



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

GRADE 11

NOVEMBER 2011

**CIVIL TECHNOLOGY
MEMORANDUM**

MARKS: 200

This memorandum of 8 pages.

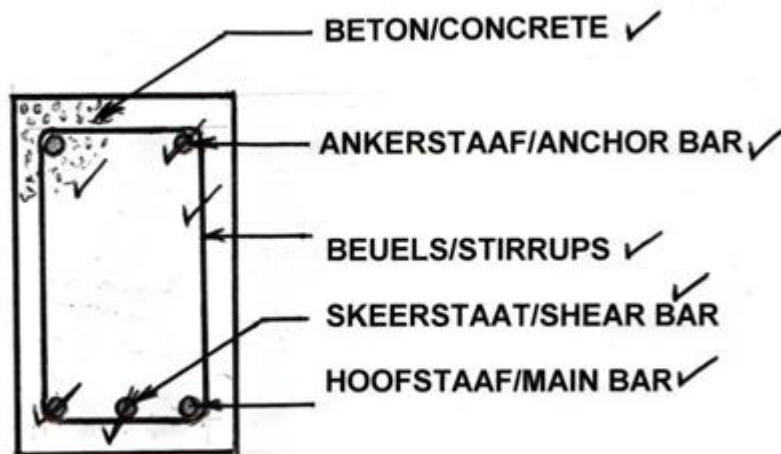
QUESTION 1: CONSTRUCTION PROCESSES

- 1.1 Bleeding and breathing (2)
- 1.2
- Pain in chest
 - Pain in neck and arms.
 - Sweating, vomiting, weakness and anxiety (3)
- 1.3
- Steps must be clean of any obstructions
 - Temporary guardrails must be secured on sides
 - A catch-net must be put under steps
 - Warning boards should be placed
 - Boards should be secured to floor to prevent overstepping or material falling off (Any 4) (4)
- 1.4
- May not work without authorisation
 - Only trained people may work on machines
 - Only one person at a machine
 - Concentrate on the point of action
 - Do not adjust machine while in motion
 - Sufficient lighting
 - Apply even pressure on the blades
 - Machine guards must be in good condition
 - Keep hands away from blades
 - Wear protective clothing
 - Electrical wires should be checked regularly
 - Safety rules must be displayed near machine
 - Keep machine and area around machine clean (Any 6) (6)
- 1.5 Heat, oxygen, fuel (3)
- 1.6 According to size of window and wind pressure. (2)
- 1.7 Aluminium
 Light in weight
 Ductile and malleable
 High resistance to rust
 Easy to cut or drill
 Good conductor of electricity. (Any 4) (4)
- 1.8 Copper pipes have a high resistance to rust.
 Easy to work with.
 Can be used for hot and cold water (3)
- 1.9 Clear glass, obscure glass, special glass (3)
- [30]**

QUESTION 2: ADVANCED CONSTRUCTION PROCESSES

- | | | | | |
|-----|-------|---|---------|-----|
| 2.1 | 2.1.1 | FALSE | | |
| | 2.1.2 | FALSE | | |
| | 2.1.3 | TRUE | | |
| | 2.1.4 | FALSE | | |
| | 2.1.5 | FALSE | | |
| | 2.1.6 | TRUE | (6 x 1) | (6) |
| 2.2 | 2.2.1 | To cut curves and straight cuts in wood. | | |
| | 2.2.2 | To plane wood to size. | | |
| | 2.2.3 | To drill accurate holes in wood or metal. | | |
| | 2.2.4 | To mix materials to make concrete. | (4 x 1) | (4) |
| 2.3 | • | Keep ventilation holes clean. | | |
| | • | Replace worn parts. | | |
| | • | Use machine for its purpose. | | |
| | • | Machines must be serviced periodically. | | |
| | • | Store machines after use. | | |
| | • | Do not force any machine unnecessary. | | |
| | • | Keep blades sharp. | | |
| | • | Power cords should be checked at regular intervals. | | |
| | • | Report any defect immediately. | (Any 7) | (7) |
| 2.4 | • | Steel must have high tensile strength. | | |
| | • | Steel must have ability to be bent in any shape | | |
| | • | Steel must bond adequately with concrete | | |
| | • | Steel must be reasonably rust free | | |
| | • | Steel must not be contaminated with grease, mud, etc. | (Any 4) | (4) |
| 2.5 | • | Main bar act against tensile forces. | | |
| | • | Shear bars act against shearing forces. | | |
| | • | Anchor bars act against compression forces. | | |
| | • | Stirrups bind the bars together / help to resist shearing forces. | | (4) |
| 2.6 | • | Must be strong enough. | | |
| | • | Must be easy to erect and to remove. | | |
| | • | Must be accurate | | |
| | • | Must be sealed. | | |
| | • | Must be clean of sawdust, stones, etc. | | |
| | • | Formwork materials must be able to be repaired on site. | | |
| | • | Must give adequate support without bending. | (Any 5) | (5) |

2.7 Vertical cross-section through concrete beam



(10)
[40]

QUESTION 3

- 3.1 3.1.1 Pillar tap or bib tap
 3.1.2 Stop tap
 3.1.3 Bib tap
 3.1.4 Drain cock or stop tap

(4)

3.2 Advantages:

- Reasonably rust resistant
- Can be used for hot and cold water installations
- Durable.
- Low maintenance

(Any 3)

Disadvantages:

- Heavy.
- Expensive.
- Difficult to work with.
- Can corrode under water or in acidulous ground
- Heavy equipment needed to do piping.

(Any 3) (6)

3.3 Purpose of fittings:

- 3.3.1 To stop water inflow at a certain level. (1)
- 3.3.2 Keep bad smells out of house. (1)
- 3.3.3 Give access to drain pipes to clean blocked drains. (1)
- 3.3.4 Collect overflow water or leaks from geyser. (1)

- 3.4 Choice of pipes:
- Cost.
 - Workability.
 - Individual preference.
 - Maintenance cost.
 - Advantages and disadvantages for a specific situation. (5)
- 3.5 Mirror check, Ball check, Leakage check-hydraulic test/ air test/smoke test. (4)
- 3.6 Metre box is used for readings of how much electricity was used. Distribution box is where electricity is distributed to electric circuits of a house. (2)
- 3.7 Abbreviations:
- 3.7.1 IE (1)
 - 3.7.2 MH (1)
 - 3.7.3 G (1)
 - 3.7.4 SW (1)
 - 3.7.5 SP (1)
- [30]**

QUESTION 4

- 4.1 Volume of concrete needed
 $1,5 \text{ m} \times 9 \text{ m} \times 0,1 \text{ m} = 1,35 \text{ m}^3$ (1,35 cubic meter) (5)
- 4.2 weld / gusset plates / rivets / flange / bolts. (Any 3) (3)
- 4.3 Missing word:
- 4.3.1 dovetail joint (1)
 - 4.3.2 housing joint (1)
 - 4.3.3 sleeve anchor (1)
 - 4.3.4 compression joint (1)
 - 4.3.5 wall ties (1)
 - 4.3.6 (i) doors and (1)
(ii) windows (1)
- 4.4
- Prevent water from coming into house.
 - High insulation against heat, cold and sound.
 - Cheaper materials can be used for inner construction.
 - Avoid expensive external rendering (plastering). (4)
- 4.5 Silicon / Mortar / Fixing in wood frames. (3)
- 4.6 R-bars = mild steel, Y-bars = high yield steel (2)
- 4.7 Time saving / reduces space needed on site / can be manufactured under controlled conditions / use of mechanisation during the manufacturing of lintels. (4)
- 4.8 Plywood / hardboard (2)
- [30]**

QUESTION 5: APPLIED MECHANICS**ANSWER SHEET 5.1(Memo)**

5.1 5.1.1 The shear force values.

$$a = 20 \text{ N} + 0 \text{ N} = -20 \text{ N}$$

$$b = -20 \text{ N} + -60 \text{ N} + +100 \text{ N} = +20 \text{ N}$$

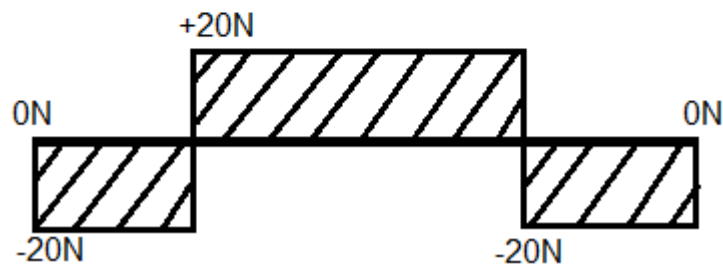
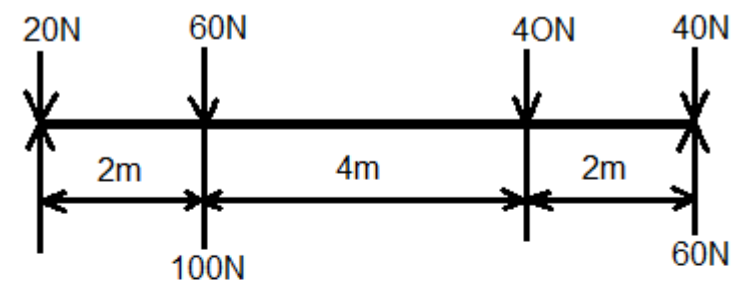
$$c = +20 \text{ N} + -40 \text{ N} = -20 \text{ N}$$

$$d = -20 \text{ N} + -40 \text{ N} + 60 \text{ N} = 0 \text{ N}$$

(4)

5.1.2 The shear force diagram.

SCALE / SKAAL: 1 mm = 2 N



(6)

5.2 Bending moments

$$a = (50 \text{ N} \times 0 \text{ m}) + (80 \text{ N} \times 0 \text{ m}) = 0 \text{ N}$$

$$b = (-50 \text{ N} \times 4 \text{ m}) + (+80 \text{ N} \times 4 \text{ m}) + (40 \text{ N} \times 0 \text{ N})$$

$$b = -200 \text{ N} \quad +320 \text{ N} \quad +0 \text{ N}$$

$$b = +120 \text{ N}$$

(2)

(2)

$$c = (-50 \text{ N} \times 6 \text{ m}) + (-40 \text{ N} \times 2 \text{ m}) + (-40 \text{ N} \times 0 \text{ m}) + (+80 \text{ N} \times 6 \text{ m})$$

$$c = -300 \text{ N} \quad -80 \text{ N} \quad 0 \text{ N} \quad +480 \text{ N}$$

$$c = +100 \text{ N}$$

(2)

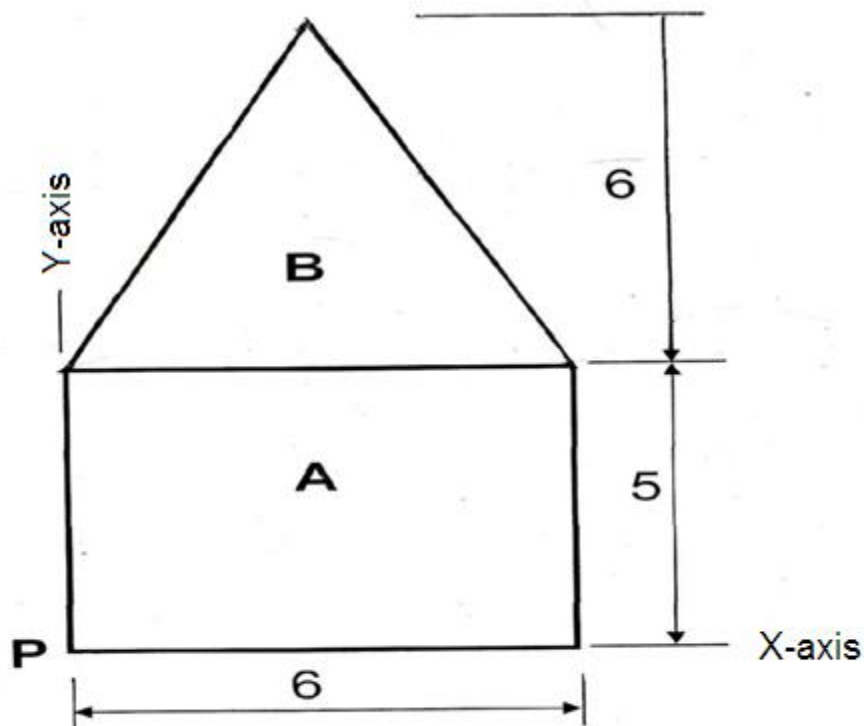
$$d = (-50 \text{ N} \times 8 \text{ m}) + (-40 \text{ N} \times 4 \text{ m}) + (-40 \text{ N} \times 2 \text{ m}) + (+80 \text{ N} \times 8 \text{ m}) + (50 \text{ N} \times 0 \text{ m})$$

$$d = -400 \text{ N} \quad -160 \text{ N} \quad -80 \text{ N} \quad +640 \text{ N} \quad +0 \text{ N}$$

$$d = -640 \text{ N} + 640 \text{ N} = 0 \text{ N}$$



(2)

QUESTION 5.3: SENTROIDS



$$\sqrt{\quad} = \frac{1}{2}$$

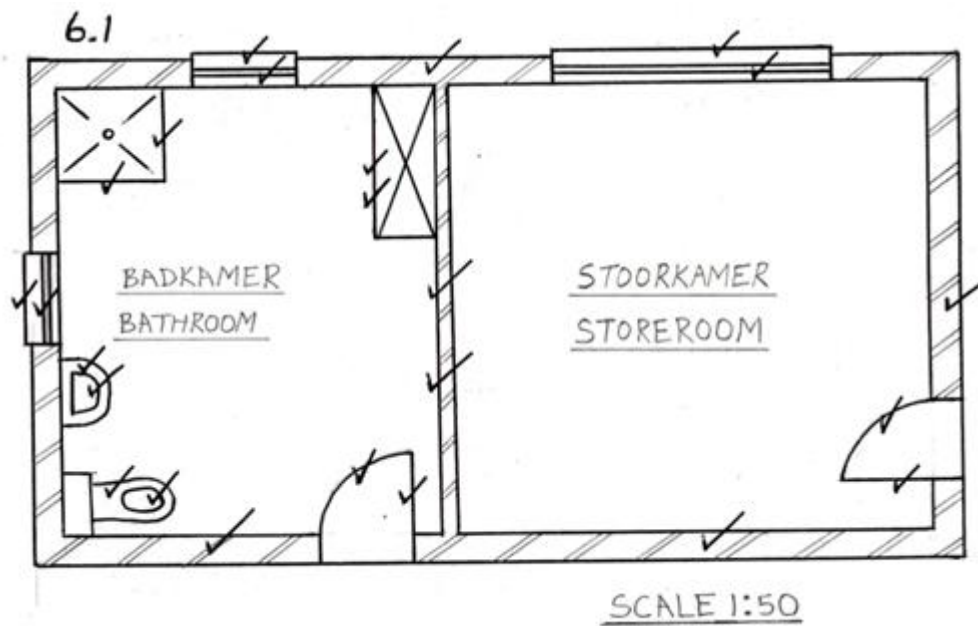
$$\sqrt{\quad} = 1$$

Form	Area	X	AX	Y	AY
A 	$L \times B$ 6×5 $= 30$ (1)	$\frac{6}{2} = \frac{6}{2}$ $= 3$ (1)	90 (1/2)	$\frac{h}{2} = \frac{5}{2}$ $= 2,5$ (1)	75 (1/2)
B 	$\frac{1}{2} b \times h$ 3×6 $= 18$ (1)	$\frac{6}{2} = \frac{6}{2}$ $= 3$ (1)	54 (1/2)	$\frac{h}{3} = \frac{6}{3}$ $= 2 + 5$ $= 7$ (1)	126 (1/2)
Total	48 (1)		144 (1/2)		201 (1/2)

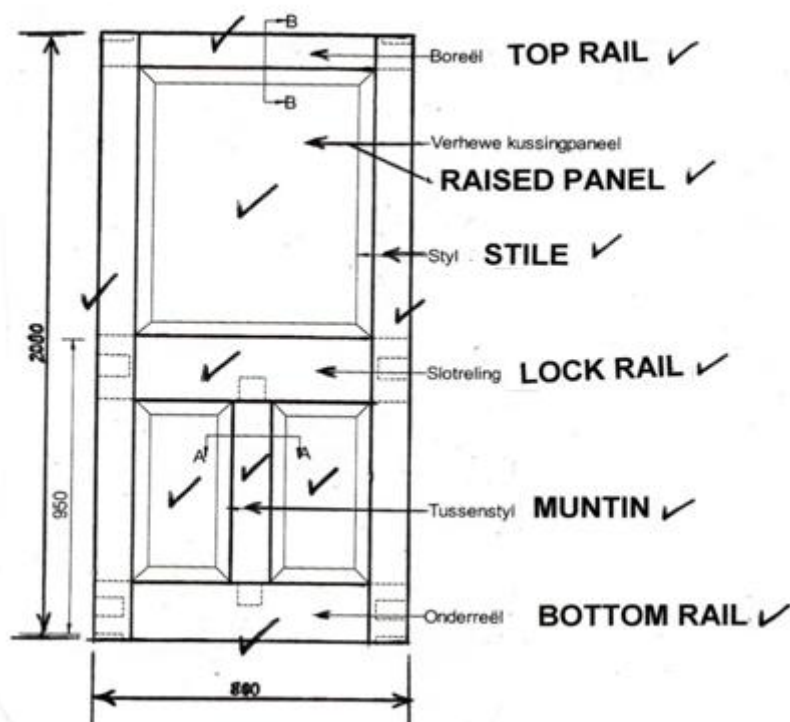
$$X = \frac{144}{48} \sqrt{\quad} = \dots 3 \dots (1/2)$$

$$Y = \frac{201}{39} \sqrt{\quad} = \dots 5,15 \dots (1/2)$$

(12)
[30]

QUESTION 6: GRAPHICS AND COMMUNICATION**ANSWER SHEET 6.1****FLOOR PLAN**

(24)

QUESTION 6.2**THREE PANEL DOOR ✓**(16)
[40]**TOTAL: 200**