higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL CONSTRUCTION N4

(8060004)

10 August 2021 (X-paper)
09:00–13:00

REQUIREMENTS: ONE A2 drawing sheet
Hot-rolled steel sections (BOE8/2)

Drawing instruments may be used.

This question paper consists of 5 pages and 1 diagram sheet.

241Q1G2110

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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. DO NOT use an answer book.
5. The lay-out of answers is important. Strictly adhere to the following:
   Do QUESTIONS 1, 3 and 5 on the FRONT of the DRAWING SHEET.
   Do QUESTIONS 2, 4 and 6 on the BACK of the DRAWING SHEET.
6. Do all drawings and labels in pencil with bold outlines.
7. Print all written answers and labels neatly in pencil.
8. All drawings must be fully labelled with descriptive notes and dimensions.
9. All drawings must conform to National Standards.
10. Write neatly and legibly.

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QUESTION 1

A parapet gutter is constructed at the foot end of a framed, mono-pitched timber roof truss. Use the following information and draw a longitudinal sectional view of the parapet gutter detail:

Wall:	330 mm wide external wall reduced to 220 mm at wall plate level. The top of the wall is finished with a stone coping. The wall is flush on the outside.
Roof structure:	Corrugated fibre-cement roof sheeting on 75 mm × 50 mm purlins on 114 mm × 38 mm rafter, tie beam and strut secured to a 114 mm × 38 mm wall plate.
Parapet gutter:	325 mm wide, dressed over the purlin on 22 mm thick boarding on 75 mm × 50 mm timber brackets.
Flashing:	Cover flashing dressed over the gutter and secured to the wall.

Draw to scale 1:10 a vertical section through the external wall, roof and parapet gutter to clearly indicate the construction method. Provide the drawing with all the labels and key symbols. **[16]**

QUESTION 2

Draw to scale 1:2 a vertical section through the top of a steel window situated in the centre of a one-brick wall. The wall is supported by ONE pre-stressed, reinforced concrete lintel and plastered on both sides and bottom of the wall.

The detail must include the following:

- Window frame
- Casement sash
- Glazing bar
- 3 mm Glass and
- Glazing putty.

Include all the key symbols, dimensions and labels. Provide the drawing with a title and scale. **[15]**

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QUESTION 3

A lean-to roof must be constructed against an existing wall to form a roof for a carport. The roof will be constructed of cement tiles nailed to 38 mm × 38 mm battens at 300 mm centres, nailed to 150 mm × 50 mm rafters built into the wall. A 114 mm × 75 mm wall plate is bolted to the wall for additional support. The pitch of the roof is 28 °.

The joint between the roof and the wall is waterproofed by means of an underflashing dressed over the roof tile. An apron flashing is built into the wall, THREE courses above the top of the roof and dressed over the underflashing. Apply 19 mm plaster above the apron flashing.

Draw to scale 1:5 a vertical section through the wall to show the following:

- The roof
- Waterproofing and
- Wall plate.

Include all the labels. **[14]**

QUESTION 4

The timber centering for a light segmental brick arch with a span of 1 260 mm and a rise 210 mm is constructed of the following:

- Two 22 mm thick shaped shutterboards nailed to 75 mm × 50 mm tie beams and covered with two layers of 3 mm hardboard lagging.
- The springing line of the arch is measured from the top of the tie beam.
- The supports are made up of two cross bearers and 75 mm diameter wooden props. The props are nailed to sliding wedges and sole plates.

Draw to scale 1:10 the front view of the timber centering to show the geometrical setout and vertical supports. Include all the labels and dimensions.

NOTE: Do NOT include brickwork. **[15]**

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QUESTION 5

A 305 mm × 165 mm × 40,5 kg/m I-section parallel flange is to be used as a steel column to support an overhead advertisement bill board. The column will be welded in the centre of a 610 mm × 450 mm × 15 mm base plate and strengthened by means of two 450 mm × 400 mm × 10 mm flange plates welded to the flanges.

The connection is further strengthened by two additional 150 mm × 90 mm × 10 mm rolled steel angles at the bottom where the flange plates meet the base plate.

A 6 mm fillet is used on both sides to weld the flange plate to the column and an 8 mm fillet weld is used to weld the column to the base plate.

Draw to scale 1:10 an isometric view showing the column flange on the left-hand side. Include the following:

- ONE M12 holding bolt in the bottom corner through the angle and base plate.

NOTE: Show the position of the bolt holes in the opposite corners.

The completed drawings must include all the labels, sectioning and welding symbols. Provide a title and scale to each of the drawings. **[18]**

QUESTION 6

A 380 mm thick foundation wall is supported on THREE courses stepped footings which are built on a 1 015 mm wide concrete foundation to form a deep foundation.

The FIGURE on the DIAGRAM SHEET (attached) shows the various levels of the deep foundation.

The foundation wall is reduced to a 220 mm solid wall, 300 mm above the natural ground level. The solid wall is 11 brick courses high.

A timber floor is constructed where the two walls meet. The floor consists of 100 mm × 22 mm floor boards nailed to 150 mm × 50 mm floor joists, on top of 150 mm × 75 mm wall plate. The floor is finished with 75 mm × 22 mm timber skirting and 19 mm quadrant. The height of the timber floor is 450 mm above a reduced ground level.

Draw to scale 1:10 a vertical section through the deep foundation. Clearly show the positions of the damp-proofing at the bottom of the floor joist and solid wall. Indicate all the labelling and key symbols on the completed drawing. **[22]**

TOTAL: 100

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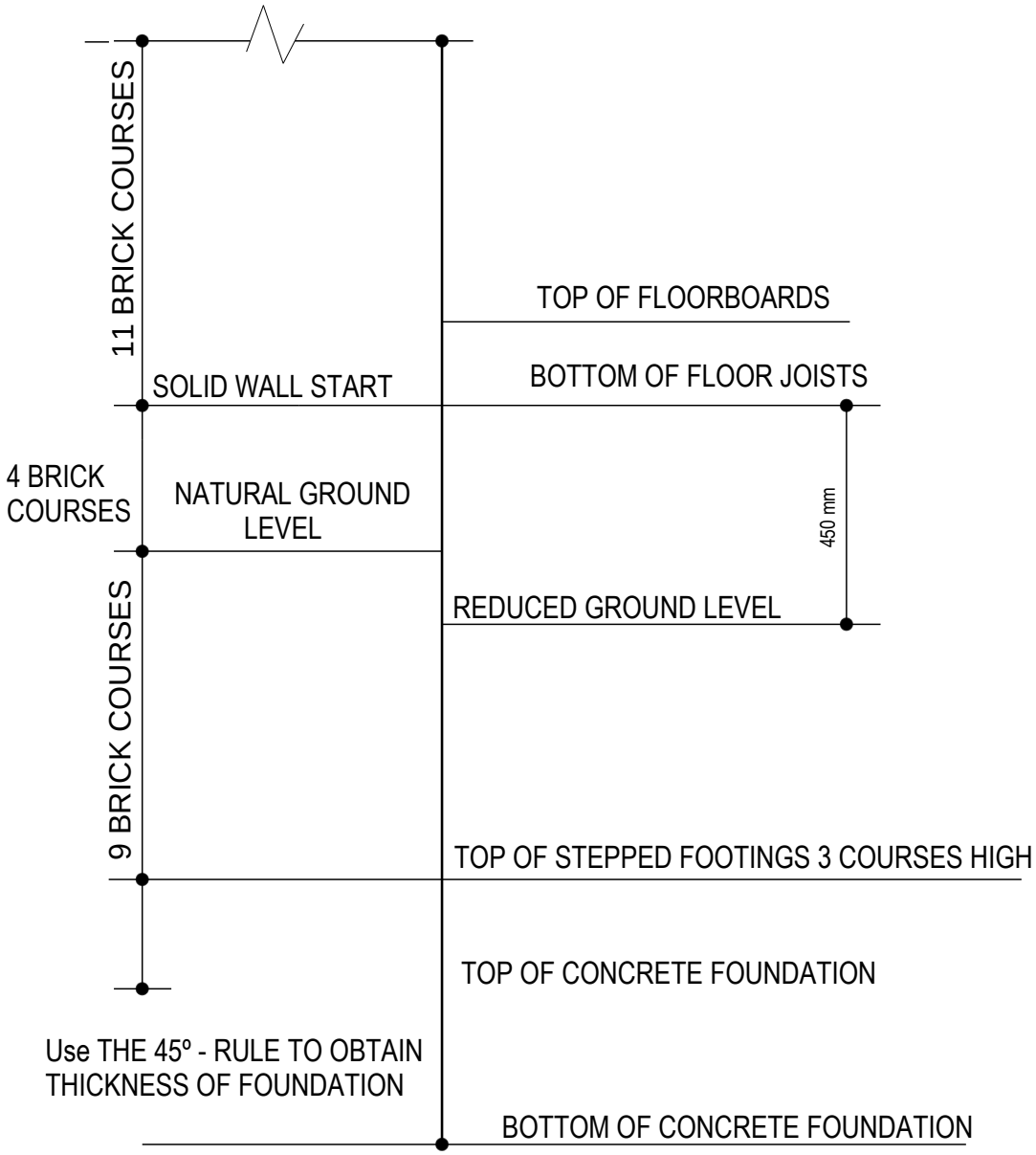
DIAGRAM SHEET



FIGURE

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