basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

CIVIL TECHNOLOGY

NOVEMBER 2010

MEMORANDUM

MARKS: 200

This memorandum consists of 16 pages.

QUESTION 1: CONSTRUCTION PROCESSES

1.1

1.1.1	I	*A top view of the whole site*
1.1.2	L	*Showing different objects without having to describe it*
1.1.3	D	*Contamination of water, air or soil*
1.1.4	C	*Product which is derived from the making of another product*
1.1.5	H	*Description and sizes of materials required*
1.1.6	E	*Disease caused by virus that is transmitted in bodily fluids*
1.1.7	F	*Removing soil or levelling of ground*
1.1.8	J	*Material that absorbs water quickly*
1.1.9	B	*An unsupported projecting beam at one end*
1.1.10	G	*Used for cutting material*

ONE '√' FOR EACH CORRECT ANSWER. *Do not* penalise the candidate if he/she has written the description. (10)

1.2   1.2.1   A   Peep sight (collimator)/sight √
                       B   Eye piece √
                       C   Circular level/plate bubble/level   √
                       D   Levelling screw / adjustment screw/foot screws √
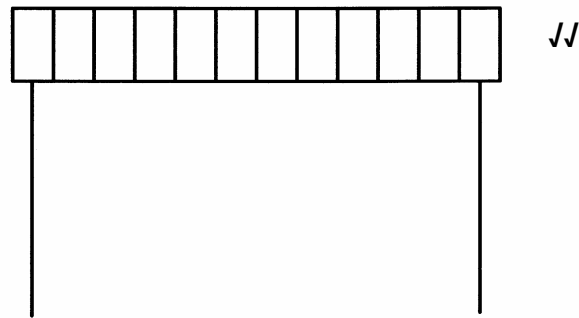   E   Base plate/footplate √
                       F   Objective/lens √ (6)

     1.2.2   Telescopic staff/staff √ (1)

     1.2.3   Tripod √ (1)

     1.2.4
- Must be stored in it's case   √
- In a safe dry place
- Store in a clean area
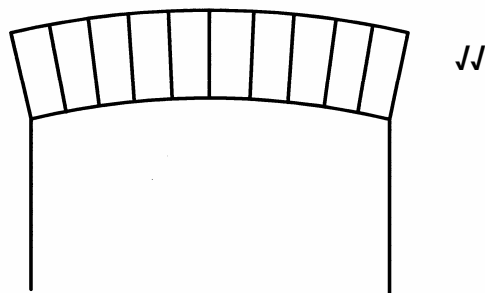
     ANY ONE OR ANY OTHER ACCEPTABLE ANSWER (1)

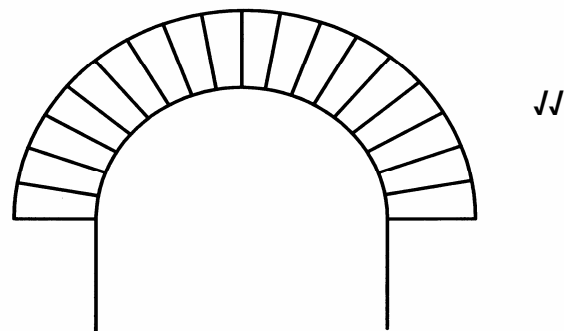
1.3 1.3.1

FLAT ARCH

(2)

1.3.2

SEGMENTAL ARCH

(2)

1.3.3

SEMI-CIRCULAR ARCH

(2)

MARKS ALLOCATED FOR CORRECTNESS

TWO MARKS PER SKETCH

ONE MARK TO BE ALLOCATED IF ONLY THE SHAPE OF THE ARCH IS DRAWN (LINE DIAGRAM)

1.4
- Wearing latex gloves to protect yourself. √ √
- Applying continuous pressure to the wound with a handkerchief or cloth.
- For a wound on a limb raise the limb higher than the body. √
- Apply a pressure bandage or use pressure points if bleeding continues. √
- Keep body warm, and treat for shock until medical help arrives. √

OR ANY OTHER ACCEPTABLE ANSWER (5)

[30]

QUESTION 2: ADVANCED CONSTRUCTION PROCESSES

2.1   2.1.1   FALSE/TRUE √ (1)

         2.1.2   TRUE √ (1)

         2.1.3   TRUE √ (1)

         2.1.4   FALSE √ (1)

         2.1.5   FALSE √ (1)

         2.1.6   TRUE √ (1)

         2.1.7   TRUE √ (1)

2.2
- Concrete blocks √
- Steel stands √
- Plastic spacer/spacer √

OR ANY OTHER ACCEPTABLE ANSWER (3)

2.3   Short bored pile:
Holes are drilled into the ground. √
These hole are filled with concrete by gravitational force. √

Precast concrete pile: √
Precast concrete piles are percussion driven. It is driven into the ground by means of a mechanical drop action hammer. √ (4)

2.4
- This method of foundation can be used anywhere. √
- Piles are made beforehand. √
- Placing is quick and easy. √
- Resists soil movement. √
- Piling can be done in all weather conditions.

ANY FOUR OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER (4)

2.5
- Timber √
- Stone √
- Ceramic tiles √
- Aluminium √
- Galvanised sheet / stainless steel sheet
- Gypsum / rhino board
- Glass / mirror

ANY FOUR OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER   (4)

2.6
- Timber √
- Steel base plates √
- Steel profiles √
- Aluminium Framing

ANY THREE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER   (3)

2.7   **On ANSWER SHEET 2.7**   (10)

2.8   A   Vertical clamps √
          B   Metal collars/rib √
          C   Lining material √
          D   Laggings √
          E   Bolt and nut/nut √   (5)

[40]

QUESTION 3: CIVIL SERVICES

3.1   3.1.1   Main sewer line/sewer line/soil pipe √   (1)

        3.1.2   100 mm/110 mm diameter   √   (1)

        3.1.3   Between 1:40 and 1:60 √   (1)

        3.1.4   Branch pipe/waste water pipe   √   (1)

        3.1.5   45 ° √   (1)

        3.1.6   Conservancy tank/vacuum tank/holding tank/sewer tank √   (1)

        3.1.7   a) Water closet √   (1)

                  b) Vent pipe/Ventilation pipe √   (1)

                  c) Shower √   (1)

                  d) Gully √   (1)

                  e) Bath √   (1)

        3.1.8   2 √   (1)

3.2   • The solar panels must face North. √
        • The solar panels must be tilted to a minimum of 35°. √
        • It must be SANS/SABS approved. √
        • Circulation pipes must be insulated to avoid loss of heat. √
        • Panels must be installed where shadows will not be cast over them.

        ANY FOUR OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER   (4)

3.3   • Maintenance cost is negligable. √
        • Operation is silent. √
        • Reliable. √
        • Can be installed where it is required. √
        • Has few moving parts.
        • Environmentally friendly
        • Wind power is free energy

        ANY FOUR OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER   (4)

3.4   3.4.1

M   **OR**   W

METER BOX

(2)

3.4.2

DB   **OR**
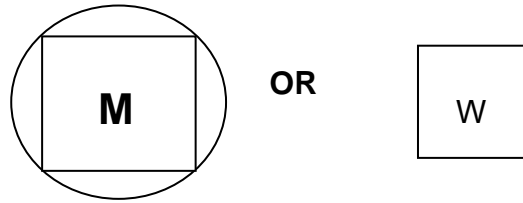
DISTRIBUTION BOARD

(2)

3.4.3

OR

2 x 40 w

FLUORESCENT LIGHT (2 TUBES)
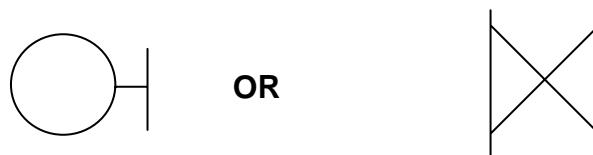
(2)

3.4.4

2   **OR**

TWO WAY LIGHT SWITCH

(2)

3.4.5

OR

WALL MOUNTED LIGHT

(2)

**CORRECTNESS = 2 MARKS PER SYMBOL
(IGNORE LETTERING WITHIN THE SYMBOL)**

[30]

QUESTION 4: MATERIALS AND QUANTITIES

4.1   4.1.1   B – Meranti   ✓   (1)

           4.1.2   A – Bolts and nuts   ✓   (1)

           4.1.3   D – Copper   ✓   (1)

           4.1.4   A – PVC adhesive   ✓   (1)

           4.1.5   C – Cement fibre board   ✓   (1)

           Do not penalise the candidate if he/she has written the word(s).

4.2   **On ANSWER SHEET 4.2**   (14)

4.3   4.3.1   To test the compressive strength/strength of concrete ✓   (1)

           4.3.2   100 mm cubes OR 150 mm cubes ✓   (1)

           4.3.3   • Mould/Three moulds ✓
                        • Tamping rod ✓
                        • Base plate ✓
                        • Trowel
                        • Shifting spanner/adjustable spanner
                        • Small brush
                        • Release oil

                        **ANY THREE OF THE ABOVE OR ANY OTHER ACCEPTABLE
                        ANSWER**   (3)

           4.3.4   • Clean the mould of any old concrete ✓
                        • Oil the inner surface of the mould ✓
                        • Remove any rust from the inner surface of the mould

                        **ANY TWO OF THE ABOVE OR ANY OTHER ACCEPTABLE
                        ANSWER**   (2)

4.4   • No maintenance is required   ✓
           • Corrosion/rust free   ✓
           • It is strong and elastic   ✓
           • It is durable
           • It is aesthetically appealing

                        OR ANY OTHER ACCEPTABLE ANSWER   (3)

4.5   • Gang nail   ✓
           • Nail
           • Bolt and nut
                        ANY ONE OF THE ABOVE
                                                                                                                             (1)
                                                                                                                          [30]

QUESTION 5: APPLIED MECHANICS

5.1 **On ANSWER SHEET 5.1** (12)

5.2 5.2.1 Area of rectangle = l x b
= 80 mm x 60 mm ✓
= 4 800 mm² ✓

Area of triangle = ½ b x h
= ½ x 60 mm x 45 mm ✓
= 30 mm x 45 mm
= 1 350 mm² ✓

Total area = 4 800 – 1 350 ✓
= 3 450 mm² ✓

OR

✓✓ ✓ ✓✓
Total area = 4 800 – 1 350
= 3 450 mm² ✓

(Two marks if the correct areas are given without any calculations shown.) (6)

5.2.2 Take moments about A left side
✓ ✓ ✓ ✓ ✓
3 450 mm² x X = (4 800 x 30) – (1 350 x 37)
3 450 mm² x X = 144 000 – 49 950
X = $\underline{94\ 050\ mm^3}$ ✓
$3\ 450\ mm²$
= 27,26 mm ✓✓ (8)

OR

PART	AREA (A)	x	AREA of X (AX)
Rectangle	4 800 mm² ✓	$\underline{L} = \underline{60} = 30$ ✓ 2 2	144 000 mm³
Triangle	-1 350 mm² ✓	7 + 30 = 37 ✓	49 950 mm³
Σ	3 450 mm² ✓		94 050 mm³

$\underline{Σ\ AX}$
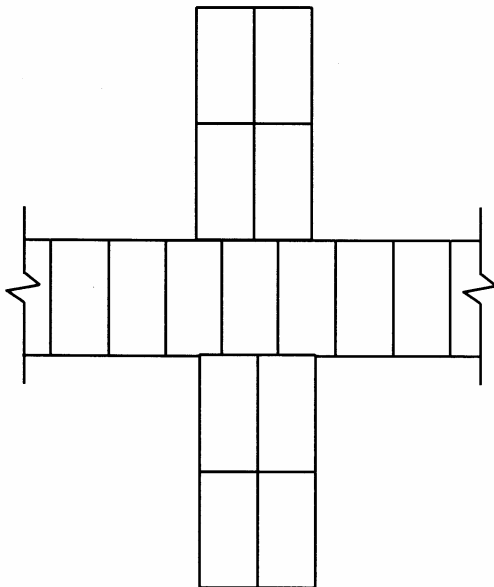$Σ\ A$
= $\underline{94\ 050\ mm^3}$ ✓
$3\ 450\ mm²$
= 27,26 mm ✓✓

OR
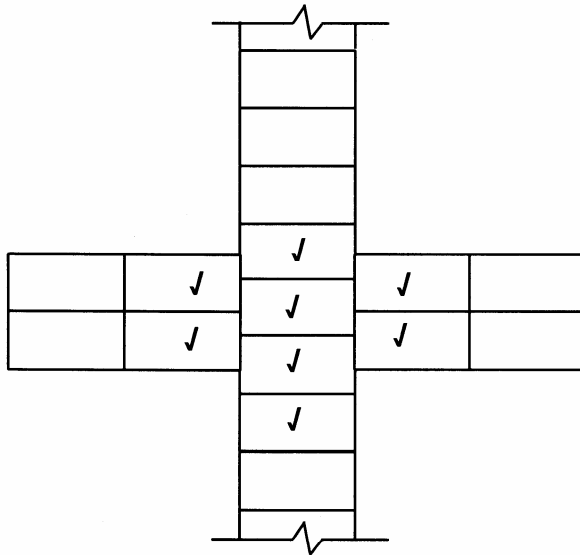
Position of centroid $=$ $\dfrac{(A1 \times d) - (A2 \times d)}{\text{Total area}}$

$$= \dfrac{(4\,800 \times 30) - (1\,350 \times 37)}{3\,450} \checkmark$$

$$= \dfrac{144\,000 - 49\,950}{3\,450}$$

$$= \dfrac{94\,050 \text{ mm}^3 \checkmark}{3\,450 \text{ mm}^2}$$

$$= 27{,}26 \text{ mm} \quad \checkmark\checkmark$$ (8)

5.3   Deformation (strain) $= \dfrac{\underline{\text{Change in length (mm)}}}{\text{Original length (mm)}}$

$= \dfrac{0{,}4 \text{ mm}\checkmark}{1\,600 \text{ mm}} \checkmark$

$= 2{,}5 \times 10^{-4}$ $\checkmark\checkmark$ **OR** $0{,}00025$ **OR** $0{,}0025^{-3}$ (4)

[30]

QUESTION 6: GRAPHIC COMMUNICATION

6.1 **On ANSWER SHEET 6.1**   (15)

6.2 **On ANSWER SHEET 6.2**   (25)
                                                                                    [40]

                                                                TOTAL: **200**

ANSWER SHEET 2.7

QUESTION 2.7

CRITERION	MARK ALLOCATION
Correctness	**8**
Line quality	**1**
Neatness	**1**
TOTAL	**10**

(10)

ANSWER SHEET 4.2

QUESTION 4.2

No	DESCRIPTION	NUMBER REQUIRED		SIZE REQUIRED		
				L	W	T
1	SIDES	2 √		1 800 √	550	16
2	TOP	1 √		868 √	550	16
3	BOTTOM	1 √		868 √	550	16
4	SHELVES	2 √		868 √	550	16
5	PLINTH - FRONT	1 √		868 √	90	16
6	BACK	1 √		1 800 √	900	3
7	DOORS	2 √		1 800 √	450	16

(14)

ANSWER SHEET 5.1

QUESTION 5.1
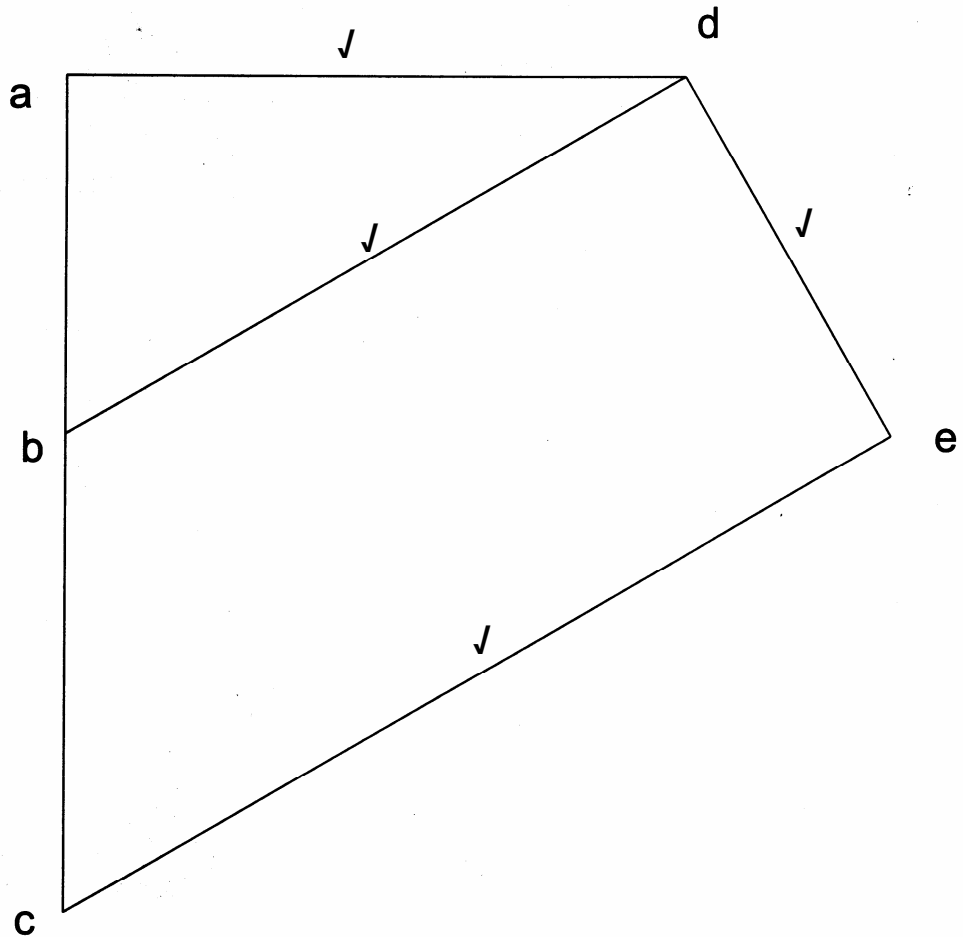
| NOT TO SCALE | USE A MASK TO MARK THIS QUESTION | (4) |

MEMBER	NATURE	MAGNITUDE
BD	Tie √	12 N √
CE	Tie √	16 N √
DE	Strut √	7 N √
AD	Strut √	10,3 N √

ALLOW TOLERANCE OF 0,2 N (2 mm) EITHER WAY   (8)

ANSWER SHEET 6.1

QUESTION 6.1

6.1.1

		ANSWERS	MARKS
	1	1 : 200	1
	2	45	1
	3	Inspection eye	1
	4	169 m²	2
	5	Rodding eye	1
	6	Building line	1
	7	Brown	1
	8	Manhole / municipal connection	1
	9	North symbol/North Point	1
	10	Nkozi street	1
	11	23	1
	12	8,2 m	1
	13	Red	1
	14	57,6 m	1

(15)

Please turn over

ANSWER SHEET 6.2

QUESTION 6.2

6.2

ANY OTHER ACCEPTABLE
METHOD OF DETERMINING THE
ROOF HEIGHT IS ACCEPTABLE

√ Galvanized roof sheet

√ Pitch 30°

Plaster √
and paint
or face
brick

√ FL

√ NGL

NORTH ELEVATION √

SCALE 1:50 √
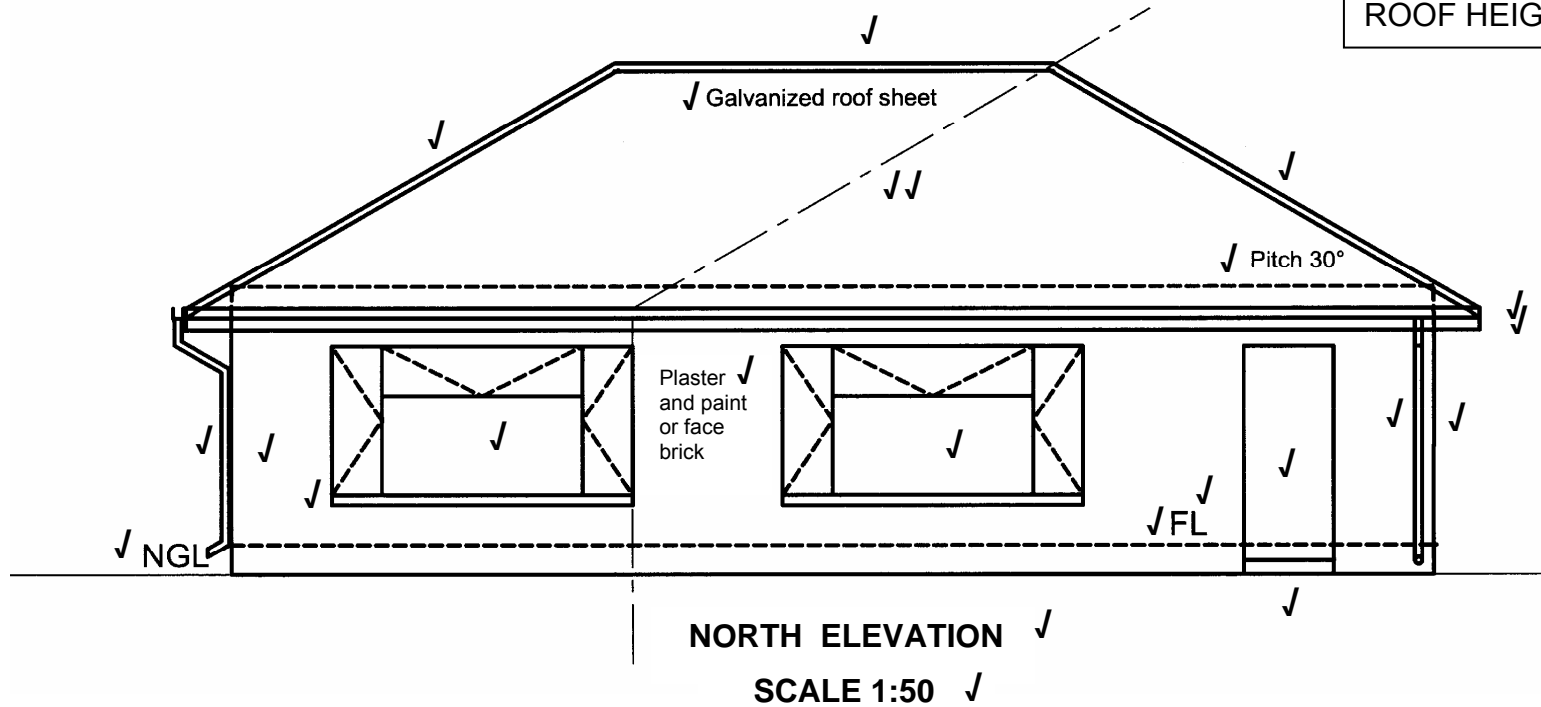
NEATNESS / LINEWORK √

NOT TO SCALE

(25)

Mark allocation for North Elevation:

CORRECTNESS OF:	MARK
POSITION OF WALLS, HEIGHT AND LENGTH OF WALLS	2
FLOOR LEVEL	1
DETERMINING OF ROOF HEIGHT	2
ELEVATION OF ROOF	3
POSITION AND MEASUREMENT OF DOOR	1
POSITION AND MEASUREMENT OF WINDOWS	2
WINDOW SILLS	1
STEP	1
FASCIA BOARD	1
GUTTERS	1
CORRECT PLACEMENT OF DOWN PIPES	2
LABELS	
NGL	1
FL	1
FACE BRICKS / PLASTER AND PAINT	1
ROOF PITCH 30°	1
GALVANIZED ROOF SHEETING	1
NORTH ELEVATION	1
SCALE 1:50	1
NEATNESS / LINEWORK	1
TOTAL	**25**

USE A MASK TO MARK THIS QUESTION
Where alternate answers are accepted, there must be evidence of these answers in text books.