



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

GRADE 11

NOVEMBER 2019

CIVIL TECHNOLOGY: CONSTRUCTION

MARKS: 200

TIME: 3 hours



This question paper consist of 15 pages including 1 page answer sheet.

REQUIREMENTS:

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

INSTRUCTIONS AND INFORMATION

1. This question paper consists of SIX QUESTIONS: THREE questions are generic and THREE 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 SHEET.
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 QUESTION 3.2 on the attached ANSWER SHEET, using drawing instruments where necessary.
13. Write your NAME on the ANSWER SHEET and hand them in with your ANSWER BOOK, whether you have answered the question or not.
14. Drawings in this question paper are NOT to scale due to electronic transfer.

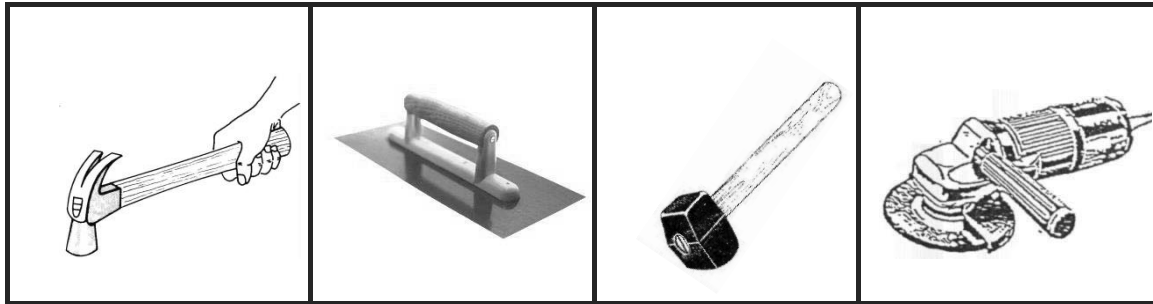
QUESTION 1: SAFETY AND MATERIALS (GENERIC)

- 1.1 What is the meaning of the abbreviation *PPE*? (1)
- 1.2 Name TWO requirements for protective footwear that is worn on a building site. (2 x 1) (2)
- 1.3 General safety for small plant equipment is important. Briefly motivate why the following safety rules must be adhered to.
- 1.3.1 Pre-operational checks should be conducted on equipment. (1)
- 1.3.2 Petrol engines should only be used outside. (1)
- 1.3.3 Driving and rotating parts should be covered. (1)
- 1.3.4 Operators should receive training with regards to equipment. (1)
- 1.4 Answer the following questions with regard to the safe stacking of materials.
- 1.4.1 What should workers use to climb up and down the stack? (1)
- 1.4.2 Name TWO factors that should not be affected by a stack. (2 x 1) (2)
- 1.4.3 Determine the maximum height of a stack if the material has a width of 500 mm and a thickness of 250 mm. (2)
- 1.4.4 Why should a stack have no protruding parts? (1)
- 1.5 Name the TWO main elements of screed. (2 x 1) (2)
- 1.6 Name ONE example of a fine aggregate. (1)
- 1.7 Name ONE purpose of lime in a building mixture. (1)
- 1.8 Name TWO board products that are suitable for wall panelling. (2 x 1) (2)
- 1.9 Name TWO uses of stainless steel. (2 x 1) (2)
- 1.10 What element of ferrous metals makes it prone to corrosion? (1)
- 1.11 Define the term *alloy*. (3)
- 1.12 Name TWO uses of safety glass. (2 x 1) (2)
- 1.13 Name ONE use of a mastic sealant. (1)
- 1.14 Define the term *thermoplastic*. (2)

[30]

QUESTION 2: EQUIPMENT, TOOLS AND GRAPHICS (GENERIC)

2.1 Name the tools in FIGURES 2.1.1 to 2.1.4 and name ONE use of each.

**FIGURE 2.1.1****FIGURE 2.1.2****FIGURE 2.1.3****FIGURE 2.1.4**

(4 x 2) (8)

2.2 Which power tool will be used for the following work:

2.2.1 Sharpening of chisels (1)

2.2.2 To cut rebates in wood (1)

2.3 Identify the tool in FIGURE 2.3 and name TWO uses of it.

**FIGURE 2.3**

(3 x 1) (3)

2.4 Name TWO maintenance measures which are applicable to straight edges.

(2 x 1) (2)

2.5 Briefly motivate why universal pliers cannot be used for clamping plumbing pipes. (1)

2.6 Answer the following questions with regard to the elevation in FIGURE 2.6.

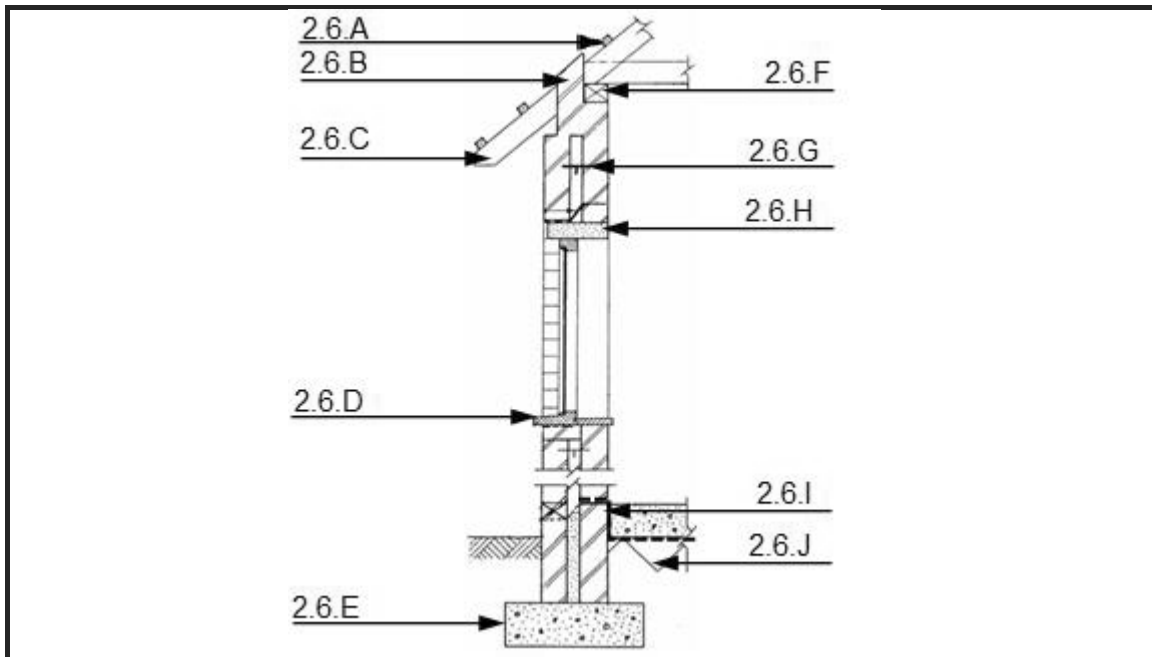


FIGURE 2.6

- 2.6.1 Name the type of elevation. (1)
- 2.6.2 Name the parts labelled 2.6.A to 2.6.J. (10)
- 2.6.3 What are the width and thickness dimensions of part 2.6.F? (2)
- 2.6.4 What is the purpose of part 2.6.G? (1)
- 2.7 Name FOUR particularities with regard to roof constructions which must be indicated in elevations. (4 x 1) (4)
- 2.8 Make neat sketches to illustrate the following symbols:
 - 2.8.1 Plaster (2)
 - 2.8.2 Undressed wood (2)
 - 2.8.3 Invert level (2)

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QUESTION 3: QUANTITIES, JOINING AND GRAPHICS (GENERIC)

3.1 Make neat sketches to illustrate the following symbols on a floor plan:

3.1.1 Grease trap (2)

3.1.2 DPC (Damp-proof course) (2)

3.1.3 Staircase (2)

3.2 FIGURE 3.2 below shows the floor plan of the foundation walls of a single room.

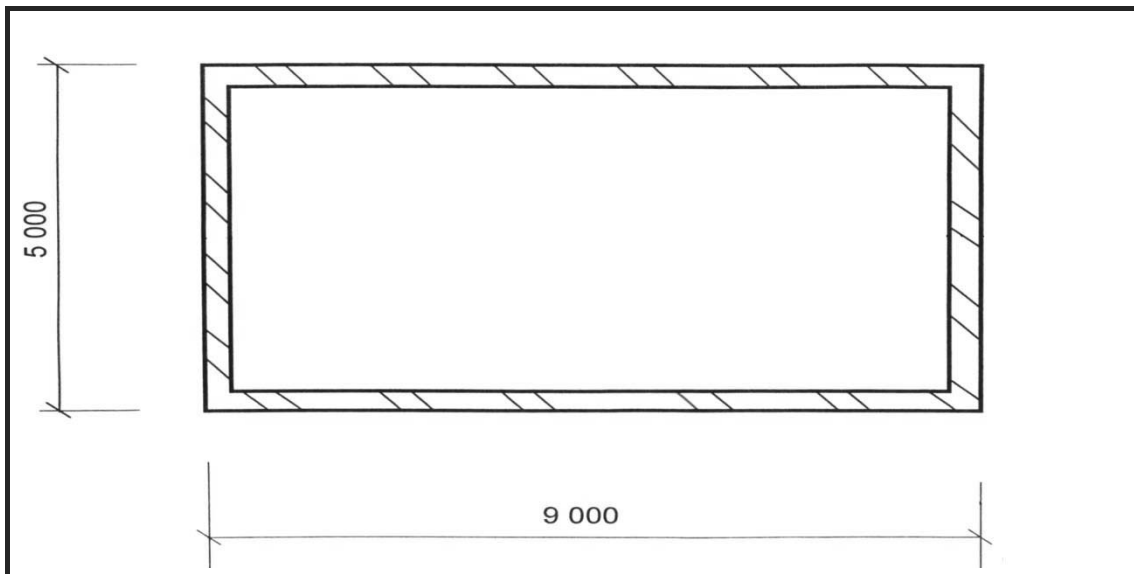


FIGURE 3.2

Use the following specifications:

- The floor slab is 85 mm thick
- Walls are 220 mm thick

Use ANSWER SHEET 1 and calculate the volume of concrete needed to cast the floor slab between the external walls. (12)

3.3 Name THREE properties of silicone. (3 x 1) (3)

3.4 Describe the application process of contact glue. (3)

3.5 Name ONE property of PVC–adhesive. (1)

3.6 Name THREE functions of glass. (3 x 1) (3)

3.7 Discuss the difference between *polythene* and *polyvinyl chloride*. (2)

[30]

QUESTION 4: MATERIAL, EQUIPMENT AND JOINING (SPECIFIC)

- 4.1 Choose a description from COLUMN B that matches an item in COLUMN A. Write only the letter (A–F) next to the question number (4.1.1–4.1.4) in the ANSWER BOOK, eg. 4.1.5 G.

COLUMN A		COLUMN B	
4.1.1	Cellular brick	A	Can be laid without mortar
4.1.2	Hollow concrete block	B	Not necessary to plaster
4.1.3	Concrete paving brick	C	Better grip for plaster
4.1.4	Keyed brick	D	Minimum strength of 17 MPa
		E	Inclined to crack owing to shrinkage
		F	Cavities make up less than 25% of the brick volume

(4 x 1) (4)

- 4.2 Name TWO disadvantages of a solid concrete brick. (2 x 1) (2)

- 4.3 Answer the following questions with regard to the manufacturing process of cement bricks.

4.3.1 How many days are the bricks left in the moulds to dry? (1)

4.3.2 What is meant by the curing of the bricks? (1)

4.3.3 How many days does the curing last? (1)

- 4.4 Name the TWO main elements for the manufacturing of cement. (2 x 1) (2)

- 4.5 Define the following properties of steel:

4.5.1 Toughness (2)

4.5.2 Plasticity (2)

- 4.6 Answer the following questions with regard to the construction machine in FIGURE 4.6.



FIGURE 4.6

- 4.6.1 What is this machine called? (1)
- 4.6.2 Name ONE use of this machine. (1)

- 4.7 Answer the following questions with regard to the scaffolding in FIGURE 4.7.

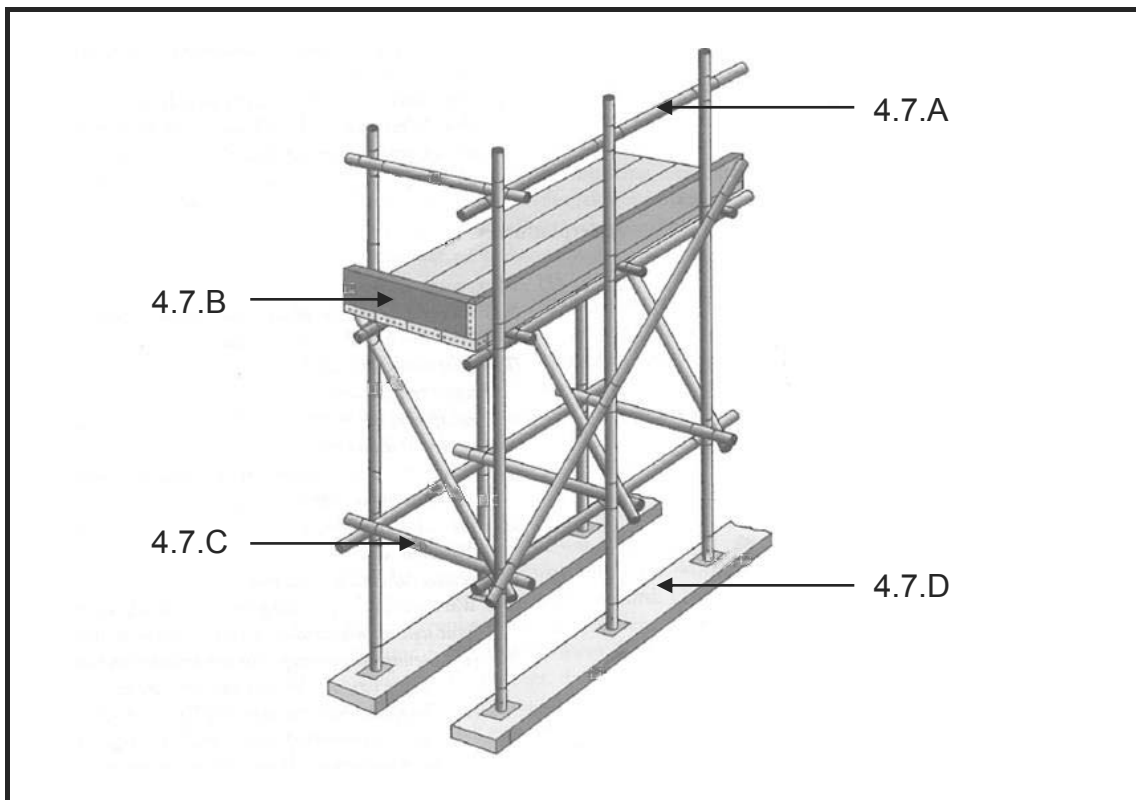


FIGURE 4.7

- 4.7.1 Name parts 4.7.A to 4.7.D. (4)
- 4.7.2 What is the purpose of part 4.7.B? (1)
- 4.8 Give TWO reasons why aluminium became the most popular choice for door and window frames. (2 x 1) (2)

4.9 Answer the following questions with regard to the wall ties in FIGURE 4.9.

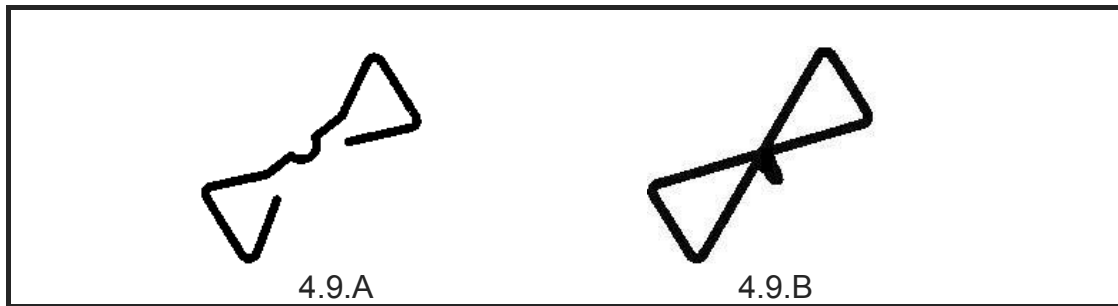


FIGURE 4.9

4.9.1 Name wall ties 4.9.A and 4.9.B. (2)

4.9.2 Describe the property of the metal used for these wall ties. (1)

4.10 Answer the following questions with regard to the cavity wall construction.

4.10.1 What is the minimum width of the opening between the two walls? (1)

4.10.2 What is the maximum height of a cavity wall? (1)

4.10.3 What is the purpose of the inspection openings in this type of wall? (1)

[30]

QUESTION 5: EXCAVATIONS, FOUNDATIONS AND STEEL (SPECIFIC)

5.1 Answer the following questions with regard to the excavation of foundations.

5.1.1 To what depth must the topsoil be removed? (1)

5.1.2 Name TWO methods of checking the depth of excavations. (2 x 1) (2)

5.1.3 What is the purpose of the pegs in a trench excavation? (1)

5.1.4 To what depth must the pegs be driven in at the trench excavations? (1)

5.2 What is the purpose of a datum peg? (1)

5.3 Indicate whether the following statements are TRUE or FALSE. Write only the word 'true' or 'false' next to the question number (5.3.1–5.3.3) in the ANSWER BOOK.

5.3.1 Excavation boards must have a moisture content of between 5% and 10%. (1)

5.3.2 Chipboard is not resistant to moisture. (1)

5.3.3 Steel formwork is more expensive than timber formwork. (1)

5.4 Name THREE causes of trench accidents. (3 x 1) (3)

5.5 Answer the following question with regard to the formwork in FIGURE 5.5.

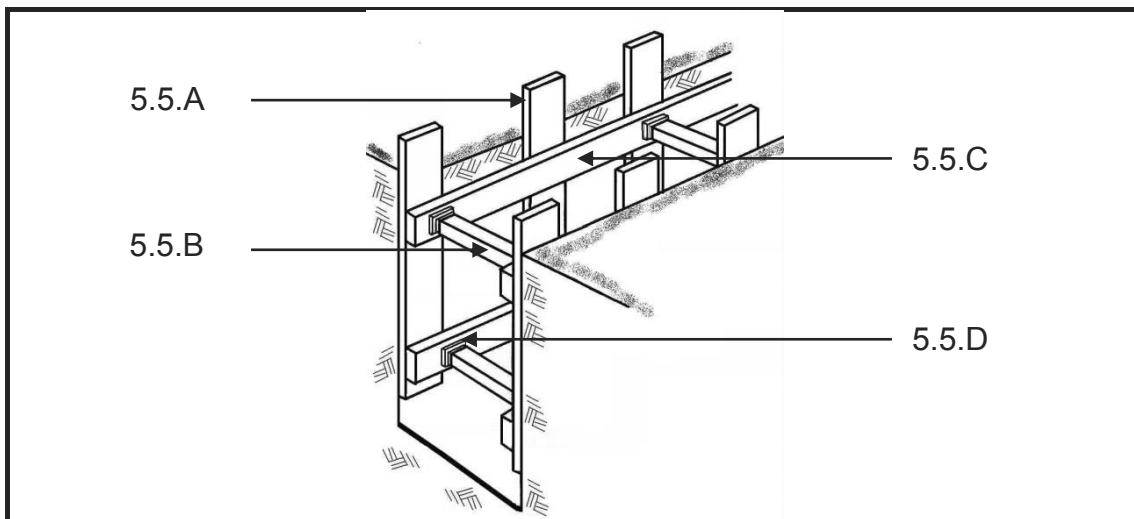


FIGURE 5.5

5.5.1 In what type of soil will this formwork be used? (1)

5.5.2 Name parts 5.5.A to 5.5.D. (4)

5.6 Choose a description from COLUMN B that matches an item in COLUMN A. Write only the letter (A–F) next to the question number (5.6.1–5.6.4) in the ANSWER BOOK, e.g. 5.6.5 G.

COLUMN A		COLUMN B	
5.6.1	Strip foundation	A	Carries the load of a pier
5.6.2	Concrete	B	High tensile strength
5.6.3	Pad foundation	C	Maximum depth of 5 metres
5.6.4	Auger drill for piling	D	Carries the load of a brick wall
		E	Maximum depth of 15 metres
		F	High compressive strength

(4 x 1) (4)

5.7 Name TWO materials with which to fill the holes of piles. (2 x 1) (2)

5.8 Name THREE advantages of piles. (3 x 1) (3)

5.9 Answer the following questions with regard to the steel profiles in FIGURE 5.9.

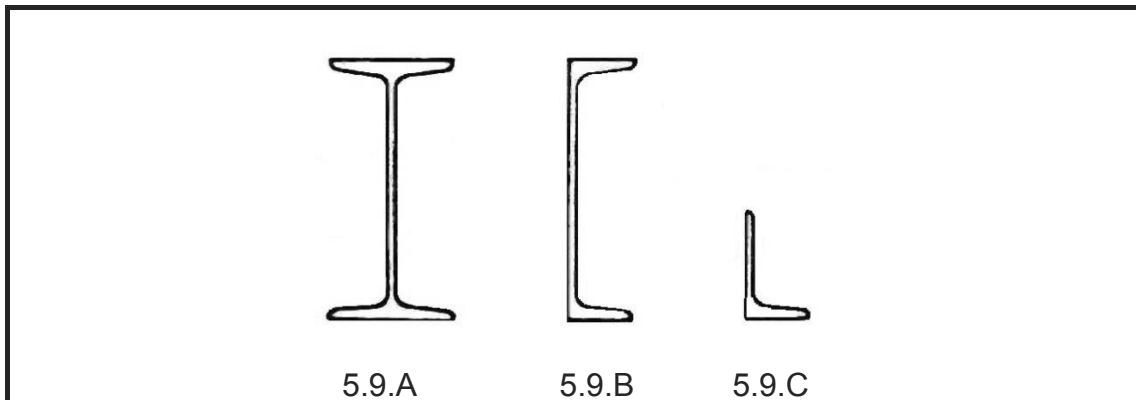


FIGURE 5.9

5.9.1 Name the steel profiles 5.9.A to 5.9.C. (3)

5.9.2 What type of steel profile in FIGURE 5.9 is most commonly used? (1)

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QUESTION 6: CONCRETE, FORMWORK, BRICKWORK, STAIRS AND ROOFS (SPECIFIC)

6.1 Answer the following questions with regard to the bar (rod) code in FIGURE 6.1.

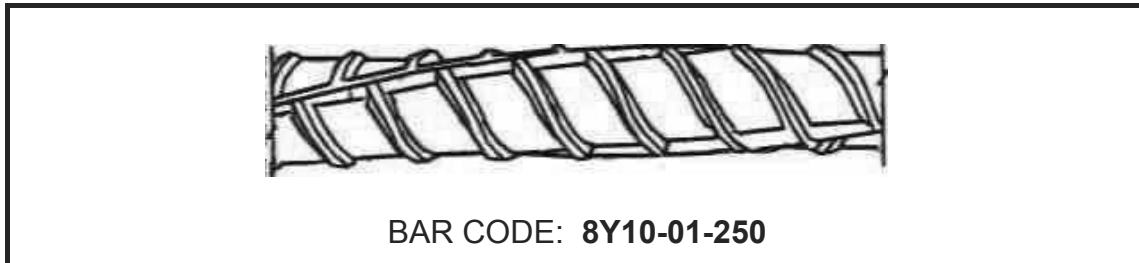


FIGURE 6.1

- 6.1.1 What type of steel is used here? (1)
- 6.1.2 What is the thickness of the bars (rods)? (1)
- 6.1.3 How many bars are required? (1)
- 6.1.4 Determine the centre-to-centre spacing of the stirrups. (2)
- 6.2 Draw a neat sectional sketch of the reinforcement for a rectangular column in the ANSWER BOOK. Use the following information:
- Use scale = 1 : 10
- Column = 800 x 500 mm (2)
 - Main bars = 25 mm diameter (3)
 - Stirrups = 10 mm diameter (2)
 - Concrete cover = 50 mm (1)
- 6.3 Name the purpose of the following bars in a concrete beam:
- 6.3.1 Anchor bars (1)
- 6.3.2 Stirrups (1)
- 6.3.3 Main bars (1)
- 6.4 Indicate whether the following statements are TRUE or FALSE. Write only the word 'true' or 'false' next to the question number (6.4.1–6.4.3) in the ANSWER BOOK.
- 6.4.1 Release agents for steel formwork should contain an anti-rust agent. (1)
- 6.4.2 An arch is the strongest structure that can be used to span a distance. (1)
- 6.4.3 The profile for the construction of arches is made from plastic. (1)
- 6.5 Describe THREE properties of a good formwork. (3 x 1) (3)

6.6 Answer the following questions with regard to the formwork in FIGURE 6.6.

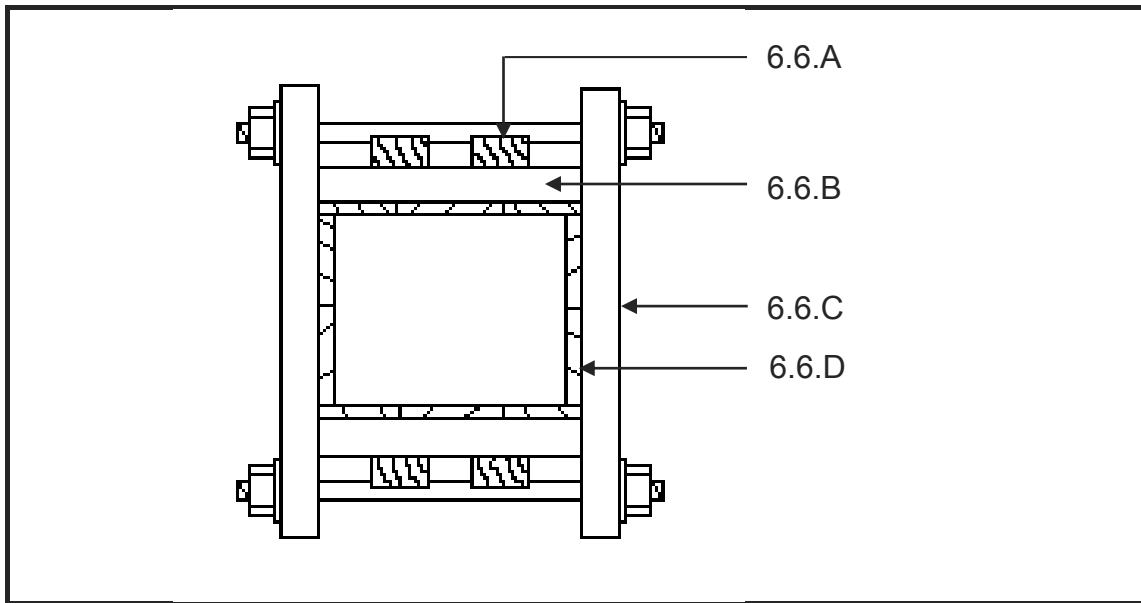


FIGURE 6.6

6.6.1 Is this formwork used for a beam or a column? (1)

6.6.2 Name parts 6.6.A to 6.6.D. (4)

6.7 Answer the following questions on the wall construction in FIGURE 6.7.

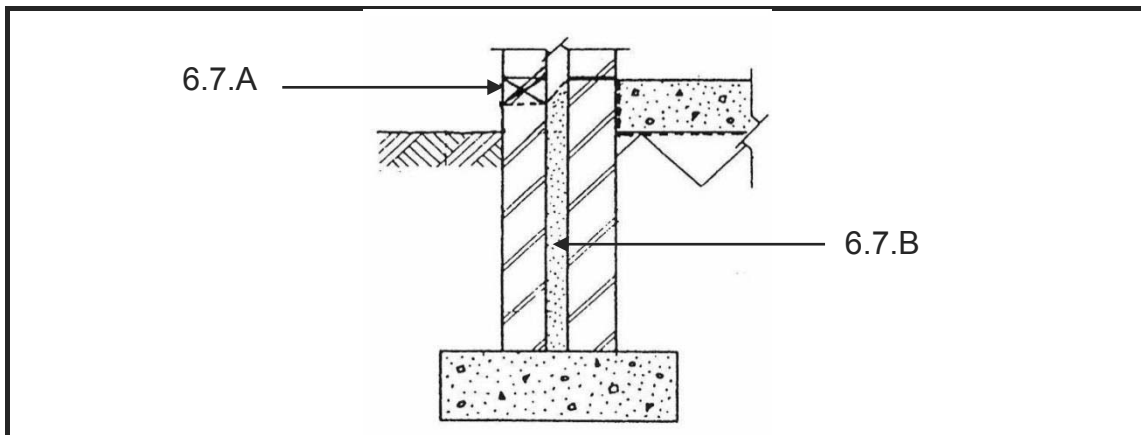


FIGURE 6.7

6.7.1 Name the type of wall in this construction. (1)

6.7.2 What is the thickness of this unplastered brick wall? (1)

6.7.3 Name parts 6.7.A and 6.7.B. (2)

6.7.4 What is the purpose of part 6.7.A? (1)

6.8 Briefly describe what a rough arch is. (2)

- 6.9 Name THREE properties of a roof underlay. (3 x 1) (3)
- 6.10 Provide ONE word/term for the following components of a staircase:
- 6.10.1 The horizontal part of a step (1)
- 6.10.2 The vertical posts that hold up the handrail (1)
- 6.10.3 A platform at the top of a flight of stairs (1)
- [40]**
- TOTAL: 200**

ANSWER SHEET 1	CONSTRUCTION CIVIL TECHNOLOGY	NAME: _____

3.2 Calculate the volume of concrete needed to cast the floor slab between the external walls. (12)

A	B	C	D
			Internal measurements of long walls (3)
			= _____ - _____ - _____
			=
			Internal measurements of short walls (3)
			= _____ - _____ - _____
			=
			Volume of concrete needed (6)
			Length of floor slab =
			Width of floor slab =
			Thickness of floor slab =
			(12)

