higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

CONCRETE STRUCTURES
NQF LEVEL 3

(12020343)

7 December 2020 (X-paper)
09:00–12:00

This question paper consists of 7 pages.

329Q1N2007

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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. Write neatly and legibly.

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QUESTION 1: THE THEORY AND USE OF REINFORCED CONCRETE

1.1 Neatly draw a cross section of piles and a pile cap with a column on top. (10)

1.2

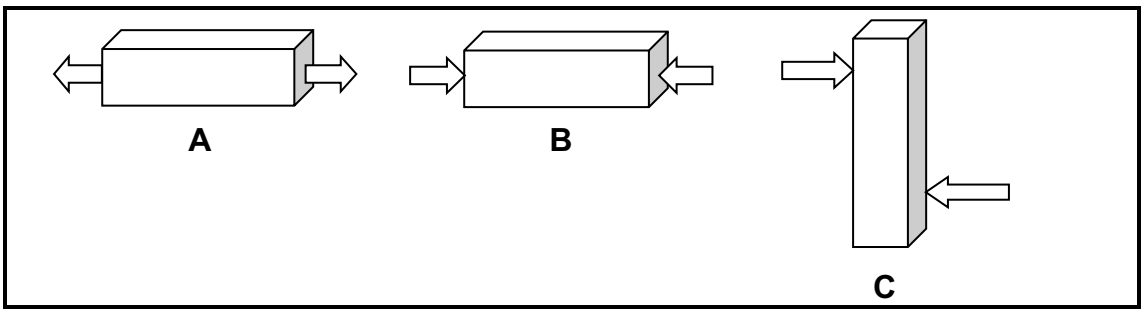

FIGURE 1

Identify the types of forces acting on each of the structures in FIGURE 1 by writing only the answer next to the letter (A–C) in the ANSWER BOOK. (3 × 1) (3)

1.3 Make a neat, labelled sketch of a cantilever retaining wall. (6)

1.4 FIGURE 2 shows a fixed beam between two supports that must be reinforced as a lot of stress occurs where the beam is fixed to a wall.



FIGURE 2

Show by means of a diagram how to reinforce the beam to work against tensile and shear stress. Redraw the diagram and reinforce the structure. (6)

[25]

QUESTION 2: REINFORCED CONCRETE IN CONSTRUCTION

2.1 Choose a term 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 the ANSWER BOOK.

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

(5 × 1) (5)

2.2 Name and explain TWO types of cold drawing. (2 × 2) (4)

2.3 List and explain FOUR symbols used to designate different types of reinforced steel. (4 × 2) (8)

2.4 List THREE commonly used sizes/nominal diameters of reinforcement. (3)

2.5 Give FIVE factors to consider when adding fibre to concrete. (5)

[25]

QUESTION 3: REINFORCING DOCUMENTATION

3.1 Copy and complete the following bending schedule by choosing a heading from the list below.

bar mark; bars per member; total bars; total length; shape code

A	B	C	D	E	F	G	H			
Member							Bending dimensions			
			Type/ diameter				A	B	C	D

(5 × 1) (5)

3.2 Use the information below to complete the bending schedule copied in QUESTION 3.1.

3.2.1 The bars must be cut according to shape code 32. (2)

3.2.2 Bars are needed for six beams✓. Each beam must have FOUR✓ high-yield✓ steel 16 mm✓ bars and SIX✓ plain mild steel 8 mm✓ bars. (6)

3.2.3 Each of the 16 mm bars must have a straight length of 600 mm. The unbent length of these bars must be 900 mm. (2)

3.2.4 Each of the mild steel bars must have a straight length of 800 mm. The unbent lengths of these bars must be 1 200 mm. (2)

3.2.5 The high-yield bars have a bar mark of 25. The bar mark for the mild steel bars is 26. (2)

3.2.6 Calculate the total number of bars for each type. (2)

3.3 Explain each of the following symbols that show where reinforced bars should be placed:

3.3.1 TOG

3.3.2 TOC

3.3.3 EF

3.3.4 HC

(4 × 1) (4)

[25]

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QUESTION 4: FABRICATION OF REINFORCING STEEL

4.1

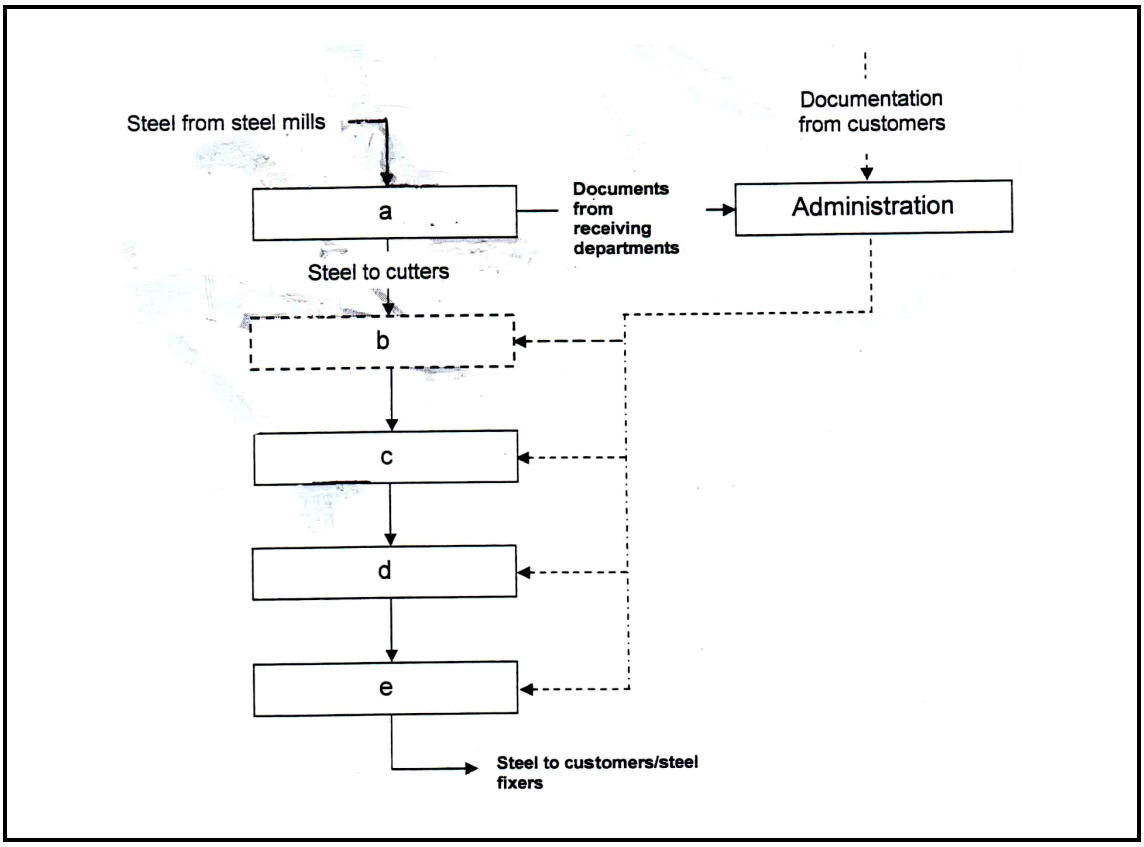

FIGURE 3

Complete the steel-yard process shown in FIGURE 3 by writing only the answer next to the letter (a–e) in the ANSWER BOOK. (5 × 1) (5)

4.2 Redraw the following table about documents used in a steel yard and explain the purpose, use and information of each type of document.

TYPE OF DOCUMENT	PURPOSE	USED BY	INFORMATION
Cutting and bending sheet	(2)	(1)	(1)
Bar label	(1)	(1)	(1)
Delivery note	(1)	(1)	(1)

(10)

4.3 Make a neat drawing of a bar label showing the following:



- Buyer: Mr Pitso
- Bar mark: 15
- Number of pieces: 20
- Shape: SABS code 43
- Cutting length: 1 200
- Grade and diameter of steel: R16

(10)
[25]

TOTAL: 100

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