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 m²

A = Circumference X thickness
Omtrek X *dikte*
= pD X 0,01 m²

D = $\frac{A}{p \text{ X } 0{,}01}$
= $\frac{0{,}000864}{p \text{ X } 0{,}01}$
= 0,0275295 m
= 27, 53 mm (9)

2.3.1

$P1 = P2$

$\frac{F1}{A1} = \frac{F2}{A2}$

$F1A2 = F2A1$

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

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

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

$= 709{,}569$ mm (8)

2.3.2

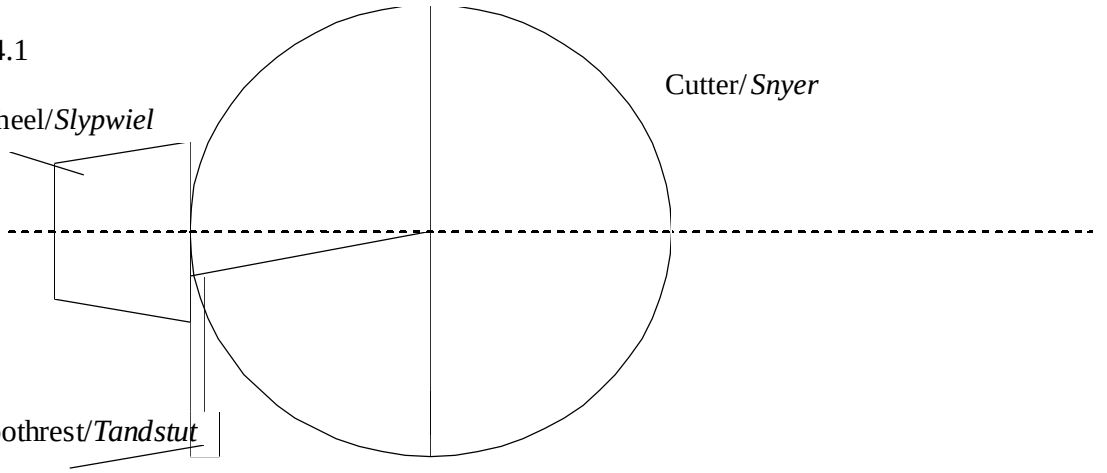
$P = F/A$

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

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

$= 50{,}93$ kPa (5)

2.4.1



(6)

2.4.2

Off-set/ *Wegstand* $= r \sin ?$

$= 100 \times \sin 4^o$ (3)

$= 6{,}9756$ mm

[35]

QUESTION 3/*VRAAG* 3

3.1.

$Dm = \text{pitch/}steek + \text{root ø/}wortel\ ø \over 2$

$= 4/2 + 52{,}6$ mm

$= 54{,}6$ mm

Lead/*Styging* $= 4 \times 3$

$= 12$ mm

3.1.1

$\tan ? = L/pDm$

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

$= 0{,}069958$

$? = \tan 0{,}069958$

$= 4^o$

3.1.2

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

3.1.3

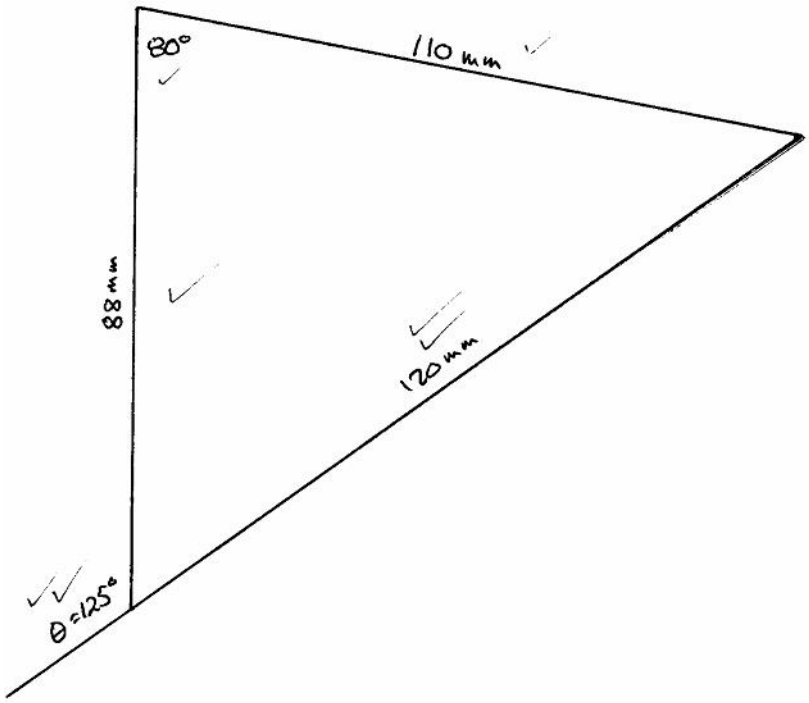
Leading angle/*Ingryphoek* = 90º - (Hel. + Clearance/*Vryloop*)
= 90º - (4º +3º)
= 90º - 7º
= 83º

3.1.4

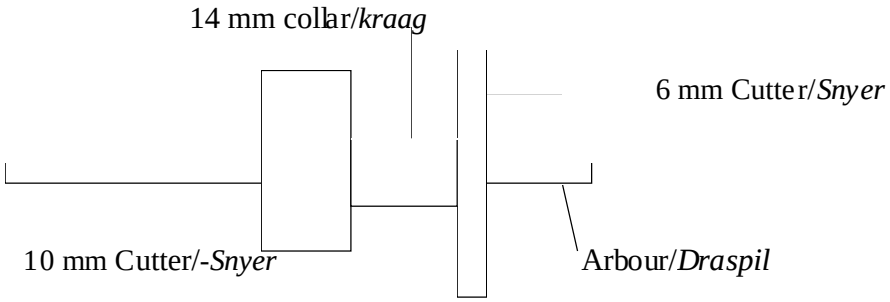
Following angle/*Nasleephoek* = 90º + (Hel. - Clearance/*Vryloop*)
= 90º + (4º - 3º)
= 90º + 1º
= 91º (13)

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

1. Mount the arbour on the machine spindle.	*1. Monteer die draspil op die masjienspil.*
2. Insert a collar longer than 12 mm on the arbour.	*2. Plaas `n kraag langer as 12 mm op die draspil.*
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.	*3. 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.*
4. Insert a collar of 15 mm on the arbour.	*4. Plaas `n kraag van 15 mm op die draspil.*
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.	*5. 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.*

(6)

3.3.2

Straddle milling/*Koppelfrees*. (2)

[35]

QUESTION 4/VR AAG 4

4.1.1

Indexing/*Indeksering* = 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* = $\frac{Dr}{Dn} = \frac{(A-N) \times 40}{A \quad 1}$

$= \frac{90-89 \times 40}{90 \quad 1}$

$= \frac{1 \times 40}{90 \quad 1}$

$= \frac{4 \times 8}{9 \quad 8}$

$= \frac{32}{72}$

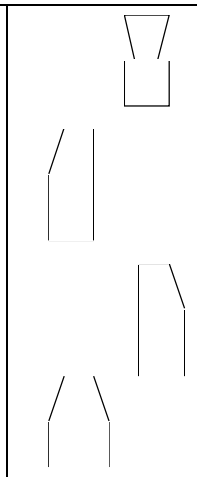
Driving gear/*Dryfrat* = 32 teeth/*tande*

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 indekskruk. (9)

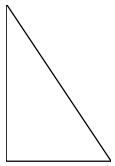
4.2

1. Set machine to 8 mm pitch, set compound slide parallel.		*1. Stel masjien op 8 mm-steek; stel saamgestelde slee parallel.*
2. Undercut start (right side) for 2 mm to root diam.		*2. Ondersny begin (regterkant) vir 2 mm tot worteldiam.*
3. Grind 1st tool as sketch shows; set centre height.		*3. Slyp 1ste beitel soos op skets en stel senterhoogte.*
4. Take light cut; check pitch.lead,etc.		*4. Neem ligte snit; gaan steek, ens. na.*
5. Cut to full depth.		*5. Sny tot voldiepte.*
6. Grind 2nd tool as in sketch;14½º.		*6. Slyp 2de beitel soos op skets; 14½º.*
7. Cut left side of thread.		*7. Sny linkerkant van draad.*
8. Grind 3rd tool.		*8. Slyp 3de beitel.*
9. Cut to full depth.		*9. Sny tot voldiepte.*
10. Grind 4th tool (29º) and cut to full depth plus 0,25 mm to finish the thread.		*10. Slyp 4de beitel (29º) en sny tot voldiepte plus 0,25 mm om draad af te rond.*

(10)

4.3

4.3.1

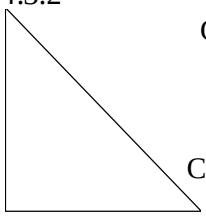


$$X = \frac{86 + 18}{2}$$
$$= \frac{104}{2}$$
$$= 52 \text{ mm}$$

$$\text{Sin } 30^\circ = \frac{52}{\text{Radius}}$$
$$\text{Radius} = 52/½$$
$$= 104 \text{ mm}$$

$$\text{PCD/SSD} = 104 \text{ X } 2$$
$$= 208 \text{ mm} \quad (9)$$

4.3.2



$$\text{Cos } 45^\circ = x/104$$
$$X = 104 \text{ X } 0{,}707$$
$$= 73{,}539 \text{ mm}$$

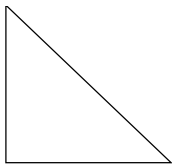
$$\text{Centre/Middel} = 2 \text{ x } X$$
$$= 2 \text{ X } 73{,}539$$
$$= 147{,}078 \text{ mm}$$

(7)

[35]

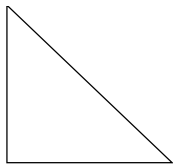
QUESTION 5/*VRAAG* 5

5.1



In Δ CDE
DE = 70 mm [given/*gegee*]
CD = 25,47 [108,2-82,73]

$$\text{Tan } ? = DE/CD$$
$$= 70/25{,}47$$
$$? = \text{Tan } 2{,}748$$
$$= 70^\circ$$



In Δ ABC
BC = 9 mm [radius]
A = 35° [70°/2]

$$\text{Tan } 35^\circ = BC/AB$$
$$AB = BC/0{,}7002$$
$$= 9/0{,}7002$$
$$= 12{,}853 \text{ mm}$$

<u>Finding "X"/Om "X" *te vind*</u>

X = 82,73 – radius – AB
X = 82,73 – 9 – 12,853
= 60,877 mm (15)

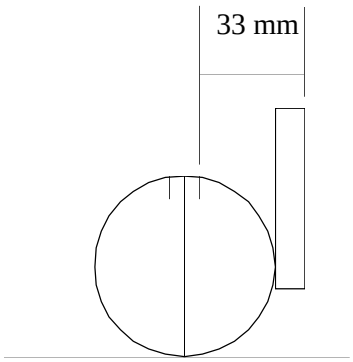
5.2

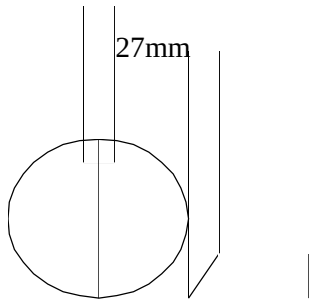
$$A = \frac{p \text{ X } d^2}{4}$$
$$= \frac{p \text{ X } 0{,}06^2}{4}$$
$$= 0{,}0028277 \text{ m}^2$$

$$P = F/A$$
$$F = P \text{ X } A$$
$$= 150\,000\,000 \text{ X } 0{,}002827$$
$$= 424\,115{,}0082 \text{ N}$$
$$= 424{,}115 \text{ kN}$$

(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

<u>Straddle Milling</u>. When two or more cutters with specific size collars between them are used at the same time to cut a large number of parts. <u>Gang Milling.</u> When a number of specific size and shape cutters with no collars between them are used to produce a shaped block or surface.	*<u>Koppelfrees.</u>* *Wanneer twee of meer snyers met spesifieke grootte krae tussen hulle gelyktydig gebruik word om `n groot aantal onderdele te sny.*  *<u>Groepfrees.</u>* *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 kompensasie is nodig wanneer gate geboor moet word nie.* *Radiuskompensasie - Absolute programmering.* *Diameter kompensasie – Inkrementele programmering.*

(3)
[35]

QUESTION 6/VR AAG 6

6.1

6.1.1

mn = mw X Cos ?

mw = mn/Cos 30º

= $\frac{3,8}{0,866}$

= 4,3878 mm

PCD/SSD = Tmw

= 94 x 4,388

= 412,459 mm (5)

6.1.2

No. = T/(Cos ?)³

= $\frac{94}{(0,866)^3}$

= $\frac{94}{0,6495}$

= 144,722

Say/Sê 145 teeth/tande (3)

6.1.3

Lead/*Styging* = p X PCD/SSD / Tan ?

= p X 412,459 / Tan 30

= 2244,354 mm (2)

6.1.4

Chordal addendum/*Koordaddendum*

= mn + [mnT/2 (1 – Cos 90/T)]

= 3,8 + [3,8 X 94 (1 – Cos 90)] / 2 94

= 3,8 + [178,6 (1 – 0,999860381)]

= 3,8 + [178,6 (0,000139618)

= 3,8 + 0,02493592

= 3,825 mm (4)

6.1.5

Chordal thickness/*Koordtanddikte*

= mnTSin 90/T

= 3,8 X 94 X Sin 0,957º

= 3,8 X 94 X 0,016709

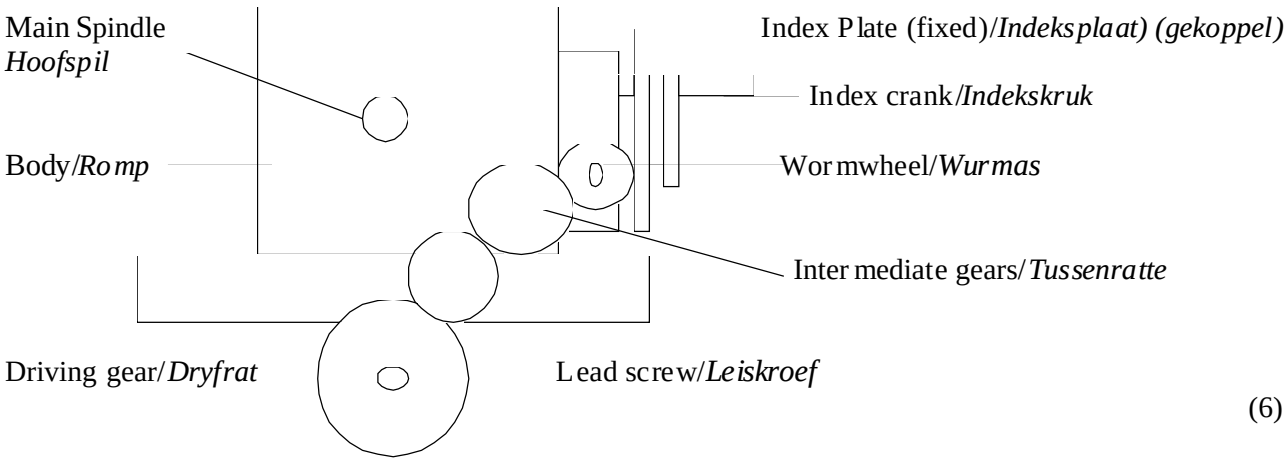
= 5,969 mm (3)

6.2

1. It holds the work while being machined.	*1. Dit hou die werkstuk tydens freeswerk.*
2. Divides the circumference of the work into any number of equal parts.	*2. Verdeel die omtrek van die werk in enige aantal gelyke dele.*
3. It facilitates helical milling.	*3. Dit help met heliese freeswerk.*
4. It facilitates gear rack cutting.	*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 masjien 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