higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

CIVIL AND STRUCTURAL STEEL WORK DETAILING
NQF LEVEL 2

(12050652)

1 March 2018 (X-Paper)
09:00–12:00

REQUIREMENTS: **A3 drawing paper**

Calculators may be used.
Candidates need drawing instruments.

This question paper consists of 6 pages.

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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. Start each question on a NEW page.
5. Rule off across the page on completion of each question.
6. Drawings and sketches must be made BIG enough to show detail.
7. Fully dimension and label ALL drawings.
8. Write neatly and legibly.

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QUESTION 1: INTRODUCTION TO CIVIL AND STRUCTURAL STEEL WORK

1.1 To understand basic communication of the civil engineering community and to be effective in the field, one needs to understand and use appropriate language and terminology.

Define the following terms:

1.1.1 Chemical composition

1.1.2 Moment of inertia

1.1.3 Ingot

1.1.4 Structural steel

(4 × 1) (4)

1.2 Sketch an H-section and label the following components: flange width, flange thickness, web depth, web thickness and beam depth (8)

1.3 Identify FOUR constituents of paint. (4)

1.4 Construction projects need to be handled efficiently and effectively for it to be finished on time. In order for this to be achieved, different role players are required.

List FOUR key role players in a construction project. (4)

1.5 Explain the roles of a mortgage lender and a deeds office and how they relate to construction. (4)

1.6 Describe the importance of steel erection marks. (2)

1.7 In the table below is a list of abbreviations generally used for structural steel work applications.

Identify the components and materials represented by the abbreviations. Write only the answer next to the question number (1.7.1–1.7.5) in the ANSWER BOOK.

COMPONENT	ABBREVIATION ON PLAN
1.7.1	ms.
1.7.2	Upvc.
1.7.3	RWP
1.7.4	DRG
1.7.5	Conc.

(5 × 1) (5)

1.8 Differentiate between *two-dimensional views* and *three-dimensional views* with regard to drawing. (2)

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1.9 State THREE advantages of using a universal drawing system. (3)

1.10 Explain the differences between *concrete drawings* and *reinforcing drawings*. (4)
[40]

QUESTION 2: STRUCTURAL STEEL WORK AND REINFORCED CONCRETE

2.1 Give ONE advantage of knowing properties of various steel members used in construction. (2)

2.2 Name the FOUR forming processes of structural steel manufacturing. (4)

2.3 Give a brief description of mechanical properties of steel. (2)

2.4 Cold rolling has a significant effect on the mechanical properties of steel.

Outline THREE of these properties and give the main disadvantage of cold rolling steel. (4)

2.5 Concrete does not damage or burn easily in fire. It is usually used for fireproof vaults.

Outline FIVE main determinants of the fire resistance of concrete. (5)

2.6 Describe how Portland cement is produced. (3)

2.7 Explain why reinforcement used on concrete should be free from contaminants such as grease, oil and millscale. (2)

2.8 Name ONE cleaning agent that can be used to clean oiled steel. (1)

2.9 Describe the purpose of a bending schedule. (2)

2.10 Although bars are very common in concrete reinforcement, they are not the only reinforcement available.

Describe THREE other materials used in reinforcement and their application. (6)

2.11 Define the following terms:

2.11.1 Elongation

2.11.2 Malleability

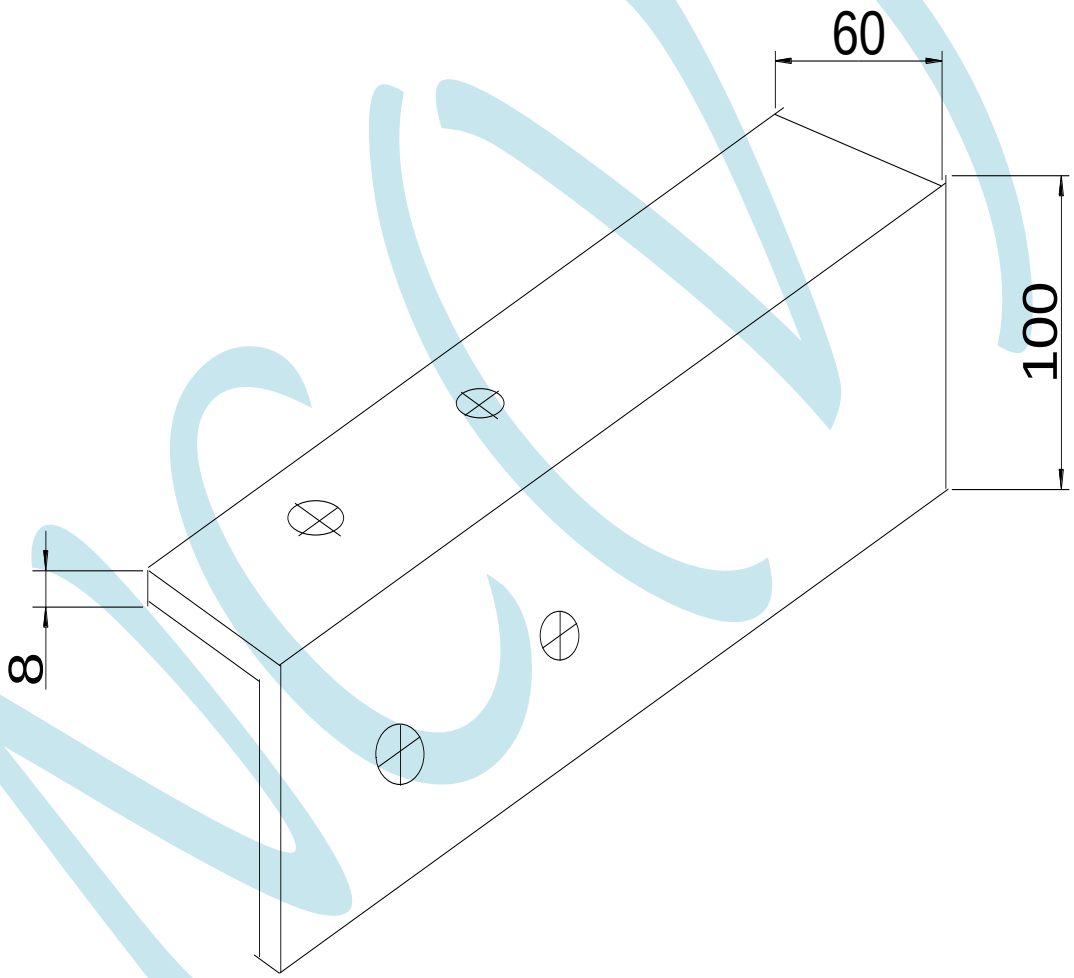
(2 × 2) (4)

2.12 Give FIVE advantages of using steel. (5)
[40]

QUESTION 3: BOLTS IN STRUCTURAL STEEL WORK

3.1 The FIGURE below shows an angle section.

Copy the drawing to any scale and label the following: end distance, pitch, heel, back mark, edge distance and toe.



(8)

3.2 Differentiate between the terms *pitch* and *gauge*. (2)

[10]

QUESTION 4: WELDING SYMBOLS AND JOINTS

4.1 Explain the main purpose of welding symbols on a drawing. (1)

4.2 Outline the differences between a *weld symbol* and a *welding symbol*. (2)

4.3 Make sketches of the following welding symbols:

4.3.1 Seam welding symbol

4.3.2 Stud welding symbol

(2 × 2) (4)

4.4 Name THREE parts of a welding symbol. (3)

[10]

TOTAL: 100

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