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NATIONAL SENIOR CERTIFICATE

GRADE 12

SEPTEMBER 2026

CIVIL TECHNOLOGY: CONSTRUCTION

MARKS: 200

TIME: 3 hours

This paper consists of 19 pages including 3 answer sheets.

REQUIREMENTS:

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

INSTRUCTIONS AND INFORMATION

1. This question paper consists of SIX questions: TWO questions are generic and FOUR questions are subject specific.
2. Answer ALL the questions.
3. Answer each question as a whole. Do NOT separate subsections of questions.
4. Start the answer to EACH question on a NEW page.
5. Do NOT write in the margins of the ANSWER BOOK.
6. You may use sketches to illustrate your answers.
7. Write ALL calculations and answers in the ANSWER BOOK or on the attached ANSWER SHEETS.
8. Use the mark allocation as a guide to the length of your answers.
9. Make drawings and sketches in pencil, fully dimensioned and neatly finished off with descriptive titles and notes to conform to the *SANS/SABS Code of Practice for Building Drawings*.
10. For the purpose of this question paper, the size of a brick should be taken as 220 mm x 110 mm x 75 mm.
11. Use your own discretion where dimensions and/or details have been omitted.
12. Answer QUESTIONS 3.6, 6.6 and 6.7 on the attached ANSWER SHEETS using drawing instruments where necessary.
13. Write your NAME on every ANSWER SHEET and hand them in with your ANSWER BOOK, whether you have answered the question or not.
14. Due to electronic transfer, drawings in the question paper are NOT to scale.

QUESTION 1: SAFETY, MATERIALS AND TOOLS (GENERIC)

Start this question on a NEW page.

- 1.1 Choose a description from COLUMN B that matches an item in COLUMN A. Write only the letter (A–H) next to the question numbers (1.1.1 to 1.1.7) in the ANSWER BOOK, for example 1.1.8 I.

COLUMN A	COLUMN B
1.1.1 Stairways	A Not to be used in the proximity of electric wires.
1.1.2 Scaffold	B To cover iron or steel with a layer of zinc to prevent it from rusting.
1.1.3 Powder coating	C Prevent vertical standards from sinking into the ground.
1.1.4 Safety net	D Should be provided with toe board to prevent objects from falling off.
1.1.5 Sole plate	E Allow workers to climb up and down the ladder.
1.1.6 Galvanising	F Finish is suitable for heavy wear and tear applications.
1.1.7 Rungs	G Slippery conditions must be corrected.
	H Prevents falling objects from injuring workers.

(7 x 1) (7)

- 1.2 Describe any TWO safety precautions that must be adhered to when working on a builder's hoist. (2 x 1) (2)
- 1.3 Explain the purpose of painting. (2)
- 1.4 Explain the effect of curing with regard to the strength of concrete. (1)
- 1.5 What is the maximum height of a trestle scaffolding? (1)
- 1.6 Describe any TWO aspects that scaffolding must adhere to before it is used. (2 x 1) (2)
- 1.7 Why should non-skid material be fitted at the bottom end of the stiles of a ladder? (1)
- 1.8 Name any ONE method that can be used to prevent corrosion of metals. (1 x 1) (1)

1.9 FIGURE 1.9 below shows a tool that is used in the building construction industry.



FIGURE 1.9

- 1.9.1 Identify tool **A**. (1)
- 1.9.2 How would you care for this tool if it is subjected to extreme temperature changes? (1)
- 1.9.3 Explain why the batteries should be removed from the tool if it is not going to be used for a long time. (1)

[20]

QUESTION 2: GRAPHICS AND JOINING

Start this question on a NEW page.

2.1 Give the abbreviations for the following:

- 2.1.1 Natural ground level (1)
- 2.1.2 Finished floor level (1)
- 2.1.3 Damp proof course (1)
- 2.1.4 Water closet (1)
- 2.1.5 Bathtub (1)

2.2 Identify the electrical symbols that is shown from QUESTIONS 2.2.1 to 2.2.5.

2.2.1  (1)

2.2.2  (1)

2.2.3  (1)

2.2.4  (1)

2.2.5  (1)

2.3 Draw the following material symbols:

- 2.3.1 Concrete (2)
- 2.3.2 Facebrick (2)
- 2.3.3 Undisturbed earth (2)
- 2.3.4 Metal (2)
- 2.3.5 Plaster (2)

2.4 Name any FIVE details that appear in a site plan. (5 x 1) (5)

2.5 Identify the bolt heads illustrated in FIGURES A to C.

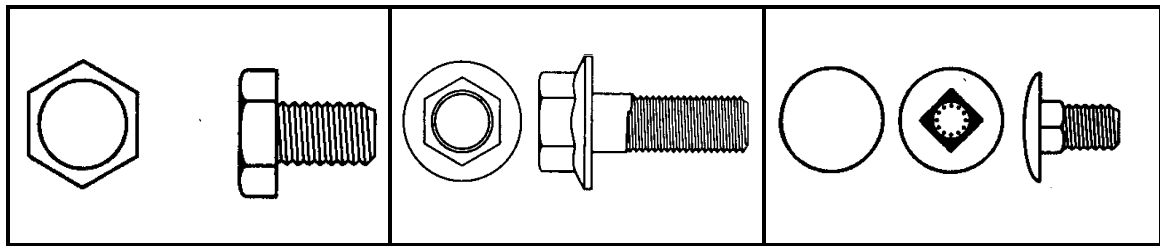


FIGURE A

FIGURE B

FIGURE C

(3 x 1) (3)

2.6 Name any FOUR details that must be mentioned when purchasing bolts.

(4 x 1) (4)

2.7 Rawl bolts are expanding sheet anchor fasteners. Briefly explain the operation of rawl bolts.

(3 x 1) (3)

2.8 FIGURE 2.8 shows the anchor shield of a rawl bolt in the hole and accessory A placed in position. Answer the following questions regarding the attachment in FIGURE 2.8.

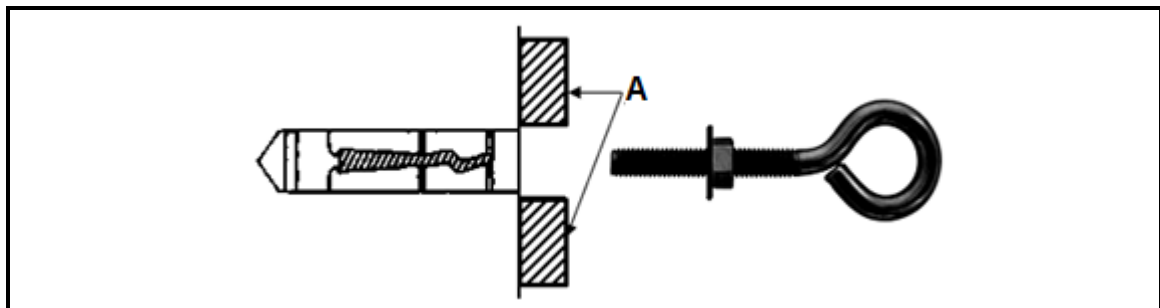


FIGURE 2.8

2.8.1 Briefly explain why the attachment of fixture A will not be effective. (2)

2.8.2 When an eye is used, should the nut or the eye be tightened for the attachment? (1)

2.8.3 Name any TWO good mechanical properties of rawl bolts. (2 x 1) (2)

[40]

TOTAL SECTION A: 60

QUESTION 3: ROOFS, STAIRCASES AND JOINING (SPECIFIC)

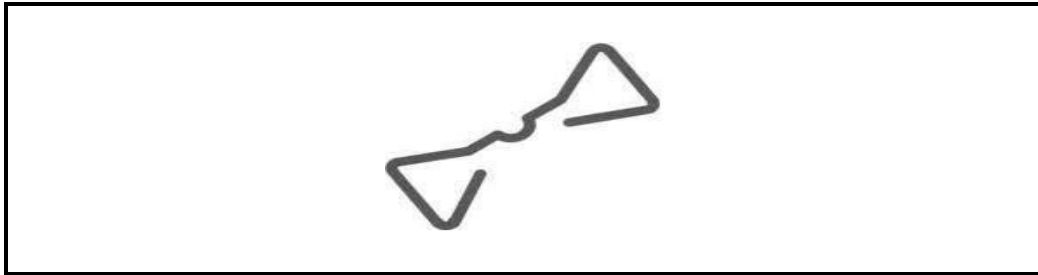
Start this question on a NEW page.

- 3.1 Give ONE word/term for each of the following descriptions by choosing a word/term from the list below. Write only the word/term next to the question numbers (3.1.1 to 3.1.5) in the ANSWER BOOK, for example
3.1.6 114 mm x 38 mm.

760 mm; fire-proof material; corrugated iron sheets; 300 mm; 38 mm x 38 mm; sisalation; 1 200 mm; fibre-cement tiles; 450 mm; concrete and clay roof tiles; bitumen asphalt; 50 x 76 mm

- 3.1.1 The maximum spacing between roof trusses for a thatch roof (1)
- 3.1.2 The material that can be used as an underlay to reduce the fire hazard during the construction of a thatch roof (1)
- 3.1.3 The maximum spacing between the battens for a thatch roof (1)
- 3.1.4 The type of roof covering if the maximum space between the roof trusses is 760 mm (1)
- 3.1.5 The dimensions of a batten that is used in an eave construction for corrugated iron sheet covering (1)
- 3.2 State ONE principle to consider when designing a staircase in terms of the following:
- 3.2.1 Minimum width of the staircase (1)
- 3.2.2 Minimum headspace (1)
- 3.2.3 Safety (1)
- 3.3 Differentiate between a *rise* and *riser* with regard to a staircase. (2)
- 3.4 Name the template that is used to set out a staircase. (1)
- 3.5 State any TWO purposes of a balustrade. (2 x 1) (2)
- 3.6 Use ANSWER SHEET A and draw in good proportion, a neat sketch of a collar tie roof truss with a pitch of 45° resting on two supporting walls. (11)

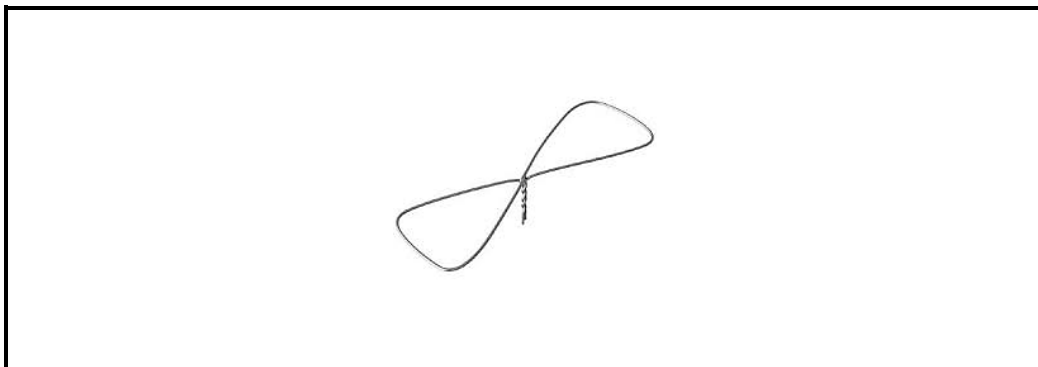
- 3.7 Identify the type of joining fixture in FIGURE 3.7 and give ONE use for the joining fixture.



(2 x 1) (2)

FIGURE 3.7

- 3.8 Identify the type of joining fixture in FIGURE 3.8 and give the horizontal spacing (distance in mm) for the joining fixture.



(2 x 1) (2)

FIGURE 3.8

- 3.9 Provide a name for the nut that fits the following descriptions:

3.9.1 A nut used for a neat appearance. (1)

3.9.2 A nut that can easily be unscrewed by hand. (1)

[30]

QUESTION 4: MATERIAL, EXCAVATIONS, FORMWORK, EQUIPMENT AND TOOLS (SPECIFIC)

Start this question on a **NEW** page.

- 4.1 Choose a description from COLUMN B that fits the item in COLUMN A. Write only the letter (A–L) next to the question numbers (4.1.1 to 4.1.8) in the ANSWER BOOK, for example 4.1.9 M.

COLUMN A		COLUMN B
4.1.1	Tin	A seals air and water leaks
4.1.2	Ready-mixed concrete	B easy to weld
4.1.3	Brass	C pumping water to a higher level
4.1.4	Aluminium	D non-acid-resistant or alkali-proof
4.1.5	Lead	E copper is the main ingredient
4.1.6	PVC (polyvinylchloride)	F reddish brown
4.1.7	Silicone	G used for waste-water systems
4.1.8	Copper	H has the same density throughout
		I silver-white in colour
		J low melting point
		K prevent corrosion
		L reinforcement in a concrete floor

(8 x 1) (8)

- 4.2 Name ONE consequence of neglecting to determine the location of services, like water pipes, electrical cables and gas lines before excavations commences. (1)
- 4.3 Describe THREE safety precautions to be considered for excavation operations at night. (3 x 1) (3)

4.4 Explain the following terms related to formwork:

4.4.1 Striking (1)

4.4.2 Releasing oil/Form oil (1)

4.4.3 Soffit board (1)

4.5 FIGURE 4.5 below shows the incomplete shuttering for a shallow trench in firm soil. Study the drawing and answer the questions that follow.

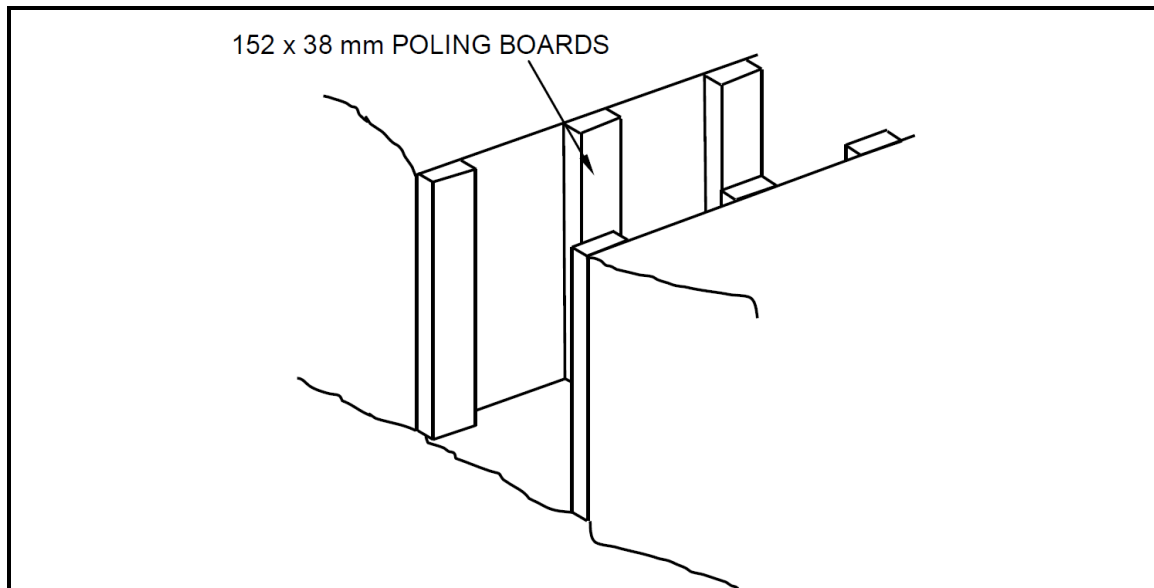


FIGURE 4.5

4.5.1 Identify any TWO members that have been omitted in FIGURE 4.5 and predict the likely consequence if these members are omitted during excavations. (3 x 1) (3)

4.5.2 Draw in your ANSWER BOOK a neat two-dimensional drawing of the complete shuttering for firm soil showing ALL the members. (5)

4.6 FIGURE 4.6 below shows formwork in a construction process. Study the drawing and answer the questions that follow.

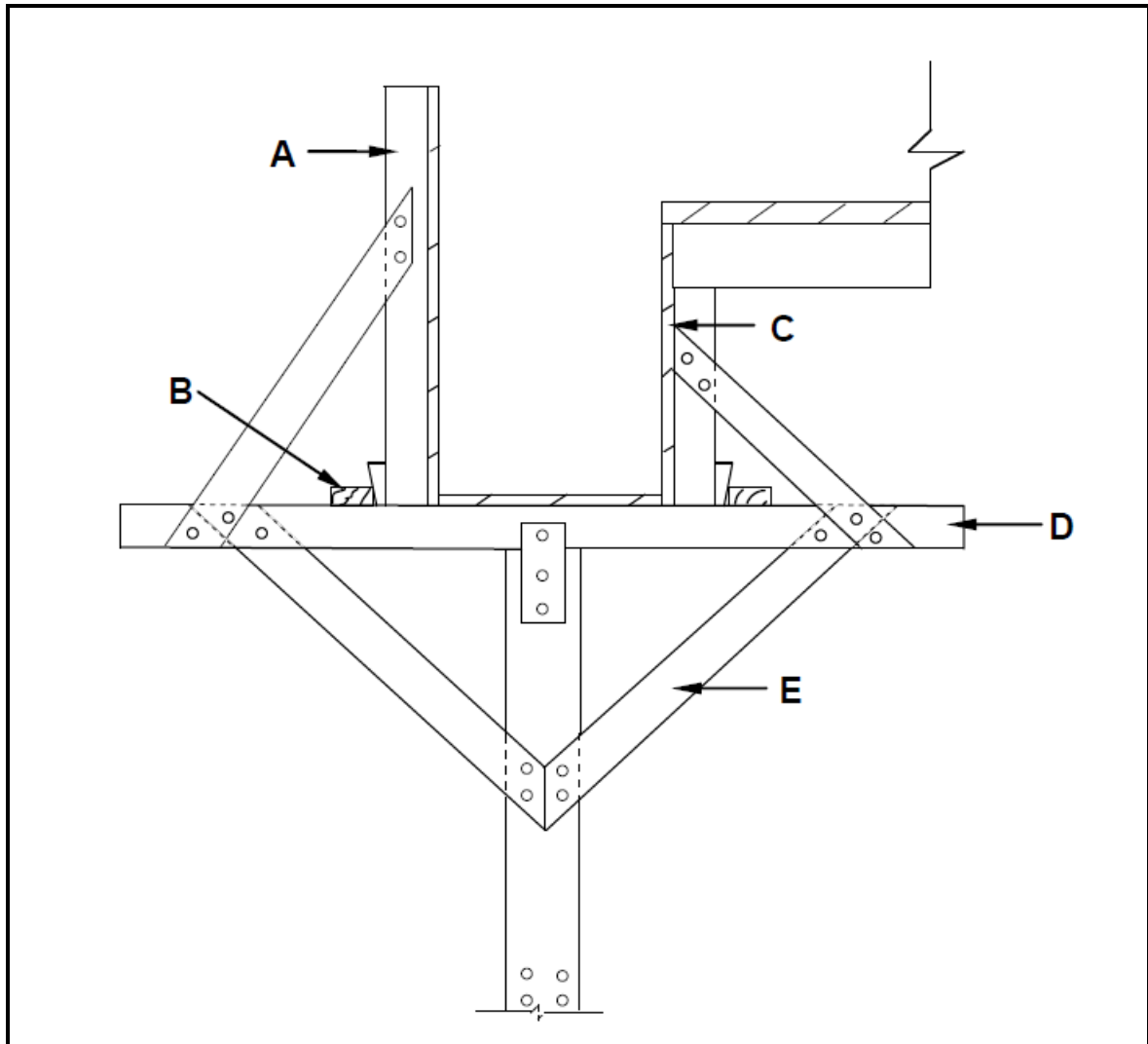


FIGURE 4.6

- 4.6.1 Identify the type of formwork. (1)
- 4.6.2 Identify parts **A** to **E**. (5 x 1) (5)

- 4.7 Tools and equipment are used extensively on a building site. Study the illustrations shown in FIGURE 4.7 below and answer the questions that follow.

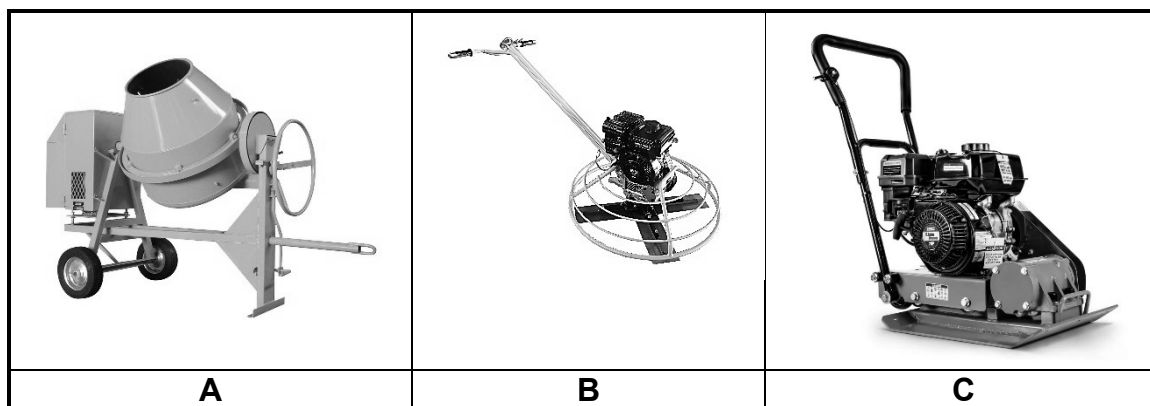


FIGURE 4.7

- 4.7.1 Name THREE types of personal protective equipment that should be worn while using any of the equipment in FIGURE 4.7. (3 x 1) (3)
- 4.7.2 Recommend ONE method that can be used to prevent the drum from rusting in **A**. (1)
- 4.8 Name the type of tests that can be conducted on concrete to determine the strength and workability respectively. (2 x 1) (2)
- 4.9 What is the resting time in a laboratory before testing the strength of concrete? (1)
- 4.10 Name the TWO categories in which metals are classified. (2 x 1) (2)
- 4.11 Explain TWO reasons why cladding is used in a building. (2 x 1) (2)

[40]

QUESTION 5: BRICKWORK, GRAPHICS, PLASTER AND SCREED (SPECIFIC)

Start this question on a **NEW** page.

- 5.1 The pictures in FIGURE 5.1 below show steps of a building process. Study the pictures and answer the following questions.

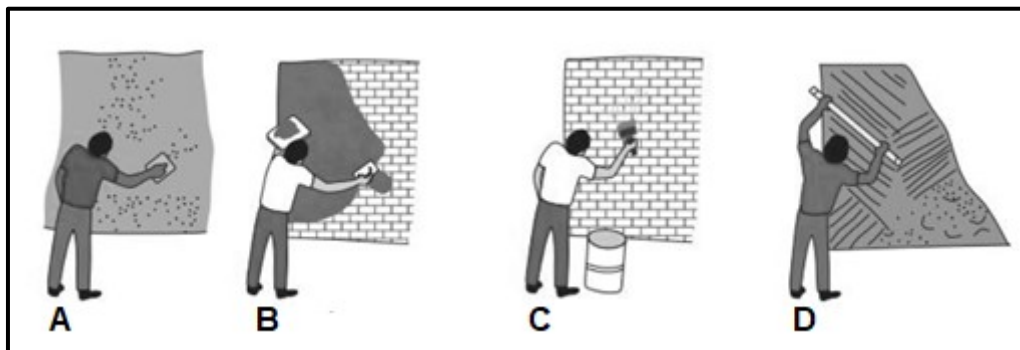


FIGURE 5.1

- 5.1.1 Re-arrange the pictures for this building process in the **CORRECT** order from start to finish, using the letters **A** to **D** and give a short description of what is being done in **EACH** picture. (4 x 2) (8)
- 5.1.2 Explain why the process in **C** is necessary. (1)
- 5.1.3 Name the admixture that can be added to the material to enhance the plasticity of the mixture. (1)
- 5.2 Explain the following terms that apply to paving:
- 5.2.1 Jointing method (1)
- 5.2.2 Bedding sand (1)
- 5.2.3 Walkways (1)
- 5.3 Draw, in good proportion, neat freehand sketches of the following paving types in your **ANSWER BOOK**. The paving must be laid from a corner to create a pattern.
- 5.3.1 Basket-weave paving pattern (5)
- 5.3.2 Herringbone paving pattern (5)

5.4 FIGURE 5.4 shows the front view of a cavity wall. Answer the following questions with regard to the cavity wall.

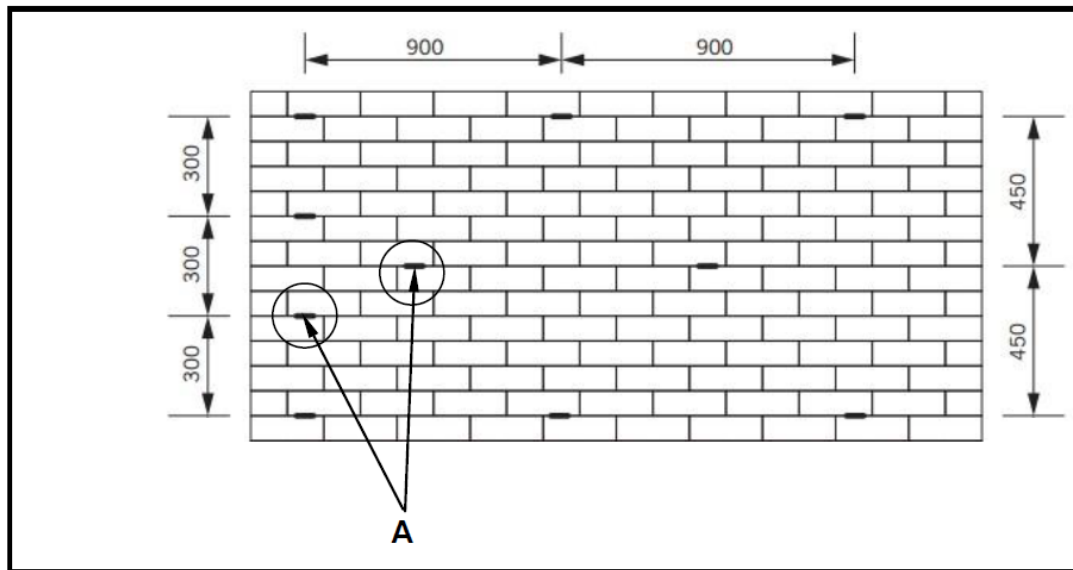


FIGURE 5.4

- 5.4.1 What is the purpose of the darkened and circled part **A**? (1)
- 5.4.2 Describe ONE position where the weep holes in a cavity wall should be positioned. (1 x 1) (1)
- 5.4.3 Explain ONE purpose of a weep hole. (1 x 1) (1)
- 5.5 Draw in your ANSWER BOOK, a neat sketch of the horizontal section of a steel door frame built into a half-brick wall, with face bricks and plastered on one side. (4)
- [30]**

QUESTION 6: FORMWORK, REINFORCING, FOUNDATIONS, CONCRETE FLOOR AND QUANTITIES (SPECIFIC)

Start this question on a NEW page.

6.1 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question numbers (6.1.1 to 6.1.5) in the ANSWER BOOK, for example 6.1.6 D.

6.1.1 Pre-cast piling can be used in ...

- A stable ground.
- B constantly wet areas.
- C dry areas.
- D None of the above-mentioned (1)

6.1.2 The equipment for the installation of piles can be mounted on ...

- A trucks.
- B cranes.
- C pick-up trucks.
- D A and B only (1)

6.1.3 A ... hammer can be used to drive a pre-cast concrete pile into the ground.

- A drop
- B club
- C claw
- D sledge (1)

6.1.4 A pile foundation is used to ...

- A float on the ground as one concrete unit.
- B support light loads.
- C distribute the load across to more stable ground.
- D construct the foundation in a series of steps. (1)

6.1.5 ... is not a category of pile foundations.

- A Pre-cast concrete piles
- B Long-board piles
- C Driven in-situ piles
- D Steel-tube caisson piles (1)

6.2 Draw in your ANSWER BOOK a neat freehand sketch of the concrete plug of an enlarged base when installing driven in-situ piles.
Indicate the symbol for concrete in the enlarged base. (5)

6.3 Name the different components that a rib and block floor consist of. (4)

- 6.4 Predict what could happen if the temporary props are removed a day after the concrete has been cast on the rib and block floor. (1)
- 6.5 Reinforcement is indicated on construction drawings with a code. Explain the meaning of these sections in the following code: 4 R 20 03 250.
- 6.5.1 4 (1)
- 6.5.2 20 (1)
- 6.5.3 250 (1)
- 6.6 FIGURE 6.6 on ANSWER SHEET B shows the outline of the sides of an L-shaped concrete column. Use ANSWER SHEET B and draw a neat sectional view of the L-shaped reinforced concrete column with 8 main bars, stirrups and minimum concrete cover. Indicate any TWO labels and the minimum concrete cover. (12)
- 6.7 FIGURE 6.7 below shows the floor plan of a building with a window and a door.

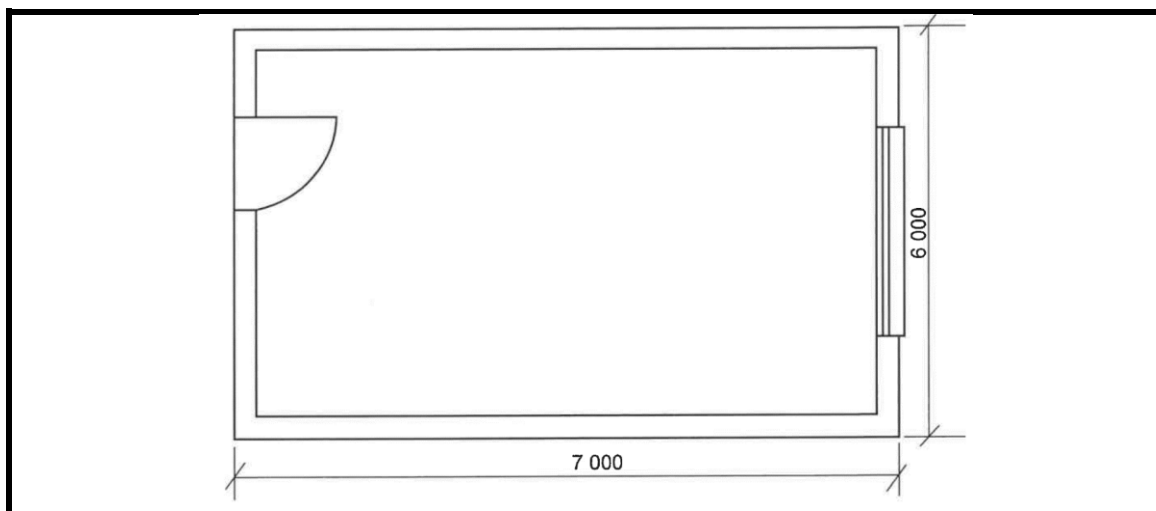


FIGURE 6.7

Use the following specifications:

- The blinding layer is 40 mm thick
- The wall thickness is 220 mm

Use the dimension paper on ANSWER SHEET C and calculate the volume of the blinding layer. Round off your answers to TWO decimal places. (9)

NOTE: Marks will be awarded for the correct use of the dimension paper. (1)
[40]

TOTAL: 200

ANSWER SHEET	A	CIVIL TECHNOLOGY (SPECIFIC)	NAME AND SURNAME:	

- 3.6 Use ANSWER SHEET A and draw in good proportion, a neat sketch of a collar tie roof truss with a pitch of 45° resting on two supporting walls. (11)

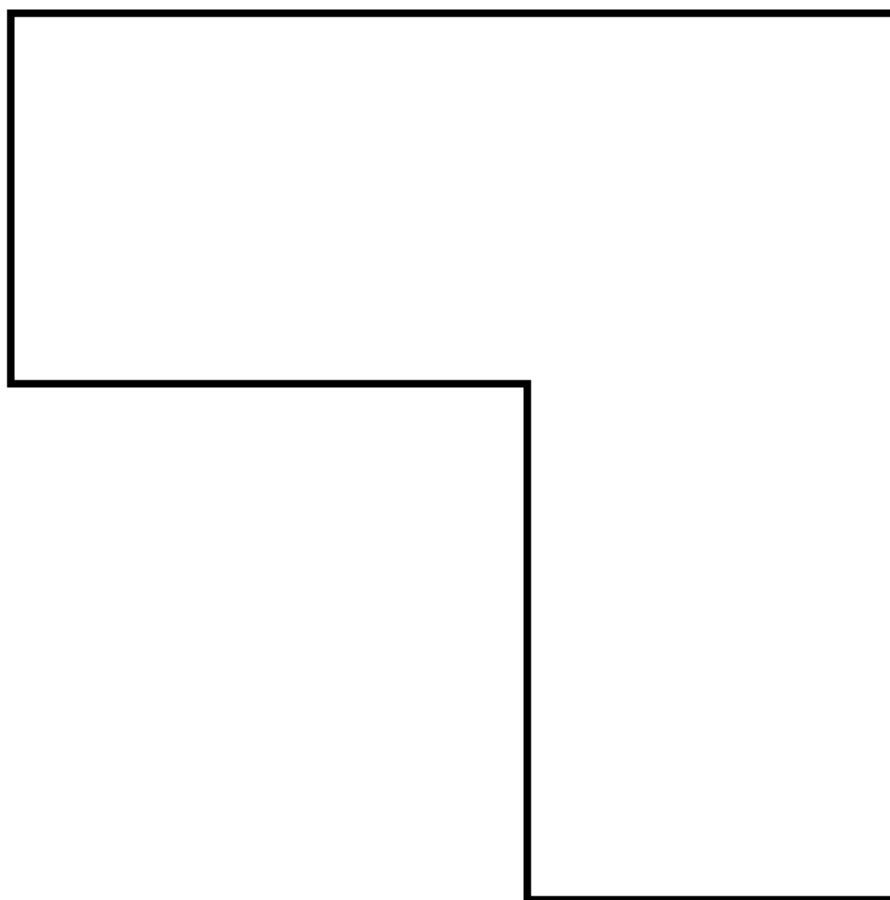
ASSESSMENT CRITERIA	MARK	CANDIDATE'S MARK
Walls	2	
Wallplate	2	
Rafters	2	
Collar beam	1	
Ridge beam correctly drawn	2	
Any ONE label	1	
Proportion of drawing	1	
TOTAL	11	

ANSWER SHEET	B	CIVIL TECHNOLOGY (SPECIFIC)	NAME AND SURNAME:	

- 6.6 FIGURE 6.6 on ANSWER SHEET B shows the outline of the sides of an L-shaped concrete column.
Use ANSWER SHEET B and draw a neat sectional view of the L-shaped reinforced concrete column with 8 main bars, stirrups and minimum concrete cover.

Indicate any TWO labels and the minimum concrete cover.

(12)



ASSESSMENT CRITERIA	MARK	CANDIDATE'S MARK
Correctness of L-shaped column	2	
Completed column and parts	8	
Any TWO labels	2	
TOTAL	12	

