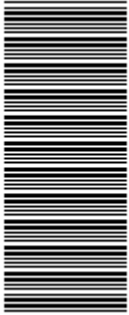


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higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

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AUGUST EXAMINATION

NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL CONSTRUCTION N4

(8060004)

21 July 2014 (Y-Paper)
13:00–17:00

REQUIREMENTS: A3 drawing paper and steel table

This question paper consists of 5 pages.

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. Write neatly and legibly.
-

QUESTION 1

A steel roof truss is built up to 100 mm × 10 mm (rafters and tie beams) with 60 mm × 60 mm × 8 mm (struts) angle-iron sections and 5 mm thick gusset plates. Draw to scale 1 : 20, a detailed elevation at the riveted connections at the following positions:

1.1 Where a strut forms a 90° angle to the rafter.

Show ALL the welding symbols.

(7)

1.2 Where two struts are connected to the tie beam, (each forms a 60° angle to the tie beam), at the same point on the tie beam.

(8)

[15]

QUESTION 2

The interior dimensions of a double garage are 6 000 mm × 6 000 mm. The garage has a flat roof which is supported by one-brick external walls.

SPECIFICATIONS:

Roof covering	:	IBR roof sheeting
Roof gradient	:	five degrees (5)
Rafters and tie beam	:	228 mm × 38 mm and 76 mm × 50 mm Respectively
Wall plate and ceiling battens	:	114 mm × 38 mm and 38 mm × 38 mm respectively
Purlins	:	76 mm × 50 mm
Roof overhang	:	500 mm open eaves
Fascia board	:	220 mm × 12 mm fibre cement fixed to the ends of the rafters

Draw to scale 1 : 10 a vertical section through the roof and parts of the external walls which shows the roof, ceiling construction and rain-water gutter and downpipes.

[23]

QUESTION 3

Draw to scale 1 : 10 an isometric view of the alternate plan courses of a 385 mm cavity wall corner, with lengths of wall approximately 1 265 mm and 1 045 mm, each with stopped ends. The lower projection must be four courses in height.

[9]**QUESTION 4**

4.1 Your father is a do-it-yourself (DIY) fanatic. He wants to build in a steel window frame which will take him more than one day to finish.

Explain or describe to him how to do the following:

4.1.1 Briefly explain how he would set up a steel window frame in position to ensure that it is plumb, level and in line with the wall.

Also tell him how to temporarily secure it in position until it is built. (5)

4.1.2 By means of drawings and explanations, explain to him the TWO ways of later joining unfinished brickwork (raking back and tothing). (4)

4.1.3 Draw, to scale 1 : 5, a vertical section through a door opening with a double-rebated steel door frame suitable for a one-and-a-half brick wall. Include dimensions and label the drawing. (11)

[20]**QUESTION 5**

The floor of a building to be erected in damp soil, is partly underground and consists of a one-and-a-half brick foundation wall (outside wall) on a 600 mm × 300 mm concrete foundation. The top of which is four courses beneath ground level. The 150 mm thick service bed, on 150 mm thick hard core, rests on top of the foundation and the floor is finished off with a mortar screed and skirting. The wall is plastered on the inside. A P.V.C. membrane is to be provided in a horizontal position underneath the service bed, with the usual vertical damp-proofing typical to a basement.

Draw, to scale 1 : 10, a vertical section through the outside wall construction and also show the bottom part of a steel casement window, built into the outside wall, with window boards and sill approximately six courses above ground level.

[20]

QUESTION 6

Draw to a scale of 1 : 10, the front elevation of a two-ring rough segmental arch. The arch spans 1,200 m and the rise is one-sixth of the span.

Only half of the brickwork in the arch must be shown with the construction method clearly illustrated in the remaining half of the arch. Show the surrounding brickwork on one side of the arch only.

[13]**TOTAL: 100**

ENGINEERING