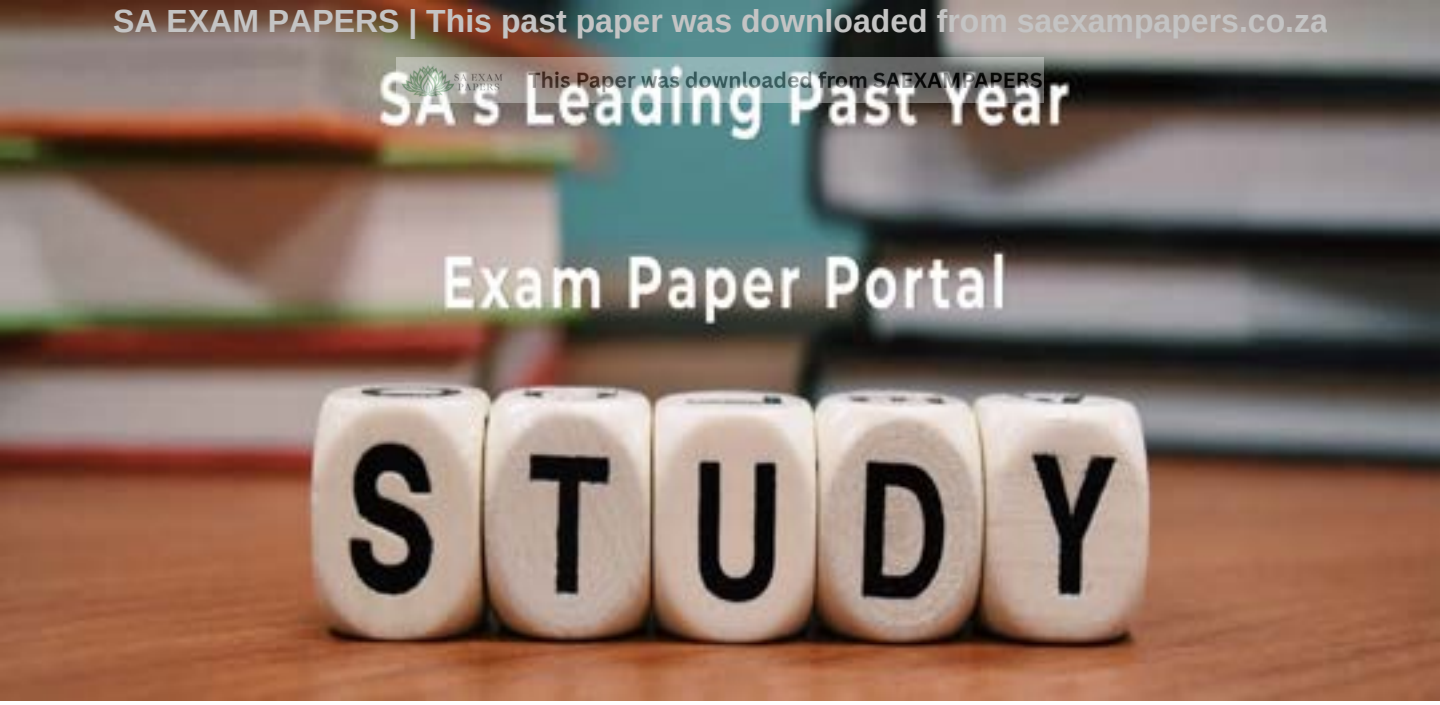


GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

JUNE EXAMINATION
JUNIE EKSAMEN
GRADE / *GRAAD* 12
2025

CIVIL TECHNOLOGY:
SIVIELE TEGNOLOGIE:
CONSTRUCTION
KONSTRUKSIE

CIVIL TECHNOLOGY Construction

C2110E

TIME/*TYD*: 3 hours/*uur*

MARKS/*PUNTE*: 200

14 pages + 6 answer sheets

14 bladsye + 6 antwoordblaaie

X05

Please turn over
Blaai om asseblief

REQUIREMENTS:

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

INSTRUCTIONS AND INFORMATION

1. This question paper consists of SIX questions.
2. Answer ALL the questions.
3. Number the answers correctly according to the numbering system used in this question paper.
4. Start the answer to EACH question on a NEW page.
5. Do NOT write in the margin 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 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 discretion where dimensions and/or details have been omitted.
12. Answer QUESTIONS 2, 3, 5.3, 5.6, 6.3 and 6.5 on the attached ANSWER SHEETS as prescribed in each question.
13. Drawings in the question paper are NOT to scale due to electronic transfer.
14. Write neatly and legibly.

QUESTION 1: OHSA, SAFETY MATERIALS, TOOLS, EQUIPMENT AND JOINING (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 – N) next to the question numbers (1.1.1 to 1.1.10) in the ANSWER BOOK, e.g.1.1.11 O.

COLUMN A		COLUMN B	
1.1.1	Conveyor belt	A	Process takes 38 days
1.1.2	Builder's hoist	B	Has rungs
1.1.3	Ladder	C	Based on visual inspections and visible features
1.1.4	Curing	D	Expensive
1.1.5	Powder coating	E	Strength usually refers to bending strength
1.1.6	Painting	F	Gates must be shut when in use
1.1.7	Galvanising	G	Loose material must never be dropped from elevated areas
1.1.8	Mechanically graded timber	H	Improves the durability of concrete by reducing cracks
1.1.9	Visually graded timber	I	Changes the surface properties of a metal
1.1.10	Linseed oil	J	Suitable for hardwood furniture
		K	Apply using a compressor and a spray gun
		L	To be used by 2 or more people
		M	To cover iron/steel with a layer of zinc to prevent rusting
		N	Enhances the appearance of surfaces

(10)

1.2 Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A – D) next to the question numbers (1.2.1 to 1.2.5) in the ANSWER BOOK, e.g. 1.2.6 A.

1.2.1 Electroplating is the process of …

A applying a plastic coating on metal using electrolysis.
B coating metal with another metal using electrolysis.
C applying paint to a metal by means of magnetism.
D applying liquid zinc to a metal using pressure. (1)

1.2.2 Why would you coat metal with a layer of paint?

A To resist extreme temperatures
B To prevent corrosion
C To prevent warping
D Only A and B (1)

1.2.3 When using a scaffold, it must be inspected to ensure that …

A the scaffold is not attached to the building.
B the scaffold platform is supported every 4 metres.
C the scaffold is free from any defects.
D All of the above mentioned. (1)

1.2.4 … of scaffolds should be secured vertically.

A Transoms
B Diagonal braces
C Standards
D Base plates (1)

1.2.5 The employer must ensure that the rungs of wooden ladders are …

A not painted.
B free from grease.
C not cracked.
D All of the above-mentioned. (1)

1.3 FIGURE 1.3 below shows a tool that is used in the building industry.

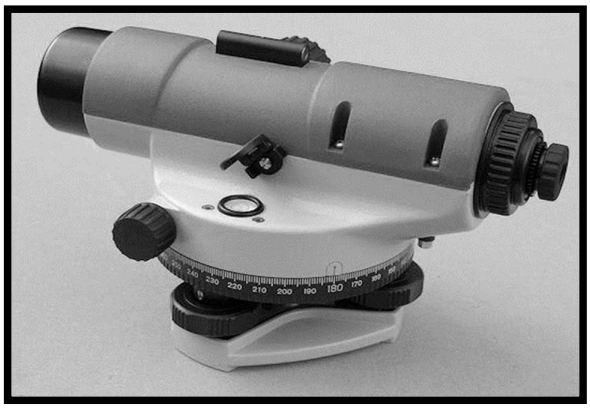


FIGURE 1.3

1.3.1 Identify the tool above. (1)

1.3.2 Explain the use of the tool in FIGURE 1.3. (1)

1.4 Explain what could happen if the ends of scaffold planks exceed 230 mm beyond the last support. (1)

1.5 Explain the safety purpose of the following members of a scaffold:

1.5.1 Guardrail (1)

1.5.2 Toe-board/kickboard (1)

[20]

QUESTION 2 GRAPHICS AS A MEAN OF COMMUNICATION (GENERIC)

Start this question on a NEW page.

FIGURE 2 below shows drawings that appear on a building plan. Analyse the drawings and complete the table on ANSWER SHEET 2.

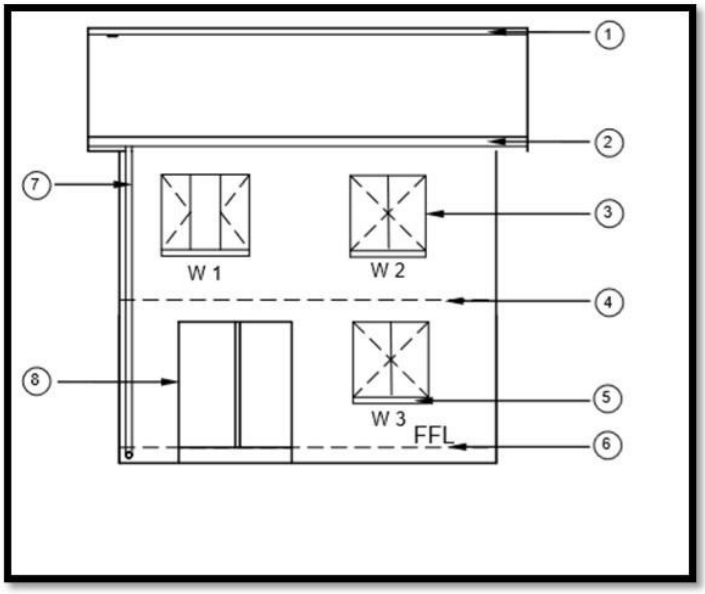


FIGURE A

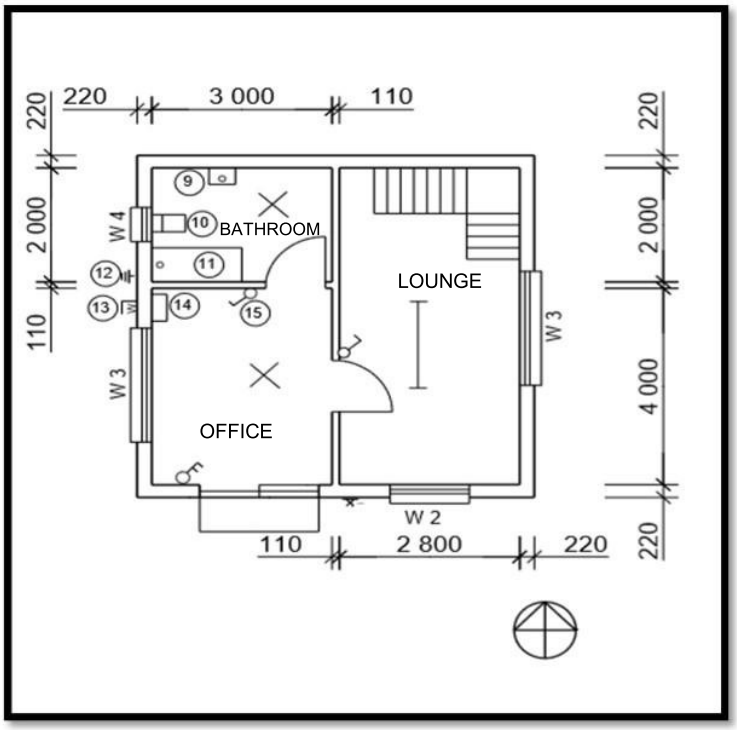


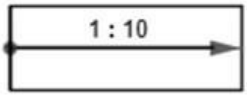
FIGURE B

NOTE:
Contractors must verify all dimensions and levels on site before commencing work. Architects must be notified immediately of any discrepancies.

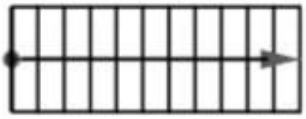
ARCHITECT'S SIGNATURE .....

CLIENT'S SIGNATURE .....

The following must be placed in the front of the sliding door:



Access to the first floor must be by means of a:



REVISION	DATE	DESCRIPTION

PRINTED BY:	DATE OF PRINT:
NKOSI PRINTERS	2018/10/02

DRAWING TITLE:
SITE PLAN STAND: 1843

PROJECT:
PROPOSED DWELLING ON STAND 1843, DIEPRIVIER

PROJECT NO.	DRAWING NO.
GR 557-102	5597P9

DATE:	DRAWN:	CHECKED:
25/04/2018	JP MALOI	P. BRITZ

REFERENCE CODE:	SCALE:
QP 1- 2018	1 : 100

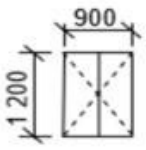
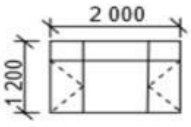
WINDOW 2	WINDOW 3
	

FIGURE 2 **[40]**

QUESTION 3: QUANTITIES (SPECIFIC)

Start this question on a NEW page.

Use ANSWER SHEET 3 to calculate the following.

3.1 FIGURE 3.1 below shows the floorplan of a room. The external walls are 220 mm thick and the external measurements are 9 500 mm x 4 500 mm.

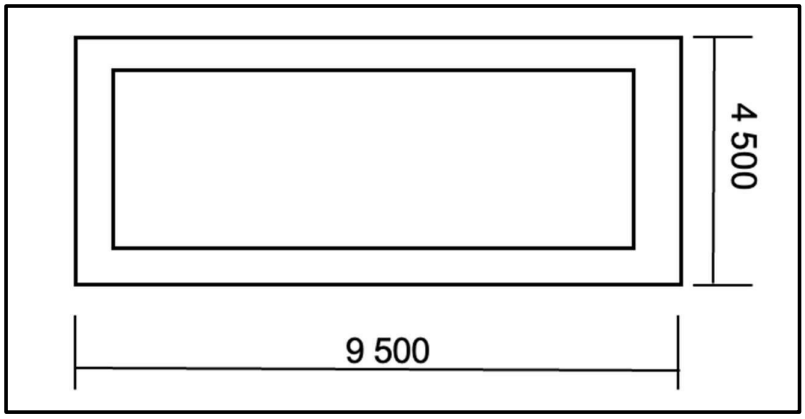


FIGURE 3.1

3.1.1 Calculate the centreline of the foundation. (8)

3.1.2 Calculate the floor area that will be tiled. (5)

3.1.3 Calculate 5% of the tiled area to allow for breakage. (3)

3.1.4 Calculate the total tiled area required. Round-off your answer to two decimal places. (3)

3.2 FIGURE 3.2 shows the front view of a 220 mm foundation wall.

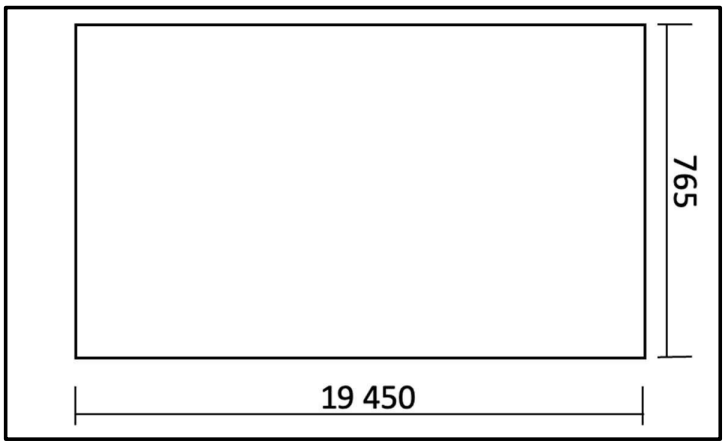


FIGURE 3.2

3.2.1 Calculate the area of bricks required for the wall. (4)

3.2.2 Calculate the number of bricks required for the wall. (4)

3.2.3 Calculate the 5% wastage. (3)

[30]

QUESTION 4: TOOLS, EQUIPMENT, MATERIALS AND EXCAVATIONS (SPECIFIC)

Start this question on a NEW page.

4.1 FIGURE 4.1 below shows people working in an excavation.

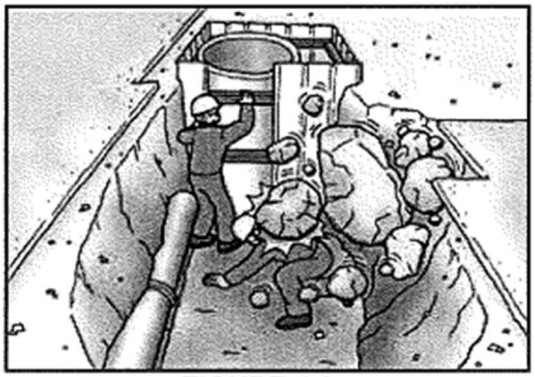


FIGURE 4.1

4.1.1 Describe TWO factors that can cause an excavation to collapse. (2)

4.1.2 When should trenches be inspected to ensure the safety of workers? (1)

4.1.3 Why would you use benching in an excavation? (2)

4.1.4 Name THREE services that should be located before excavations start. (3)

4.2 FIGURE 4.2 below shows equipment used to test concrete on a construction site. Study the figure and answer the questions that follow.

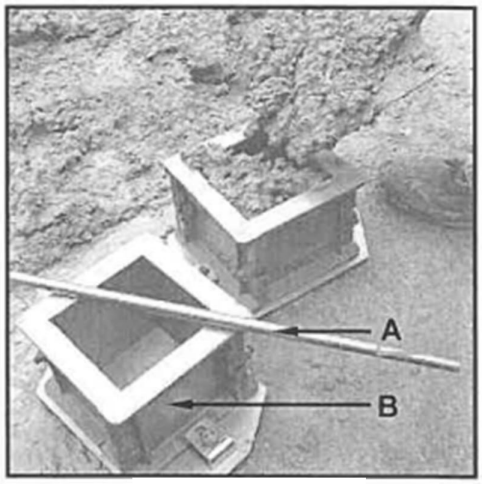


FIGURE 4.2

4.2.1 Identify **A** and **B**. (2)

4.2.2 Name the test that is being performed in FIGURE 4.2 above. (1)

4.2.3 Which property of concrete is being tested during this process? (1)

4.2.4 Indicate the amount of time required before testing can take place after the concrete has been immersed in water. (2)

4.3 List TWO factors that should be considered when stacking materials. (2)

4.4 Distinguish between *ferrous* and *non-ferrous* metals in terms of their composition. (2)

4.5 Give TWO reasons why different types of hazardous material should be stored in a safe, separate room. (2)

4.6 Water is used to mix concrete. Name THREE other ingredients of concrete. (3)

4.7 Explain the purpose of water in a concrete mix. (2)

4.8 State the minimum distance that excavated soil should be kept from the edge of a trench. (1)

4.9 Explain THREE safety factors that should be considered before an excavation commences. (3)

4.10 Describe TWO properties of steel shuttering. (2)

4.11 Describe THREE methods that can be used to level a site. (3)

4.12 Name THREE components of shuttering that are used to support trenches. (3)

4.13 FIGURE 4.13 below shows equipment used in a construction site. Study the figure and answer the questions that follow.

FIGURE 4.13

4.13.1 Identify the piece of equipment shown above. (1)

4.13.2 Mention ONE guideline for the safe handling of the equipment. (1)

4.13.3 Discuss ONE way to take care of the equipment. (1)

[40]

QUESTION 5: JOINING, BRICKWORK AND GRAPHICS AS MEANS OF COMMUNICATION (SPECIFIC)

Start this question on a NEW page.

5.1 Name ONE method that can be used to secure a wall plate to a wall. (1)

5.2 FIGURE 5.2 below shows joining fixtures.

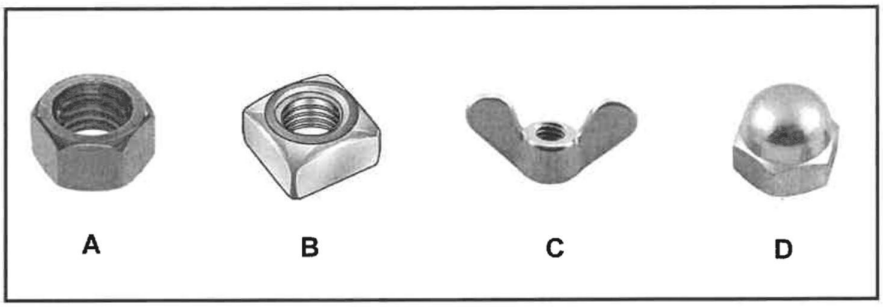


FIGURE 5.2

Identify **A** to **D**. (4)

5.3 Use ANSWER SHEET 5.3 and complete the sketch to show how a roof truss is joined to a wall using a hoop iron strap. Provide ONE label. (8)

5.4 FIGURE 5.4 shows a piece of paving. Study the figure carefully and answer the questions that follow.

FIGURE 5.4

5.4.1 Identify the paving pattern illustrated in FIGURE 5.4. (1)

5.4.2 Describe the reason for the construction failure in FIGURE 5.4 above. (1)

5.4.3 State ONE commonly used paving method. (1)

5.5 Differentiate, by means of line diagrams, between a *butterfly-pattern wall tie* and a *double-triangular pattern wall tie*. (4)

5.6 Use ANSWER SHEET 5.6 and draw a neat sketch showing the alternate plan courses of a one-and-a-half brick pier built in stretcher bond. Use the assessment criteria on the ANSWER SHEET as a guide. (10)
[30]

QUESTION 6: REINFORCEMENT IN CONCRETE, FOUNDATIONS AND CONCRETE FLOORS (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 6.1.4) in the ANSWER BOOK, e.g. 6.1.5 E.

6.1.1 For which type of pile foundation is the steel pipe slowly extracted as the concrete is poured into the pipe? (1)

A Driven in-situ piles
B Steel tube caisson piles
C Precast concrete piles
D Short-bored piles

6.1.2 Precast concrete piles can be used in … (1)

A soil where there is movement.
B stable soil.
C cohesive soil.
D constantly dry areas

6.1.3 The type of pile where the steel casing will form part of the construction and is not removed. (1)

A Driven in-situ piles
B Steel tube caisson piles
C Precast concrete piles
D Short-bored piles

6.1.4 A drop hammer is operated with a ... (1)

A hoist.
B lift.
C conveyor.
D crane.

6.2 Explain THREE reasons for using pile foundations (3)

6.3 ANSWER SHEET 6.3 shows a beam, measuring 4 m in length, that protrudes into two walls. Use ANSWER SHEET 6.3 and draw, in good proportion, the reinforcement that should be placed in the beam. Label your drawing and indicate the minimum concrete cover. (9)

6.4 FIGURE 6.4 below shows a sectional view of a reinforced concrete column.

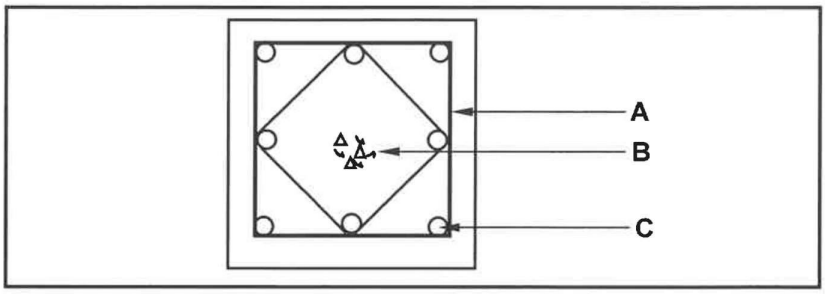


FIGURE 6.4

6.4.1 Identify **A** and **B**. (2)

6.4.2 Explain ONE reason why cover depth is important in the reinforcement of concrete. (1)

6.4.3 Reinforcement on a construction drawing is indicated using a code. In the code **12 Y 16 10 – 300,** explain what the 300 indicates. (1)

6.4.4 Motivate why ribbed bars would be used instead of plain round bars at **C**. (1)

6.5 ANSWER SHEET 6.5 shows two ribs of a rib and block floor. Use ANSWER SHEET 6.5 and draw, in good proportion, a sectional view through the partial rib and block floor up to the finished floor level. Draw ALL omitted details and add the symbol for concrete. Print any TWO labels. (11)

6.6 There is sufficient evidence in the media that proves that certain developers do not take construction failures seriously.

6.6.1 State TWO factors that need to be taken into consideration when planning a rib and block floor. (2)

6.6.2 Before the installation of this type of floor construction, provision should be made for civil and electrical services to be installed. Name THREE services that must be considered. (3)

6.6.3 What is the width of the load-bearing walls underneath a rib and block floor. (1)

6.6.4 Explain ONE disadvantage of this type of floor construction. (1)

6.6.5 State ONE important safety factor that should be adhered to after the installation of this type of floor construction. (1)

[40]

TOTAL: 200

END

NAME AND SURNAME: _____

ANSWER SHEET 2

NO.	QUESTIONS	ANSWERS	MARKS
1.	Name the drawing depicted in FIGURE **B.**		1
2.	Deduce the scale of the drawing.		1
3.	Identify number **4**.		1
4.	Identify number **12**.		1
5.	Identify number **11**.		1
6.	Identify number **8**.		1
7.	Identify number **7**.		1
8.	Identify number **14**.		1
9.	Identify number **5**.		1
10.	Identify the number that indicates the ELECTRICITY METER in FIGURE **B**.		1
11.	Recommend TWO suitable scales for floor plans other than the one listed in the notes.		2
12.	Give the abbreviations for the following: 12.1 Water closet 12.2 Bath	12.1 12.2	2

NAME AND SURNAME: _____

13.	Name the feature that must be placed in front of the sliding door as specified in the notes.		1
14.	Who checked the drawing?		1
15.	Describe what is indicated by number **3**?		1
16.	Differentiate between the light installed in the lounge and the light in the office.		2
17.	What is the drawing number of the building plan.		1
18.	Who must be notified when a contractor sets out levels on a site and there are variances?		1
19.	Identify ONE important feature that has been omitted from the plan.		1
20.	What should be installed for balancing and support as you go up the staircase?		1
21.	Deduce the height of window **2** from the window schedule.		1
22.	Draw the symbol for a shower.		2

NAME AND SURNAME: _____

23.	Draw the electrical symbol for a wall-mounted light.		1
24.	Deduce the width of window **3** from the window schedule.		1
25.	Recommend a suitable floor covering for the bathroom.		1
26.	Explain what is meant by 1 : 10 indicated on the symbol in the notes.		1
27.	Identify the type of roof that is used for the building in FIGURE **A**.		1
28.	Prove, by means of a control test, that the total vertical dimensions on the left and right of the plan in FIGURE **B** are equal.		6
29.	Calculate the area of the bathroom. Show ALL calculations. Give your answer in m². Round-off your answer to TWO decimal places.		3
		TOTAL:	**40**

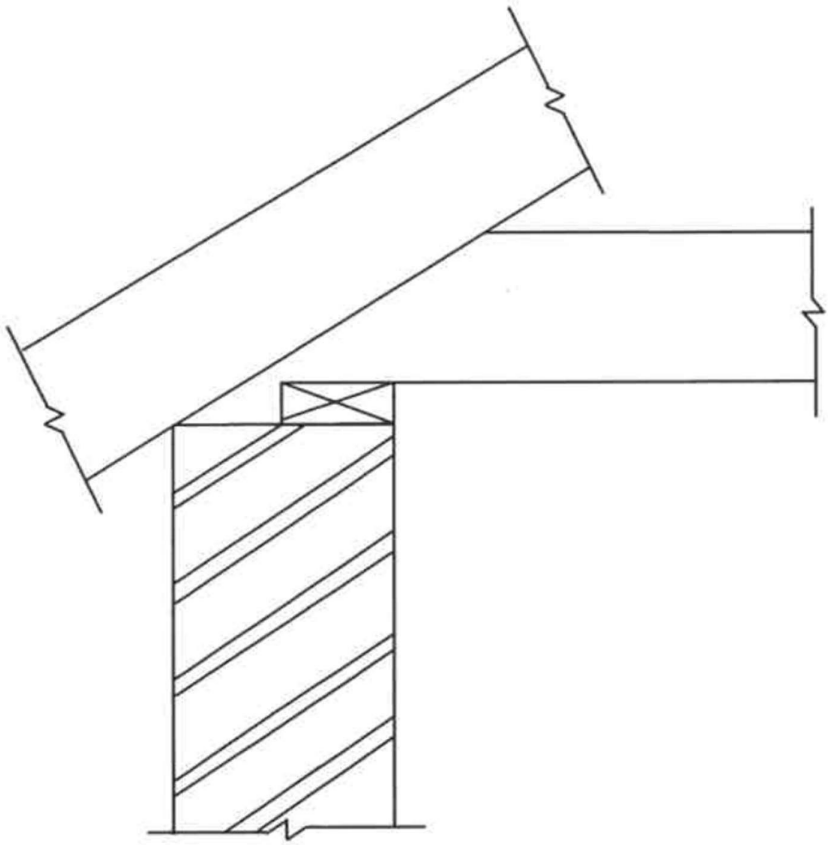
NAME AND SURNAME: _____

ANSWER SHEET 3

A	B	C	D	
3.1.1			**CENTRE LINE OF FOUNDATION:**	
				(8)
3.1.2			**AREA FOR TILES REQUIRED:**	
				(5)
3.1.3			**5% FOR BREAKAGE:**	
				(3)
3.1.4			**TOTAL AREA FOR TILES REQUIRED:**	
				(3)
3.2.1			**AREA OF BRICKS REQUIRED:**	
				(4)
3.2.2			**NUMBER OF BRICKS REQUIRED:**	
				(4)
3.2.3			**5% FOR WASTAGE:**	
				(3)

NAME AND SURNAME: _____

ANSWER SHEET 5.3



ASSESSMENT CRITERIA	MARK	CANDIDATE'S MARK
Correctness of joining	1	
Members	6	
Any ONE label	1	
TOTAL:	**8**	

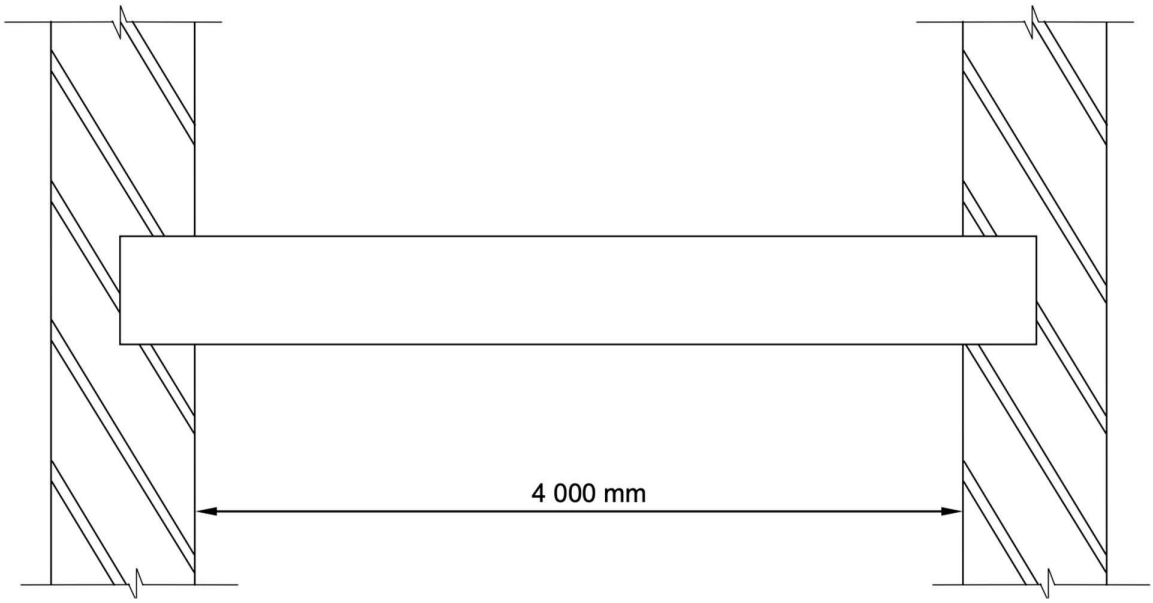
NAME AND SURNAME: _____

ANSWER SHEET 5.6

ASSESSMENT CRITERIA	MARK	CANDIDATE'S MARK
Stretcher bond – first course	5	
Stretcher bond – second course	5	
TOTAL:	**10**	

NAME AND SURNAME: _____

ANSWER SHEET 6.3



ASSESSMENT CRITERIA	MARK	CANDIDATE'S MARK
Correctness of drawing	5	
TWO labels	2	
Indicate minimum concrete cover	2	
TOTAL:	**9**	

NAME AND SURNAME: _____

ANSWER SHEET: QUESTION 6.5

NO.	MARK	CANDIDATE'S MARK
1	2	
2	3	
3	2	
4	1	
5	1	
6	2	
TOTAL:	**11**	