higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

CONCRETE STRUCTURES
NQF LEVEL 3

(12020343)

9 March 2018 (X-Paper)
09:00–12:00

Calculators may be used.

This question paper consists of 7 pages and 1 answer sheet.

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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: THEORY AND USE OF REINFORCED CONCRETE

1.1 FIGURE 1 shows a concrete beam with support on both sides. Different loads and forces act on and in the beam under normal conditions.

Name the forces as indicated in FIGURE 1.

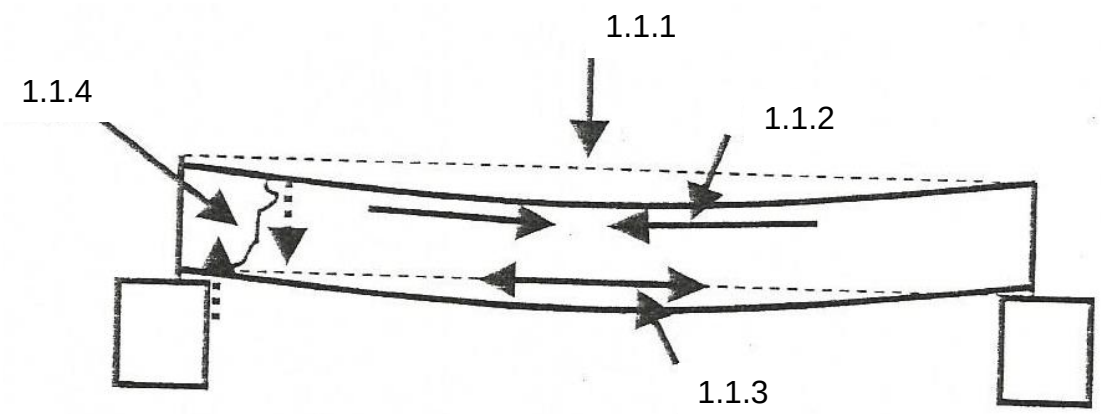

FIGURE 1 (4 x 1) (4)

1.2 Give a reason for each of the following factors that will cause the concrete to crack or collapse:

1.2.1 Bond failure (1)

1.2.2 Bearing failure (1)

1.2.3 Corrosion (2)

1.2.4 Restraint (2)

1.2.5 Settlement (1)

1.2.6 Thermal shrinkage (2)

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1.3 Choose ONE word/term from the list below for each of the following descriptions. Write only the word/term next to the question number (1.3.1–1.3.4) in the ANSWER BOOK.

lateral; direct; ground; compressive; suspended; tensile

1.3.1 In a cantilever, the (a) … stress is in the upper part, while the lower section of the cantilever is under (b) … stress. (2)

1.3.2 There are two types of slabs: (a) … slabs which lie on the ground and (b) … slabs which hang in the air. (2)

1.3.3 Columns come under … compressive loads. (1)

1.3.4 A cantilever retaining wall comes under … earth pressure. (1)

1.4 Make use of simple drawings and an explanation if required to explain the change in a column under load:

1.4.1 If there is no reinforcement in the column

1.4.2 If there are no stirrups in the reinforced column

(2 × 3) (6)
[25]

QUESTION 2: REINFORCED CONCRETE IN CONSTRUCTION

2.1 Describe the possibility of using reinforcing bars that were cut into short lengths. (2)

2.2 Discuss the following terms of 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)

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2.3 Discuss the following patterns that are found in high-tensile and mild-deformed bars made in South Africa:

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 State THREE advantages and THREE disadvantages of using steel mesh. (6)
[25]

QUESTION 3: REINFORCING DOCUMENTATION

3.1 A bending schedule is shown in FIGURE 2 below. Choose the headings that are left out, from the following list. Write the headings in the correct spaces on the ANSWER SHEET (attached), e.g. Type/diameter:

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

FIGURE 2 (5)

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3.2 Use the following information for rebars to be used to reinforce beams in a construction project, to complete the bending schedule on the ANSWER SHEET (attached) that you used to answer QUESTION 3.1.

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

3.2.2 You need bars for six beams. Each beam must have 4 high-yield steel 16 mm bars and 6 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 Give the meaning of each of the following symbols which 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 Name THREE documents that are commonly used in the steelyard. (3)

4.2 Explain step-by-step, the procedure used for cutting steel. (7)

4.3 When the steel arrives from the mill, the steel cutter cuts the steel according to the customers' specifications.

State FOUR duties that the steel cutter must perform before cutting the steel. (4)

4.4 Describe SEVEN duties of the steel fixer in the steel yard. (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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ANSWER SHEET

EXAMINATION NUMBER:

CENTRE NUMBER:

QUESTION 3

3.1

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

(5)

3.2

(16)

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