higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL CONSTRUCTION N4

(8060004)

25 November 2022 (X-paper)
09:00–13:00

CLOSED-BOOK EXAMINATION

REQUIREMENTS: **ONE A2 drawing paper**

NO answer books allowed

Hot-rolled steel sections (BOE 8/2)

This question paper consists of 4 pages.

237Q1E2225

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
BUILDING AND STRUCTURAL CONSTRUCTION N4
TIME: 4 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Read all the questions carefully.

2. Layout of answers are important. Use BOTH sides of the drawing paper.

3. Answer all the questions. The following must be strictly applied:

   Question 1, 2 and 3.1 must be done on the FRONT of the drawing paper.
   Question 4 and 5 must be done on the BACK of the drawing paper.
   Question 3.2 and 6 must be neatly printed on the drawing paper.
   (DO NOT use an ANSWER BOOK)

4. Number the answers according to the numbering system used in this question paper.

5. All drawings and labels must be done in pencil with bold outlines.

6. All written answers and labels must be neatly printed in pencil on the drawing paper.

7. The drawings must be done in accordance to national standards and be fully labelled with descriptive notes and dimensions.

8. Write neatly and legibly.

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QUESTION 1

A typical steel roof for a factory is to be constructed of rolled steel angles to form a W-pattern truss with a pitch of 30°.

Draw, to scale 1:5, a sectional front view of the detail at the ridge of the steel roof. The truss members will be made up of 100 × 100 × 12 mm rolled steel (RS) angle rafters and TWO 50 × 50 × 6 mm RS angle struts which will be connected to a 10 mm thick gusset plate.

The fibre-cement corrugated roofing sheets will be fixed to 75 × 50 mm timber purlins bolted to 70 × 70 × 12 mm angles welded to the top of the rafters. The ridge of the roof will be closed using TWO fibre-cement ridge-capping pieces.

Use the following bolt specifications:

TWO rafters : 4 M16 bolts spaced at 80 mm centres with an edge distance of 35 mm.

TWO struts : 2 M16 bolts spaced at 130 mm centres with an edge distance of 35 mm.

FOUR purlins : M16 bolt

Do NOT draw the bolts, but draw the bolt holes and centre lines. The completed drawings must include all labels and key symbols.

[20]

QUESTION 2

Draw, to scale 1:5, a horizontal section through a single rebated steel doorframe built into a 270 mm wide cavity brick wall with the stop end near the back of the doorframe. The wall is plastered on both sides. Show the position of the double fixing lug as well as part of the door in the rebate.

[10]

QUESTION 3

Draw, to scale 1:10, the isometric view of a one-and-a-half brick corner built in English bond. Both projections must be approximately 1 100 mm long.

[15]

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QUESTION 4

4.1 Explain the process involved when constructing a suspended concrete floor. (10)

4.2 Give FIVE advantages of a suspended concrete floor. (10)
[20]

QUESTION 5

Draw, to scale 1:10, the front elevation of a gauged segmental arch, one and a half bricks deep. The arch span is 1 200 mm and the rise is one sixth of the span. Only half of the brickwork in the arch must be shown. The remaining half of the arch must clearly illustrate the construction method used. **[15]**

QUESTION 6

A 330 mm wide foundation wall is supported on a 630 × 300 mm thick concrete foundation to form a sub-basement. The ground level is 525 mm above the top of the foundation and the damp-proof course level is 150 mm above the ground level. The basement wall is reduced to a 270 mm cavity wall SIX courses above the ground level by means of a plinth brick.

A 100 mm thick concrete floor is cast on top of the concrete foundation on the inside of the basement. The floor is finished off with a 25 mm screed and 100 mm cement skirting.

The inside walls of the basement will be coated with 19 mm cement plaster.

Draw, to scale 1:10, a vertical section through the basement wall. Show the position of the vertical and horizontal damp-proofing that would prevent any dampness from entering the basement. The completed drawing must include ALL labels, dimensions and key symbols. **[20]**

TOTAL: 100

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