



education

Department:
Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 11

CIVIL TECHNOLOGY

EXEMPLAR 2007

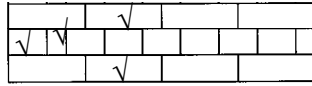
MEMORANDUM

This memorandum consists of 13 pages.

QUESTION 1

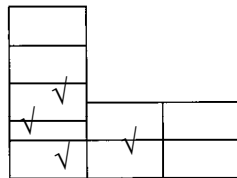
1.1

1.1.1

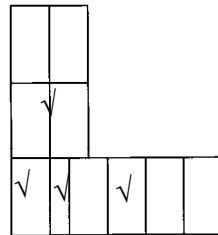


(4)

1.1.2



(4)



(4)

1.2

1.2.1

Sand
Cement/lime
Water.

(3)

1.2.2

10 mm

(1)

1.2.3

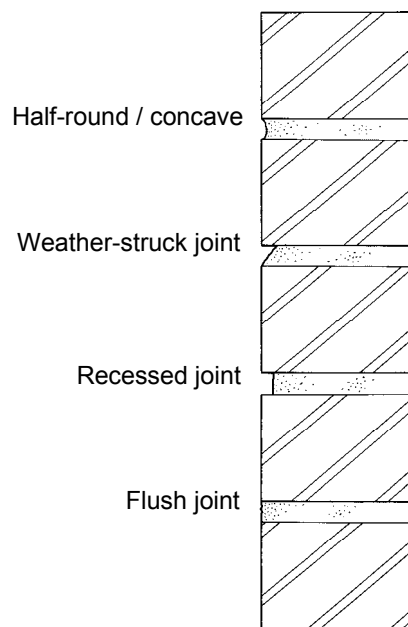
- (a) Must be workable
- (b) Have a good bond
- (c) Must be durable and resistant to frost and chemical attacks,
- (d) Have sufficient strength for the purpose for which it is required.

(2)

(Any two)

1.2.4

(2)

**(Any two of the above)**

1.2.5 Mortar is used to join bricks of a wall into one solid mass, thus making the wall strong enough to stand upright. (1)

1.2.6 Brickforce (1)

1.2.7

- (a) Soil structure (1)
- (b) Location of openings
- (c) Location of joints and corners

(Any one of the above)

1.3

1.3.1 (a) Profiles and Building line (1)
(b) (Marking gauge, spirit level, line blocks and building line)

1.3.2 Galvanised straps or long nails \checkmark are knocked into the timber frame. \checkmark (4)
Make sure that the doorframe is in position, \checkmark level and plumb by using wooden stays, spirit level. \checkmark

1.4

1.4.1

- (a) Scaffolds should be inspected regularly (2)
- (b) Standards should rest on solid surface or base
- (c) Platforms should be closely boarded.
- (d) Toe-boards must be provided on all platforms higher than 2 m.
- (e) Guard rails must be set at least 0.9m above the platform,
- (f) Ladders must be of sound construction and have no defects or missing rungs.

(Any two)**[30]****QUESTION 2**

2.1

2.1.1

- (a) Formwork should be strong enough to support the load (5)
- (b) Should not deflect under load including wet concrete
- (c) Must be accurately set out
- (d) Must have grout tight joints
- (e) Form sizes should be designed so that they are of maximum size, which can be easily handled.
- (f) Materials must be chosen so that it can be easily fixed, should be easily dismantled and assembled without any member being trapped.

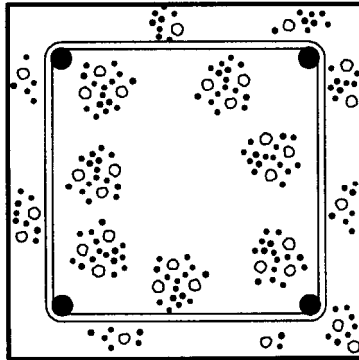
(Any five)

2.1.2

- (a) Must be able to achieve tensile strength without undue stress (1)
- (b) Must be of material that can be easily bent to any required shape (1)
- (c) Its surface must be capable of developing an adequate bond between concrete and reinforcement (1)
- (d) Must be economical (1)
- (e) Must have a similar coefficient of thermal expansion to prevent unwanted stress (1)

2.2

(3)



Mark allocation:

- Column (1)
- Main bars (1)
- Binder (1)

2.3 To prevent rainwater from entering the building

(1)

2.4

- (a) A - Head of the frame (1)
- (b) B - Frame stile (1)
- (c) C - Sill (1)
- (d) D - Top rail (1)
- (e) E - Sash stile (1)
- (f) F - Bottom rail (1)

2.5

(10)

2.5.1

(6)

Hollow core/Flush Door	Solid door
Softwood framework	Solid hardwood frame
Fabricated boards / masonite / veneer for panels	Solid materials for panels
Hollow core	Various materials can be used as panels

2.5.2 Weather resistant
Security
Privacy
Durable
Expensive

(2)

(any two)

2.5.3 Light
Provide privacy
Provide sound insulation
Cheap

(2)

(any two)

2.6

- (a) Screws have better grip than nails (1)
- (b) Screws do not split the timber when used at the end of the timber (1)
- (c) Screws can be easily removed (1)
- (d) Screws will not damage the work surface (1)

2.7

- (a) Is a strongest joint for the drawer (2)
- (b) Does not pull apart easily
- (c) Does not show from the front.
- (d) The joint will not pull apart from the front as it can only be fitted in one direction

(Any two)

- 2.8
- Plywood is made up of uneven layer of veneers. (4)
 - Alternate boards are laminated with the grain crossing each other at 90°
 - The outer layers of the board, the grain faces the same direction
 - The boards can be made waterproof

[40]**QUESTION 3**

3.1

- 3.1.1 100 mm or 110 mm (1)
- 3.1.2 32 mm or 50 mm (1)
- 3.1.3 For ventilation purposes (1)
- 3.1.4 Prevents bad smell from entering the dwelling (1)
- 3.1.5 Gully (1)
- 3.1.6 Provides the access point to the drainage system for the purpose of cleansing, inspection and testing of drains (1)
- 3.1.7 1:40 (1)

3.2

- 3.2.1
 - A is a stop valve (2)
 - B is a full way stop valve / gate valve

3.2.2

- (a) A is used in houses to control the flow of water in a pipe (1)
 (b) B is used on hot water pipes where the full bore is essential. (1)

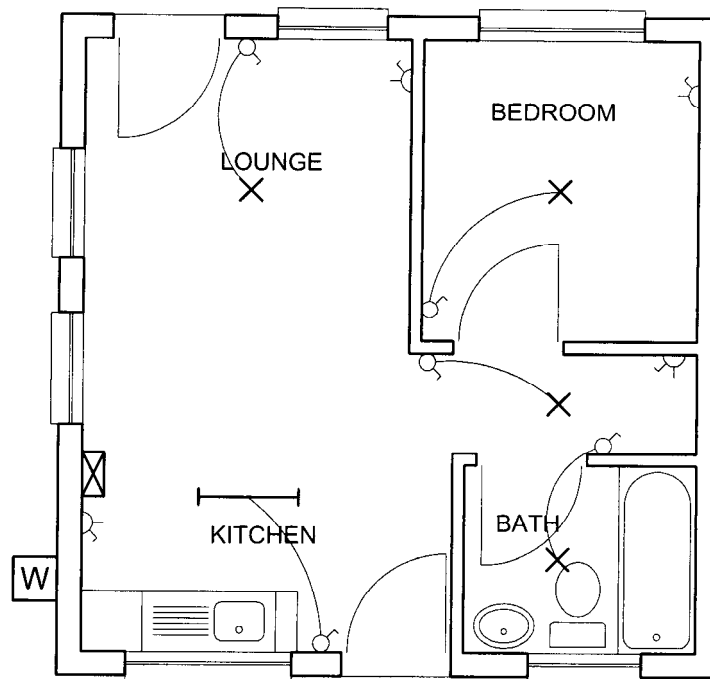
3.2.3

- (a) Pipes connected the wrong way round (1)
 (b) There is lime deposits in the pipes restricting the flow of water (1)
 (c) Taps being closed too quickly (1)

3.2.4

- (a) G = Gully (1)
 (b) IE = Inspection Eye (1)
 (c) MH = Manhole (1)
 (d) S = Sink (1)
 (e) SP = Soil Pipe (1)

3.3



Note: All symbols are worth half a mark each. (8)

3.4 Wireman certificate (1)

3.5 • To detect small imbalances between the earth and the supply, (2)

indicating leakage of electricity down to earth

- To cut off electricity supply when an imbalance is detected to avoid electrocution or possible fire hazards.

[30]**QUESTION 4**

4.1

- | | | |
|-----|---|-----|
| (a) | b | (1) |
| (b) | a | (1) |
| (c) | c | (1) |
| (d) | e | (1) |
| (e) | d | (1) |

4.2

- Glass is made from soda, lime, silica, magnesia and aluminium. (1)
- The materials are heated in a furnace to a temperature of 1 490°C to 1 550°C. (1)
- At this temperature, the materials fuse together in a molten state. (1)
- The glass sheet is then produced by drawing, floating or rolling. (1)

4.3

- | | | |
|-----|---|-----|
| (a) | Thermosetting plastics are brittle and cannot be softened | (2) |
| (b) | Thermoplastics can be softened and bent | (2) |

4.4

(17)

A	B	C	D
			Centre line
			$2 \times 6000 = 12000 \quad \checkmark$
			$2 \times 4000 = \underline{8000} \quad \checkmark$
			$= 20000$
			$\text{less } 4 \times 220 = 880 \quad \checkmark$
			Total $= 19120 \quad \checkmark$
1/	19.12		
	<u>2.60</u> \checkmark	49.71 \checkmark	Area for super structure = <u>49.71m²</u>
1/	2.10		Area for the door opening = 2.100 x 0.900
	<u>0.90</u> \checkmark	1.89 \checkmark	$= \underline{1.89m^2}$
1/	2.00		Area for the window opening = 2.00 x 1.20
	<u>1.20</u> \checkmark	2.40 \checkmark	$= \underline{2.400m^2}$
			Total area of superstructure $\checkmark \quad \checkmark$
			$= 49.71 - (1.89 + 2.4)$
			$= \underline{45.42m^2} \quad \checkmark$
\checkmark		\checkmark	
2 /	45.42	4542	Number of bricks for the superstructure is

50 ✓	4542 ✓

[30]**QUESTION 5**

5.1

SF Calculations

$$\text{SF at A} = \underline{450 \text{ kN}} \text{ upwards} \quad (1)$$

$$\text{SF at B} = 450 \text{ kN} - 200 \text{ kN} = \underline{250 \text{ kN}} \text{ downwards} \quad (1)$$

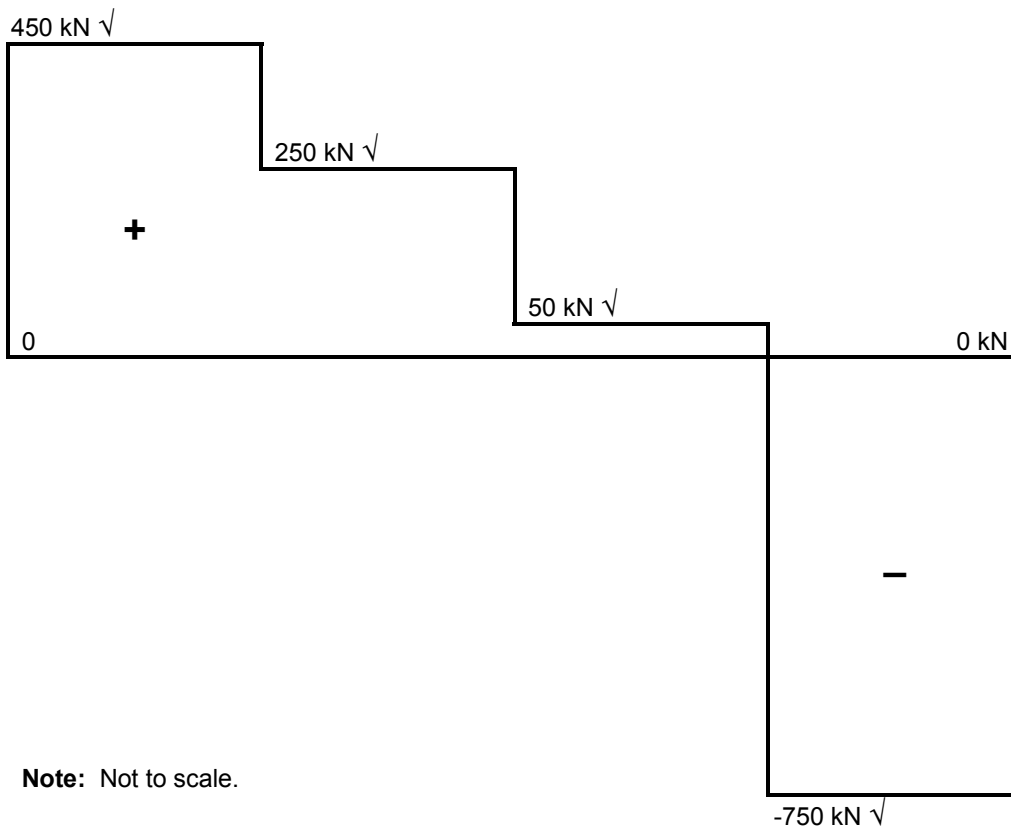
$$\text{SF at C} = 250 \text{ kN} - 200 \text{ kN} = \underline{50 \text{ kN}} \text{ downwards} \quad (1)$$

$$\text{SF at D} = 50 \text{ kN} - 800 \text{ kN} = \underline{-750 \text{ kN}} \text{ downwards} \quad (1)$$

$$\text{SF at E} = -750 \text{ kN} + 750 \text{ kN} = \underline{0 \text{ kN}} \text{ upwards} \quad (1)$$

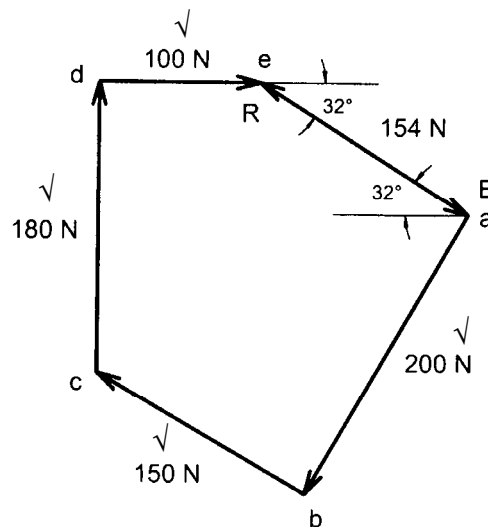
SF DIAGRAM (5)

Scale: 1 mm = 10 kN ✓

**Note:** Not to scale.

5.2

(8)

**Note: Not** to scale.

$$R = 154 \text{ N at } 32^\circ \text{ North of East}$$

$$E = 154 \text{ N at } 32^\circ \text{ South of West}$$

Allow tolerance of 5N and 2° to either side5.3

Area(A)	Distance(D)	Area x Distance(AxD)	(12)
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Area 1 =	$150 \times 150 = 225000$	$\sqrt{\quad}$	75	$\sqrt{\quad}$	$225000 \times 75 = 1687500$	$\sqrt{\quad}$
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Area 2 =	$\frac{1}{2} \times 300 \times 240 = 36000$	$\sqrt{\quad}$	230	$\sqrt{\quad}$	$36000 \times 230 = 8280000$	$\sqrt{\quad}$
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Total =	$= 261000$	$\sqrt{\quad}$			$= 9967500$	$\sqrt{\quad}$
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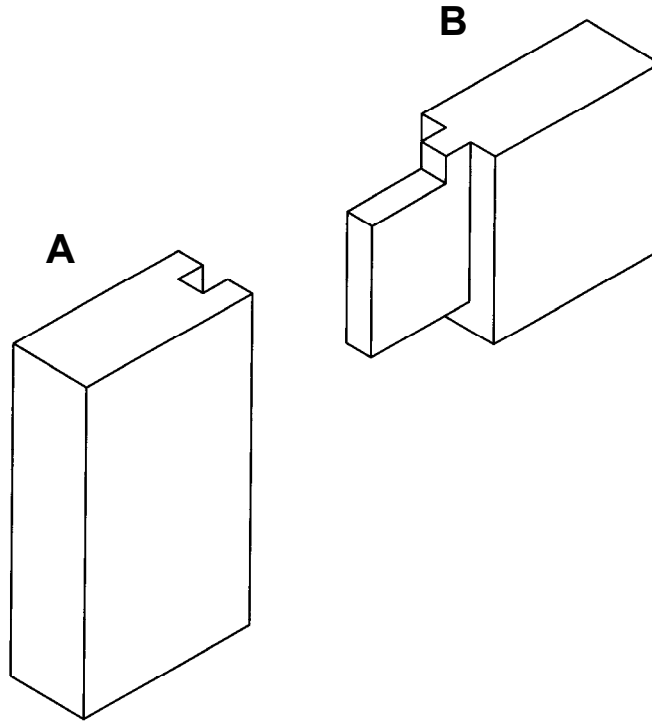
$$\text{Position of centroid from line A-B} = \frac{\text{Total (AxD)}}{\text{Total A}} \sqrt{\quad}$$

$$= \frac{9967500}{261000} \sqrt{\quad}$$

[30]

QUESTION SIX

6.1



Note: Not to scale.

Mark allocation:

Insight:

- Positioning of Parts A and B without overlapping according to the isometric axis (6)

Line work:

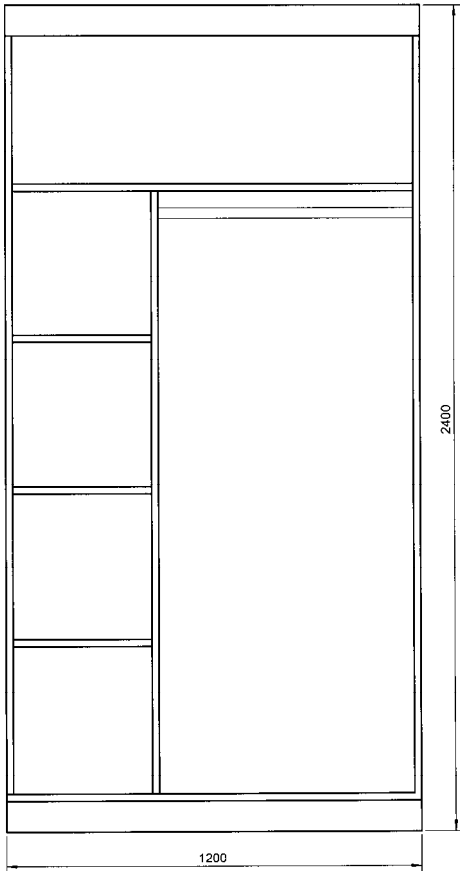
- Outlines (3)
- Projection lines (3)

Accuracy:

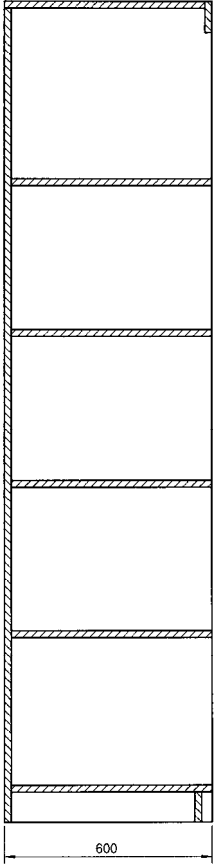
- Part A = 4 planes x 4 (2 for height and 2 for length) (16)
- Part B = 8 planes x 4 (2 for height and 2 for length) (32)

TOTAL: 60 ÷ 3 = 20

6.2



FRONT VIEW



SECTION A-A

Note: Not to scale.

Mark allocation:

Design:

- Layout and spacing (6)
- Equally spacing of shelves (4)
- Plinth, top rail and hanger (3)

Dimensioning:

- Length (2)
- Height (2)
- Depth (2)

Cutting planes:

- Hatching (9 planes, 1 mark each) (9)

Accuracy:

- Front view (16 planes, 1 mark each) (16)
- Section A-A (16 planes, 1 mark each) (16)

TOTAL: 60 ÷ 3 = 20