

**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 SUPP 2007

QUESTION 1 / VRAAG 1

- | | | |
|------|-----|------|
| 1.1 | B,D | |
| 1.2 | A | |
| 1.3 | C,D | |
| 1.4 | C,D | |
| 1.5 | A,D | |
| 1.6 | A,C | |
| 1.7 | B,D | |
| 1.8 | C | |
| 1.9 | A | (15) |
| 1.10 | F/O | |
| 1.11 | T/W | |
| 1.12 | T/W | |
| 1.13 | F/O | |
| 1.14 | F/O | (10) |
- [25]**

QUESTION 2/VRAAG 2

2.1

Advantages. 1. Time saving 2. Handling minimised Disadvantages. 1. Not flexible for other products. 2. Optimal use of equipment not possible.	Voordele. 1. Tydbesparend. 2. Hantering minimaal. Nadele. 1. Nie buigsaam vir ander produkte nie. 2. Optimale gebruik van toerusting nie moontlik nie.
--	---

(4)

2.2

A = F/d
 = $\frac{320\,000}{370\,000\,000}$
 = $0,000864864\text{ m}^2$

A = Circumference X thickness
Omtrek X dikte
 = $pD \times 0,01\text{ m}^2$

D = $\frac{A}{p \times 0,01}$
 = $\frac{0,000864}{p \times 0,01}$
 = $0,0275295\text{ m}$
 = $27,53\text{ mm}$

(9)

2.3.1

$$P1 = P2$$

$$\underline{F1} = \underline{F2}$$

$$A1 = A2$$

$$F1A2 = F2A1$$

$$A2 = \frac{F2A1}{F1}$$

$$D^2 = \frac{25\,000 \times 100^2}{400}$$

$$D = \sqrt{625\,000}$$

$$= 709,569 \text{ mm}$$

(8)

2.3.2

$$P = \frac{F}{A}$$

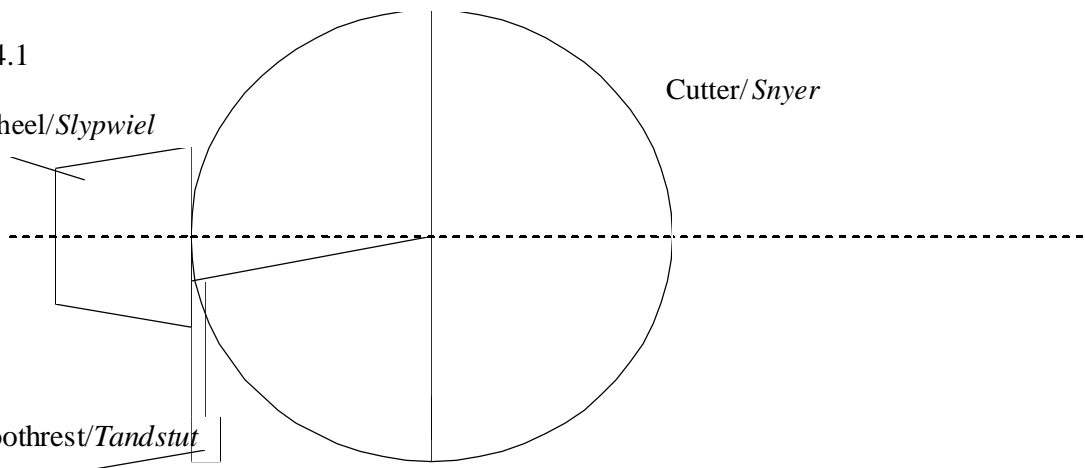
$$= \frac{400 \times 4}{p \times 0,1^2}$$

$$= 50\,929,582 \text{ Pa}$$

$$= 50,93 \text{ kPa}$$

(5)

2.4.1

Wheel/*Slyp wiel*Cutter/*Snyer*Toothrest/*Tandstut*

(6)

2.4.2

$$\text{Off-set/ Wegstand} = r \sin ?$$

$$= 100 \times \sin 4^\circ$$

$$= 6,9756 \text{ mm}$$

(3)

[35]

QUESTION 3/VRAAG 3

3.1.

$$Dm = \frac{\text{pitch/steek} + \text{root } \phi/\text{wortel } \phi}{2}$$

$$= \frac{4}{2} + 52,6 \text{ mm}$$

$$= 54,6 \text{ mm}$$

$$\text{Lead/Styging} = 4 \times 3 = 12 \text{ mm}$$

3.1.1

$$\text{Tan ?} = \frac{L}{pDm}$$

$$= \frac{12}{p \times 54,6 \text{ mm}}$$

$$= 0,069958$$

$$? = \text{Tan } 0,069958$$

$$= 4^\circ$$

3.1.2
 Cutting depth/Snydiepte = Pitch/Steek ÷ 2
 = 4/2
 = 2 mm

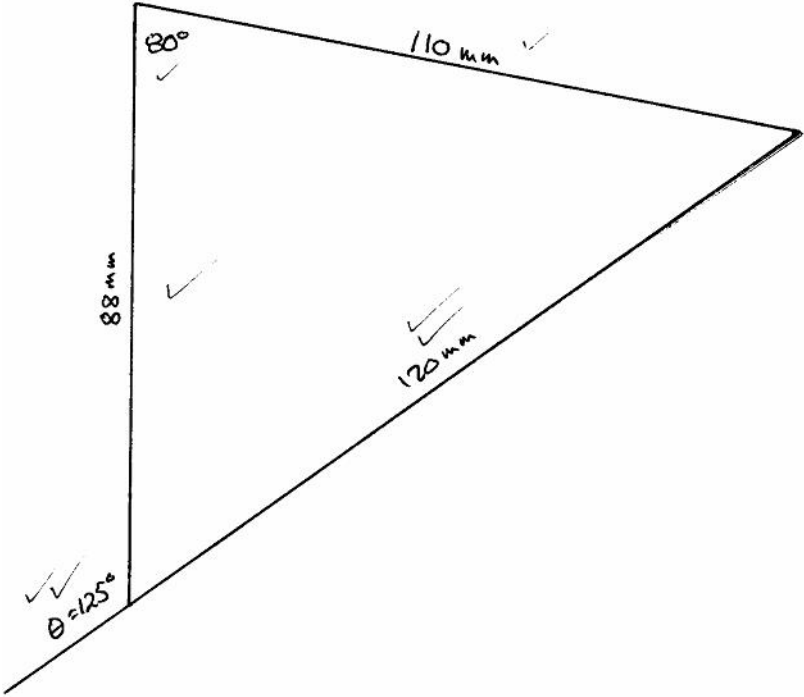
3.1.3
 Leading angle/Ingryphoek = 90° - (Hel. + Clearance/Vryloop)
 = 90° - (4° + 3°)
 = 90° - 7°
 = 83°

3.1.4
 Following angle/Nasleefhoek = 90° + (Hel. - Clearance/Vryloop)
 = 90° + (4° - 3°)
 = 90° + 1°
 = 91°

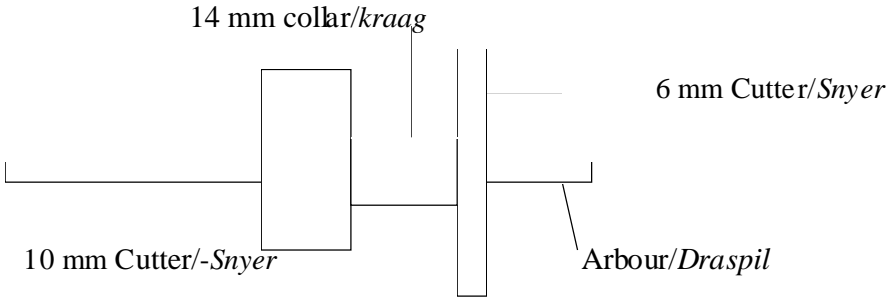
(13)

3.2

M	D/A	M/D	Scale/Skaal
4	220	880	88 mm
4,4	250	1100	110 mm
5,58	215	1200	120 mm



(14)



3.3.1

- | | |
|--|--|
| <ol style="list-style-type: none"> 1. Mount the arbour on the machine spindle. 2. Insert a collar longer than 12 mm on the arbour. 3. Choose a 6 mm wide side and face milling cutter with a diameter of say 80 mm and insert on the arbour. Be sure that there will be enough play between the arbour and the workpiece. 4. Insert a collar of 15 mm on the arbour. 5. Now choose a 10 mm cutter with a diameter of 20 mm smaller than the 6 mm cutter. The difference in the cutter diameters must be twice the difference in cutting depth to cut to the correct depths. | <ol style="list-style-type: none"> 1. <i>Monteer die draspil op die masjienspil.</i> 2. <i>Plaas 'n kraag langer as 12 mm op die draspil.</i> 3. <i>Kies 'n 6 mm wye snyer met 'n diameter van se 80 mm en plaas op die draspil. Maak seker daar is genoeg speling tussen die draspil en die werkstuk.</i> 4. <i>Plaas 'n kraag van 15 mm op die draspil.</i> 5. <i>Kies nou 'n 10 mm-snyer met 'n diameter van 20 mm kleiner as die 6 mm-snyer. Die verskil tussen die snyer-diameters moet twee keer die verskil in snydiepte wees.</i> |
|--|--|

(6)

3.3.2

Straddle milling/*Koppelfrees*.

(2)

[35]

QUESTION 4/VR AAG 4

4.1.1

Indexing/*Indeksering* = $\frac{40}{N}$
 = $\frac{40}{90}$
 = $\frac{4}{9}$
 = 24 holes on a 54 hole circle/*24 gate op 'n 54-gat-sirkel*.

4.1.2

Change gears/*Wisselratte* = $\frac{Dr}{Dn} = \frac{(A-N) \times 40}{A \times 1}$
 = $\frac{90-89 \times 40}{90 \times 1}$
 = $\frac{1 \times 40}{90 \times 1}$
 = $\frac{4 \times 8}{9 \times 8}$
 = $\frac{32}{72}$

Driving gear/*Dryfrat* = 32 teeth/*tande*Driven gear/*Gedrewe rat* = 72 teeth/*tande*

4.1.3

Index plate rotates in the same direction as the index crank./*Indeksplaat roteer in dieselfde rigting as die indeksskruk.*

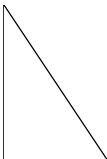
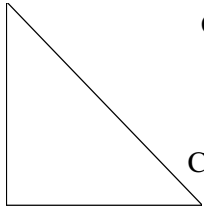
(9)

4.2

- | | | |
|---|--|--|
| <ol style="list-style-type: none"> 1. Set machine to 8 mm pitch, set compound slide parallel. 2. Undercut start (right side) for 2 mm to root diam. 3. Grind 1st tool as sketch shows; set centre height. 4. Take light cut; check pitch, lead, etc. 5. Cut to full depth. 6. Grind 2nd tool as in sketch; 14½°. 7. Cut left side of thread. 8. Grind 3rd tool. 9. Cut to full depth. 10. Grind 4th tool (29°) and cut to full depth plus 0,25 mm to finish the thread. | | <ol style="list-style-type: none"> 1. <i>Stel masjien op 8 mm-steek; stel saamgestelde sleet parallel.</i> 2. <i>Ondersny begin (regterkant) vir 2 mm tot worteldiam.</i> 3. <i>Slyp 1ste beitel soos op skets en stel senterhoogte.</i> 4. <i>Neem ligte snit; gaan steek, ens. na.</i> 5. <i>Sny tot voldiepte.</i> 6. <i>Slyp 2de beitel soos op skets; 14½°.</i> 7. <i>Sny linkerkant van draad.</i> 8. <i>Slyp 3de beitel.</i> 9. <i>Sny tot voldiepte.</i> 10. <i>Slyp 4de beitel (29°) en sny tot voldiepte plus 0,25 mm om draad af te rond.</i> |
|---|--|--|

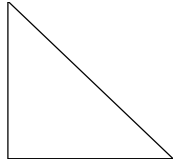
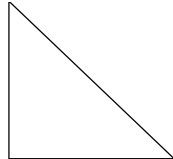
(10)

4.3

<p>4.3.1</p>  $X = \frac{86 + 18}{2}$ $= \frac{104}{2}$ $= 52 \text{ mm}$ $\sin 30^\circ = \frac{52}{\text{Radius}}$ $\text{Radius} = 52 / \frac{1}{2}$ $= 104 \text{ mm}$ $\text{PCD/SSD} = 104 \times 2$ $= 208 \text{ mm} \quad (9)$	<p>4.3.2</p>  $\cos 45^\circ = x/104$ $X = 104 \times 0,707$ $= 73,539 \text{ mm}$ $\text{Centre/Middel} = 2 \times X$ $= 2 \times 73,539$ $= 147,078 \text{ mm} \quad (7)$
[35]	

QUESTION 5/VRAAG 5

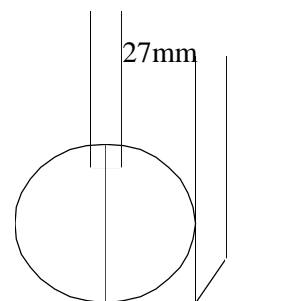
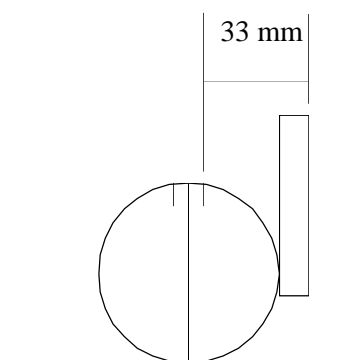
5.1

 <p>In Δ CDE DE = 70 mm [given/gegee] CD = 25,47 [108,2-82,73]</p> $\tan ? = DE/CD$ $= 70/25,47$ $? = \tan 2,748$ $= 70^\circ$	 <p>In Δ ABC BC = 9 mm [radius] A = 35° [70°/2]</p> $\tan 35^\circ = BC/AB$ $AB = BC/0,7002$ $= 9/0,7002$ $= 12,853 \text{ mm}$ <p><u>Finding "X"/Om "X" te vind</u></p> $X = 82,73 - \text{radius} - AB$ $X = 82,73 - 9 - 12,853$ $= 60,877 \text{ mm} \quad (15)$
--	---

5.2

$A = \frac{p \times d^2}{4}$ $= \frac{p \times 0,06^2}{4}$ $= 0,002827 \text{ m}^2$	$P = F/A$ $F = P \times A$ $= 150\,000\,000 \times 0,002827$ $= 424\,115,0082 \text{ N}$ $= 424,115 \text{ kN} \quad (7)$
---	---

5.3



1. Bring cutter to touch work piece, set dial to 0.
2. Lift cutter clear of work.
3. Move cutter over 33 mm [$30 + 6 - 3$]

1. *Bring snyer om werk te raak, stel kraag op 0.*
2. *Lig snyer vry van werk.*
3. *Beweeg snyer oor 33 mm [$30 + 6 - 3$]*

1. Centre cutter more or less.
2. Bring square to touch work.
3. Use ruler to measure 27 mm between cutter and square. [$30 - 3$]

1. *Sentreer snyer min of meer.*
2. *Bring winkelhaak om werk te raak.*
3. *Gebruik liniaal om 27 mm te meet tussen snyer en winkelhaak. [$30 - 3$]*

(6)

5.4

Straddle Milling.

When two or more cutters with specific size collars between them are used at the same time to cut a large number of parts.

Gang Milling.

When a number of specific size and shape cutters with no collars between them are used to produce a shaped block or surface.

Koppelfrees.

Wanneer twee of meer snyers met spesifieke grootte krae tussen hulle gelyktydig gebruik word om 'n groot aantal onderdele te sny.

Groeprees.

Wanneer 'n aantal snyers van spesifieke groottes en vorm met geen krae tussen hulle nie gebruik word om 'n gevormde blok of oppervlak te sny

(4)

5.5

No Compensation is necessary when holes are to be drilled.

Radius Compensation – Absolute programming.

Diameter compensation – Incremental programming.

Geen kompensasië is nodig wanneer gate geboor moet word nie.

Radiuskompensasië - Absolute programmering.

Diameter kompensasië – Inkrementele programmering.

(3)

[35]

QUESTION 6/VR AAG 6

6.1

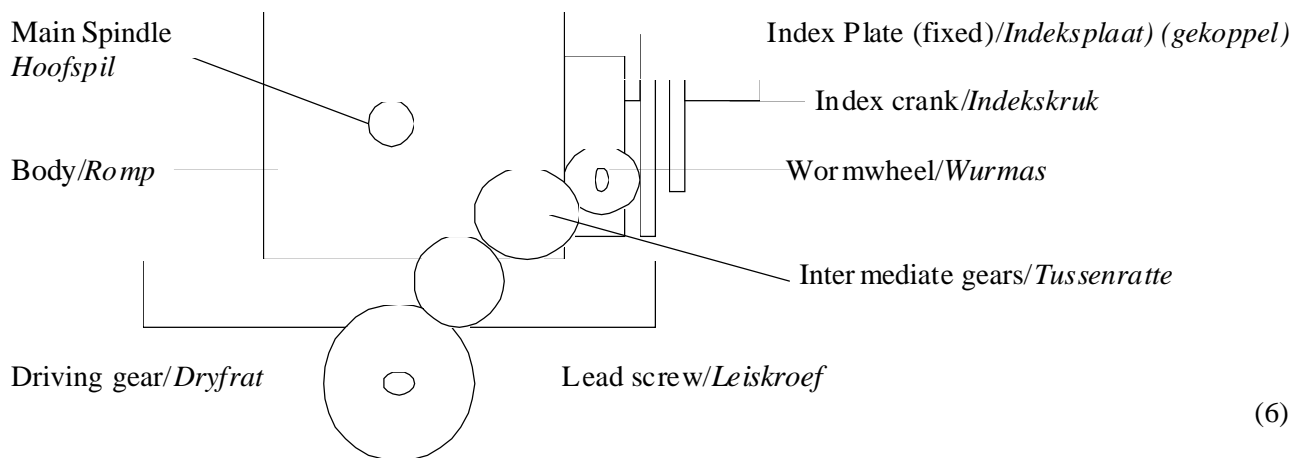
<p>6.1.1</p> $mn = mw \times \cos ?$ $mw = \frac{mn}{\cos 30^\circ}$ $= \frac{3,8}{0,866}$ $= 4,3878 \text{ mm}$ $\text{PCD/SSD} = Tmw$ $= 94 \times 4,388$ $= 412,459 \text{ mm} \quad (5)$	<p>6.1.2</p> $\text{No.} = \frac{T}{(\cos ?)^3}$ $= \frac{94}{(0,866)^3}$ $= \frac{94}{0,6495}$ $= 144,722$ <p>Say/Sê 145 teeth/tande (3)</p>
<p>6.1.3</p> $\text{Lead/Styging} = p \times \frac{\text{PCD/SSD}}{\tan ?}$ $= p \times \frac{412,459}{\tan 30}$ $= 2244,354 \text{ mm} \quad (2)$	<p>6.1.4</p> <p>Chordal addendum/<i>Koordaddendum</i></p> $= mn + \left[\frac{mnT}{2} (1 - \cos 90/T) \right]$ $= 3,8 + \left[\frac{3,8 \times 94}{2} (1 - \cos 90) \right]$ $= 3,8 + [178,6 (1 - 0,999860381)]$ $= 3,8 + [178,6 (0,000139618)]$ $= 3,8 + 0,02493592$ $= 3,825 \text{ mm} \quad (4)$
<p>6.1.5</p> <p>Chordal thickness/<i>Koordtanddikte</i></p> $= \frac{mnT \sin 90}{T}$ $= 3,8 \times 94 \times \sin 0,957^\circ$ $= 3,8 \times 94 \times 0,016709$ $= 5,969 \text{ mm} \quad (3)$	

6.2

<ol style="list-style-type: none"> 1. It holds the work while being machined. 2. Divides the circumference of the work into any number of equal parts. 3. It facilitates helical milling. 4. It facilitates gear rack cutting. 	<ol style="list-style-type: none"> 1. Dit hou die werkstuk tydens freeswerk. 2. Verdeel die omtrek van die werk in enige aantal gelyke dele. 3. Dit help met heliese freeswerk. 4. Dit help met die sny van tandstange.
--	---

(4)

6.3



(6)

6.4

1. Diameter of the cutter.
2. Material to be machined
3. Type of cutter.

1. *Diameter van die snyer.*
2. *Materiaal wat gesny word.*
3. *Tipe freessnyer.*

(3)

6.5

A work piece is said to be dynamically balanced when it can be stopped at any point and it will come to a complete standstill.
The machine will run smoothly and without any vibration.

*? Werkstuk is dinamies gebalanseer wanneer dit op enige tydstip gestop kan word en dit volkome tot stilstand kom.
Die masji en sal glad loop sonder enige vibrasies.*

(3)

6.6

Any two.

1. Machine table can swivel up to 45 degrees on the horizontal plane.
2. It has three-way feed.
3. Provided with universal dividing head.

Enige twee.

1. *Masjientafel kan tot 45 grade swaai op die horisontale vlak.*
2. *Dit het drierigting-toevoer.*
3. *Van universele verdeelkop voorsien*

(2)

[35]

TOTAL / TOTAAL: 200