higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

BUILDING DRAWING N3

(8090023)

8 April 2020 (X-paper)
09:00–13:00

REQUIREMENTS: ONE A2 drawing sheet

Calculators and drawing instruments may be used.

This question paper consists of 5 pages.

165Q1A2008

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
BUILDING DRAWING N3
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.
5. Make all drawings to the required scale.
6. Provide all drawings with an appropriate title and scale.
7. Write all labels in capital letters.
8. Make all drawings, including candidate's information, in pencil. An ink pen is not allowed.
9. Sketches and/or diagrams must be neat, reasonably large, in proportion and fully labelled.
10. Use your discretion where dimensions are not given.
11. All drawing work must comply with the relevant SANS (SABS) recommended codes.
12. All abbreviations and symbols must comply with the latest National Building Regulations and all relevant SANS (SABS) codes.
13. A balanced layout is very important and candidates will be penalised for poor planning.
14. Work neatly.

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QUESTION 1: PITCH ROOF WITH A PARAPET GUTTER AND PARAPET WALL

Parapets walls have a gutter fitted behind them. This type of gutter is also found behind a cornice with a single stone course above it. If the gutter is not properly tied into the wall, a build-up of water or snow in the gutter can cause the parapet wall to tumble.

Draw, to scale 1:20, a vertical section showing the detail construction of the parapet gutter, part of the wall, roof and ceiling fixed directly to the tie beam.

Specifications:

Roof:	30°
Roof members:	150 mm × 38 mm
Wall plate:	110 mm × 75 mm
Roof coverings:	Asbestos cement slates
Roof battens:	38 mm × 38 mm at 310 mm centres
External wall:	330 mm
Parapet wall:	220 mm
Parapet gutter:	260 mm
Blockboard:	19 mm
Tilting batten:	50 mm × 38 mm
Ceiling cover strips:	8 mm ceramic tiles
Ceiling insulation boards:	44 mm × 10 mm
Brandering:	38 mm × 38 mm at 400 mm centres

[20]

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QUESTION 2: CONSTRUCTION DETAILS OF A CASEMENT WINDOW FRAME

Draw, to scale 1:5, a vertical section showing the construction details of the bottom frame of a wooden casement window built into a cavity wall.

Specifications:

Wall thickness:	270 mm
Brick force:	SABS approved
Wall ties:	SABS
Damp-proof course:	375 microns
Sill:	125 mm × 75 mm
Fibre-cement internal sill:	120 mm × 12 mm
External sill:	Brick on edge
Bottom rail:	64 mm × 44 mm
Glass:	3 mm

[20]

QUESTION 3: REINFORCED CONCRETE SLAB AND BEAM

The first floor of a building consists of a reinforced concrete slab supported at both ends. The concrete slab is reinforced by main bars with alternate bars cranked up into the top of the slab over the beam. The centre of the reinforced concrete slab is supported by a T-beam.

Draw, to scale 1:10, a vertical cross section through the T-beam and show the adjoining sections of the first-floor slab.

Specifications:

Floor finish:	19 mm
Concrete slab:	100 mm thick
Concrete slab reinforcement	
Main bars:	Ø 12 mm at 200 mm centres
Distribution bars:	Ø 6 mm at 150 mm centres
T-beam:	200 mm × 300 mm
T-beam reinforcement	
Tensile bars:	3 × Ø 20 mm
Compressive bars:	2 × Ø 16 mm
Stirrups:	Ø 8 mm at 300 mm centres
Bars concrete cover:	25 mm

[15]

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QUESTION 4: PLUMBING

Produce a neat, proportional freehand drawing of a vertical section through a wash-down water closet pan P-trap. **[10]**

QUESTION 5: FOUNDATION WALLS WITH FOOTINGS

A house has one-brick external walls and foundation walls that have two footings resting on a concrete strip foundation. The floor slab is cast 110 mm into the external wall which is plastered externally and bagged internally. The foundation wall is built with face brick.

Draw, to scale 1:10, the vertical section through the external wall and the foundation.

Specifications:

Concrete strip foundation:	740 mm × 180 mm
First footing:	440 mm above concrete foundation
Second footing:	330 mm, 75 mm above foundation
Brick wall:	220 mm
Natural ground level:	375 mm above the concrete foundation
Hard core:	150 mm
Floor slab:	75 mm
Screed:	20 mm

Damp-proof course **[20]**

QUESTION 6: BRICKWORK

Draw, to scale 1:10, the isometric view of a one-brick external corner built in Flemish bond. The wall is five courses high, but the fifth course is projected above the other four courses. There are stopped ends at both ends of the wall.

Specifications:

- The wall is 880 mm to the left-hand side and 1 210 mm to the right-hand side.
- Label the queen closer. Insert dimensions only in the four-course wall.
- Brick size: 220 × 110 × 75 mm

[15]

TOTAL: 100

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