

**GAUTENG DEPARTMENT OF EDUCATION
SENIOR CERTIFICATE EXAMINATION
GAUTENGSE DEPARTEMENT VAN ONDERWYS
SENIORSERTIFIKAAT-EKSAMEN**

**FITTING AND TURNING SG
PAS- EN DRAAIWERK SG**

**Possible Answers / Moontlike Antwoorde
Feb / Mar / Maart 2006**

QUESTION / VRAAG 1

- | | | | |
|-----|--------|------|--------|
| 1.1 | B,Cüü | 1.10 | T/W üü |
| 1.2 | C,D üü | 1.11 | T/W üü |
| 1.3 | A,D üü | 1.12 | T/W üü |
| 1.4 | B,D üü | 1.13 | F/O üü |
| 1.5 | B ü | 1.14 | T/W üü |
| 1.6 | Dü | | |
| 1.7 | A,D üü | | |
| 1.8 | A,D üü | | |
| 1.9 | B ü | | |

[25]

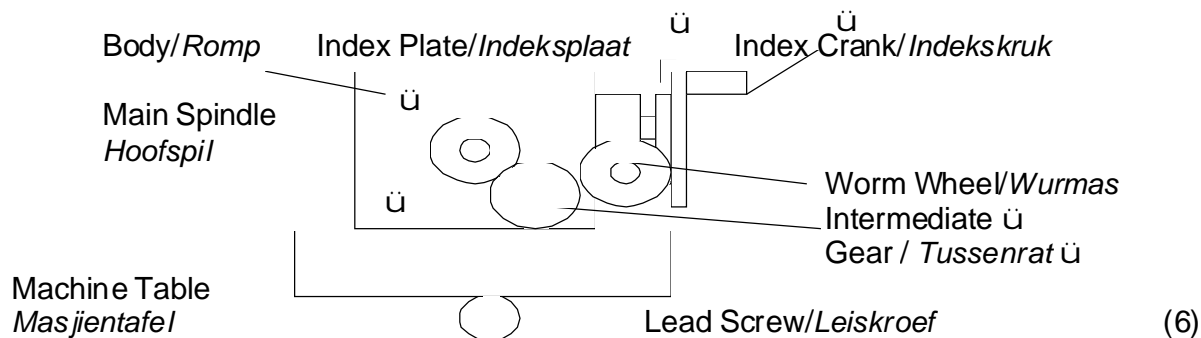
QUESTION / VRAAG 2

- 2.1
- | | | | |
|----|--------------------------|----|---------------------------------|
| 1. | Employment ü | 1. | <i>Indiens neming</i> |
| 2. | Negotiations ü | 2. | <i>Onderhandelinge</i> |
| 3. | Safety and Security ü | 3. | <i>Veiligheid en sekuriteit</i> |
| 4. | Welfare ü | 4. | <i>Welsyn</i> |
| 5. | Education and Training ü | 5. | <i>Onderrig en Opleiding</i> |
- (5)**
- 2.2
1. Regular inspections to determine necessary maintenance. ü
 2. Programs put in place of which part must be replaced or re-set. ü
 3. Regular care of machines. ü
 4. Operator should report anything suspicious. ü
- (4)**
- 2.2
1. Gereelde inspeksies om noodsaaklike instandhouding vas te stel. ü
 2. Program in plek gestel van watter onderdeel vervang of verstel moet word. ü
 3. Gereelde versiening van masjiene. ü
 4. Operateur moet enigiets verdags rapporteer. ü
- 2.3 (ANY 4)
1. Production cost and time reduced to minimum. ü
 2. Supervision and production control made easy. ü
 3. Programme changes easily affected. ü
 4. Maximum production – all available space utilised. ü
 5. Better quality product – better and safer methods employed. ü
 6. Feeling of unity amongst workers created by avoiding unnecessary divisions. ü
- (4)**

2.3

1. Produksiekoste en tyd tot minimum beperk.
2. Toesig oor arbeid asook produksiebeheer vereenvoudig.
3. Programveranderings maklik gedoen.
4. Maksimum produksie – all beskikbare spasie benut.
5. Beter gehalte produk – beter en veiliger metodes toegepas.
6. Eenheidsgevoel onder werkers deur onnodige skeidings te vermy.

2.4



2.5.1

$$\begin{aligned} \text{PCD/SSD} &= T_m \\ &= 75 \times 6 \text{ ü} \\ &= 450 \text{ mm ü} \end{aligned}$$

2.5.2

$$\begin{aligned} \text{OD/BD} &= \text{PCD/SSD} + 2 \text{ add} \\ &= 450 + (2 \times 6) \text{ ü} \\ &= 462 \text{ ü} \end{aligned}$$

2.5.3

$$\begin{aligned} a &= m \text{ ü} \\ &= 6 \text{ mm ü} \end{aligned}$$

2.5.4

$$\begin{aligned} \text{Ded} &= 1.157 \\ &= 1,157^m \times 6 \text{ ü} \\ &= 6,942 \text{ mm ü} \end{aligned}$$

2.5.5

$$\begin{aligned} \text{WD} &= 2 \times \text{Ad} \\ &= 2 \times 6 \text{ ü} \\ &= 12 \text{ mm ü} \end{aligned}$$

2.5.6

$$\begin{aligned} \text{FD/VD} &= \text{Ad} + \text{Ded} \\ &= 6 + 6,942 \text{ ü} \\ &= 12,942 \text{ mm ü} \end{aligned} \quad (12)$$

2.6

$$\text{Chordal Addendum} = m + \left[\frac{mT}{2} \left(1 - \frac{90^\circ}{\cos T} \right) \right]$$

Koord-addendum

$$\begin{aligned} &= m_n + \left[\frac{m_n T}{2} \left(1 - \frac{\cos 90^\circ}{\cos T} \right) \right] \text{ ü} \\ &= 4,8 + \left[\frac{4,8 \times 28}{56} \left(1 - \frac{\cos 1,607^\circ}{\cos 1,607^\circ} \right) \right] \text{ ü} \\ &= 4,8 + \left[134,4 \left(1 - 0,999606626 \right) \right] \text{ ü} \\ &= 4,8 + \left[134,4 \left(0,000393373 \right) \right] \text{ ü} \\ &= 4,8 + 0,052869413 \text{ ü} \\ &= 4,853 \text{ mm} \end{aligned}$$

(4)
[35]

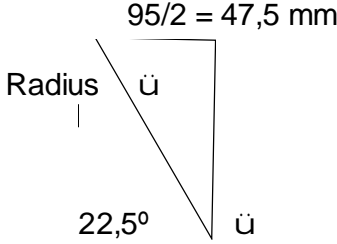
QUESTION / VRAAG 3

3.1.1

Chordal distance/*Koordafstand* = 85 + Button/*Knoppie-diam.*
 = 85 + 10
 = 95 mm ü

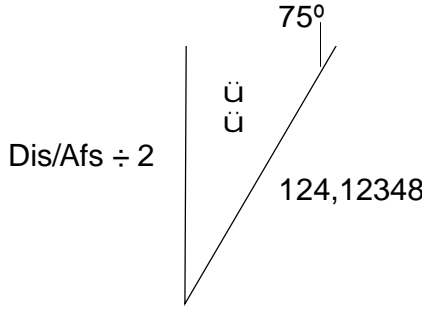
3.1.2

$\sin 22,5^\circ = \frac{47,5 \text{ ü}}{\text{Radius ü}}$
 $r = \frac{47,5}{\sin 22,5^\circ \text{ ü}}$
 = 124,123 mm
 PCD/SSD = 2 x 124,123
 = 248,247 mm ü



3.1.3

$\sin 75^\circ = \frac{\text{Dis/Afs} \div 2 \text{ ü}}{124,12348}$
 Dis/Afs = 2 X $\sin 75^\circ$ X 124,12348 ü
 = 239,788 mm ü



(12)

3.2

M	D	M/D
5	250	1250
6	300	1800
	75	

} ü

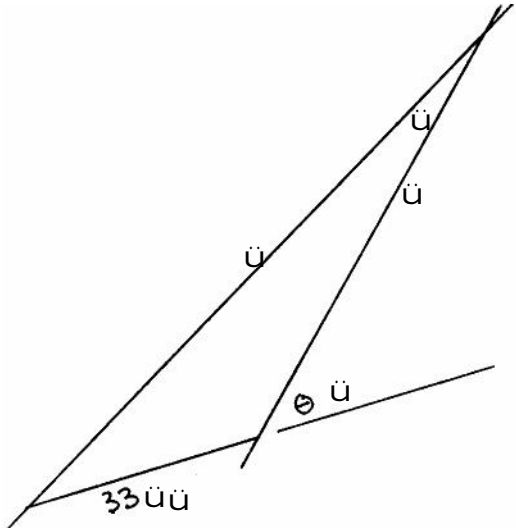
Vector= 33 mm
Vektor

To Scale
Volgens Skaal = 33 X 20 ü
 = 660 Units/*Eenhede* ü

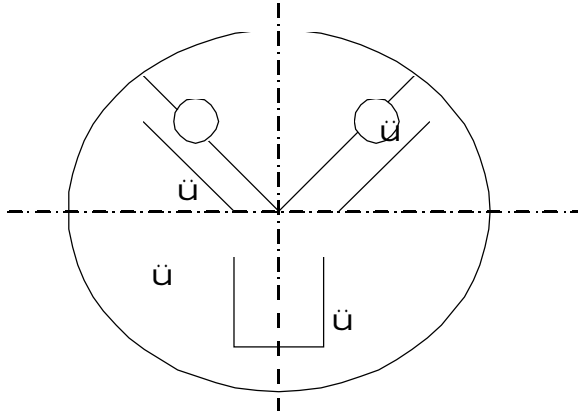
Mass / *Massa* = $\frac{660}{75 \text{ ü}}$
 = 8,8 kg ü

Angle/*Hoek* ? = 45°

(11)



3.3



(4)

3.4

1. Machine failures as a result of defective control are rare ü
2. Machines last longer. ü
3. Higher production. ü
4. Improved accuracy. ü

3.4

1. *Masjiene wat onklaar raak weens foutiewe kontrole is raar.*
2. *Masjiene hou langer.*
3. *Hoër produksie.*
4. *Verbeterde akkuraatheid.*

3.5 (ANY 4)

1. Gears ü	1. <i>Ratte</i>
2. Machine slides ü	2. <i>Masjiën-glybane en -sleë</i>
3. Bearings ü	3. <i>Laers</i>
4. Cutting tools ü	4. <i>Snybeitels</i>
5. Etc.	5. <i>Ens.</i>

(4)

[35]

QUESTION / VRAAG 4

4.1.1

$$\begin{aligned}
 D_m/D_g &= \text{Root/Wortel } \phi + \frac{1}{2}p \\
 &= 35 + (\frac{1}{2} \times 4)\ddot{u} \\
 &= 35 + 2\ddot{u} \\
 &= 37 \text{ mm}
 \end{aligned}$$

4.1.2

$$\begin{aligned}
 L &= p \times \text{Starts/Gange} \\
 &= 4 \times 3\ddot{u} \\
 &= 12 \text{ mm}\ddot{u}
 \end{aligned}$$

4.1.3

$$\begin{aligned}
 \text{Helix Angle} = \text{Helikshoek} &= \text{Tan } ? = \frac{L}{pDm} \text{ ü} \\
 &= \frac{12}{p \times 37} \text{ ü} \\
 &= 0,10323564 \text{ ü} \\
 ? &= \text{Tan}^{-1} 0,10323564 \text{ ü} \\
 &= 5,894^\circ \\
 &= 5^\circ 54' \text{ ü}
 \end{aligned}$$

4.1.4

$$\begin{aligned}
 \text{Leading angle/Ingryphoek} &= 90^\circ - (5^\circ 54' + 3) \\
 &= 90^\circ - 8^\circ 54' \text{ ü} \\
 &= 81^\circ 6' \text{ ü}
 \end{aligned}$$

4.1.5

$$\begin{aligned}
 \text{Following angle/Nasleephoek} &= 90^\circ + (5^\circ 54' - 3) \\
 &= 90^\circ + 2^\circ 54' \text{ ü} \\
 &= 92^\circ 54' \text{ ü}
 \end{aligned}
 \tag{13}$$

4.2

1. Mount work on lathe and bore to 35 mm. ü
 2. Recess front to major diameter. ü
 3. Set compound slide parallel with the lathe bed. ü
 4. Grind tool and set it square with the work. ü
 5. Take tool inside the hole and let it scrape the work, then set dial to 0. ü
 6. Take tool out and set for light cut. ü
 7. Cut first thread. ü
 8. Return to start and set dial back to 0. ü
 9. Move compound slide forward a distance equal to one pitch. ü
 10. Cut second thread – do the same with third thread. ü
- (10)

4.2

1. *Monteer werk in draaibank en boor uit tot 35 mm.*
2. *Ondersny voorkant tot buitediameter.*
3. *Stel saamgestelde slee parallel met die draaibank-bed.*
4. *Slyp beitel en stel dit haaks met die werk.*
5. *Voer beitel in die gat, laat dit die werk skraap en stel die skaalkraag op 0.*
6. *Neem beitel uit die gat en stel dit vir ligte snit.*
7. *Sny die eerste skroefdraad.*
8. *Keer terug na begin en stel skaalkraag terug op 0.*
9. *Beweeg saamgestelde slee oor 'n afstand gelyk aan een steek vorentoe.*
10. *Sny tweede draad – doen dieselfde met die derde draad.*

4.3

<ol style="list-style-type: none"> 1. Uses less power. ü 2. Gives better finish. ü 3. Has less chatter. ü 4. Less friction – cutter lasts longer. ü 5. Enough space between teeth – well backed off. ü 6. Smaller twisting moment. ü 7. Requires less clearance – stronger teeth. ü 	<ol style="list-style-type: none"> 1. Gebruik minder krag. 2. Gee beter afwerking. 3. Het minder trillings. 4. Minder wrywing – snyer hou langer. 5. Genoeg spasie tussen tande – goed teruggesny. 6. Kleiner draaimoment. 7. Vereis minder speling – sterker tande.
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(5)

4.4

Slab milling is when a large flat surface must be machined using an arbor and a helical cutter. ü ü

4.4

Flakfrees is wanneer 'n groot plat oppervlak gemasjineer moet word deur 'n heliese freessnyer op 'n draspil. (2)

4.5

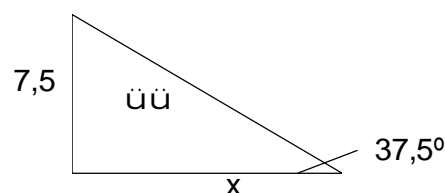
<ol style="list-style-type: none"> 1. Improves the cutting action and finish. ü 2. Prevents long continuous chips. ü 3. Chips easily washed away. ü 4. Reduces chattering. ü 5. Consumes less power. ü 	<ol style="list-style-type: none"> 1. Verbeter sny-aksie en afwerking. 2. Verhoed lang, aaneenlopende snysels. 3. Snysels maklik weggewas. 4. Verminder trillings. 5. Gebruik minder krag.
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(5)

[35]**QUESTION / VRAAG 5**

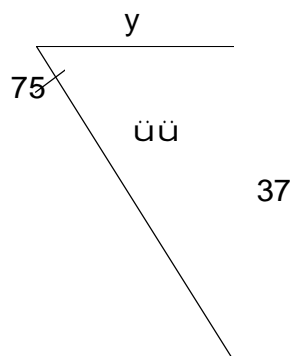
5.1

$$\begin{aligned} \tan 37,5^\circ &= \frac{7,5}{x} \\ x &= \frac{7,5}{\tan 37,5^\circ} \\ &= 9,774 \text{ mm} \end{aligned}$$



$$\begin{aligned} X &= 69,548 - (2x + 2r) \\ &= 69,548 - 2(9,774 + 7,5) \\ &= 69,548 - 34,548 \\ &= 35 \text{ mm} \end{aligned}$$

$$\begin{aligned} \tan 75^\circ &= \frac{37}{y} \\ y &= \frac{37}{\tan 75^\circ} \\ &= 9,914 \text{ mm} \end{aligned}$$



$$\begin{aligned} Y &= 35 + 2(9,914) \\ &= 35 + 19,828 \\ &= 54,828 \text{ mm} \end{aligned}$$

(16)

5.2

$$\begin{aligned}
 P &= F/A & A &= \frac{pd^2}{4} \\
 A &= F/P & d &= \sqrt{\frac{A \times 4}{p}} \\
 &= \frac{12250}{35000000} & &= \sqrt{\frac{0,00035 \times 4}{p}} \\
 &= 0,00035 \text{ m}^2 & &= \sqrt{0,000445633} \\
 & & &= 0,021110041 \text{ m} \\
 & & &= 21,11 \text{ mm} \quad (7)
 \end{aligned}$$

5.3

$$\begin{aligned}
 A &= (25 \times 50 \times 10) - (19 \times 44 \times 10) \\
 &= 0,000414 \text{ m}^2 \\
 F &= d \times A \\
 &= 7,3 \times 10 \times 0,000414 \\
 &= 3022,2 \text{ N} \\
 &= 3,022 \text{ kN} \quad (9)
 \end{aligned}$$

5.4

1. Excessive heat. 2. Uses extra power. 3. Causes wear on moving parts.	1. Oormatige hitte. 2. Gebruik ekstra krag. 3. Veroorsaak slytasie van bewegende dele.
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(3)
[35]

QUESTION / VRAAG 6

$$\begin{aligned}
 6.1.1 & & P &= F/A \\
 A_{\text{ram}} &= \frac{pd^2}{4} & &= \frac{15000}{0,25134} \\
 &= \frac{p \times 0,57657^2}{4} & &= 59680,02827 \text{ Pa} \\
 &= 0,25134 \text{ m}^2 & &= 59,68 \text{ kPa}
 \end{aligned}$$

6.1.2

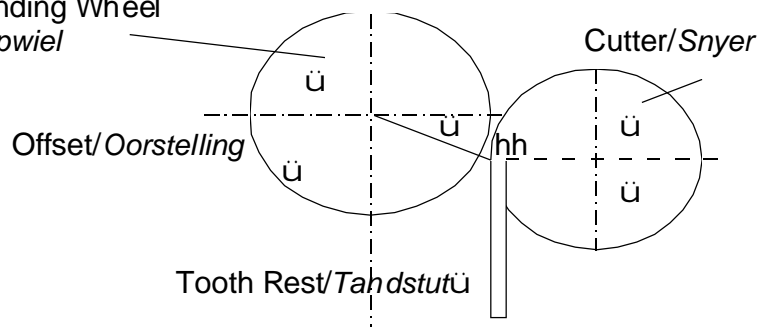
$$\begin{aligned}
 P_1 &= P_2 & \text{But/Maar } A_1 &= \frac{pd^2}{4} \\
 \frac{300}{A_1} &= \frac{59680}{1} & d &= \sqrt{\frac{A \times 4}{p}} \\
 A_1 &= \frac{300}{59680} & &= \sqrt{\frac{0,005026807 \times 4}{p}} \\
 &= 0,005026807 \text{ m}^2 & &= \sqrt{0,006400329} \\
 & & &= 0,080002061 \text{ m} \\
 & & d &= 80 \text{ mm} \quad (12)
 \end{aligned}$$

6.2.1

$$\begin{aligned}
 \text{Off-set/Oorstelling} &= R \sin 4^\circ \\
 &= 75 \sin 4^\circ \\
 &= 5,232 \text{ mm}
 \end{aligned}$$

6.2.2

Grinding Wheel
Slypwiël



(9)

6.3.1

$$\begin{aligned}
 \text{Indexing} &= \frac{N}{9} \quad \text{or} \quad \frac{N}{540} \\
 &= \frac{13^\circ 20' \ddot{u}}{9} \quad \frac{800 \ddot{u}}{540} \\
 &= 1 \text{ and/en } \frac{26 \ddot{u}}{54} \\
 &= 1 \text{ Full turn plus 26 hole on 54 hole circle} \\
 &= 1 \text{ Volle draai plus 26 gate op 54-gat-sirkel}
 \end{aligned}$$

6.3.2 (i)

Indexing

$$\begin{aligned}
 \text{Indeksering} &= \frac{40}{N} \\
 &= \frac{40}{120} = \frac{1 \ddot{u}}{3} \\
 &= 8 \text{ holes on 24} \\
 &= 8 \text{ gate op 24}
 \end{aligned}$$

6.3.2 (ii)

$$\begin{aligned}
 \frac{D_r}{D_n} &= \frac{(A - N) \times 40}{A \quad 1 \ddot{u}} \\
 &= \frac{(120 - 119) \times 40 \ddot{u}}{120 \quad 1} \\
 &= \frac{40}{120} = \ddot{u} \quad \frac{1 \times 24}{3 \quad 24} \\
 D_r &= 24 \text{ Teeth/Tande} \\
 D_n &= 72 \text{ Teeth/Tande}
 \end{aligned}$$

6.3.3 Clockwise/Kloksgewys.ü

(10)
[35]

TOTAL / TOTAAL: 200