



Province of the  
**EASTERN CAPE**  
EDUCATION

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 11**

**NOVEMBER 2018**

**CIVIL TECHNOLOGY: CIVIL SERVICES**

**MARKS: 200**

**TIME: 3 hours**

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This question paper consists of 18 pages, including 4 pages of answer sheets.

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**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 2.6, 3.1, 5.1 and 6.9 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 AND MATERIAL (GENERIC)**

- 1.1 Answer the following questions with regard to the safety equipment in FIGURE 1.1.



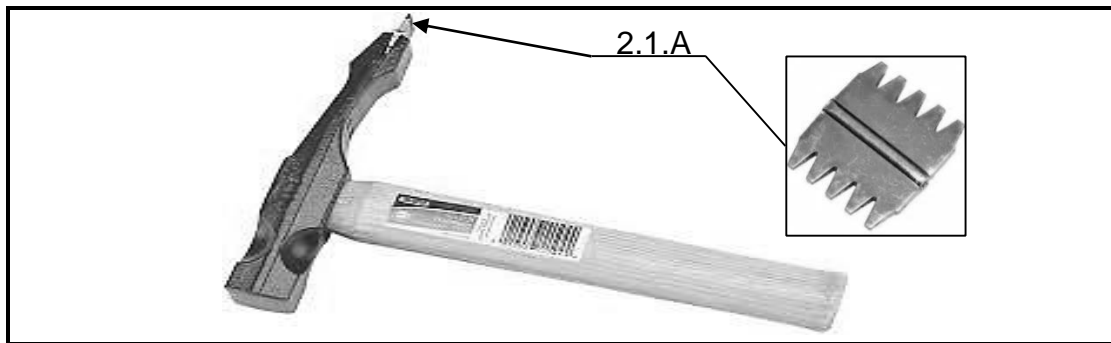
**FIGURE 1.1**

- 1.1.1 What is the safety equipment in FIGURE 1.1 called? (1)
- 1.1.2 On which type of site is this type of safety equipment compulsory? (1)
- 1.2 Describe the safety measure which is applicable to each of the following factors:
- 1.2.1 Loose clothing (1)
- 1.2.2 Type of shoes in a workshop (1)
- 1.2.3 Carrying of sharp objects (1)
- 1.2.4 Dangerous moving parts of power tools (1)
- 1.2.5 Number of operators who operate a machine (1)
- 1.3 Who is responsible for the safety of visitors on a construction site? (1)
- 1.4 Name any FOUR safety measures which are applicable to the storage of flammable liquids. (4 x 1) (4)
- 1.5 Unreinforced concrete, reinforced concrete and precast concrete are used on construction sites.  
Identify the type of concrete which will be used for the following work:
- 1.5.1 Suspended concrete floors (1)
- 1.5.2 Lintels above door openings (1)
- 1.5.3 Foundations for single-storey buildings (1)

- 1.6 Name ONE use of screed. (1)
- 1.7 Name TWO reasons why lime can be added to a mortar mix. (2 x 1) (2)
- 1.8 Briefly motivate why pine wood is used for carpentry work on a construction site. (2)
- 1.9 Indicate whether the following statements are TRUE or FALSE. Write only the word 'true' or 'false' next to the number in the ANSWER BOOK.
- 1.9.1 Board products are cheaper than solid wood products. (1)
- 1.9.2 Stock bricks are manufactured from cement. (1)
- 1.9.3 Face bricks must be plastered. (1)
- 1.9.4 Cement blocks are cast with hollow cores to make them lighter. (1)
- 1.10 Briefly motivate why sinks are manufactured from stainless steel. (2)
- 1.11 Briefly describe what an alloy is. (3)
- 1.12 Name ONE use of thermosetting plastic. (1 x 1) (1)
- [30]**

**QUESTION 2: EQUIPMENT, TOOLS AND GRAPHICS (GENERIC)**

2.1 Answer the following questions with regard to the hand tool in FIGURE 2.1.



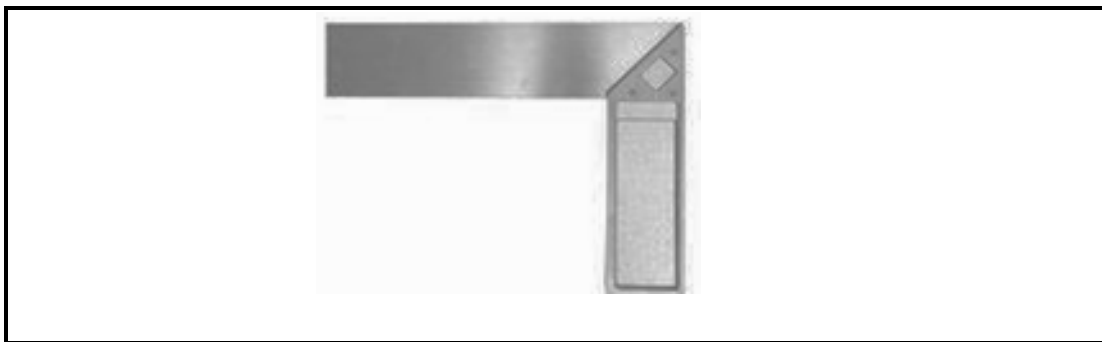
**FIGURE 2.1**

2.1.1 What is this tool called? (1)

2.1.2 Describe the purpose of part 2.1.A. (2)

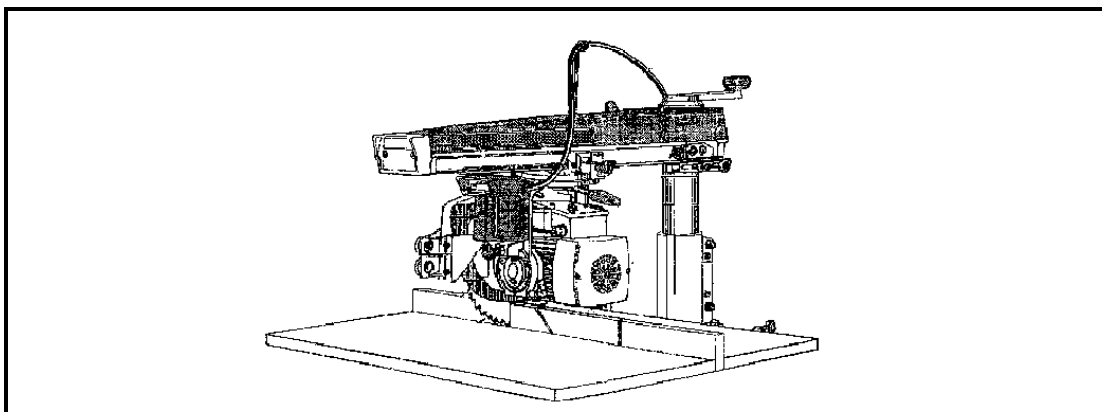
2.1.3 Briefly motivate why part 2.1.A must be replaced regularly. (2)

2.2 Identify the tool in FIGURE 2.2 and name THREE measures that should be taken to care for it. (4)



**FIGURE 2.2**

2.3 Identify the tool in FIGURE 2.3 and name THREE measures that should be taken to care for it. (4)



**FIGURE 2.3**

2.4 Name TWO measures for caring for a concrete mixer. (2 x 1) (2)



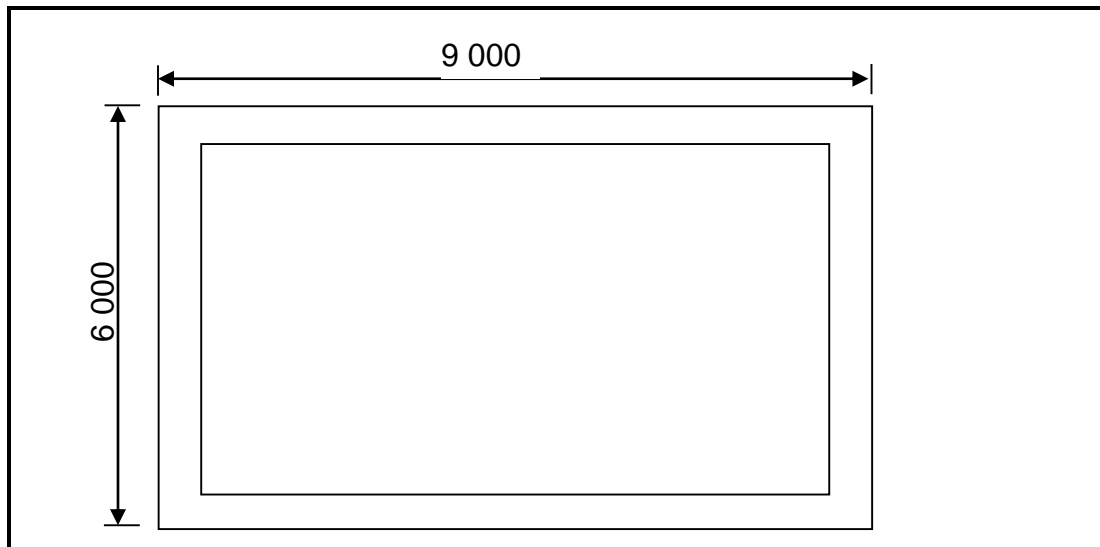
2.6 FIGURE 2.6, on ANSWER SHEET A, shows an incomplete section view of a single brick wall. Complete the section view to scale 1 : 20 and show the following parts with symbols and labels:

- 2.6.1 A strip foundation of 700 x 250 mm with the invert level of 400 mm (3)
- 2.6.2 A single brick wall with a height of 2 700 mm from the floor level and 10 mm plaster work on the outside and inside (5)
- 2.6.3 The hardcore filling of 250 mm (1)
- 2.6.4 The dampproof course (2)
- 2.6.5 The blinding layer of 50 mm (1)
- 2.6.6 The concrete floor slab of 90 mm (1)
- 2.6.7 A door opening with a height of 2 100 mm (1)
- 2.6.8 A concrete lintel with a thickness of 70 mm above the door opening (2)
- 2.6.9 A wall plate of 114 x 38 mm (2)
- 2.6.10 Show any TWO labels. (2 x 1) (2)

**[40]**

**QUESTION 3: QUANTITIES, JOINING AND GRAPHICS (GENERIC)**

- 3.1 FIGURE 3.1 shows the foundation wall of a building. The width of the wall is 220 mm and the height 450 mm.

**FIGURE 3.1**

Use the quantity list on ANSWER SHEET B and calculate the following:

- 3.1.1 Determine the centre line of the foundation wall. (6)
- 3.1.2 Determine the quantity of bricks needed to build the foundation wall. Make provision for 5% brick breakages. (9)
- 3.2 Fully describe the purpose of the description column on the dimension paper for quantities. (3)
- 3.3 Describe, in point form, the application process of contact glue. (3)
- 3.4 Which joining glue/material consists of resin and a hardener? (1)
- 3.5 Name TWO properties of mastic sealant. (2 x 1) (2)
- 3.6 Make neat sketches to illustrate the following symbols on a floor plan:
- 3.6.1 Gully (2)
- 3.6.2 Check valve (2)
- 3.6.3 Dressed wood (2)

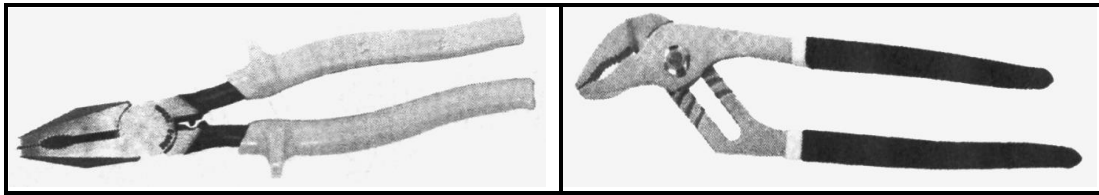
**[30]**



**QUESTION 4: SAFETY, MATERIAL, EQUIPMENT AND JOINING (SPECIFIC)**

- 4.1 Name TWO causes of water pollution. (2 x 1) (2)
- 4.2 Briefly describe the safety risk of sewage. (2)
- 4.3 Briefly motivate why the working area where soldering work is done, must be well ventilated. (2)
- 4.4 Briefly describe the difference between the sizes of coarse aggregate and fine aggregate. (2)
- 4.5 Various metals are listed to possibly fit the following properties. Choose the correct answer and write it next to the question number in your ANSWER BOOK, e.g. 4.5.4 Copper.
- 4.5.1 ... is suitable for producing sewerage pipes. (1)
- A Lead
  - B Grey cast iron
  - C Tin
  - D Stainless steel
- 4.5.2 ... is ideal for producing hot-water pipes. (1)
- A Wrought iron
  - B Aluminium
  - C Copper
  - D Tin
- 4.5.3 ... is suitable for external water taps. (1)
- A Brass
  - B Stainless steel
  - C Bronze
  - D Copper
- 4.6 Name THREE properties of thermoplastic. (3 x 1) (3)
- 4.7 Which hand tool will be used for the following work?
- 4.7.1 To cut sheet metal (1)
- 4.7.2 To form rivet heads (1)

- 4.8 Identify the tools in FIGURES 4.8.1 and 4.8.2 and name ONE use of each.

**FIGURE 4.8.1****FIGURE 4.8.2**

(4)

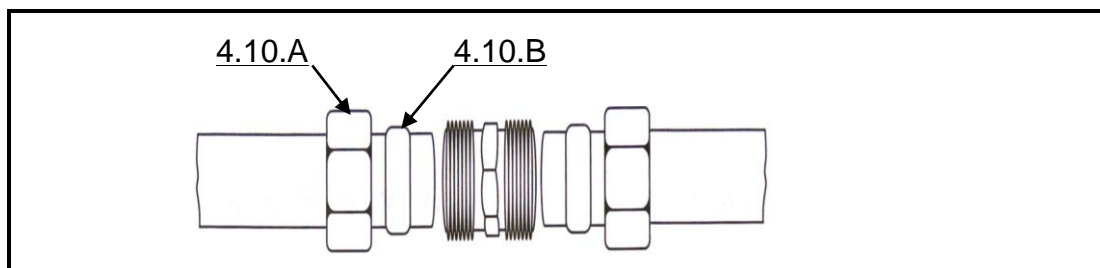
- 4.9 Indicate whether the following statements are TRUE or FALSE. Write only the word 'true' or 'false' next to the number in the ANSWER BOOK.

4.9.1 Copper pipe is heated with a torch to bend it. (1)

4.9.2 Galvanised steel pipe is bent by means of a pipe bending spring. (1)

4.9.3 Polythene pipes are joined with PVC glue and joints. (1)

- 4.10 Answer the following questions with regard to the joining component in FIGURE 4.10.

**FIGURE 4.10**

4.10.1 What is this type of pipe joint called? (1)

4.10.2 Name the parts 4.10.A and 4.10.B. (2)

4.10.3 Which type of pipe is joined by this type of joint? (1)

- 4.11 Make a neat sketch of a grooved-seamed joint for sheet metal. (2)

- 4.12 What is the purpose of the flux when soldering work is done? (1)

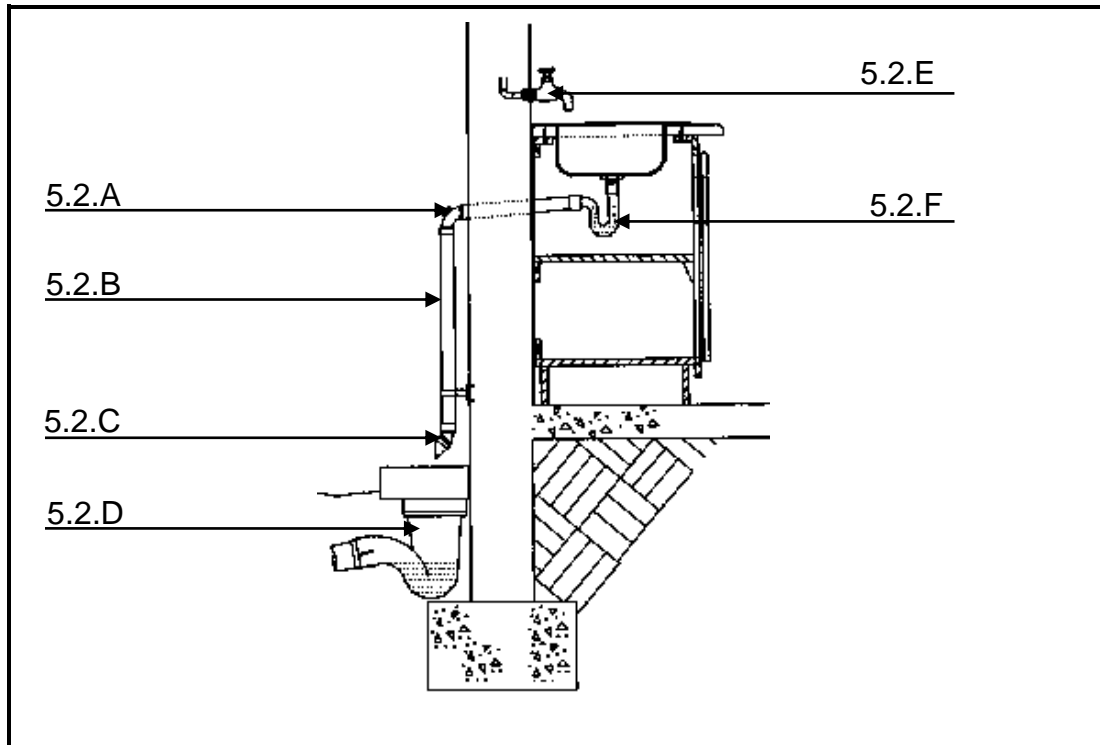
**[30]**

### QUESTION 5: GRAPHICS AND CONSTRUCTION IN CIVIL SERVICES (SPECIFIC)

- 5.1 FIGURE 5.1 on ANSWER SHEET C shows a 45° cut-off cylindrical pipe. Use ANSWER SHEET C and develop and draw the development of the cut-off of the cylindrical pipe to scale 1 : 1.

(14)

- 5.2 Answer the following questions with regard to the sink installation in FIGURE 5.2.



**FIGURE 5.2**

- 5.2.1 What is the pipe at 5.2.A called? (1)
- 5.2.2 What is the access opening at part 5.2.A called? (1)
- 5.2.3 At what angle is the pipe at 5.2.A bent? (1)
- 5.2.4 What is the pipe at 5.2.B called? (1)
- 5.2.5 What is the section size of the pipe at 5.2.B? (1)
- 5.2.6 At what angle is the pipe at 5.2.C bent? (1)
- 5.2.7 Name parts 5.2.D tot 5.2.F. (3)
- 5.3 Make a neat section-view sketch to illustrate the construction of a straight capillary soldering joint for copper pipes. (2)

- 5.4 Choose the term from COLUMN B that matches the description in COLUMN A. Write only the letter (A–C) next to the question number (5.4.1–5.4.3) in the ANSWER BOOK, for example 5.4.4 F.

COLUMN A		COLUMN B	
5.4.1	Fresh concrete is covered with damp hessian	A	Floating
5.4.2	Formwork for fresh concrete	B	Concrete placing
5.4.3	Tampers are used to fill all holes and corners with concrete	C	Compacting
		D	Curing
		E	Plywood boards

(3 x 1) (3)

- 5.5 What is the minimum thickness of the following concrete parts?

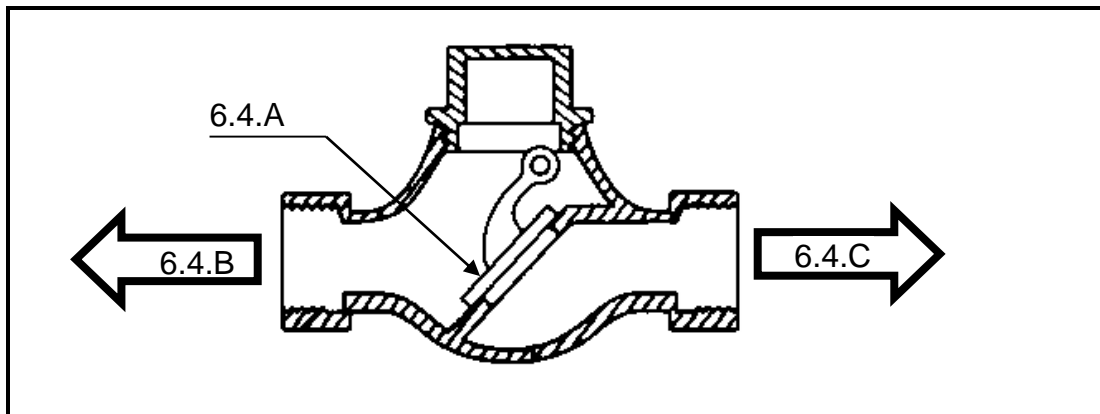
5.5.1 Domestic floor slabs (1)

5.5.2 Manhole slab (1)

**[30]**

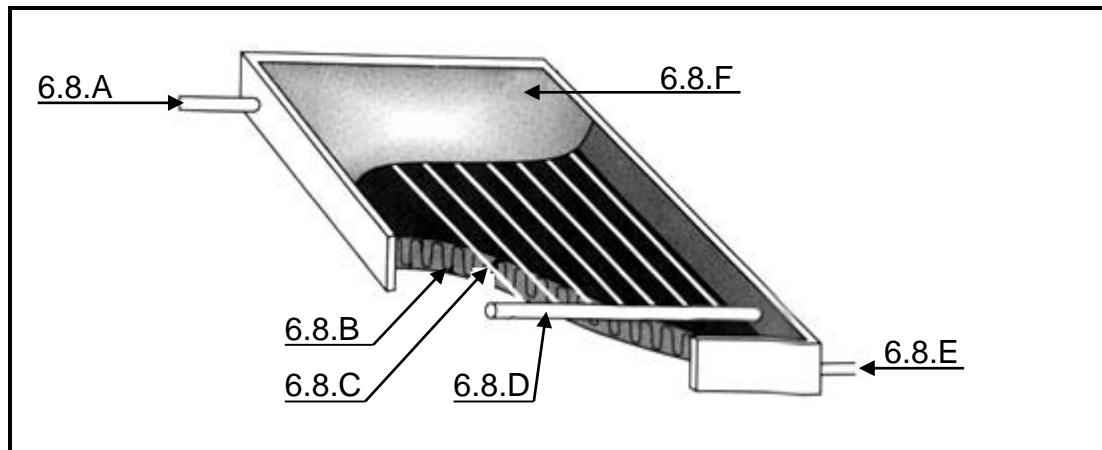
**QUESTION 6: COLD AND HOT WATER SUPPLY, DRAINAGE AND SANITARY FITMENTS (SPECIFIC)**

- 6.1 Under which circumstances are stainless steel pipes used? (1)
- 6.2 Name THREE disadvantages of stainless steel pipes. (3 x 1) (3)
- 6.3 Name THREE advantages of high-density polyethylene pipes. (3 x 1) (3)
- 6.4 Answer the following questions with regard to the valve in FIGURE 6.4.

**FIGURE 6.4**

- 6.4.1 What is the type of valve in FIGURE 6.4 called? (1)
- 6.4.2 What is part 6.4.A called? (1)
- 6.4.3 Which arrow point indicates the correct flow direction, arrow point 6.4.B or 6.4.C? (1)
- 6.4.4 In which circumstances is this type of valve used? (1)
- 6.5 Make neat sketches of the symbols for the following:
- 6.5.1 Draining tap (2)
- 6.5.2 Float valve (2)
- 6.5.3 External pipe (2)
- 6.5.4 Water meter (2)
- 6.6 What is the purpose of the thermostat in a geyser? (1)
- 6.7 Which part of the geyser allows air to enter the pipe when needed? (1)

- 6.8 Answer the following questions with regard to the hot-water reservoir system in FIGURE 6.8.



**FIGURE 6.8**

- 6.8.1 Name the parts 6.8.A to 6.8 F. (6)
- 6.8.2 Name TWO functions of part 6.8.F. (2 x 1) (2)
- 6.9 FIGURE 6.9 on ANSWER SHEET D shows the side elevation of the incomplete schematic representation of the sanitary fittings which must be connected to a one-pipe system. Complete on ANSWER SHEET D the following sanitary pipework by means of neat line sketches:
- 6.9.1 Discharge stack and vent pipe  
Indicate the vent pipe by means of a neat label. (2)
- 6.9.2 Traps for the sanitary fittings (2)
- 6.9.3 Waste-water discharge pipes (2)
- 6.9.4 Soil-water discharge pipe (1)
- 6.10 Briefly describe how the following factors can cause the water locks in traps to break:
- 6.10.1 Wavering (2)
- 6.10.2 Compression (2)

**[40]**

**TOTAL: 200**

<b>ANSWER SHEET    A</b>	<b>CIVIL TECHNOLOGY GENERIC</b>	<b>NAME:</b> _____

2.6      FIGURE 2.6 on ANSWER SHEET A shows an incomplete section view of a single brick wall. Complete the section view to scale 1 : 20.

2.6.1	Strip foundation	3	
2.6.2	Single brick wall	5	
2.6.3	Hard core filling	1	
2.6.4	Damp proof course	2	
2.6.5	Blinding layer	1	
2.6.6	Concrete floor slab	1	
2.6.7	Door opening	1	
2.6.8	Concrete lintel	2	
2.6.9	Wall plate	2	
2.6.10	2 Labels	2	
	<b>TOTAL</b>	<b>20</b>	

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<b>ANSWER SHEET    B</b>	<b>CIVIL TECHNOLOGY GENERIC</b>	<b>NAME:</b> _____

**QUESTION 3.1**

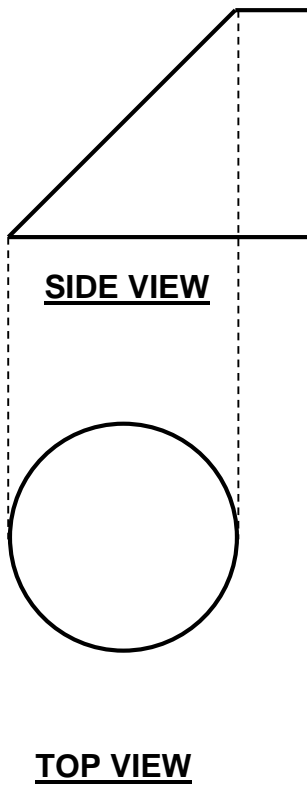
<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
			3.1.1 CENTRE LINE: (6)
			..... x ..... m = ..... m
			..... x ..... m = ..... m
			= ..... m
			Minus: ..... x ..... m = ..... m
			TOTAL CENTRE LINE = ..... m
			3.1.2 QUANTITY OF BRICKS: (9)
			<u>AREA:</u>
			<u>Total wall area</u>
.....	.....		
	<u>.....</u>	<u>.....</u>	Thus: Total wall area = .....
			<u>TOTAL BRICKS</u>
	.....		100 bricks/ m <sup>2</sup> for single brick wall
	<u>.....</u>	<u>.....</u>	Thus: ..... bricks for total wall
			<u>5% BREAKAGE</u>
			TOTAL BRICKS:
			..... + ..... = ..... total quantity bricks



<b>ANSWER SHEET    C</b>	<b>CIVIL TECHNOLOGY CIVIL SERVICES</b>	<b>NAME:</b> _____

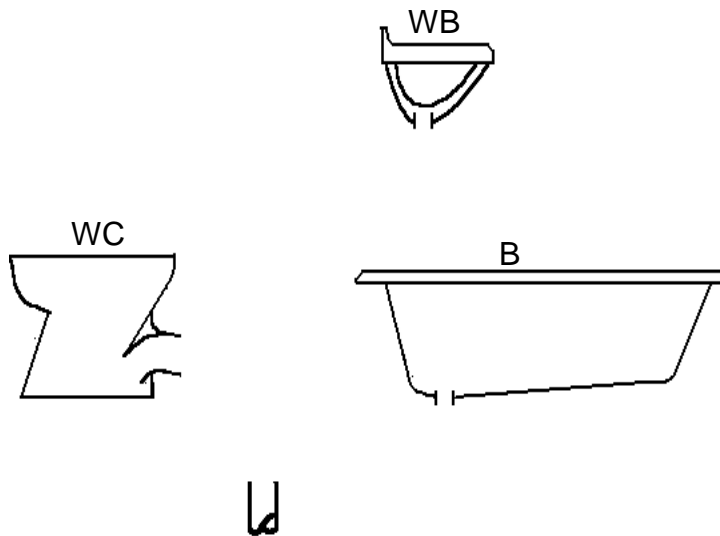
- 5.1 FIGURE 5.1 on ANSWER SHEET C shows a 45° cut-off cylindrical pipe. Use ANSWER SHEET C and develop and draw the development of the cut-off of the cylindrical pipe on scale 1 : 1.

(14)



<b>ANSWER SHEET     D</b>	<b>CIVIL TECHNOLOGY CIVIL SERVICES</b>	<b>NAME:</b> _____

6.9 FIGURE 6.9 on ANSWER SHEET D shows the side elevation of the incomplete schematic representation of the sanitary fittings which must be connected to a one-pipe system. Complete on ANSWER SHEET D the following sanitary pipework by means of neat line sketches:



Discharge stack + vent pipe.		
Label	2	
Traps	2	
Waste water discharge pipes.	2	
Soil water discharge pipe.	1	
<b>TOTAL</b>	<b>7</b>	