

**GAUTENG DEPARTMENT OF EDUCATION
GAUTENGSE DEPARTEMENT VAN ONDERWYS**

**SENIOR CERTIFICATE EXAMINATION
SENIORSERTIFIKAAT-EKSAMEN**

TECHNIKA (CIVIL / SIVIEL) SG

POSSIBLE ANSWERS OCT / NOV 2006

VRAAG 1 / QUESTION 1

1.1

- 1.1.1 Die riool mag nie van rigting verander onder die gebou nie.
There must be no change of direction under the building.
- 1.1.2 Geen aansluitings mag onder die gebou gemaak word nie.
There must be no connections underneath the building.
- 1.1.3 Toegangsopeninge moet aan beide kante, waar die riool onder die gebou in- en uitgaan, aangebring word.
An access opening should be installed on both sides where the sewer enters the building and at the exit.
- 1.1.4 By voorkeur moet swaar gietysterpipe vir die rioollyn gebruik word.
It is preferable to use heavy cast iron pipes for the sewer line.
- 1.1.5 Die riool moet minstens 50 m vry van enige fondasies wees.
The sewer should be laid at least 50 m clear of any foundations.

EEN PUNT ELK

ONE MARK EACH

(5)

1.2

1. Beton-druktoets
Concrete pressure test
2. Saktoets
Slump test

TWEE PUNTE ELK

TWO MARKS EACH

(4)

1.3

- 1.3.1 Ligging van die erf
Location of the stand
- 1.3.2 Helling van die grond
Slope of the stand
- 1.3.3 Is munisipale dienste beskikbaar?
Are municipal services available?
- 1.3.4 Lugbesoedeling in die omgewing
Air pollution in the area
- 1.3.5 Uitsig
View
- 1.3.6 Tipe grond
Type of soil
- 1.3.7 Voginhoud van die grond
The moisture content of the soil
- 1.3.8 Hoofpaaie en aansluitings
Main roads and access roads
- 1.3.9 Geraas
Noise
- 1.3.10 Skole in die omgewing
Schools in the area

ENIGE VYF EEN PUNT ELK**ANY FIVE ONE MARK EACH****(5)**

1.4

- 1.4.1 Dit toon die posisie en diepte van die aansluitingspunte met die munisipale hoofrioolstelsel aan.
It shows the position and depth of the connection with the municipal main sewerage system.
- 1.4.2 Dit toon die plasing en posisie van alle sanitêre muurmeublemente.
It shows all sanitary fitments.
- 1.4.3 Om die aansluitingspunte van die sanitêre muurmeublemente met die woonhuis se rioolstelsel te toon
To show the connecting of all the fitments with the sewer system of the dwelling.
- 1.4.4 Om die uitleg van die hele rioolstelsel asook die helling van al die pype te toon.
It shows a complete layout of the sewerage system as well as the slope of all the pipes
- 1.4.5 Om die plasing van toegangsopeninge soos: inspeksieoë, steekoë en mangate te toon.
To show the placing of the following: access openings, manholes, inspection eyes and cleaning eyes.
- 1.4.6 Dit toon ook die posisie van lugpype, rioolputte en die diameter van al die pype wat in die stelsel gebruik word.
It shows the position of vent pipes, drains and the diameter of all pipes used in the system.

ENIGE VYF EEN PUNT ELK**ANY FIVE ONE MARK EACH.****(5)**

1.5

- 1.5.1 Rooktoets
Smoke test
- 1.5.2 Watertoets
Water test
- 1.5.3 Lugdruktoets
Air pressure test

ENIGE TWEE EEN PUNT ELK ANY TWO ONE MARK EACH (2)

1.6

- 1.6.1 Moet bestand wees om gietende reën te weerstaan en te verhoed dat water die binnemure bevogtig
Must be able to withstand pouring rain, and prevent water from dampening the inner wall
- 1.6.2 Gee goeie termiese isolasie
Gives good thermal isolation
- 1.6.3 Geen beraping van buitemure is nodig nie
No rendering necessary for outer walls
- 1.6.4 Binnemure kan van goedkoper materiaal vervaardig word
Cheaper material can be used for inner walls
- 1.6.5 Gewone 275 mm-spoumuur het beter klankisolasië
Ordinary 275 mm cavity wall has a better sound isolation

ENIGE VIER EEN PUNT ELK ANY FOUR ONE MARK EACH (4)

1.7

- 1.7.1 Skroef die instrument op die driepoot vas.
Screw the instrument onto the tripod.
- 1.7.2 Maak die pote van die driepoot oop en stel dit totdat die instrument op 'n gerieflike hoogte staan.
Open the tripod legs and set the instrument to a comfortable height.
- 1.7.3 Stel die basisplaat horisontaal waterpas op met behulp van die klein waterpas.
Set the base plate horizontal level by means of the small spirit level.
- 1.7.4 Stel die instrument se voetskroewe halfpad tussen die op- en afwaartse verstellingsposisie.
Set the instrument's foot screws in the centre of the up- and downward position.

- 1.7.5 Maak seker dat die driepoot op 'n gerieflike hoogte is, en stel die voetplaat se lugbel sentraal in.
Make sure the tripod is set at a comfortable height and set the foot plate air bubble in the centre.
- 1.7.6 Die teleskoop moet nou gedraai word sodat die lugbel parallel is aan die rigting tussen enige twee voetskroewe.
Turn the telescope so that the tubular air bubble is parallel in the direction between any two foot screws.
- 1.7.7 Hierdie twee voetskroewe word nou gelyktydig met albei hande gestel totdat die lugbel sentraal is. Sorg dat beide skroewe gelyktydig en ewe veel gedraai word.
The two foot screws are now altered at the same time until the air-bubble is in the centre. See to it that both foot screws are turned equally and at the same time.
- 1.7.8 Draai nou die teleskoop kloksgewys deur 90 grade oor die derde skroef.
Turn the telescope clockwise through 90 degrees over the third screw.
- 1.7.9 Verstel nou net hierdie voetskroef tot die lugbel sentraal is.
By only turning this foot screw centre the air-bubble.
- 1.7.10 Die instrument is nou gereed vir gebruik.
The instrument is now ready for use.

TWEE PUNTE ELK TWO MARKS EACH.

(20)

1.8

- 1.8.1 Klimaat in die omgewing
Climate in the area
- 1.8.2 Noord front
Northern front
- 1.8.3 Is munisipale dienste beskikbaar?
Are municipal services available?
- 1.8.4 Estetiese voorkoms
Aesthetic appearance
- 1.8.5 Gerieflikheid
Comfort
- 1.8.6 Rioolaansluitings
Sewer connections

ENIGE VYF EEN PUNT ELK

ANY FIVE ONE MARK EACH

(5)

1.9

- 1.9.1 Om mense teen beserings te beskerm
To protect people against injuries
- 1.9.2 Om gebou teen waterindringing te beskerm
To protect buildings against flooding by water
- 1.9.3 By glasruite in deure
Used as glass in doors
- 1.9.4 By trappe waar openinge laer as 1,8 meter is
At steps where the openings are less than 1,8 metres
- 1.9.5 By vensters laer as 300 mm vanaf vloervlak
At windows lower than 300 mm from floor level
- 1.9.6 By badkamers en storthokkies
At bathrooms and shower doors
- 1.9.7 By winkelvensters met 'n oppervlakte van meer as
een vierkante meter
At shop windows with a area of more than one square metre

ENIGE VYF TWEE PUNTE ELK

ANY FIVE TWO MARKS EACH

(10)

VRAAG 2 / QUESTION 2

2.1

2.2

2.3

ONDERDEEL MEMBER	AARD NATURE	GROOTTE MAGNITUDE
AG	STUT / STRUT	70 kN
AF	STUT / STRUT	70 kN
BF	STANG / TIE	40 kN
CJ	STUT / STRUT	22 kN
DK	STUT / STRUT	59 kN
FG	-----	-----
GH	STUT / STRUT	70 kN
HJ	STANG / TIE	37 kN
JK	STUT / STRUT	45 kN
KE	STANG / TIE	57 kN
EH	-----	-----

[60]

VRAAG 3 / QUESTION 3

3.1 BEREKEN P / CALCULATE P

Neem momente om Q

Take moments about Q

$$\begin{aligned}
 \text{LOM} &= \text{ROM} \\
 P \times 10 &= (D \times 2) + (C \times 6) + (B \times 8) \\
 10 P &= (6 \times 2) + (3 \times 6) + (8 \times 8) \\
 10 P &= 12 + 18 + 64 \\
 10 P &= 94 \\
 P &= \frac{94}{10} \\
 \mathbf{P} &= \mathbf{9,4 \text{ kN}}
 \end{aligned}$$

BEREKEN Q / CALCULATE Q

Neem momente om P

Take moments about P

$$\begin{aligned}
 \text{LOM} &= \text{ROM} \\
 Q \times 10 &= (B \times 2) + (C \times 4) + (D \times 8) \\
 10 Q &= (8 \times 2) + (3 \times 4) + (6 \times 8) \\
 10 Q &= 16 + 12 + 48 \\
 10 Q &= 76 \\
 Q &= \frac{76}{10} \\
 \mathbf{Q} &= \mathbf{7,6 \text{ kN}}
 \end{aligned}$$

TOETS / TEST

$$\begin{aligned}
 \text{Opwaartse kragte} &= \text{Afwaartse kragte} \\
 \text{Upward forces} &= \text{Downward forces}
 \end{aligned}$$

$$\begin{aligned}
 9,4 \text{ kN} + 7,6 \text{ kN} &= 8 + 3 + 6 \\
 \mathbf{17 \text{ kN}} &= \mathbf{17 \text{ kN}}
 \end{aligned}$$

3.2 BEREKEN BUIGMOMENTE

CALCULATE BENDINGMOMENTS

$$\begin{aligned}
 \mathbf{BMA} &= P \times 0 \\
 &= 9,4 \times 0 \\
 &= \mathbf{0 \text{ kN/m}}
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{BMB} &= (P \times 2) - (R \times 1) \\
 &= (9,2 \times 2) - (4 \times 1) \\
 &= 18,8 - 4 \\
 &= \mathbf{14,8 \text{ kN/m}}
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{BMC} &= (P \times 4) - (B \times 2) \\
 &= (9,4 \times 4) - (8 \times 2) \\
 &= \mathbf{21,6 \text{ kN/m}}
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{BMD} &= (P \times 8) - (C \times 4) - (B \times 6) \\
 &= (9,2 \times 8) - (3 \times 4) - (6 \times 6) \\
 &= 73,6 - 12 - 36 \\
 &= \mathbf{25,6 \text{ kN/m}}
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{BME} &= (P \times 10) - (D \times 2) - (C \times 6) - (B \times 8) \\
 &= 9,4 \times 10 - (6 \times 2) - (3 \times 6) - (8 \times 8) \\
 &= 94 - 12 - 18 - 64 \\
 &= \mathbf{0 \text{ kN/m}}
 \end{aligned}$$

BEREKEN SKUIFKRAGTE / CALCULATE SHEAR FORCES

$$\begin{aligned}
 \mathbf{SKA- / SFA-} &= \mathbf{0 \text{ kN}} \\
 \mathbf{SKA+ / SFA+} &= \mathbf{P = 9,4 \text{ kN}} \\
 \mathbf{SKB / SFB} &= \mathbf{P - R = 9,4 - 4 = 5,4 \text{ kN}} \\
 \mathbf{SKC- / SFC-} &= \mathbf{P - B = 9,4 - 8 = 1,4 \text{ kN}} \\
 \mathbf{SKC+ / SFC+} &= \mathbf{P - B - C = 9,4 - 8 - 3 = -1,6 \text{ kN}} \\
 \mathbf{SKD- / SFD-} &= \mathbf{P - B - C = 9,4 - 8 - 3 = -1,6 \text{ kN}} \\
 \mathbf{SKD+ / SFD+} &= \mathbf{P - B - C - D = 9,4 - 8 - 3 - 6 = -7,6 \text{ kN}} \\
 \mathbf{SKE- / SFE-} &= \mathbf{P - B - C - D = 9,4 - 8 - 3 - 6 = -7,6 \text{ kN}} \\
 \mathbf{SKE= / SFE+} &= \mathbf{P - B - C - D + Q = 9,4 - 8 - 3 - 6 + 7,6 = 0 \text{ kN}}
 \end{aligned}$$

4.2

Riool word in die tenk ingelaat vanaf huishoudelike rioolstelsel, of vanaf ablusieblokke waar dit in sommige gevalle in bv. karavaanparke met die rioolstelsel verbind is.

Wanneer hierdie tenk vol word, moet die plaaslike owerhede gekontak word om die tenk te kom leegmaak.

Die vakuumentenk is voorsien van 'n suigpyp wat tot op die bodem van die tenk strek. Aan die bo-punt van hierdie pyp, op straatvlak, of 'n gelykvlak met die sypaadjie, is 'n klep aangebring wat met 'n mangatdeksel bedek is. Die rioolvuil word deur hierdie suigpyp uitgesuig.

Die plaaslike owerhede is verantwoordelik om hierdie tenks te ledig, en die rioolvuil na die rioolwerke te neem en daar te verwerk.

Periodiek of wanneer hierdie tenk vol is en leeggemaak moet word, word 'n rubberslang vanaf 'n houer op 'n vragmotor, wat spesiaal vir hierdie doel ontwerp is, gekoppel aan die klep van die suigpyp.

Die lug word met behulp van 'n pomp in die tenk op die vragmotor uitgepomp. Die vakuüm wat hierdeur gevorm word, suig die rioolvuil tot in die tenk op die vragmotor wat dit na die rioolwerke vervoer.

(10)

Sewer enters the tank from the domestic sewer system, or from ablution blocks where it may be used in eg. caravan parks and connected to the sewer system.

When the tank is full the local government must be contacted to empty the tank.

The vacuum tank is supplied with a suction pipe which reaches to the bottom of the tank. At the top end of this pipe at street level, or on a straight level with the pavement, a valve is attached and covered with a manhole cover. All the sewer is sucked up through this pipe.

The local government is responsible for emptying these tanks and removing the sewerage to the sewerage plant to be re-worked.

Periodically or when these tanks are full and must be emptied, a rubber hose from a container on a specially designed truck, is attached to the valve of the suction pipe in the tank.

With the aid of a pump the air in the tank on the truck is sucked out. The vacuum formed by this, sucks up the sewerage into the tank on the truck which takes it to the sewerage plant.

(10)

4.3

KELDERVERDIEPING**BASEMENT CONSTRUCTION**

AFSTAND ONDER GROND	2	<i>DISTANCE BELOW GROUND</i>
BETONVLOER (100 mm)	2	<i>CONCRETE FLOOR (100 mm)</i>
EEN-EN-HALFSTEEN-MUUR	4	<i>ONE AND A HALF-BRICK WALL</i>
BETONFONDASIE	2	<i>CONCRETE FOUNDATION</i>
GRONDLAAG	2	<i>GROUND LEVEL</i>
SANDSLYTLAAG (50 mm)	1	<i>SAND BLINDING (50 mm)</i>
VERTIKALE EN HORIZONTAL VOGWEERLAE	6	<i>VERTICAL AND HORIZONTAL DAMP-PROOFING</i>
PLEISTER BINNEMUUR	<u>1</u>	<i>PLASTER INNER WALL</i>
	20	

VRAAG 5 / QUESTION 5

BETONTRAPBEKISTING

CONCRETE STAIRCASE FORMWORK

MUUR	3	WALL
BORDES	4	LANDING
STYGING	2	RISE
LOOPVLAK	2	TREAD
BORDESBEWAPENING	4	LANDING REINFORCEMENT
TRAPWAPENING	3	STAIRCASE REINFORCEMENT
SPALKPLATE	2	FISH PLATES
DRABALKE	2	BEARER BEAM
DRAER	2	BEARER
VERTIKALE STUTTE	4	VERTICAL STRUTS
SKUINSSTUTTE	2	DIAGONAL STRUTS
WIGPARE	4	WEDGES
BLADBEKISTING	4	SLAB FORMWORK
KLAMPE	3	CLAMPS
OPTREEPLANKE	3	RISER FORMWORK
AFMETINGS	4	DIMENSIONS
BYSKRIFTE	4	LABELLING
LYNWERK	4	LINE WORK
SKAAL	<u>4</u>	SCALE
	60	

VRAAG 6 / QUESTION 6

SNITAANSIG VAN HUISPLAN

SECTIONAL VIEW OF DWELLING

FONDASIES	2	FOUNDATIONS
ONDERBOU	2	SUBSTRUCTURE
BOBOU	2	SUPERSTRUCTURE
HARDEPUIN	2	HARD CORE
PUINVULLING	2	CORE FILLING
VLOER	2	FLOOR
VWL	2	DPC
VLOERLYS	2	SKIRTING
KWARTROND	2	QUARTER ROUND
VENSTERBANK	2	WINDOW SILL
LATEI	2	LINTEL
BUIEMURE	2	OUTER WALLS
BINNEMURE	2	INNER WALLS
PLAFON	2	CEILING
KROONLYS	2	CORNICE
PLAFONLATTE	2	BRANDERING
MUURPLAAT	2	WALL PLATE
DAKKONSTRUKSIE	6	ROOF CONSTRUCTION
NOKPLAAT	2	RIDGE CAP
OORHANG	4	OVERHANG
DAKBEDEKking	2	ROOF COVERING
GEUTE	2	GUTTERS
AFLEIPYPE	2	DOWN PIPES
LYNWERK	2	LINEWORK
NETHEID	2	NEATNESS
BYSKRIFTE	2	LABELS
SKAAL	<u>2</u>	SCALE
	60	

A	B	C	D
			18 Dakkappe moet vervaardig word 18 Roof trusses must be made
			Lengtes van tekening <i>Lengths from drawing</i>
			Hoofstyl / <i>Kingpost</i> 1 380 mm
			Kapbeen / <i>Rafter</i> 3 160 mm
			Bindbalk / <i>Tiebeam</i> 4 200 mm
			Skuinsstut / <i>Diagonal strut</i> 1 200 mm
			Stut / <i>Strut</i> 820 mm
			HOOFSTYL / KINGPOST (B)
18/	1,38 m	24,84 m	1 380 mm x 1 x 18
			KAPBEEN / RAFTER (A)
36/	3,16 m	113,76 m	3 160 mm x 2 x 18
			BINDBALK / TIE BEAM (C)
18/	4,2 m	75,60 m	4 200 mm x 1 x 18
			SKUINSSTUT/DIAGONAL STRUT D
36/	1,20 m	43,20 m	1 200 mm x 2 x 18
			STUT / STRUT (E)
36/	0,82 m	29,52 m	820 mm x 2 x 18
			TOTALE HOEVEELHEID HOUT TOTAL AMOUNT OF TIMBER
		24,84 m	HOOFSTYL / KINGPOST
		113,76 m	KAPBEEN / RAFTER
		75,60 m	BINDBALK / TIE BEAM
		43,20 m	SKUINSSTUT / DIAGONAL STRUT
		29,52 m	STUT / STRUT
		286,92 m	TOTAAL / TOTAL

			5%-VERMORSING / WASTAGE
		$\begin{array}{r} 286,92 \\ \times 0,05 \\ \hline 14,35 \text{ m} \end{array}$	
		$\begin{array}{r} 286,92 \\ + 14,35 \\ \hline 301,27 \text{ m} \end{array}$	TOTAAL / TOTAL
			<p>Daar sal 301,27 lopende meter 114 x 38 mm-timmerhout nodig wees om 18 dakkappe te vervaardig.</p> <p><i>There will be 301, 27 running metre 114 x 38 mm timber needed to manufacture 18 roof trusses</i></p>