

**GAUTENG DEPARTMENT OF EDUCATION
SENIOR CERTIFICATE EXAMINATION**

TECHNIKA (CIVIL) SG

TIME: 3 hours

MARKS: 300

**OCTOBER / NOVEMBER 2005
OKTOBER / NOVEMBER 2005**

REQUIREMENTS:

Answer script
Drawing Answer Book 712-2/X
Drawing instruments
Pocket calculator

INSTRUCTIONS:

- This question paper consists of TWO sections, A and B.
 - Section A is COMPULSORY.
 - Candidates must answer Section A and any TWO questions from Section B.
 - All calculations and written answers must be done in your answer book.
 - Number the questions as they appear in the examination question paper.
 - Clearly indicate on the drawing paper, the number of the question you are answering.
 - Use both sides of the drawing paper.
 - Drawings and sketches must be fully dimensioned and neatly finished with titles and labels to conform with the SABS Recommended Practice of Building Drawings.
 - Write your examination number on all loose papers, drawing answer book and answer book.
 - For the purpose of this examination, the size of a brick should be taken as 220 mm x 110 mm x 75 mm.
 - Measurements not shown or given must be taken as standardized measurements.
 - No correction fluid (e.g. Tipp-Ex) must be used.
 - Calculations to be rounded off to the second decimal.
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SECTION A
COMPULSORY

QUESTION 1

Figure 1 shows a concrete staircase consisting of six stairs including a landing of 900 mm x 100 mm. The stairs have a rise of 150 mm and a tread of 275 mm and an unplastered outer wall supporting the landing.

Draw, to a scale of 1:10, a vertical section through the total length of this staircase and show the formwork and reinforcing for the erection of this staircase.

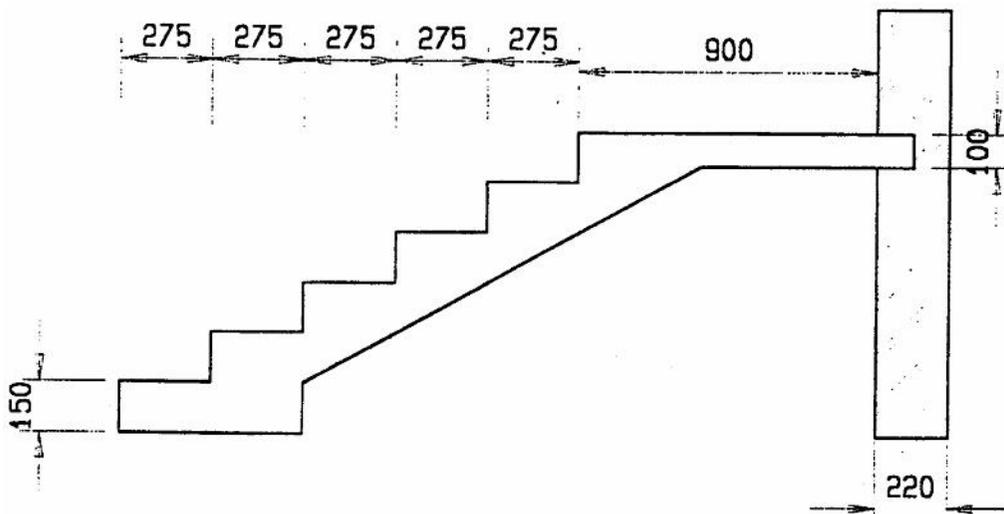


Figure 1

[60]

QUESTION 2

Figure 2 shows a ground plan of a house. The dwelling has a corrugated zinc hipped roof, with a 30 degree pitch and a 500 mm open eaves overhang. The 100 mm x 100 mm square gutters with 75 mm downpipes are fixed to a 200 mm asbestos fascia board.

The superstructure is 2 800 mm high and the substructure 300 mm. The outer doors are Z framed, ledged and braced. The 150 mm x 30 mm window sills are finished with clay tiles.

Use the window schedule shown in **Figure 3** for the window sizes.

Draw, to a scale of 1:100, the **North and West elevations** of this dwelling. Also show by means of a scale drawing the method to determine the different roof heights.

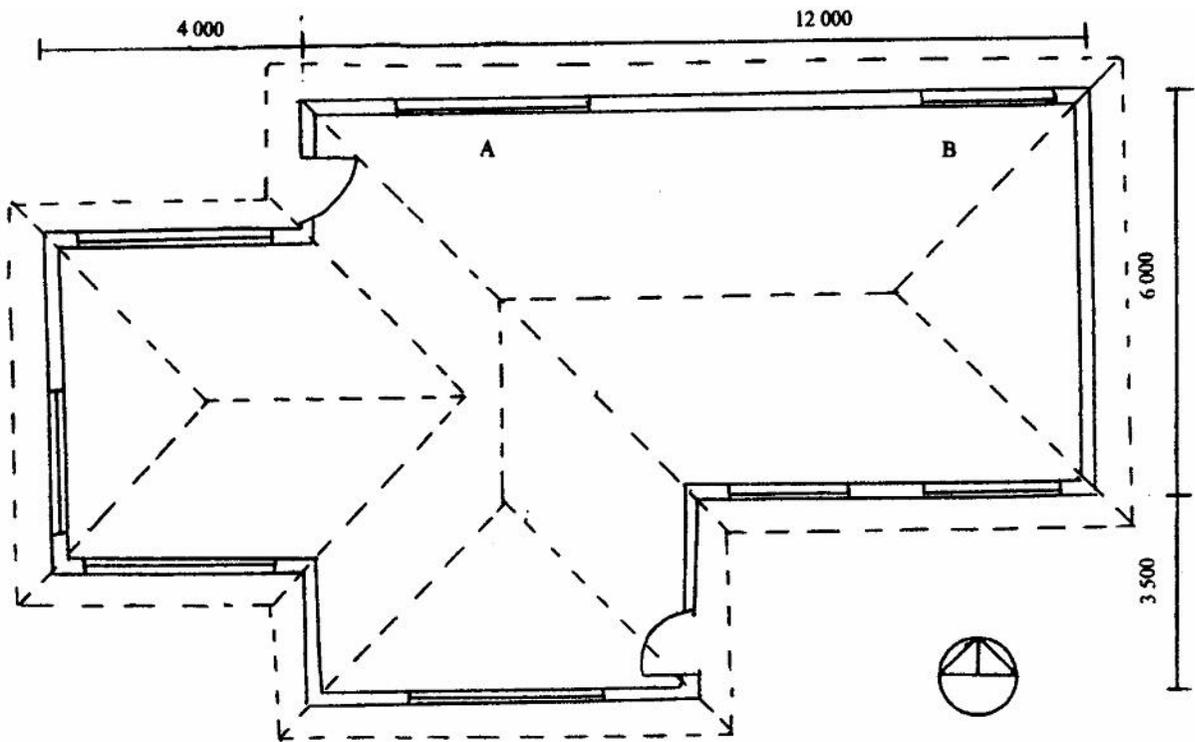


Figure 2



WINDOW SCHEDULE

Figure 3

[60]

P.T.O.

QUESTION 3

- 3.1 State any FIVE precautions which must be taken into consideration when a sewer has to be laid underneath a building. (5)
- 3.2 Name any FIVE requirements for concrete formwork. (5)
- 3.3 Name the THREE main colours which are used for safety and give an example where each one would be applied in a centre. (6)
- 3.4 Name any FIVE items to be shown on a sewer plan. (5)
- 3.5 Name the standard abbreviations of the following fitments on a sewer plan:
- 3.5.1 Shower
 - 3.5.2 Inspection eye
 - 3.5.3 Vent pipe
 - 3.5.4 Bidet
 - 3.5.5 Bath
 - 3.5.6 Water closet (6)
- 3.6 Name the standard colour code for indicating the following pipes on a sewer plan:
- 3.6.1 New drains
 - 3.6.2 Vents to waste pipes
 - 3.6.3 Existing drains
 - 3.6.4 Waste pipes (4)
- 3.7 Describe the function of a grease trap, as well as where it is installed in a sewerage system. (4)
- 3.8 State FIVE requirements to which reinforcing material must comply. (5)
- 3.9 List any FIVE characteristics of concrete. (5)
- 3.10 Name any THREE main causes of fires. (6)
- 3.11 State FOUR important reasons why steel reinforcement must be used in concrete constructions. (4)
- 3.12 List any FIVE characteristics of glass. (5)

[60]

TOTAL FOR SECTION A: [180]

SECTION B

Candidates must answer any TWO questions from this section.

QUESTION 4

Figure 4 below shows a space diagram of a simply supported beam with two point loads.

- 4.1 Draw the complete space diagram to a scale of 1:100.
- 4.2 Draw a vector diagram to a scale of 1 kN = 6 mm.
- 4.3 Determine graphically the magnitude and nature of the forces in each member of the framework.

Draw the table below in your answer book, then answer Question 4.3 on the table.

MEMBER	MAGNITUDE	NATURE
AE		
BG		
CH		
DH		
DF		
DE		
EF		
FG		
GH		

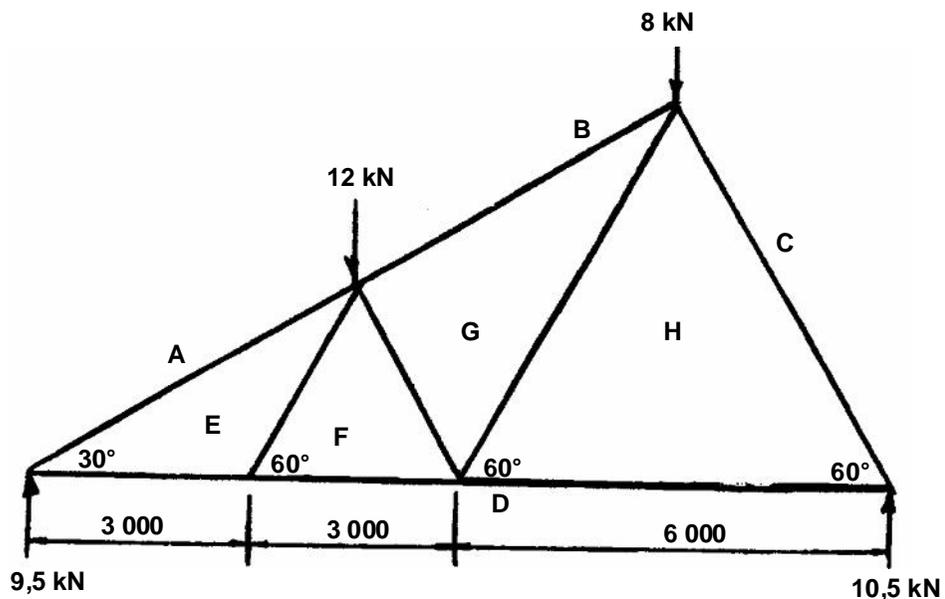


Figure 4

[60]

P.T.O.

QUESTION 5

Figure 5 shows a beam supported at points **P** and **Q**. The beam has two point loads and a uniform distributed load of 3 kN/m.

- 5.1 Calculate the reactions at supports **P** and **Q**.
- 5.2 Calculate the bending moments at points **A**, **B**, **C**, **D**, **E** and **F**.
- 5.3 Calculate the shear forces at points **A**, **B**, **C**, **D**, **E** and **F**.
- 5.4 Draw the space, bending moment and shear force diagrams.

Use the following scales:

- Space diagram : 1:100
Shear force diagram : 3 mm = 1 kN
Bending moment diagram : 1 kN/m = 3 mm

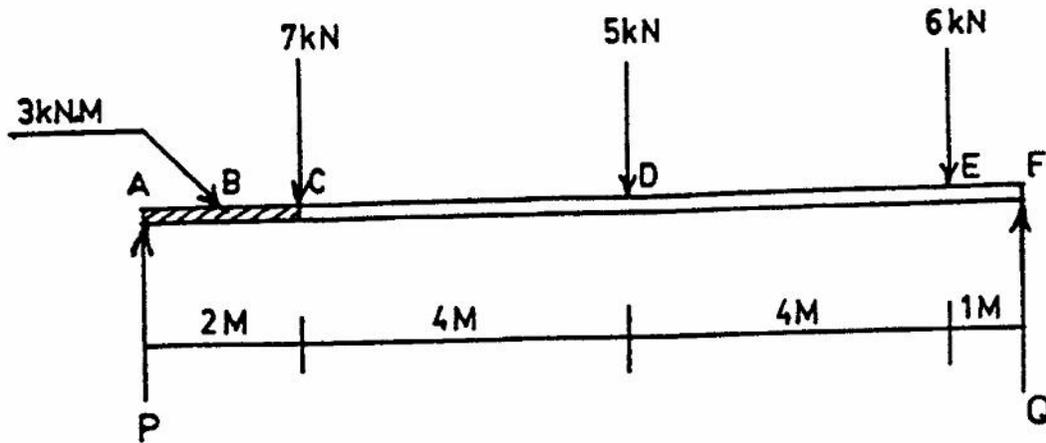


Figure 5

[60]

QUESTION 6

6.1 **Figure 6** shows the junction of the beams of a roof truss. Draw, to a scale of 1:5, a detailed drawing of this junction to show the gusset plate which must be used.

Use the following measurements:

- ◆ Diameter of the bolts (D) : 18 mm
- ◆ Seam lap : 1.5 D
- ◆ Bolt pitch for the main beam : 5 D
- ◆ Bolt pitch of the struts : 3 D
- ◆ Main beam is 89 mm x 89 mm x 6 mm, with the standard back mark 55 mm.
- ◆ The struts are 63 mm x 63 mm x 6 mm, with the standard back mark 35 mm.

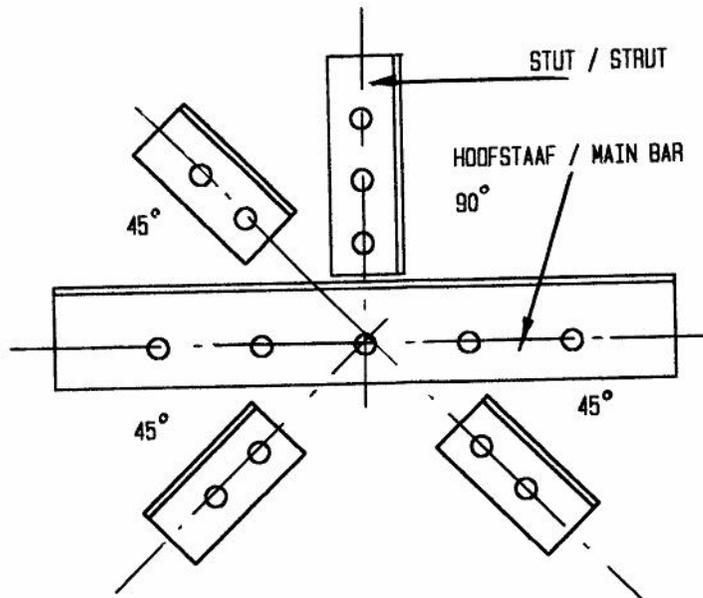


Figure 6

(20)

6.2 Raking shores must support the wall of a building. Using a scale of 1:10, draw an isometric view to illustrate the top and bottom ends of the shoring.

Use the following dimensions for the drawing:

- Wall-plate : 228 mm x 75 mm
- Cleat : 200 mm x 100 mm x 100 mm
- Needle : 300 mm x 100 mm x 100 mm
- Raking shore : 228 mm x 228 mm
- Wall hook : 8 mm diameter

(20)

6.3 Show by means of a sketch, the construction of the window sill of a metal window.

The following must be clearly shown:

- ◆ One-brick wall
- ◆ Plaster finish on the inside
- ◆ Damp-proofing
- ◆ Window sill tiles on the inside
- ◆ Clay tiles on the outside
- ◆ Face bricks
- ◆ Metal window

(20)
[60]

QUESTION 7

- 7.1 Describe the difference between the **mass** and **weight** of an object. (2)
- 7.2 Define **load**. (2)
- 7.3 Define **strain**. (2)
- 7.4 What do you understand by the term **deformation** or **change in length**? (2)
- 7.5 Define **safety factor**. (2)
- 7.6 Deduce the formula for **maximum strain** from the standard formula. (4)
- 7.7 Calculate Young's modulus for a rod 20 mm in diameter and 500 mm long, which changes 0,2 mm in length under a load of 33 kN. (12)
- 7.8 List FIVE requirements of concrete reinforcement. (10)
- 7.9 Sketch FOUR different reinforcement bars. (8)
- 7.10 Interpret the following annotated code on a plan to ensure the correct bars will be used for reinforcement: **9R 12 01 300**. (5)
- 7.11 Sketch a horizontal section of an L-shaped reinforced concrete beam with SEVEN main bars. Also show the stirrups to hold the reinforcement in place. (7)
- 7.12 List FOUR important reasons why steel reinforcement must be used in a concrete construction. (4)

[60]

TOTAL FOR SECTION B: [120]

TOTAL: 300

END

CANDIDATE'S NUMBER / KANDIDAAT SE NOMMER

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SENIOR CERTIFICATE EXAMINATION
SENIORSERTIFIKAAT-EKSAMEN



OCTOBER / NOVEMBER
OKTOBER / NOVEMBER

2005

TECHNIKA (CIVIL)
TECHNIKA (SIVIEL)

DRAWING ANSWER BOOK
TEKENE ANTWOORDBOEK

SG

712-2/X

4 pages / bladsye

QUESTION VRAAG	MARKS PUNTE	INITIAL PARAFEER
TOTAL / TOTAAL		



