higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

CONCRETE STRUCTURES
NQF LEVEL 3

(12020343)

10 March 2020 (X-paper)
09:00–12:00

This question paper consists of 5 pages and 2 addenda.

373Q1S2010

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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 Draw a cross section of piles and a pile cap with a column on top. (16)

1.2 Give ONE reason for each of the following causes of cracking or collapsing concrete:

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)

[25]

QUESTION 2: REINFORCED CONCRETE IN CONSTRUCTION

2.1 Explain why reinforcing bars are cut to shorter lengths. (2)

2.2 Explain each of 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 Give SIX reasons why steel is used as reinforcement in concrete structures. (6)

2.4 Briefly explain the term *welded steel*. (1)

2.5 Give THREE advantages and THREE disadvantages of using steel mesh.

(3 + 3) (6)

[25]

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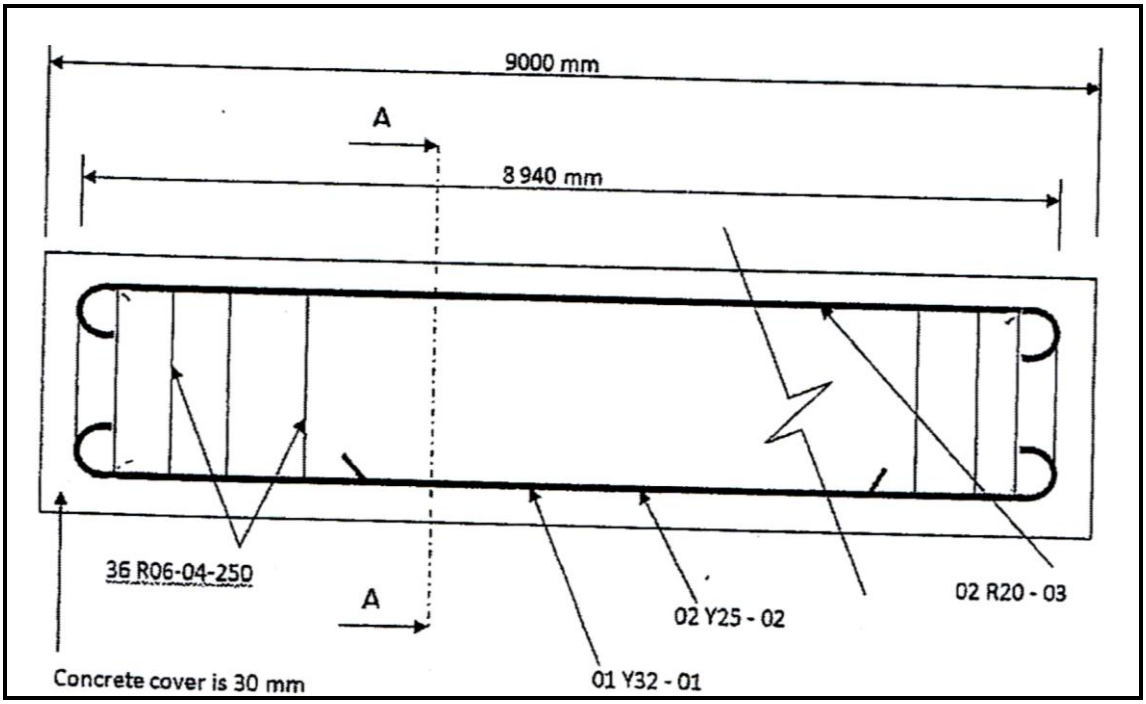
QUESTION 3: REINFORCING DOCUMENTATION

3.1 List THREE pieces of information regarding reinforcing bars to give to the steel supplier when ordering reinforcement. (3)

3.2 Shown below is a reinforced concrete beam of 400 mm × 550 mm × 9 000 mm.

Use the summary of SABS 82 Shape Codes: SANS 282:2004 edition 5.1 on ADDENDUM A (attached), as well as the specifications and steel codes of the drawing below to complete the bending schedule for FOUR similar reinforced concrete beams on ADDENDUM B (attached).



Use the following specifications to complete the bending schedule:

- The shape code for bar mark number 1 is 20.
- The shape code for bar mark number 2 and 3 is 33.
- The shape code for bar mark number 4 is 72.
- The tolerance for code 20 should be zero millimetres.
- The hook distance for code 33 is 130 mm per hook.
- The hook distance for code 72 is 85 mm per hook.
- Bar mark number 1 is situated in the bottom centre of the beam. (20)

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

3.3.1 TOG

3.3.2 TOC

(2 × 1) (2)

[25]

QUESTION 4: FABRICATION OF REINFORCING STEEL

4.1 List THREE documents commonly used in a steelyard. (3)

4.2 Explain the steel bending procedure step-by-step. (8)

4.3 List FOUR duties of a steel cutter that must be performed before cutting steel. (4)

4.4 Explain SEVEN duties of a steel fixer in a steelyard. (7)

4.5 Give TWO reasons why spacers are important in fixing reinforcement. (2)

4.6 Give ONE reason why reinforcing steel should be cleaned before being assembled. (1)

[25]

TOTAL: 100

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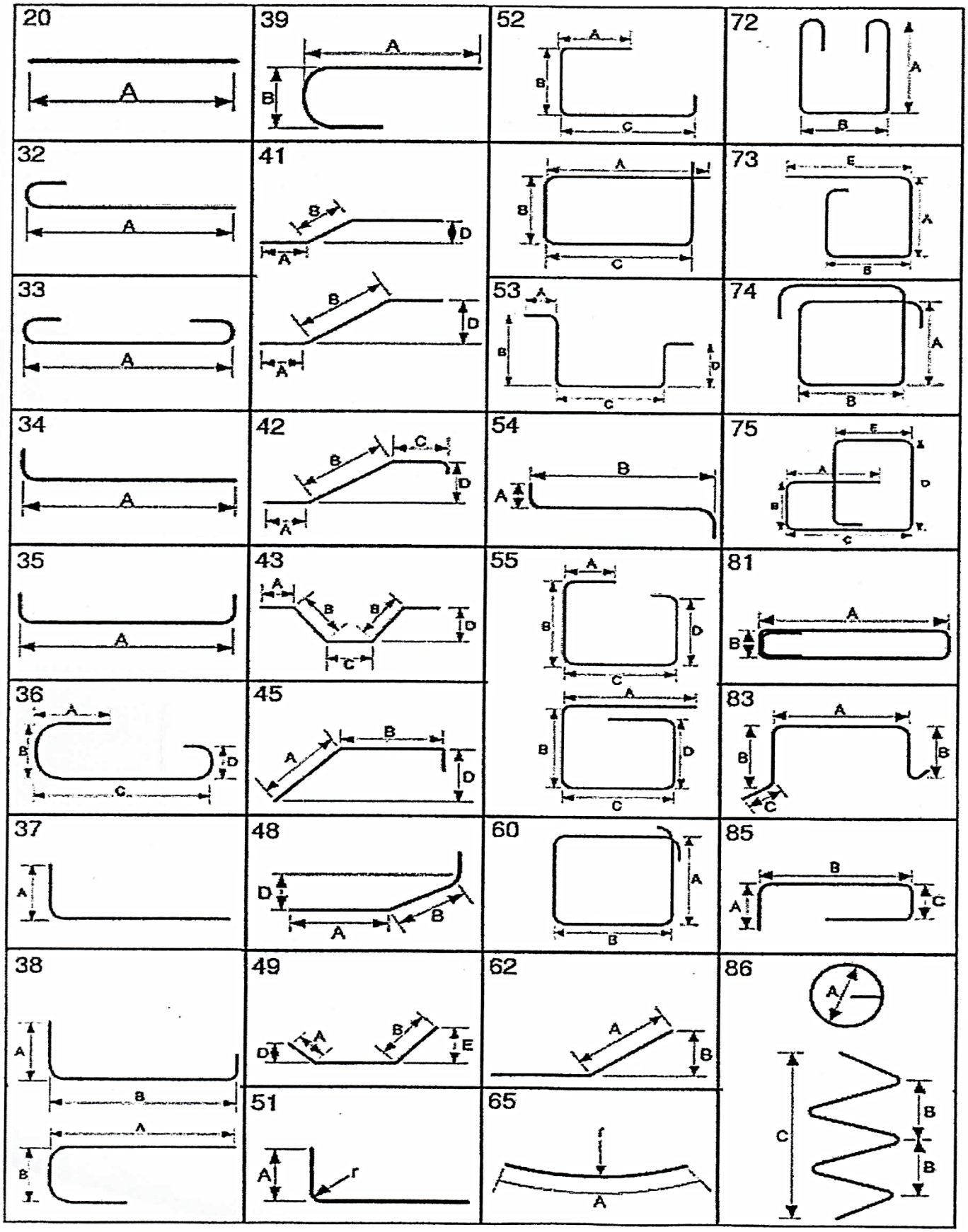
ADDENDUM A

SABS 82 SHAPE CODE



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ADDENDUM B **EXAMINATION NUMBER:** _____

A	B	C	D	E	F	G	H			
Member							Bending dimensions			
	Bars per member	Total bars	Type/ diameter	Bar mark	Shape code	Total length	A	B	C	D
							8940			
							8940			
							8940			
							490	340		

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