



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

SEPTEMBER 2011

CIVIL TECHNOLOGY

MARKS: 200

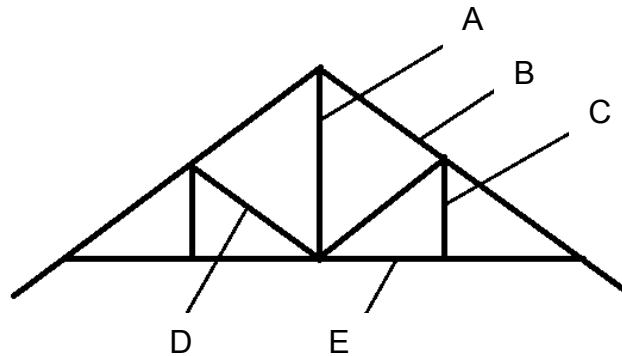
TIME: 3 hours



This question paper consists of 11 pages.

QUESTION 1 CONSTRUCTION PROCESS

- 1.1 What determines the spacing between roof trusses? (1)
- 1.2 The figure below show a South African (Howe-) roof truss. Write down the letters A – E and next to the letter the correct name of each member of the roof truss.



- (5)
- 1.3 Name TWO methods that can be used to join the above mentioned roof truss parts. (2)
- 1.4 Give TWO reasons why roof trusses must be braced. (2)
- 1.5 What is the standard size of a wall plate that roof trusses rest on? (2)
- 1.6 The main purpose of the factories act is to protect the worker. Name THREE responsibilities that the employer must abide by. (3)
- 1.7 Materials that are used in the construction of a roof are listed below:

Purlin Truss Ceiling board Corrugated iron Brandering Cornice
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- Write down the numbers 1.7.1 – 1.7.6 and arrange the listed materials in the correct order as it will be seen in a finished roof construction, starting from the outside and ending on the inside. (6)
- 1.8 Protective clothing must be worn by workers to protect themselves. Name FOUR types of personal protective clothing that workers could wear. (4)
- 1.9 Which type of fire extinguisher must be used to extinguish electrical fires? (1)
- 1.10 Name FOUR safety rules when working with hand tools. (4)

[30]

QUESTION 2 ADVANCED CONSTRUCTION PROCESSES

- 2.1 Indicate whether the following statements are TRUE or FALSE. Choose the correct answer and write only true or false next to the question number.
- 2.1.1 A rough gauged arch is one that will be plastered. (1)
- 2.1.2 In a rectangular house with a hip roof all the inner walls will bear the load of the roof. (1)
- 2.1.3 Electrical fires must be extinguished with water. (1)
- 2.1.4 Creosote is used as preservative for kitchen cabinets. (1)
- 2.1.5 Piling forms the deepest part of a foundation and helps to distribute the weight of the building into deeper firmer ground. (1)
- 2.1.6 A portable router machine is used to plane wood level. (1)
- 2.1.7 The standard size of a clay brick is 250 mm x 100 mm x 60 mm. (1)
- 2.1.8 A haunch double mortise and tendon joint can be used to join the bottom rail and stile of a door. (1)
- 2.1.9 Reinforcement bars for concrete beams must touch the sides of the formwork to ensure maximum strength. (1)
- 2.1.10 The floor of a house must be at the same level as the ground level. (1)
- 2.2 Name FOUR requirements for formwork. (4)
- 2.3 Rib and block floors are used in double storey buildings. Name FOUR advantages of rib and block floors. (4)
- 2.4 Name THREE methods to fix mirrors to a wall. (3)
- 2.5 Shoring is used to support walls and unstable ground. Name THREE types of shoring which are used to support walls. (3)
- 2.6 Draw a horizontal section through a square concrete column to a scale of 1:10 with the formwork in position. ANSWER ON ANSWERSHEET 2.6

Use the following specifications:

- Square column 450 mm x 450 mm
- Plywood 22 mm thickness
- Bolt 16 mm
- Yoke 50 mm x 75 mm
- Clamp 50 mm x 75 mm

(16)
[40]

QUESTION 3 CIVIL SERVICES

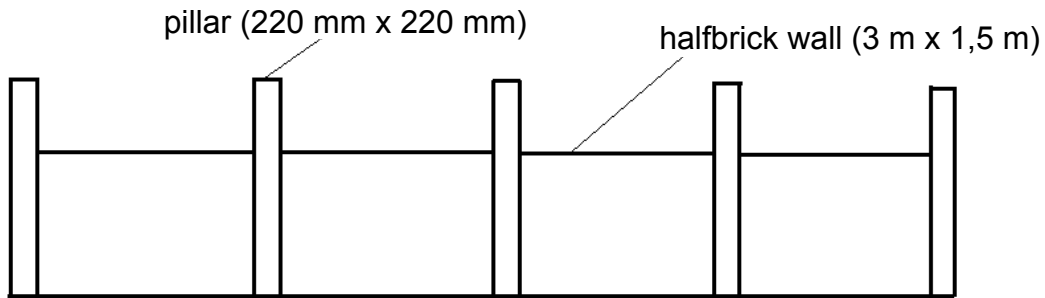
- 3.1 Electrical geysers are used in households to heat water. Explain shortly how a low pressure electrical geyser works. (4)
- 3.2 Name FOUR factors that determine the maximum water temperature in a solar heating system. (4)
- 3.3 Different kinds of taps are used for water supply. Explain the difference between a stop tap and a bib tap. (2)
- 3.4 Clay drain pipes are used for drainage. Name FOUR more types of drain pipes that can be used. (4)
- 3.5 A French drain is often used on farms. Explain how a French drain is built. (4)
- 3.6 Name TWO advantages of a manhole in a drainage system. (2)
- 3.7 An electrical three pin plug is wired with three different colours of wires. Name the THREE colours and explain each one. (6)
- 3.8 Name TWO advantages of wind energy as an energy source. (2)
- 3.9 Explain the function of a water trap at a water closet. (1)
- 3.10 Name ONE type of trap that can be used at a basin. (1)
- [30]**

QUESTION 4 MATERIALS

- 4.1 As building contractor you are asked to do a driveway in front of a garage. The driveway must be 3 metres wide, 8 metres in length and 100 mm thick.
- Calculate the volume of concrete needed to do the driveway. All calculations must be shown. (5)
- 4.2 Concrete is very strong and has a high compressive strength. Name FIVE more advantages of concrete. (5)
- 4.3 Complete the following questions by choosing the correct answer out of the possible answers that are given. Write down only the correct word.
- 4.3.1 For hot water supply (plastic pipes, copper pipes) must be used. (1)
- 4.3.2 The (slump test, cube test) is used on wet concrete to determine if too much water is added to the mixture. (1)
- 4.3.3 Aluminium is rust resistant and a (good, bad) conductor of electricity. (1)

- 4.3.4 (Pressboard, Pine wood) are used to manufacture roof trusses. (1)
- 4.3.5 Woodwork joints are glued with (PVA-glue, contact glue). (1)
- 4.3.6 At cavity walls (gang nailed plates, brick ties) are used to strengthen the walls. (1)
- 4.4 Name TWO methods to fix glass to a wooden window frame. (2)
- 4.5 You must build a boundary wall (FIGURE 4.5) between you and your neighbour. The walls consist of FIVE square brick pillars of 220 mm x 220 mm and are TWO metres high. FOUR half brick walls of 1 500 mm x 3 000 mm long are built in between the pillars. Calculate how many bricks you would need to build the wall and pillars. Use FIFTY bricks per square metre for a half brick wall. (12)

FIGURE 4.5

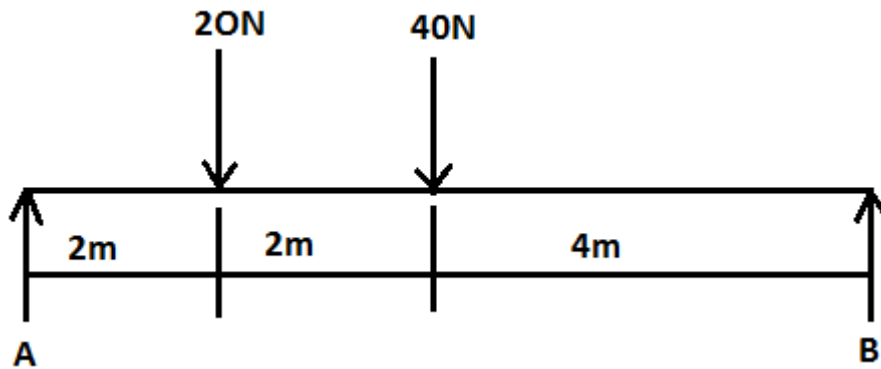


Copy the table below on your question paper and do all calculations on your table.

COLUMN A	COLUMN B	COLUMN C	COLUMN D

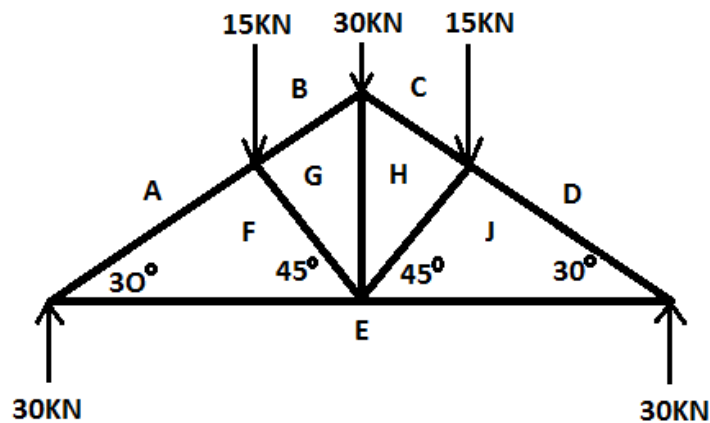
QUESTION 5 APPLIED MECHANICS

- 5.1 FIGURE 5.1 show a beam with pointed loads. Calculate the reaction forces at supports A and B.



(8)

- 5.2 FIGURE 5.2 shows the design of a roof truss which must be constructed on a building.



- 5.2.1 Determine graphically the sizes of the forces of each member of the roof truss. Use a scale 2 mm = 1 kN. Answer on ANSWER SHEET 5.2 (9)
- 5.2.2 Write the sizes of the forces on the table on ANSWER SHEET 5.2 (9)
- 5.3 Determine the stress in a 25 mm square bar that is subjected to a force of 10 kN. (4)

[30]

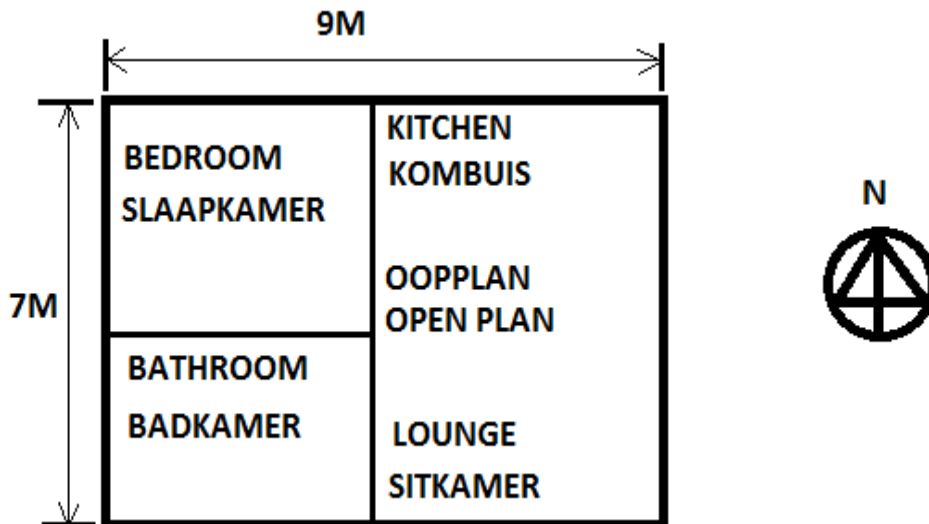
QUESTION 6 GRAPHICS AND COMMUNICATION

ANSWER THIS QUESTION ON THE ATTACHED ANSWER SHEETS.

Your school wants to build a one bedroom flat for the caretaker. As a draughtsman you are tasked to prepare the drawings for the flat:

NOTES:

- The size of the flat must be 7 m x 9 m
- The flat must have THREE rooms
 - Bedroom
 - Bathroom
 - Open-plan kitchen & lounge
- Access from one room to the other is through inter-leading doors built into a halfbrick wall
- The front door is on the southern side of the house and the back door is on the northern side of the house which is built into a cavity wall
- The roof is hip roof construction
- The concrete floor is 100 mm thick



SPECIFICATIONS:

- Bathroom must have a shower, basin and water closet
- Inside measurements for bedroom is 4 600 mm x 3 600 mm
- Show TWO bathroom windows of 900 mm x 900 mm
- Show ONE bedroom window of 2 400 mm x 1 200 mm on the southern side
- Show ONE lounge window on eastern side
- All doors are 800 mm x 2 000 mm
- Show ONE built in cabinet in bedroom
- Show sink and stove in kitchen

6.1 Use a scale of 1:50 to design and draw the floor plan of the flat.
 Draw on ANSWER SHEET 6.1. (25)

6.2 Use a scale of 1:20 to draw a vertical section through the bottom part of one outside wall. Show foundation, floor and only a part off cavity wall above the floor. Label all parts. Draw on ANSWER SHEET 6.2 (15)

[40]

TOTAL: 200

ANSWER SHEET 2.6

NAME OF CANDIDATE: _____

ANSWER SHEET 5.2 NAME OF CANDIDATE: _____

FORCE DIAGRAM

(9)

PART/FORCE SIZE

AF = _____

BG = _____

HC = _____

JD = _____

JF = _____

FE = _____

FG = _____

GJ = _____

HJ = _____

(9)

ANSWER SHEET 6.1

NAME OF CANDIDATE: _____

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