



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

SEPTEMBER 2012

CIVIL TECHNOLOGY

MARKS: 200

TIME: 3 hours



This question paper consists of 13 pages, including 3 answer sheets.

REQUIREMENTS

1. Drawing instruments
2. A non-programmable pocket calculator
3. ANSWER BOOK

INSTRUCTIONS AND INFORMATION

1. This question paper consists of SIX questions.
2. Answer ALL the questions.
3. Answer each question as a whole, do NOT separate subquestions.
4. Start EACH question on a NEW page.
5. Sketches may be used to illustrate your answers.
6. ALL calculations and written answers must be done in the ANSWER BOOK or on the attached ANSWER SHEETS.
7. Use the mark allocation as a guide to the length of your answers.
8. Drawings and sketches must be done in pencil, fully dimensioned and neatly finished off with descriptive titles and notes to conform to the SANS/SABS Recommended Code of Practice for Building Drawings.
9. For the purpose of this question paper, the size of a brick should be taken as 220 mm x 110 mm x 75 mm.
10. Use your discretion where dimensions and/or details have been omitted.
11. Non-programmable pocket calculators may be used.

QUESTION 1 (CONSTRUCTION PROCESSES)

- 1.1 Choose a description from COLUMN B that matches an item in COLUMN A. Write only the letter (A – J) next to the question number (1.1.1 – 1.1.10).

Column A		Column B	
1.1.1	Nail gun	A	used to cut bricks and metal
1.1.2	Angle grinder	B	used to break up hard surfaces
1.1.3	Jack hammer	C	used to cut wooden strips
1.1.4	Circular saw	D	used to strengthen brick walls between bricks
1.1.5	Beam filling	E	brickwork from floor to wall plate at roof
1.1.6	Superstructure	F	concrete beam above door or window
1.1.7	Brick force	G	used to finish off roof eaves
1.1.8	Reinforcement	H	used to fasten parts to a concrete wall
1.1.9	Lintel	I	steel rods in concrete to make it stronger
1.1.10	Facia board	J	built in bricks between roof trusses

(10)

- 1.2 Draw to good proportion a line diagram of the following roof trusses with a pitch of 30°.
- 1.2.1 a Kingpost roof truss (5)
- 1.2.2 a Fink truss (5)
- 1.3 What factor determines the spacing between roof trusses? (1)
- 1.4 What is meant by the bracing of roof trusses? (1)
- 1.5 What type of glass would you use for a bathroom window? (1)
- 1.6 Damp proofing is used to prevent water from entering the house. Name FOUR places in a building where it should be used. (4)
- 1.7 You must apply first aid to an injured worker on site that is bleeding. Name THREE precautionary measures you would take to prevent yourself from being infected with germs or harmful bacteria. (3)

[30]

QUESTION 2 (ADVANCED CONSTRUCTION PROCESSES)

- 2.1 Name TWO types of measuring tools that can be used to set out the foundation of a house. (2)
- 2.2 Name THREE requirements for steel bars which are used for reinforcement. (3)
- 2.3 Rib and block floor slabs are becoming more popular in the building industry. Name FOUR components of a rib and block floor slab. (4)
- 2.4 Explain why it is necessary to reinforce a concrete beam. (1)
- 2.5 Name the FOUR components of a ground level floor. (4)
- 2.6 What is the metal plate called which is used to join steel roof truss members. (1)
- 2.7 Name THREE items that can be used to prevent reinforcement touching the sides of formwork when pouring concrete into the boxing. (3)
- 2.8 Name TWO tests that can be done to test the strength of concrete. (2)
- 2.9 Indicate whether the following statements are TRUE or FALSE. Write only TRUE or FALSE next to the question number.
- 2.9.1 Gauged arches are constructed with bricks that are cut to the required wedge shape. (1)
- 2.9.2 Concrete piles are used to support rib and block floors. (1)
- 2.9.3 The 3-4-5 method is used to test 90 degree angles. (1)
- 2.9.4 Electrical fires must be extinguished with a dry-chemical extinguisher. (1)
- 2.9.5 A site plan must be drawn to scale 1:50 to show the position of the house and the size of the plot. (1)
- 2.9.6 The Band saw is used to cut curves in wood. (1)
- 2.9.7 Purlins with dimensions of 38 mm x 38 mm are used to secure an asbestos roof. (1)
- 2.9.8 The gouge chisel is used at the wood turning lath to cut V-grooves into wood. (1)
- 2.9.9 Housing joints are used in the construction of shelves. (1)
- 2.9.10 Ladders are the only way to reach the roof of a house. (1)
- 2.10 Draw to scale 1:20 a vertical sectional view through the length of a concrete beam of 3 000 mm x 400 mm x 300 mm to show all the necessary steel reinforcement. Label all parts. (10)

[40]

QUESTION 3 (CIVIL SERVICES)

- 3.1 Name TWO types of traps and indicate where it is used in a soil water system. (4)
- 3.2 What is the purpose of a grease trap and where would you install it? (2)
- 3.3 What angle must be used to join junction pipes to the main sewerage pipe? (1)
- 3.4 Explain shortly the purpose of a manhole and the advantage of installing it. (2)
- 3.5 Name THREE methods to collect and discharge of sewerage water in cases where a sewerage system does not exist. (3)
- 3.6 Explain the purpose of a ball valve and name ONE place in a household where it is used. (2)
- 3.7 Name EIGHT drainage principles that should be adhered to in order to see to it that drainage is trouble free. (8)
- 3.8 Name FOUR factors that should be taken into account when installing solar panels for a hot water system. (4)
- 3.9 Abbreviations are used on building plans to show certain appliances. Write out the following abbreviations:
 - 3.9.1 B
 - 3.9.2 WC
 - 3.9.3 VP
 - 3.9.4 WM

(4)
[30]

QUESTION 4 (MATERIALS)

- 4.1 Materials are used at different places in the building industry. Name ONE use of the following materials:
- 4.1.1 Cast iron
 - 4.1.2 Aluminium
 - 4.1.3 Copper
 - 4.1.4 Zinc (4)
- 4.2 Different types of pipes are used to supply water to a house. Name TWO advantages and TWO disadvantages when using plastic pipes. (4)
- 4.3 You must cast a concrete floor. Name TWO reasons why you would prefer ready mixed concrete. (2)
- 4.4 Timber that is used in the building industry must be graded. Name TWO methods that can be used to grade timber. (2)
- 4.5 As building surveyor it is your task to determine the amount of concrete needed to do the foundation of a boundary wall. Calculate the volume of concrete which would be needed to do the foundation of 12 000 mm long, 500 mm wide and 200 mm thick. Show all calculations. (5)
- 4.6 Explain how you would store cement on a building site. (3)
- 4.7 Name FIVE reasons why wood must be seasoned before it can be used for construction purposes. (5)
- 4.8 What type of glue must be used to glue woodwork joints? (1)
- 4.9 The strength of plywood makes it very popular to be used in the building industry. Name FOUR other properties of plywood. (4)

[30]

QUESTION 5 (APPLIED MECHANICS)

5.1 FIGURE 5.1 below shows the design of a roof truss to be erected on a building.

5.1.1 Determine graphically the magnitude of the forces in each member of the truss. Answer on ANSWER SHEET 5.1. Use a scale of 1 mm = 1 N. (7)

5.1.2 Write down the magnitude of the forces in the table on ANSWER SHEET 5.1. (7)

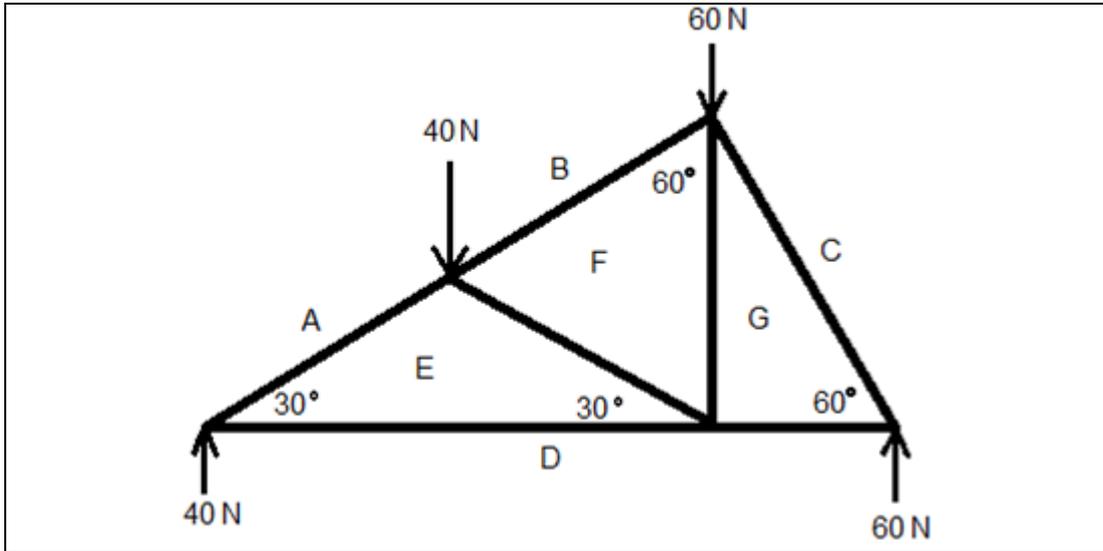


FIGURE 5.1

5.2 FIGURE 5.2 shows a beam with pointed loads.

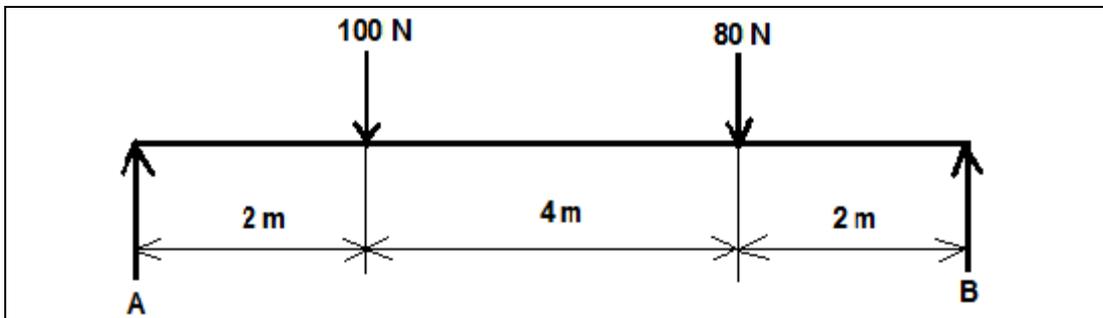


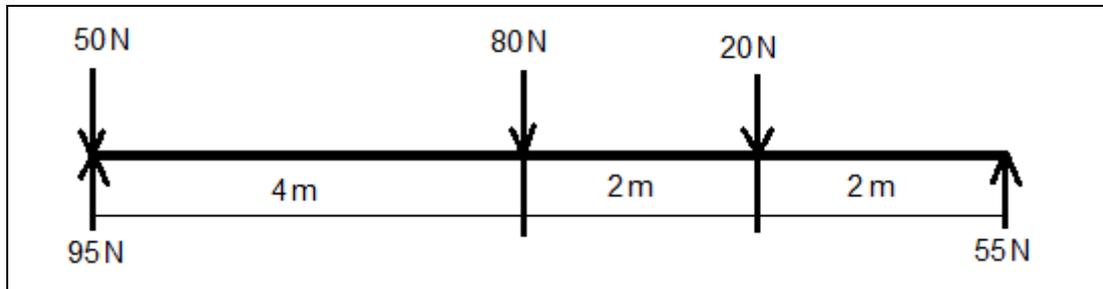
FIGURE 5.2

Calculate the reaction forces at loadpoints A and B. (8)

5.3 FIGURE 5.3 shows a beam of 8 meter which is subjected to different loads.

5.3.1 Determine the shear forces at each point. (4)

5.3.2 Draw the shear force diagram. Use a force scale of 1 mm = 1 N and a linear scale of 1 cm = 1 m. (4)



[30]

FIGURE 5.3

QUESTION 6 (GRAPHICS AND COMMUNICATION)

6.1 FIGURE 6.1 shows the floor plan of a building. Draw to scale 1:50 on ANSWER SHEET 6.1 the south view of the building. The building has a hip roof with a pitch of 30°. (20)

Use the following specifications:

- The front door is 800 mm wide and 2 000 mm high.
- The roof is covered with asbestos roof sheets.
- Height between floor and wall plate is 2 600 mm.
- The overhang of the roof eave is 500 mm.
- Downpipes are 75 mm in diameter.
- Window 1(V1) is 1 500 mm x 900 mm
- Window 2(V2) is 2 100 mm x 900 mm.

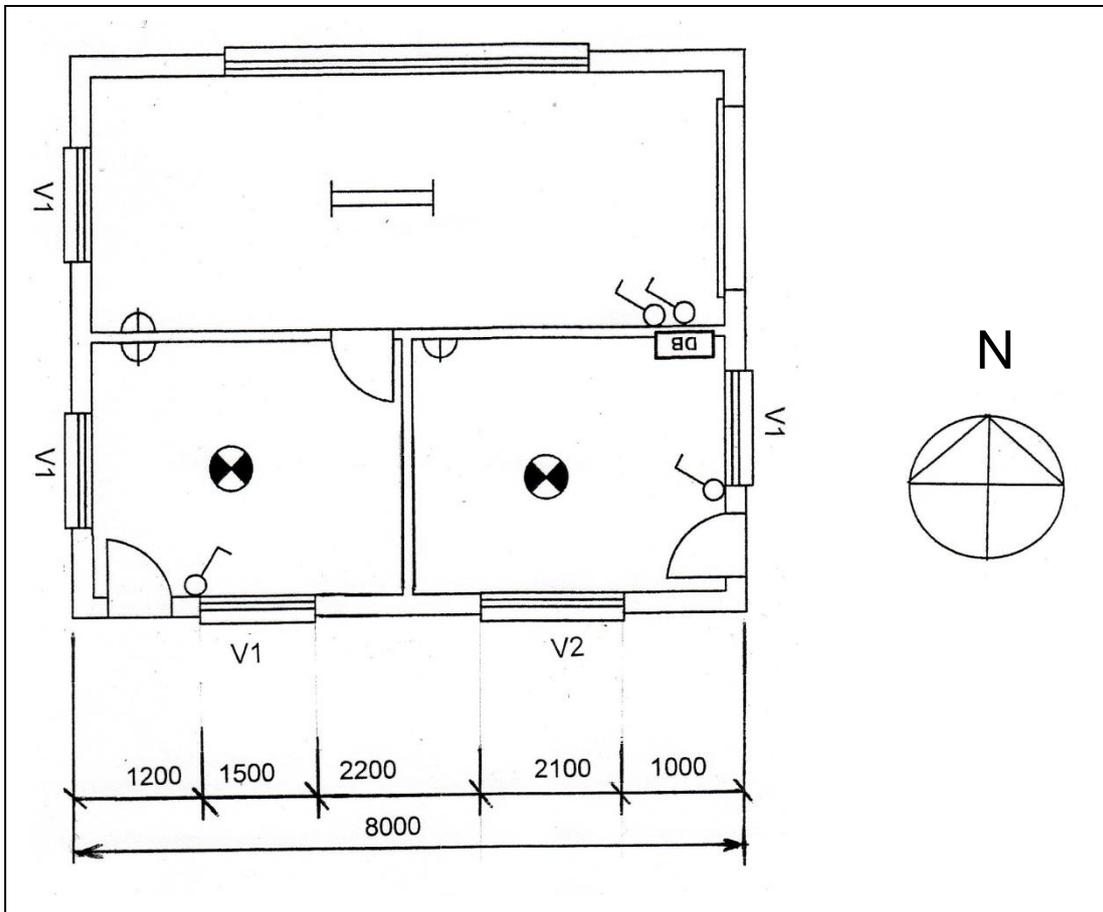


FIGURE 6.1

- 6.2 Draw to scale 1:10 the vertical sectional view through the top part of the building to show the roof overhang with a closed eave. Show only a part of the roof truss, wall and ceiling.

Use the following specifications:

- Cavity wall of 270 mm
- The roof pitch is 30° with an overhang of 500 mm
- Roof truss members are 114 mm x 38 mm
- Two purlins of 75 mm x 50 mm
- 10 mm thick ceiling board
- 75 mm cornice
- Use asbestos board for closed eave
- 38 mm x 38 mm bearer and hanger
- 220 mm x 30 mm fascia board
- 100 mm x 100 mm square gutter with 75 mm down pipe

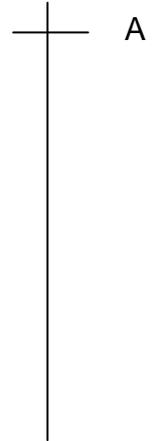
(20)

[40]

TOTAL: 200

ANSWER SHEET 5.1 NAME OF CANDIDATE: _____

FORCE DIAGRAM



(7)

PART / FORCE SIZE

AE = _____

BF = _____

CG = _____

DG = _____

DE = _____

EF = _____

FG = _____

(7)

ANSWER SHEET 6.1

NAME OF CANDIDATE: _____

ANSWER SHEET 6.2 **NAME OF CANDIDATE:** _____