steel cutter cuts according to the customer's specifications.

Name ONE duty of the steel cutter that must be performed before cutting the steel. (1)

[25]

TOTAL: 100

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