GAUTENG DEPARTMENT OF EDUCATION

SENIOR CERTIFICATE EXAMINATION

TECHNIKA (CIVIL) SG

TIME: 3 hours

MARKS: 300

REQUIREMENTS:

- Answer book
- A3-size drawing answer book
- Drawing instruments
- Pocket calculator
- Answer Sheet SG 712-2/(1)

INSTRUCTIONS:

- This question paper consists of TWO sections, Section A and Section 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 and all drawings in the drawing answer book.

- Number your answers exactly as the questions are numbered in the question paper.

- Clearly indicate on the drawing paper, the number of the question you are answering.

- Do proper planning.

- Drawings and sketches must be fully dimensioned and neatly finished with titles and labels to conform with the SABS Recommended Practice for Building Drawings.

- Fill in your examination number on Answer Sheet SG 712-2/(1), your drawing answer book and your 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 Tipp-Ex may be used.

- Calculations to be rounded off to the second decimal.

- Detach Answer Sheet SG 712-2/(1) and place it **inside** your answer book when finished.

SECTION A

COMPULSORY

QUESTION 1

1.1 List any FIVE precautions with regard to a sewer when conditions are of such a nature that it is necessary to lay the sewer system underneath the building. (5)

1.2 Name TWO different tests that can be carried out on concrete. (4)

1.3 Name any FIVE important points to consider when purchasing a new stand. (5)

1.4 List any FIVE reasons why a sewer plan must be submitted and accompany new house plans for municipal approval. (5)

1.5 Name any TWO density tests that can be carried out on a sewer system. (2)

1.6 List any FOUR advantages of cavity walls. (4)

1.7 Describe in full how you would go about setting up the dumpy level before any readings can be carried out with it. (20)

1.8 List any FIVE important facts to consider when designing a new house. (5)

1.9 Name any FIVE areas where safety glass can be used in buildings. (10)
[60]

QUESTION 2

Figure 1 shows a space diagram of a framework.

2.1 Draw the space diagram to a scale of 1:100.

2.2 Draw the forces diagram using a scale of 1 mm = 1 kN.

2.3 Determine graphically the nature and magnitude of the forces in each component of the framework.

Draw the table on the next page in your answer book and complete Question 2.3 within the table.

MEMBER	MAGNITUDE	NATURE
AG		
AF		
BF		
CJ		
DK		
FG		
GH		
HJ		
JK		
KE		
EH		

FIGURE 1

[60]

QUESTION 3

Figure 2 shows a loaded beam simply supported at the ends.
The beam is loaded with two point loads and an evenly distributed load of 2 kN/m.

3.1   Calculate the reaction forces at supports P and Q.

3.2   Calculate the bending moments and shear forces at points A, B, C, D and E.

3.3   Draw the space, shear force and bending moment diagrams.

Use the following scales:

Space diagram   :   1:100

Shear force diagram   :   1 kN = 5 mm
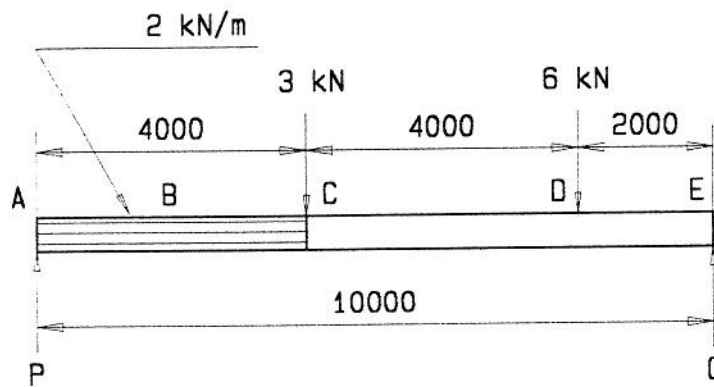
Bending moment diagram   :   1 kN/m = 4 mm

FIGURE 2   **[60]**

TOTAL FOR SECTION A: **[180]**

SECTION B

Answer any TWO questions from this section.

QUESTION 4

4.1   Draw a neat, proportional sectional sketch to show the construction of a vacuum
       tank.   (10)

4.2   Describe the working process of a vacuum tank as well as how these tanks are
       emptied.   (10)

4.3   The floor of a basement of a building is 2 700 mm below ground level and is 100 mm thick. The total height between the basement floor and the 100 mm concrete floor of the building is 3 000 mm.

The exterior wall of the building is one-and-a-half-bricks thick, and plastered on the inside, with vertical damp-proofing built in half-brick thickness from the exterior wall.

Draw, using a scale of 1:20, a vertical section through the exterior wall and part of the two concrete floors to show the necessary damp-proofing needed to ensure that no moisture penetrates the basement level.   (20)

4.4   **Answer Sheet SG 712-2/(1)** shows a partial plan of a dwelling with outbuildings. The sanitary fitments are shown by means of standard abbreviations.

Use **Answer Sheet SG 712-2/(1)** to design an effective sewer system for the dwelling. Show all the drainage details by means of standard abbreviations.   (20)
[60]

QUESTION 5

Draw, to a scale of 1:10, a vertical section through the length of a straight concrete stair and show the formwork, struts and reinforcement necessary for the erection of the stairs. The flight of stairs consists of six steps, including a landing of 900 mm x 100 mm. An unplastered external wall supports the landing which is one brick thick. The steps have a rise of 150 mm and a tread of 275 mm.   **[60]**

QUESTION 6

Figure 3 shows a ground plan of a dwelling.

Draw, to a scale of 1:50, a vertical section at A – A.

Show the roof construction, ceiling board, cornice, wall-plate and 100 mm square gutter and downpipes.

Use the following specifications:

Roof pitch 30 degrees
Open eaves with a 550 mm overhang
Superstructure 2 900 mm
Substructure 300 mm
Fascia board 230 mm x 30 mm
Window sizes 2 000 mm x 1 500 mm
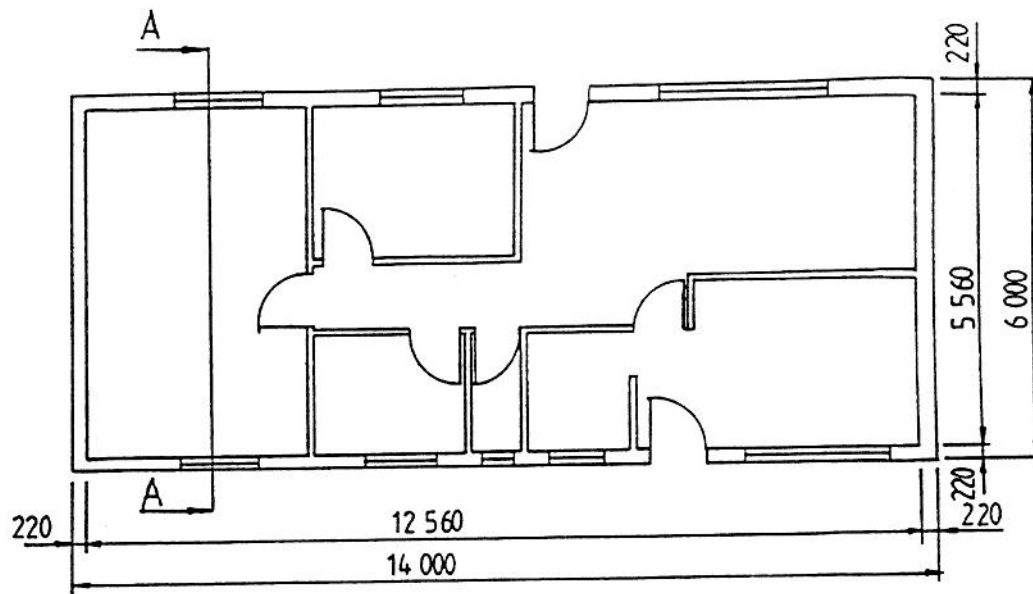Door openings 2 000 mm x 1 000 mm
Foundations 600 mm x 230 mm

FIGURE 3

[60]

QUESTION 7

Figure 4 shows the ground plan of a store room, with a gabled roof consisting of 18 timber roof trusses, to be erected.   The open eaves overhang is 500 mm and the roof pitch is 30 degrees.

Draw, to a scale of 1:20, the front view of one roof truss to determine the true length of each member.

Draw the standard columns in your answer book and calculate the total timber, in running metres, needed to build the roof trusses.

A factor of 5 percent must be added for wastage.

All timber to be used is 114 mm x 38 mm.

4 000

12 000
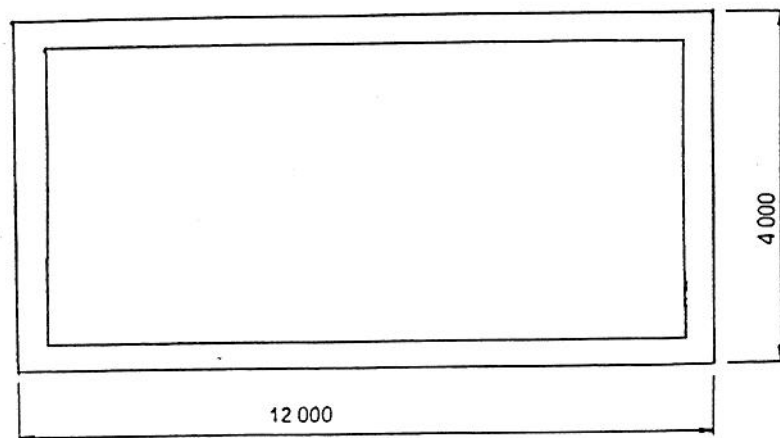
FIGURE 4

[60]

TOTAL FOR SECTION B: [120]

TOTAL: 300

ANSWER SHEET SG 712-2/(1)
ANTWOORDBLAD SG 712-2/(1)

EXAMINATION NUMBER:
EKSAMENNOMMER:

SK
WC

ST
S
HWB
WB

OWB

B

HWB/WB
SK
WC

SK
WV

HWB
WB

AANSLUITING
CONNECTION

HEINING / FENCE

HOOFRIOOL

MAIN SEWERAGE
MAIN DRAIN / *HOOFRIOOL*

END / EINDE