higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T130**(E)**(A9)T

NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL CONSTRUCTION N4

(8060004)

9 April 2018 (X-Paper)
09:00–12:00

REQUIREMENTS: **ONE A2 drawing paper**
Hot-rolled structural steel tables

Candidates need drawing instruments.

This question paper consists of 4 pages.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
BUILDING AND STRUCTURAL CONSTRUCTION N4
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. ALL the drawings must be drawn to the required scale.
5. Use both sides of the drawing paper.
6. ALL drawings, including candidate's information, must be done in pencil.
7. An ink pen is NOT allowed.
8. ALL drawing work must comply with the relevant SANS (SABS) recommended codes.
9. Use your own discretion where dimensions are not given.
10. ALL the abbreviations and symbols must comply with the latest National Building Regulations and all relevant SANS (SABS) codes.
11. A balanced layout is very important and candidates will be penalised for poor planning.
12. The sketches and/or diagrams must be neat, reasonably large, in proportion and fully labelled
13. ALL labelling must be written in capital letters.
14. Provide an appropriate title and scale to all drawings.
15. Write neatly and legibly.

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QUESTION 1: FOUNDATION

1.1 A 30° pitch IBR roof sheet on a 75 mm × 50 mm purlin is constructed on a 114 mm × 38 mm rafter, tie beam and wall plate with an overhang of 300 mm. It is supported by a 270 mm cavity wall and is plastered only inside. The concrete lintel is on top of the steel window and rests on the five courses of the cavity wall. The DPC, wall tie and concrete filling must be shown on top of the floor slab. The floor slab is 100 mm, and the floor is finished off with a 20 mm thick screed and a 150 mm hard core rests on the four courses. The one-and-a-half brick foundation wall is resting on a 650 mm × 250 mm concrete foundation.

The overhang has open eaves with an asbestos ceiling, a 220 mm × 32 mm fascia board and a 100 mm × 100 mm galvanised square gutter. Do not show the downpipe. The ceiling is constructed of 1 000 mm × 400 mm × 15 mm thick acoustic panelling, secured to the 38 mm × 38 mm brandering by means of a thick aluminium H-section, finished to the walls with a 75 mm × 19 mm hardboard cornice. On top of the concrete lintel show the four courses of the cavity wall. Three courses below the wall plate it is reduced by means of plinth brick to a 220 mm brick wall.

Draw, to scale 1 : 10, a vertical section through the eaves and foundation and show the steel window. (30)

1.2 Give FIVE reasons why foundations are necessary for buildings. (5)
[35]

QUESTION 2: BRICK BONDING

Draw, to scale 1 : 10, the alternate plan course of a one-and-a-half brick corner wall built in English bond, the height is 880mm and the length is 1 100mm. Show the queen closer and three-quarter bat and insert the dimensions. **[10]**

QUESTION 3: WINDOWS

Draw, to scale 1 : 2, a vertical section through only the bottom section of a steel casement window set in a one-brick wall, plastered on the inside with a quarry tile sill and a terrazzo window board. Clearly show the damp-proof course below the frame and also a portion of the clear sheet glass with putty in the steel frame. **[10]**

QUESTION 4: ARCH WORK

An arch must be built between the dining room and the kitchen of a house. The arch structure must be temporarily supported while the building takes place.

Draw, to scale 1 : 10, a temporary structure that can be used, and label the components of the structure. **[15]**

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QUESTION 5: ROOF

A roof is to be constructed on a 70 mm × 70 mm × 10 mm angle-iron rafter and 70 mm × 70 mm × 10 mm angle-iron tie beam on a 12 mm gusset plate. It is supported by a half-brick wall on the left side and a 50 mm gap in the middle and a one-brick wall on the right side. A 220 mm × 330 mm concrete pad rests on the three courses of the one-brick wall. A pitch of 30º/30 degrees finished with a corrugated fibre cement sheet is bolted to the 75 mm × 50 mm purlin with a 70 mm × 70 mm × 8 mm angle-iron bracket.

Draw, to scale 1 : 10, a vertical section through the foot of the roof. Clearly show the position of the holes to receive the mind-steel bolts. **[10]**

QUESTION 6: STRUCTURAL STEEL WORK

An H-steel profile of size 305 mm × 305 mm × 96,8 kg/m is used as a stanchion in a steel structure which supports an I-section parallel flange. The main beam of 356 mm × 171 mm × 44,8 kg/m is fixed to the flange of the stanchion. The secondary beam of 305 mm × 102 mm × 24,5 kg/m is fixed to the web of the stanchion. Both beams are connected to the stanchion with two equal angle-iron cleats of 80 mm × 80 mm × 8 m for the main beam is welded to the stanchion and bolted to the beam. The welding of the cleats is done on the 6 mm fillet.

Draw, to scale 1 : 5, an isometric view of the steel structure. Label the drawing and show all the dimensions. **[20]**

TOTAL: 100

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