higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL CONSTRUCTION N4

(8060004)

19 April 2021 (X-paper)
09:00–13:00

CLOSED-BOOK EXAMINATION

REQUIREMENTS: **ONE A2 drawing sheet**
Hot-rolled steel sections (BOE 8/2)

Drawing instruments may be used.

This question paper consists of 5 pages.

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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. 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. Use both sides of the DRAWING SHEET. The following must be strictly adhered to:

   Answer QUESTIONS 1; 2; 5 and 6.1 on the front of the DRAWING SHEET. Answer QUESTIONS 3; 4.1; 4.2 and 6.2 on the back of the DRAWING SHEET. Neatly print all written answers on the DRAWING SHEET.

5. Make all drawings, labels and written answers in pencil with bold outlines.

6. The layout of answers is important.

7. The drawings must be done in accordance with National Standards and be fully labelled with descriptive notes and dimensions.

8. Work neatly.

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QUESTION 1

Draw, to scale 1:5, a horizontal section through a standard steel window built in the middle of a 270 mm cavity wall. The wall is plastered on the inside only. The external window sill is completed with brick-on-edge face bricks with a window board on the inside.

Clearly indicate:

Window:	Window frame, casement sash and glazing bar
Glass:	A 3 mm thick with glazing putty
Wall:	A 270 mm cavity with stop end at the window frame showing one wire tie
Waterproofing:	The damp-proof course attached to window fixing lug with joint sealer should be between the edge of the window and the wall.

The completed drawing must include all labels, dimensions and key symbols. **[15]**

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

A semicircular arch with a span of 1 500 mm must be constructed in a passageway.

Draw, to scale 1:10, the centring required to construct the archway. The centring consists of FOUR 32 mm thick ribs (TWO on each side) bolted to TWO 114 × 38 mm tie beams and a vertical strut. The top of the ribs is completed with 50 × 22 mm closed lagging. All joints will be bolted with M12 nuts and bolts. The springing line is in the centre of the tie beam. TWO 150 × 50 cross bearers on adjustable telescopic steel props are placed on 230 × 38 sleepers to support the centre.

The completed drawing must include all labels, key symbols and dimensions. **[15]**

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QUESTION 4

4.1 A 330 mm wide basement brick wall is supported on a 660 × 330 mm concrete foundation. The ground level is 1 350 mm above the top of the foundation.

The 110 × 110 mm ventilations shafts are constructed in the centre of the wall at 1 200 mm apart. A 150 mm thick concrete floor is cast on top of the inside foundation. The floor supports a four-course high, 110 mm wide honeycomb sleeper wall built 100 mm in from the basement wall. A 114 × 38 mm wall plate is placed on top of the wall to support a 150 × 50 mm thick floor joist and 150 × 22 mm tongue and groove flooring boards.

The inside of the basement wall is finished with 19 mm plaster and 75 × 22 skirting boards. A 220 × 150 mm air brick is placed THREE courses above the ground level where the ventilation shafts starts. The outlet of the shaft is in-line with the floor joists. Allow THREE courses of brickwork above the airbrick.

Draw, to scale 1:10, a vertical section through one of the ventilation shafts and floor construction. Clearly indicate the method of damp-proofing the basement on the drawing. The completed drawing must include all labels, dimensions and relevant key symbols. (20)

4.2 4.2.1 The honeycomb sleeper wall mentioned in QUESTION 4.1 must support the floor joists.

Draw, to scale 1:10, the front view of the honeycomb wall. (3)

4.2.2 Give ONE reason for using a ventilation shaft. (2)

[25]

QUESTION 5

Draw, to scale 1:10, an isometric view at the corner of a 550 mm wide cavity wall between a one-and-a-half-brick wall built in English bond and a half-brick wall built in stretcher bond.

The half-brick wall is built in front of the English bond wall. The half-brick wall is SIX bricks long and TWO brick courses high. The right-hand side is 1 430 mm long and the left-hand side SIX bricks long. The one-and-a-half-brick wall is FOUR brick courses high with a 110 mm cavity between the TWO walls. Show stopped ends at both the walls on the left-hand side. **[15]**

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QUESTION 6

6.1 A 30° framed timber roof is supported on a 114 × 38 mm wall plate secured to a 270 mm cavity brick wall. The roof overhangs the wall by 200 mm to form an open eave. A 19 mm fibre-cement fascia board is screwed to the ends of the rafters to which a plastic gutter and a rainwater pipe are hung. The flush ceiling consists of 6 mm skimmed Rhino boards nailed to 38 × 38 mm brandering at 400 centres with a 75 mm cornice.

Other details:

Roof covering: Galvanised roof covering on 75 × 50 purlins at 900 mm centres

Roof members: A 114 × 38 mm rafter, vertical strut and tie beam

Cavity wall: Plastered internally with the top FOUR courses built solid showing ONE tie wire

Draw, to scale 1:5, a vertical section through the wall to show the roof, ceiling and rainwater goods. Include all labels. (16)

6.2 Draw TWO neat drawings to show the profiles of the types of roof coverings:

6.2.1 IBR metal roof sheet

6.2.2 Big six fibre-cement roof sheet

(2 × 2) (4)

[20]

TOTAL: 100

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