

GAUTENG DEPARTMENT OF EDUCATION
SENIOR CERTIFICATE EXAMINATION

FEB / MAR 2006

BUILDING CONSTRUCTION SG

TIME: 3 hours

MARKS: 300

REQUIREMENTS:

- Answer book
- A3-size Drawing Answer Book (702-2/X)
- Drawing instruments
- Pocket calculator
- Answer Sheet SG 702-2/0 (1)
- Answer Sheet SG 702-2/0 (2)

INSTRUCTIONS:

- Section A is COMPULSORY.
 - Answer any TWO questions from Section B.
 - All calculations and written answers must be done in your answer book.
 - Answer Sheets SG 702-2/0 (1) and 702-2/0 (2) are at the back of this question paper. Please detach these answer sheets and place them inside your answer book after completing them.
 - Number your answers exactly as the questions have been numbered in the paper.
 - Clearly indicate on the drawing paper, the number of each question you are answering.
 - Drawings and sketches must be fully dimensioned and neatly finished with titles and labels to conform with the SABS Recommended Practice for Building Drawings.
 - Write your examination number on all loose pages, 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.
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SECTION A
COMPULSORY

QUESTION 1

The plan of a dwelling is shown in **Figure 1**. The dwelling has a gabled roof covered with corrugated iron and has open eaves with an overhang of 500 mm and a pitch of 30 degrees. The roof has square gutters of 100 mm x 100 mm with downpipes of 75 mm diameter and a fascia board of 200 mm.

The superstructure is 2 800 mm high and the substructure 450 mm of which four layers of bricks are above ground level. The dwelling has framed Z-batten doors and all the windows must be placed in the correct positions by using the sizes given in the window schedule.

- 1.1 Draw, according to a scale of 1:100, a south elevation and west elevation of the dwelling.

[60]

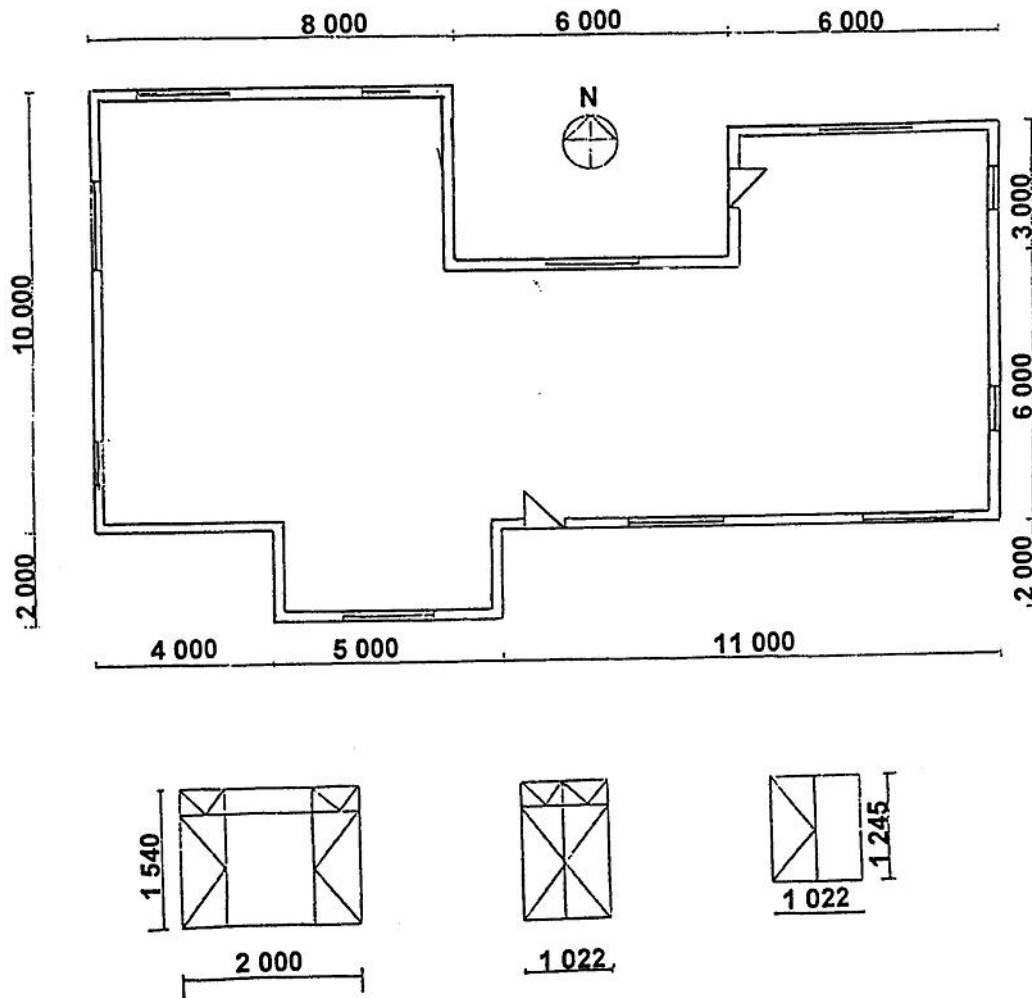


Figure 1

QUESTION 2

Use Answer Sheet SG 702-2/0 (1) to answer this question.

The plan of a dwelling is shown in **Figure 2**. Calculate

- 2.1 the number of bricks required for the substructure (330 mm).
- 2.2 the number of bricks required for the superstructure (220 mm).
- 2.3 the number of bricks required for the beam filling (110 mm).
- 2.4 the total number of bricks required for the dwelling.
- 2.5 the amount of concrete needed for the floor.

Use the following specifications for the calculations:

- Use 50 bricks per square metre for a half-brick wall.
- Height of the substructure is 450 mm.
- Height of the superstructure outside wall is 2 900 mm.
- Height of beam filling is 3 layers of brick.
- Windows are 2 000 mm x 1 500 mm.
- The floor thickness is 75 mm and penetrates the outer wall by 110 mm.
- Doors are 2 000 mm x 1 000 mm.
- Allow 6 % for wastage.

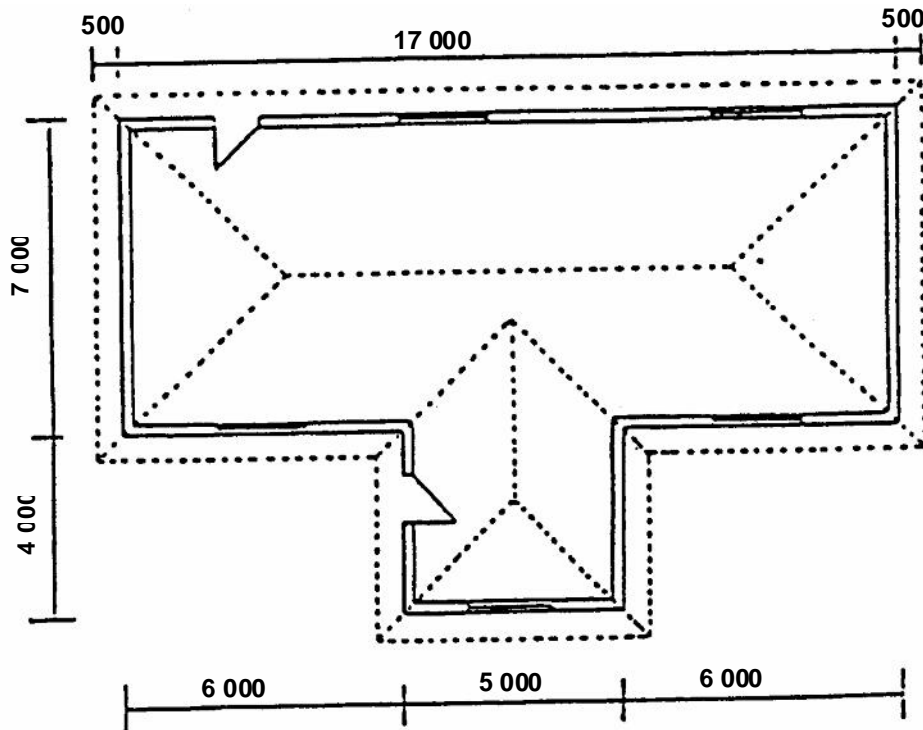


Figure 2

[60]

QUESTION 3

- 3.1 State FIVE requirements with which materials for reinforcement must comply. (10)
- 3.2 List any TEN safety precautions that must be taken while building is in progress to ensure the safety of workers and the public. (20)
- 3.3 Name FIVE important factors to consider when planning and installing an effective sewerage system underneath a house. (10)
- 3.4 Identify the following symbols that appear as standard abbreviations on a sewer plan.
- 3.4.1 BT (2)
 - 3.4.2 WC (2)
 - 3.4.3 GT (2)
 - 3.4.4 MSP (2)
 - 3.4.5 FD (2)
- 3.5 Name any FIVE important points to consider when purchasing a new stand. (5)
- 3.6 In which colours should the following detail, in accordance with the regulations, be coloured on a drainage plan?
- 3.6.1 Soil pipes (1)
 - 3.6.2 Waste pipes (1)
 - 3.6.3 Soil and combined vents (1)
 - 3.6.4 Waste vents (1)
 - 3.6.5 Pipes for the drainage of industrial effluent (1)
- [60]**

SECTION B

Answer any TWO questions from this section

QUESTION 4

Figure 3 below shows a beam which is simply supported at the ends.

- 4.1 Calculate the reactions at the supports.
- 4.2 Calculate the bending moments at points A, B, C, D and E.
- 4.3 Calculate the shear force at points A, B, C, D and E.
- 4.4 Draw the space, bending moments and shear force diagrams respectively.

Use the following scales:

Space diagram	:	1:50
Bending moment diagram	:	2 mm = 1 kN.m
Shear force diagram	:	2 mm = 1 kN

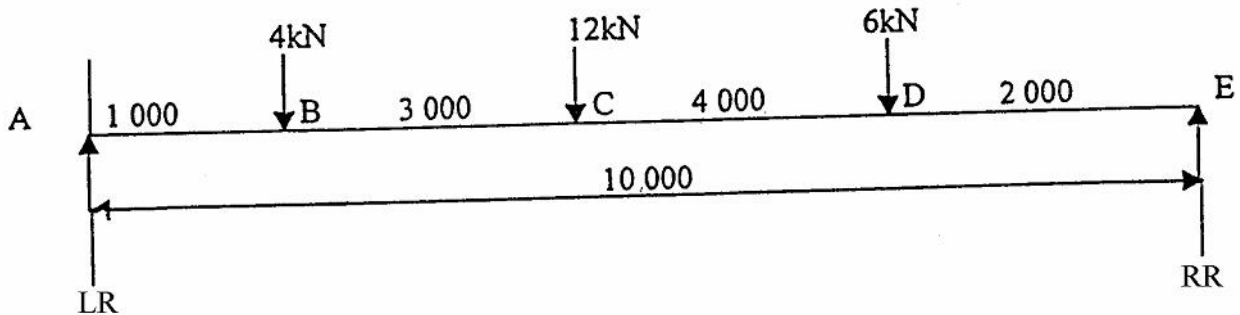


Figure 3

[60]

QUESTION 5

The first floor of a building consists of a 150 mm thick concrete slab, which is supported by a 300 mm x 500 mm concrete beam. The total height of the beam and floor is 500 mm.

Use a scale of 1:10 to draw a vertical section through the beam and part of the floor on both sides of the beam. Show the formwork and reinforcement as well as the top and bottom of a prop in position.

[60]

QUESTION 6

6.1 A solar hot water heating system consists of a solar collector, an electric storage cylinder and a hot water cylinder, which must be installed in a dwelling with a 30 degree pitched roof. The cold water supply to the electric hot water storage cylinder is controlled by a pressure-reducing valve.

With the aid of a neat line diagram, show the arrangement of all the components of the system. Also indicate, by means of arrows, the direction of the flow of water when the system is in use.

(30)

6.2 Answer Sheet SG 702-2/0 (2) shows a partial dwelling plan. The sanitary fittings are shown by means of standard abbreviations.

6.2.1 Use the attached Answer Sheet SG 702-2/0 (2) and design a suitable and effective drainage system for the dwelling. Show all drainage details by means of standard abbreviations.

(30)

[60]

QUESTION 7

Figure 4 below shows a line diagram of a steel roof truss which is simply supported.

- 7.1 Draw the space diagram to a scale of 1:100.
- 7.2 Draw the vector diagram to a scale of 1 kN = 10 mm.
- 7.3 Determine graphically the nature and magnitude of the force in each component of the framework.

Copy the table below in your answer book and answer Question 7.3 on the table.

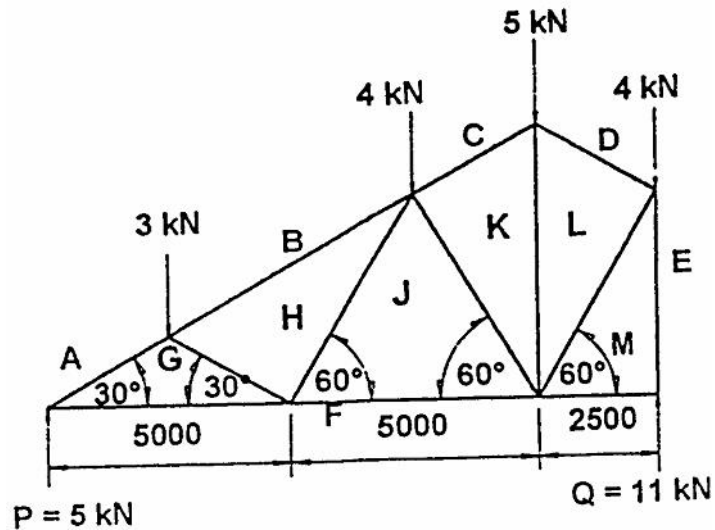


Figure 4

Member	Nature	Magnitude
AG		
FG		
GH		
BH		
HJ		
FJ		
JK		
CK		
KL		
DL		
LM		
ME		
FM		

[60]

TOTAL: 300

P.T.O.

QUESTION 2 / VRAAG 2

ANSWER SHEET / ANTWOORDBLADSG 702-2/0 (1)

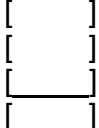
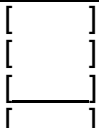
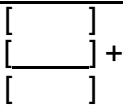
CANDIDATE'S NUMBER / KANDIDAAT SE NOMMER

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A	B	C	D
			Substructure centre line / Onderbou-hartlyn
			[x] = [] mm
			[x] = [] mm
			[] mm
			Minus [x] = [] mm
			[] mm
			The centre line is / Die hartlyn is [] metres / meter
			Height of the substructure is 450 mm
			<i>Hoogte van die onderbou is 450 mm</i>
			50 Bricks per square metre for a half-brick wall
			<i>50 Stene per vierkante meter vir 'n halfsteen-muur</i>
			There are [] half-brick walls
			<i>Daar is [] halfsteen-mure</i>
1/	[] [] []	[] m	
[/]	[] [] []		[] bricks are required [] stene word benodig
			Superstructure centre line / Bobou-hartlyn
			[x] = [] mm
			[x] = [] mm
			[] mm
			Minus [x] = [] mm
			[] mm
			The centre line is / Die hartlyn is [] m
			Height of the superstructure is [] mm
			<i>Hoogte van die bobou is [] mm</i>
			50 Bricks per square metre for a half-brick wall
			<i>50 Stene per vierkante meter vir 'n halfsteen-muur</i>
			There are [] half-brick walls
			<i>Daar is [] halfsteen-mure</i>

1/	[] [] []	[] m	
[/]	[] [] []		[] bricks are required [] stene word benodig
			Beam filling centre line / Balkvulling-hartlyn
			[x] = [] mm
			[x] = [] mm
			[] mm
			Minus [x] = [] mm
			[] mm
			The centre line is / Die hartlyn is [] m
			Height of the beam filling is [] mm
			Hoogte van die balkvulling is [] mm
			50 Bricks per square metre for a half-brick wall
			50 Stene per vierkante meter vir 'n halfsteen-muur
			There are [] half-brick walls
			Daar is [] halfsteen-mure
1/	[] [] []		
1/	[] [] []		[] bricks are required [] stene word benodig
			Total for structure without deductions
			Totaal van struktuur sonder aftrekkings
			Substructure / Onderbou []
			Superstructure / Bobou []
			Beam filling / Balkvulling []
			[] Bricks / Stene
			Deductions / Aftrekkings
			Doors / Deure
			[] x 2 x 1
			50 Bricks per square metre for a half-brick wall
			50 Stene per vierkante meter vir 'n halfsteen-muur
			There are [] half-brick walls
			Daar is [] halfsteen-mure

2/	[] [] []		
[/]	[] [] []		There are [] bricks Daar is [] stene
			Windows / Vensters
			WINDOW A / VENSTER A
			[] x 2 x 1,5
			50 Bricks per square metre for a half-brick wall
			50 Stene per vierkante meter vir 'n halfsteen-muur
			There are 4 half-brick walls
			Daar is 4 halfsteen-mure
[/]	[] [] []		
2/	[] [] []		[] bricks are required [] stene word benodig
			Total deductions / Totale aftrekkings
			Doors / Deure [] Windows / Vensters [] [] Bricks / Stene
			Total bricks for the structure
			Totale getal stene vir die struktuur
			Structure / Struktuur [] Deductions / Aftrekkings [] []
			Plus 6% Wastage / Vermorsing
			[] [] x []
			[] [] + []
			[] bricks will be required for the structure.
			[] stene sal vir die struktuur benodig word.

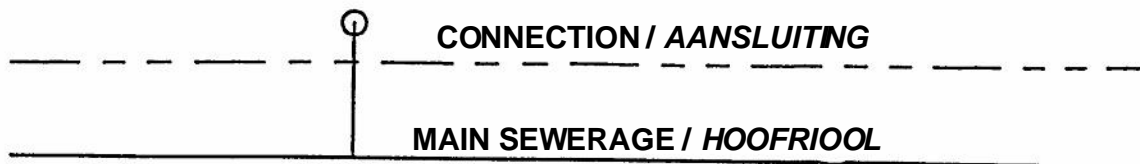
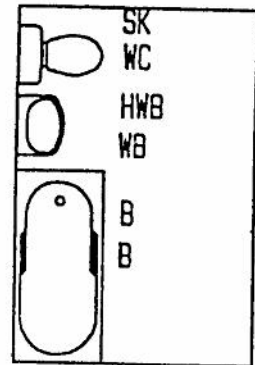
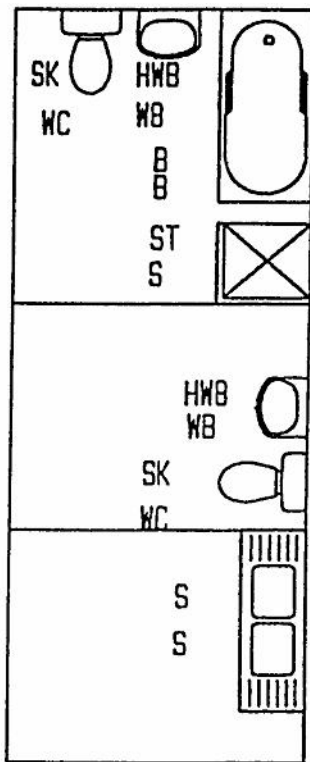
			Foundation centre line / Fondasie-hartlyn A
			$[\quad] - 2/110 = [\quad]$ $[\quad] - 2/110 = [\quad]$ Floor thickness / Vloerdikte 75 mm
			
			Foundation centre line / Fondasie-hartlyn B
			$[\quad] - 2/110 = [\quad]$ $[\quad] - 2/110 = [\quad]$ Floor thickness / Vloerdikte 75 mm
			
			Total volume of concrete Totale volume beton
			$[\quad]$ cubic metres of concrete will be required. $[\quad]$ kubieke meter beton sal benodig word.

CANDIDATE'S NUMBER / KANDIDAAT SE NOMMER

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ANSWER SHEET / ANTWOORDBLADSG 702-2/0 (2)

QUESTION 6.2 / VRAAG 6.2



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