GAUTENG DEPARTMENT OF EDUCATION
SENIOR CERTIFICATE EXAMINATION

BUILDING CONSTRUCTION SG

TIME: 3 hours

OCTOBER / NOVEMBER 2005
OKTOBER / NOVEMBER 2005

MARKS: 300

REQUIREMENTS:

- Answer book

- A3-size Drawing Answer Book (702-2/X)

- Drawing instruments

- Pocket calculator

- Answer Sheet SG 702-2/2 (1)

INSTRUCTIONS:

- Section A is COMPULSORY.

- Answer any THREE questions from Section B.

- All calculations and written answers must be done in your answer book.

- Answer Sheet SG 702-2/2 (1) is at the back of this question paper. Please detach this answer sheet and place it inside your answer book after completing it.

- 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.

- All calculations must be rounded off to the second decimal.

- No Tipp-Ex must be used.

SECTION A
COMPULSORY

QUESTION 1

1.1 List TEN safety precautions applicable to scaffolds. (20)

1.2 Describe SEVEN important aspects which must be taken into consideration for maximum efficiency when installing a solar water heating system. (14)

1.3 Name THREE uses of a dumpy level. (6)

1.4 Draw, to a scale of 1:10, a vertical section through the hardwood-strip panelling, 1 200 mm high to show the construction. Wooden strips, 60 mm x 12 mm, with a tongue and groove joint, are fixed to 40 mm x 20 mm grounds to cover the wall. Show a suitable skirting, dado capping and quarter rounds to finished panelling. (16)

1.5 Describe the function of a grease trap and name TWO buildings where it can be installed. (4)

[60]

QUESTION 2

Figure 1 on page 4 shows a diagram of a steel roof truss which is simply supported.

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

2.2 Draw the vector diagram to a scale of 2 mm = 1 kN.

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

(Copy the table below in your answer book and answer Question 2.3 on the table.)

Member	Nature	Magnitude
AF		
BG		
HJ		
GH		
JD		
CJ		
FE		
FG		
HE		

50 kN

10 kN

40 kN

B

C

G

H

A

D

F

J

45°
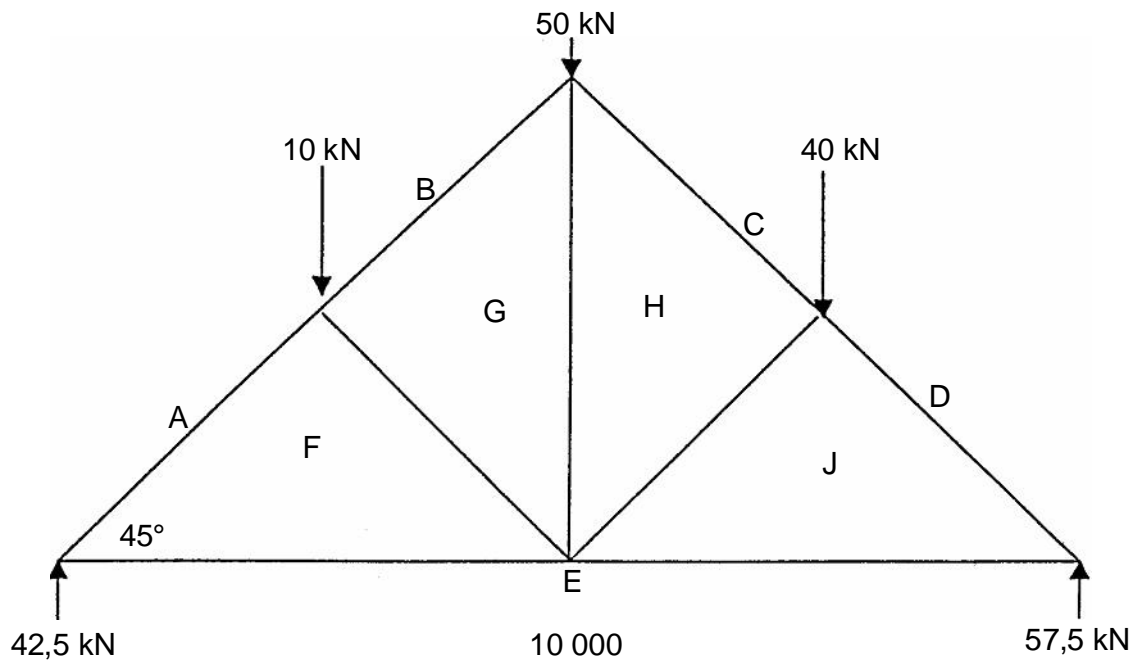
E

42,5 kN

10 000

57,5 kN

Figure 1

[60]

SECTION B

Answer any THREE questions from this section.

QUESTION 3

Figure 2 below shows a loaded beam which is supported at the ends. The beam is loaded with two point loads and a universal spreaded load of 3 kN/m.

3.1   Calculate the reaction forces at P and Q.

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

3.3   Calculate the bending moments at A, B, C, D and E.

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

       Use the following scales:

       Space diagram   :   1:100
       Shear force diagram   :   1 kN = 5 mm
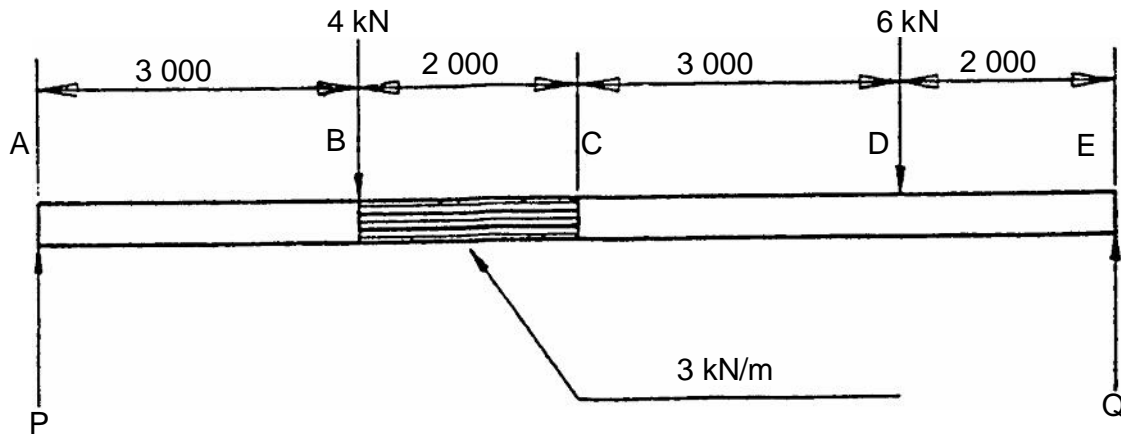   Bending moment diagram   :   1 kN.m = 2 mm

Figure 2   **[60]**

QUESTION 4

4.1   A solar hot water system consists of a solar collector and a horizontal electric geyser that must be installed in a dwelling with a 30 degree pitched roof. A pressure-reducing valve controls the cold water supply to the hot water system.

      4.1.1   Draw a neat line diagram in good proportion, showing the arrangement of all the components of this system. Also indicate, by means of arrows, the direction of water flow when the system is in use.   (30)

4.2   Draw a neat, sectional sketch in good proportion of an underground vacuum tank which is connected to an inspection chamber.   (10)

4.3   Draw a neat, sectional sketch in good proportion of a joint between two 100 mm earthenware pipes.   (10)

4.4   Briefly describe how a water test is carried out on a sewerage system.   (10)

[60]

QUESTION 5

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

Figure 3 on page 7 shows the groundplan of a dwelling.

Determine

5.1   the quantity of bricks required for the 330 mm substructure.

5.2   the quantity of bricks required for the 220 mm superstructure.

5.3   the quantity of bricks required for the 110 mm beam filling.

5.4   the quantity of bricks required for the complete building.

5.5   the quantity of concrete needed for the floor.

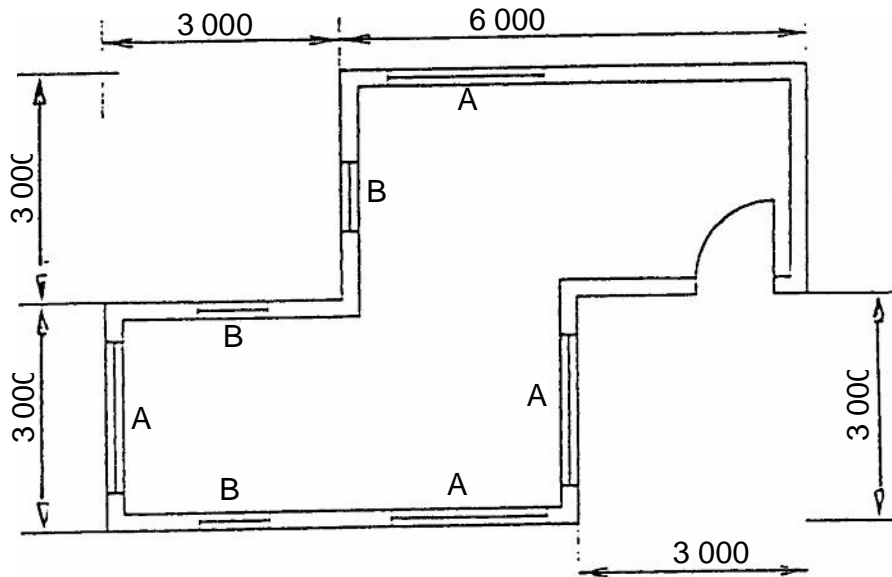Only the quantity of bricks for the doors and windows must be deducted.

Figure 3

Use the following specifications for the calculation:

- 50 bricks per square metre for a half-brick wall
- The height of the substructure is 450 mm.
- The height of the superstructure is 2 800 mm.
- The beam filling is three layers of bricks high.
- Door openings are 2 000 mm x 1 000 mm.
- Window A is 2 500 mm x 2 000 mm.
- Window B is 1 500 mm x 900 mm.
- The floor thickness is 75 mm and penetrates the outer wall by 110 mm.
- A six percent brick wastage should also be included in the calculation. **[60]**

QUESTION 6

A plan of a dwelling is shown in **Figure 4** below. The dwelling has a hipped roof, covered with corrugated iron and has closed eaves with an overhang of 500 mm and a pitch of 30°. The roof has 100 mm x 100 mm square gutters and a fascia board of 200 mm. The superstructure is 3 000 mm high and the substructure has six layers of bricks of which only two layers are above ground level. The dwelling has framed, Z batten doors. All steel windows must be placed in the correct position by using the sizes given in the window schedule. The window sills are made of 25 mm thick quarry tiles.

6.1   Draw to a scale of 1:100, a North and East elevation of the dwelling.   **[60]**

Figure 4
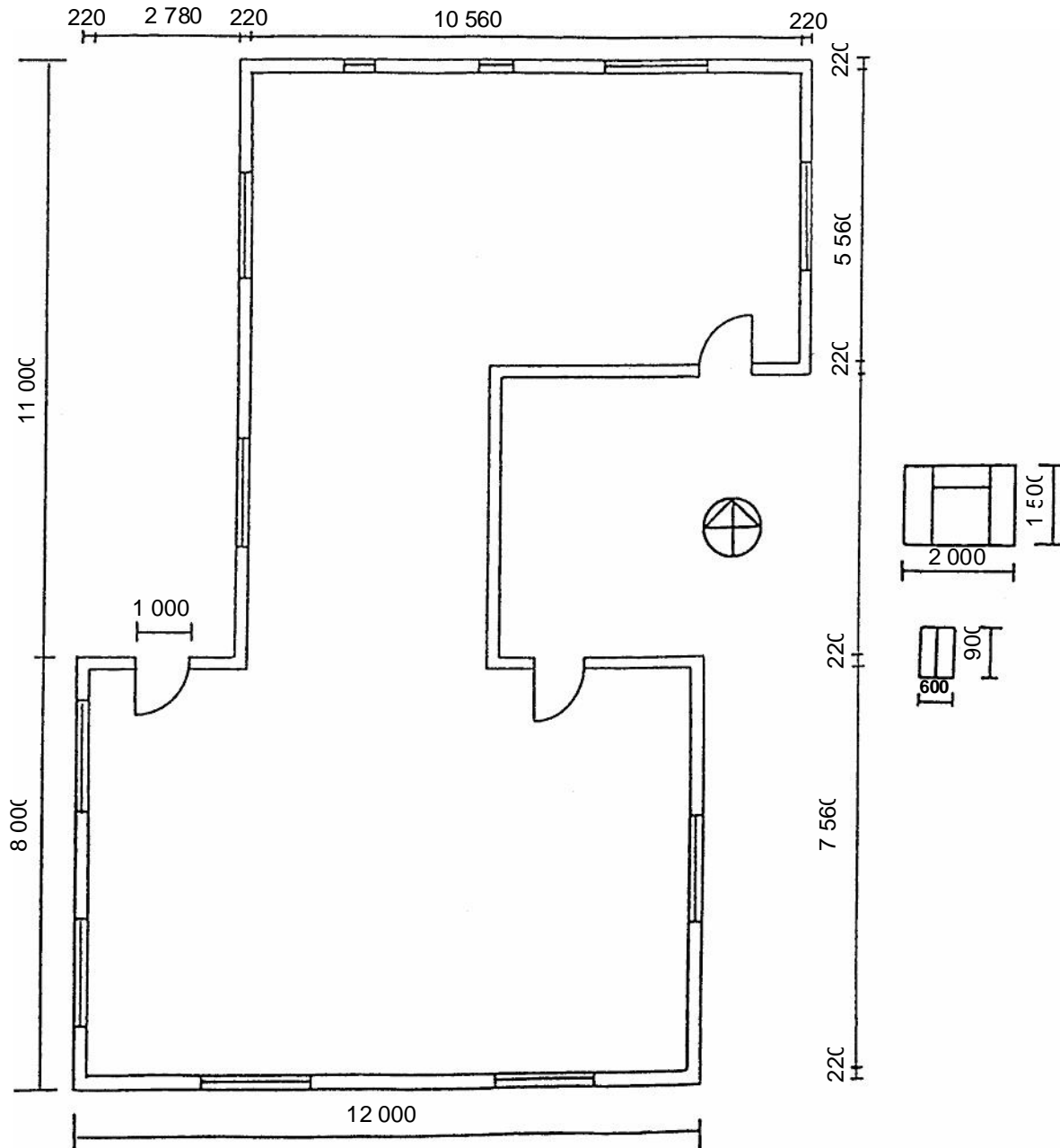
QUESTION 7

7.1   Show by means of a sketch the construction of a one-brick foundation wall.

The following must clearly be shown on the sketch:

- Concrete foundation
- Foundation wall
- Core filling
- Hardcore
- Ground level
- Blinding
- Screed
- Damp-proof
- Concrete floor
- Floor blocks
- Quarter rounds
- Skirting
- Part of the one-brick outer wall
- Plaster finish on the inside wall   (20)

7.2   State FIVE precautions which must be taken when it is essential, due to
circumstances, for a sewer to be laid underneath a building.   (10)

7.3   State EIGHT aspects to which an inspector must pay attention when inspecting a
sewer.   (16)

7.4   Describe, step by step, the setting up of a dumpy level before readings can be
taken.   (14)
                                                                            [60]

                                                    TOTAL: 300

QUESTION 5 / *VRAAG 5*

ANSWER SHEET / *ANTWOORDBLAD* SG 702-2/2 (1)

CANDIDATE'S NUMBER / *KANDIDAAT SE NOMMER*

A	B	C	D
			Substructure centre line / *Onderbou-hartlyn*
			2 x [ ] = [ ] mm
			2 x [ ] = [ ] mm
			= [ ] mm
			Minus 4 x [ ] = [ ] <u>mm</u>
			= [ ] mm
			The centre line is / *Die hartlyn is* [ ] metre / *meter*
			Height of the substructure is [ ] mm
			Hoogte van die onderbou 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/ 3/	[ ] [_____] [ ] <u>50</u> [ ]		[ ] bricks are required *[ ] stene word benodig*
			Superstructure centre line / *Bobou-hartlyn*
			2 x [ ] = [ ] mm
			2 x [ ] = [_____] mm
			= [ ] mm
			Minus [x] = [_____]
			= [ ] mm
			The centre line is / *Die hartlyn is* [ ] metres / *meter*
			Height of the superstructure is [ ] mm
			Hoogte van die bobou 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/	[ ] [_____] [ ]	[ ]	

2/	[ ] [50] [ ]		[ ] bricks are required *[ ] stene word benodig*
			Beam filling centre line / *Balkvulling-hartlyn*
			2 x [ ] = [ ] mm
			2 x [ ] = [_____] mm
			= [ ] mm
			Minus [x] = [_____] mm
			= [ ] mm
			The centre line is / *Die hartlyn is* [ ] metres / *meter*
			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 is / are [ ] half-brick wall (s)
			Daar is [ ] halfsteen-muur / mure
1/	[ ] [_____] [ ]	[ ]	
1/	[ ] 50 [ ]		[ ] 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*
			1 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
1/	2 1 2	[ ]m	
[ ]/	2 [_____] 100	[ ]	There are [ ] bricks *Daar is [ ] stene*

			Windows / *Vensters*
			WINDOW A / *VENSTER A*
			4 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 [ ] half-brick walls
			Daar is [ ] halfsteen-mure
[ ]/	$\dfrac{2}{3}$	12 m	
2/	$\dfrac{50}{600}$	1 200	1 200 bricks are required *1 200 stene word benodig*
			Windows / *Vensters*
			WINDOW B / *VENSTER B*
			3 x 0,900 x 1,5
			[ ] bricks per square metre for a half-brick wall
			[ ] stene per vierkante meter vir 'n halfsteen-muur
			There are 2 half-brick walls
			Daar is 2 halfsteen-mure
[ ]/	$\dfrac{[\ ]}{1,35}$	4,1 m	
2/	$\dfrac{50}{205}$	410	[ ] bricks are required *[ ] stene word benodig*
			Total deductions / *Totale aftrekkings*
			Doors / *Deure* [ ] Windows / *Vensters* [____] [ ]
			Total bricks for the structure *Totale getal stene vir die struktuur*
			Structure / *Struktuur* [ ] Deductions / *Aftrekkings* [____] [ ]

			Plus 6% Wastage / *Vermorsing*
			8 614 [____] [ ] [ ] [____] [ ]
			[ ] bricks will be required for the structure
			[ ] stene sal vir die struktuur benodig wees
			Foundation centre line / *Fondasie-hartlyn*
			-[ ] = -[ ] = Floor thickness / *Vloerdikte 75 mm*
	[ ] [ ] [___] [ ]	[ ] m	[ ]cubic metres of concrete are required for the floor. *[ ] kubieke meter beton word vir die vloer benodig.*

END / *EINDE*

SENIOR CERTIFICATE EXAMINATION
SENIORSERTIFIKAAT-EKSAMEN
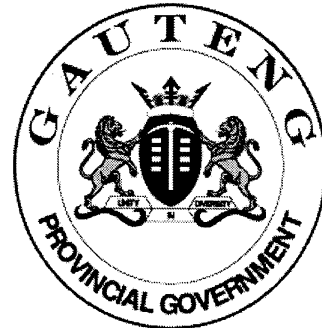
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2005

BUILDING CONSTRUCTION
BOUKONSTRUKSIE

SG

DRAWING ANSWER BOOK
TEKENE ANTWOORDBOEK

702-2/x

4 pages/*bladsye*

QUESTION VRAAG	MARKS PUNTE	INITIAL PARAFEER
1		
2		
3		
4		
5		
6		
7		
TOTAAL / *TOTAL*		

2

BUILDING CONSTRUCTION SG	
BOUKONSTRUKSIE SG	2
(Drawing Answer Book)	
(Tekene Antwoordboek) 702-2/X	