

POSSIBLE ANSWERS FOR:**METALWORK SG P₂**
(SECOND PAPER: THEORY)**QUESTION 1**

1.1	D	1.11	A
1.2	A	1.12	D
1.3	D	1.13	A
1.4	D	1.14	B
1.5	A	1.15	D
1.6	C	1.16	B
1.7	B	1.17	D
1.8	B	1.18	A
1.9	A	1.19	B
1.10	D	1.20	D

[20]**QUESTION 2**

2.1	False	2.11	False
2.2	False	2.12	True
2.3	False	2.13	True
2.4	True	2.14	False
2.5	True	2.15	False
2.6	False	2.16	True
2.7	True	2.17	False
2.8	True	2.18	True
2.9	False	2.19	False
2.10	False	2.20	True

[20]**QUESTION 3**

3.1.1

- The stock and die was not held perfectly square to the workpiece/ Hold the tool square to the work.
 - The tip of the workpiece was not ground evenly.
 - Taper the tip evenly.
- } any 1 (2)

3.1.2 Stock and die

(1)

3.1.3 B is an adjusting screw and is used to adjust the depth of thread. To facilitate easy start by opening the die to its maximum depth.

(2)

3.1.4 Taper the tip of the rod / chanfer or bevel the end of the rod on grinder or lathe

(2)

3.1.5 By wrapping the shaft / rod with soft sheetmetal e.g.aluminium and cramping in the bench vice.

(2)

3.1.6

- To reduce friction
- facilitate smoother cutting
- ensure a good finish

any 1

(1)

(10)

- 3.2.1 B – machine vice
C – table
D – column / pilar

(1)

(1)

(1)

3.2.2 To prevent the drill bit from breaking through the workpiece and damaging the vice.

(1)

3.2.3

- Wrap masking tape on the drill bit.
- Adjust the table to the specific height that you require

any 1

(2)

3.2.4 First drill a smaller hole (pilot hole), then the required size hole

(2)

3.2.5

- the drill screeches as a result of friction
- excessive pressure is needed to drill through materials
- when drilling results in the ejecting of more than one cutting per flute.

any 2

(2)

(10)

[25]**QUESTION 4**

4.1.1 micrometer/external micrometer

(1)

4.1.2 A – workpiece/rod/round stock

(1)

B – thimble

(1)

C – ratchet

(1)

D – steel/frame

(1)

4.1.3 one hundredth

(1)

4.1.4

- do not leave around cluttered with other tools
- clean the anvil faces and oil before storing away
- handle carefully – do not force or overtighten

any 2

(1)

(1)

4.1.5 vernier caliper
internal micrometer
micrometer depth gauge
dial gauge

any 2

(2)

(10)

4.2.1 tool steel

(1)

4.2.2 60°

(1)

4.2.3 when drilling or marking on round stock

(1)

4.2.4 A – cross-cut chisel

(1)

B – flat chisel

(1)

4.2.5.1 half-round file

(1)

4.2.5.2 triangular file

(1)

4.2.6 drawfiling

(1)

4.2.7 to prevent the blade from jamming/binding in the cut.

(1)

4.2.8 ball-pen hammer

(1)

(10)

[20]

QUESTION 5

5.1.1 A – taper turning

(1)

B – right-cut side facing/facing

(1)

C – cut-off / parting off/parting

(1)

D – boring/internal cutting

(1)

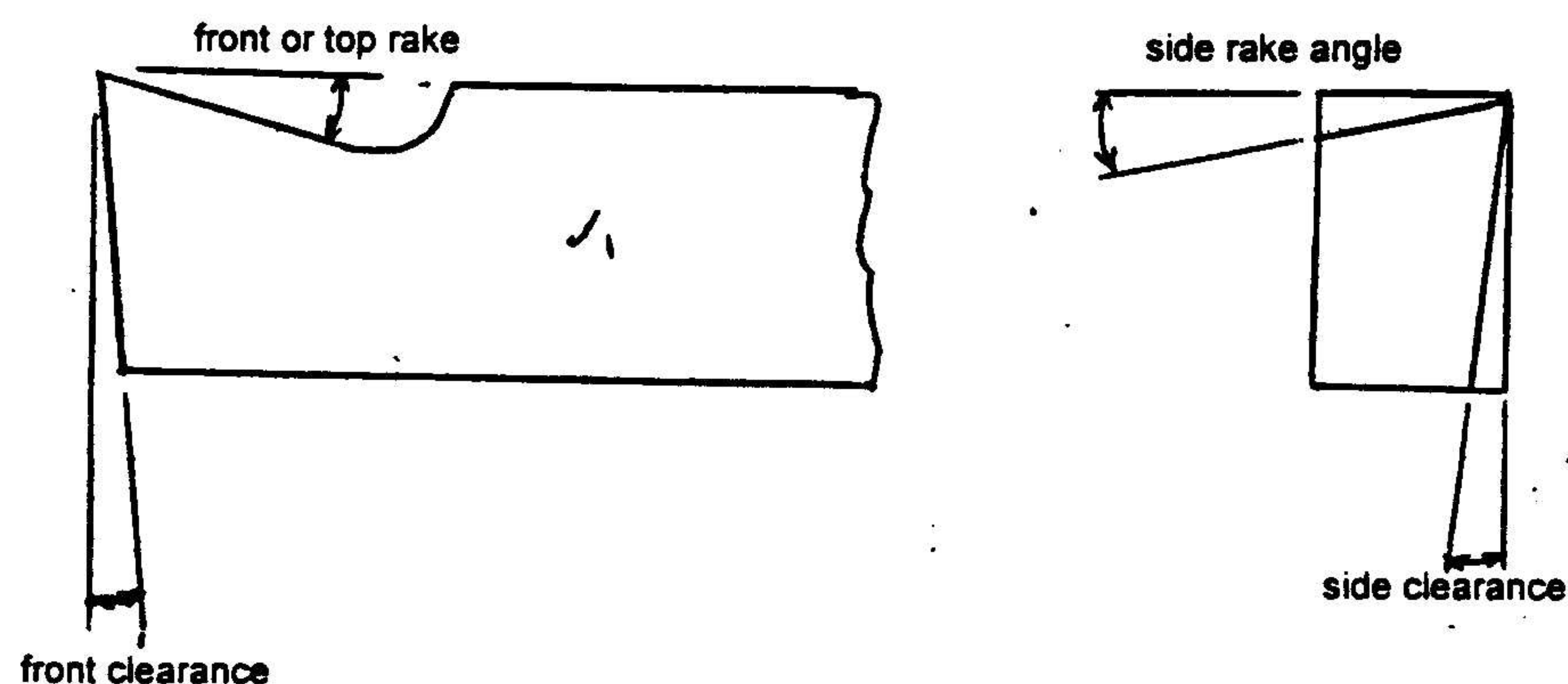
5.1.2

- grinding angles must be correct
 - profile of tool (chisel) must be correct and sharp
 - tool must be adjusted to centre height
 - the tool must not protrude to far from the tool holder
 - the machine must be steady
 - all movable slides must be adjusted correctly
- } any 3

(3)

5.1.3

(5)



5.1.4 C – the tool is set at the correct height for effective cutting

(2)

At A the work will roll over – no cutting

At B the tool cut very little or nothing

5.1.5

- to support workpieces when turning between centres, knurling
- for drilling on the lathe (accommodate drill chuck)

(1)

(1)

5.1.6

- the workpiece must be securely held in the chuck with a steady giving additional support.
- the knurling tool must be set square to the centre height with minimum overhang of the tool for rigidity.
- the machine must be set at low speed (automatic)
- the knurling pattern is created as the tool is fed into the workpiece.

(1)

(1)

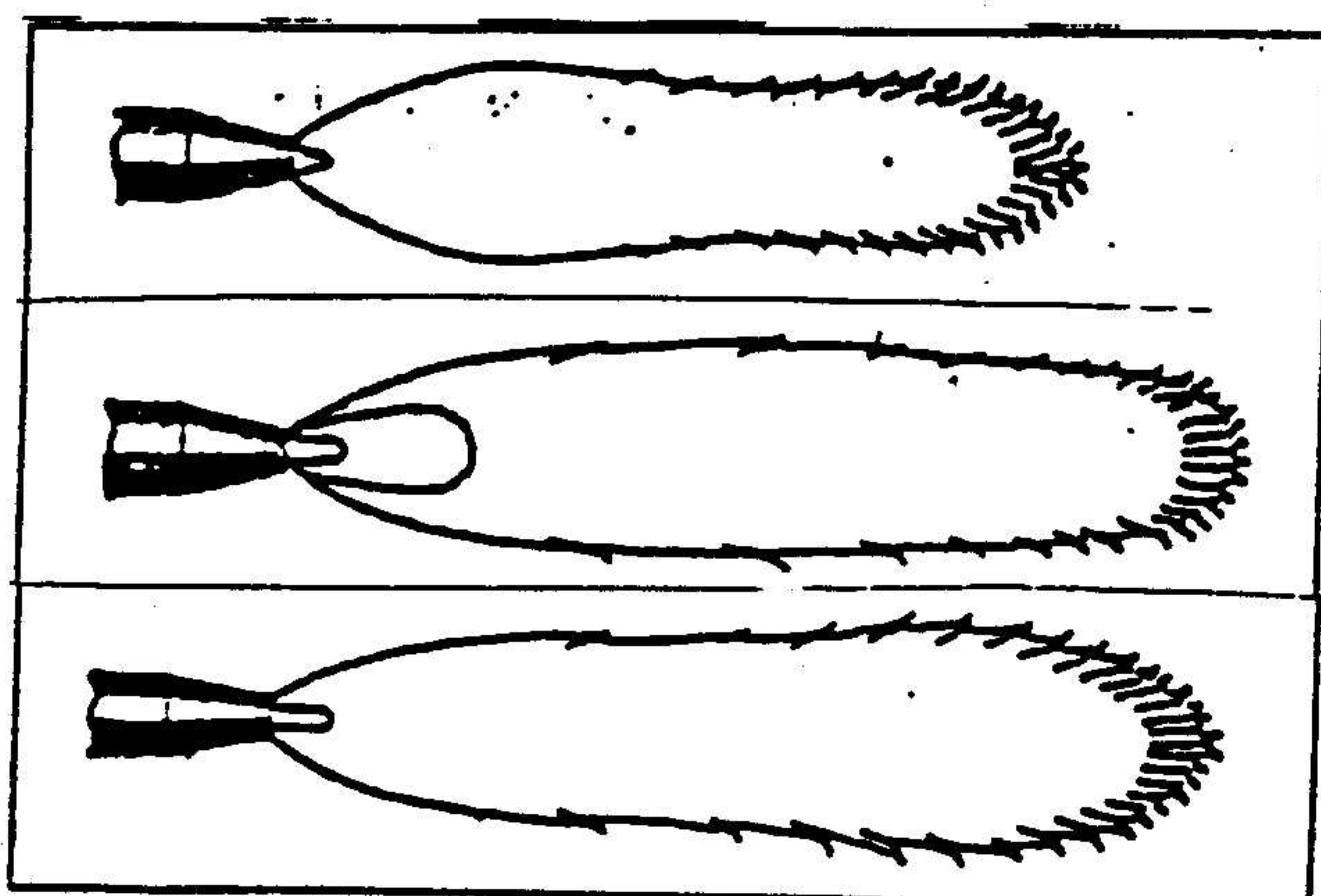
(1)

(1)

QUESTION 6

6.1.1 Welding; brazing; cutting; soldering; heating metal for shaping etc. (2)

6.1.2



A – oxidizing flame (1)

B – carburizing flame (1)

C – neutral flame (1)

A – oxidizing flame is used for welding brass and brazing. (1)

B – carburizing flame is used for hardsurfacing and stelliteing (1)

C – neutral flame is used for welding mild steel, stainless steel, copper, aluminium, cast iron (1)

6.1.3 (a) black / blue (1)

6.1.3 (b) maroon/red (1)

6.1.4 (a) leftward welding (1)

6.1.5 (b) rightward welding (1)

6.1.5 (a) flint lighter / spark lighter

6.1.6 (b) welding tip cleaner

6.1.5 To ensure that both sides/edges melt evenly and the welding rod fills it up. (2)

6.1.7.1 First close the acetylene and then the oxygen valve on the tank / cylinder (1)

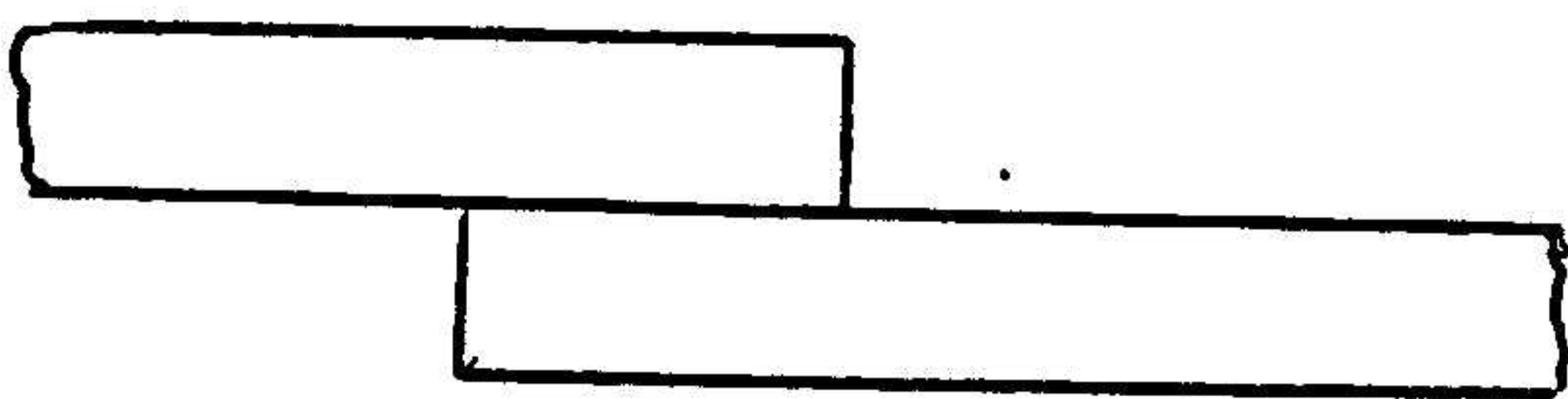
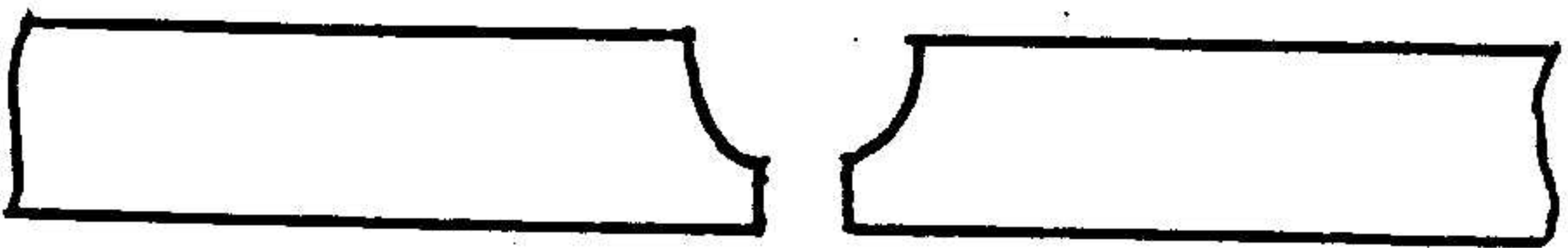
6.1.7.2 Close the cylinder valves (1)

6.1.7.3 Open blowpipe valves one at a time to release the pressure in the hoses. (1)

6.1.7.4 Release the pressure on the pressure-regulator diaphragm by turning the screws. (1)

[20]

QUESTION 7

- 7.1 strong quick method
cost effective, safe method
saves time, very effective } any two (2)
- 7.2
- correct choice of electrode
 - correct choice of electrode size
 - correct welding current
 - correct arc length
 - correct electrode to work angle
 - correct speed of operating movement
 - correct preparation of workpiece
- } any 4 (4)
- 7.3 A – filler rod/metalwire (cove) (1)
B – flux coating (1)
- 7.4 (a) flame too hot; current too strong; electrode too thin. (1)
(b) welding current too high, incorrect electrode to workpiece angle (1)
(c) current too low; slag not removed after each weld; incorrect electrode angle; incorrect preparation of joint; inadequate penetration. (1)
(d) plates are dirty, metal metled too quickly, weld metal is cooled down too fast. (1)
- 7.5 A – effective throat thickness (1)
B – fusion face (1)
C – leg length (1)
D – root (1)
- 7.6
- 7.6.1  lap joint (1)
- 7.6.2  x butt weld (1)
- 7.6.3  u butt weld (1)
- 7.6.4  square butt weld (1)

QUESTION 8

- 8.1.1 A – carbon electrodes
 B – water-cooled walls
 C – water-cooled roof
 D – rotation base
 E – tilting cylinder
 F – ladle
 G – taphole
 H – hearth

(8)

8.1.2

- can be used to produce all types of steel
- temperature heat application can be easily and carefully regulated
- phosphor and sulphur content can be reduced to very low percentages
- slag reduction method ensures that alloys are effectively conserved.
- less flux/deoxidation agents are needed, resulting in better cleaner steel.

} any 2

(2)

- 8.1.3 ferrous – contain iron
 non-ferrous – no iron content

(1)

(1)

8.1.4 ferrous

(1)

8.1.5 steel; mild steel; low carbon steel; high carbon steel

(1)

8.1.6.1 corrosion resistant/strength

(1)

8.1.6.2 improves strength/hardness

(1)

8.1.7

- medical and surgical instruments
- blades (saws, chisels, etc)
- propellers (aeroplanes, boats; ships etc)
- tools
- cutlery

} any 4

[20]**QUESTION 9**

9.1

- The ore is crushed and melted to a fine powder
- The powder is mixed with water and other chemicals in floatation cells to form a slurry.
- The copper particles are now separated from the rest by a process called froth floatation.
- Air is forced into the floatation from below.
- Bubbles move through slurry which collects copper particles that rise to the surface.
- A chemical which acts as a collector and is part of the slurry, collects copper particles and make them water repellent so that they rise to the surface with the bubbles.
- A frothier is also added to stabilise the bubbles and prevent them from bursting open.
- This froth containing the solid copper mineral is collected, washed and dried.

(8)

- 9.2 non-ferrous, it does not contain iron, non magnetic (2)
- 9.3 By heating to dull red and quickly immersing in cold water (2)
- 9.4
- manufacturing electric cables; water and gas pipes; wiring for motors, (2)
 - coins; ornaments; electronic circuits; alloys
- 9.5.1 turpentine; soluble oil (1)
- 9.5.2 none; soluble oil (1)
- 9.6.1 ductility (1)
- 9.6.2 malleability (1)
- 9.7
- to lower melting point to below the mean of the metal components
 - to produce stronger, tougher metals
 - to alter colour
 - to produce a corrosion-proof metal
 - improve hardness
 - to improve casting properties
 - to improve electrical resistance
 - to strengthen metal against wear and tear
 - to create stronger / tougher metal
- any 2
- [20]

QUESTION 10

- 10.1
- Identification of the need – problem identified and goals formulated (2)
 - Design proposal – research; ideas; possible solutions are developed (2)
 - Manufacturing, making – the design is constructed, made (2)
 - Evaluation – solution is evaluated, modified, functionality (2)
- 10.2 any practical design should be accepted
any form of sketches or drawings are acceptable
marks should be awarded for creativity and originality (5)
- 10.3 cutting list should include these aspects (5)

ITEM	DESCRIPTION	QUANTITY	SIZE	MATERIAL
1.				
2.				
3.				

- 10.4 paint; spraypaint; chroming (electroplating) and any other suitable method of finishing. (2)
- [20]

$200 + 2 = 100$

END

MOONTLIKE ANTWOORDE VIR:

METAALWERK SG (TWEDE VRAESTEL: TEORIE)

VRAAG 1

1.1	D	1.11	A
1.2	A	1.12	D
1.3	D	1.13	A
1.4	D	1.14	B
1.5	A	1.15	D
1.6	C	1.16	B
1.7	B	1.17	D
1.8	B	1.18	A
1.9	A	1.19	B
1.10	D	1.20	D

[20]

VRAAG 2

2.1	Onwaar	2.11	Onwaar
2.2	Onwaar	2.12	Waar
2.3	Onwaar	2.13	Waar
2.4	Waar	2.14	Onwaar
2.5	Waar	2.15	Onwaar
2.6	Onwaar	2.16	Waar
2.7	Waar	2.17	Onwaar
2.8	Waar	2.18	Waar
2.9	Onwaar	2.19	Onwaar
2.10	Onwaar	2.20	Waar

[20]

VRAAG 3

- 3.1.1 Die stok en snymoer is nie volkome haaks met die werkstuk nie
gereedskap is nie haaks gehou met die werkstuk nie } enige (2)
- 1
- Die punt van die werkstuk was nie egalig afgeskuur nie.
Punt moet egalig afgewerk word.
- 3.1.2 Stok en snymoer (1)
- 3.1.3 B is 'n stelskroef en word gebruik om die diepte van die skroefdraad te verstel. (1)
Om die aanvangsproses te vergemaklik deur die snymoer tot op sy maksimum te verstel. (2)
- 3.1.4 Skuur die punt van die staaf af (1)
Gebruik 'n snyvloeistof/pasta
- 3.1.5 Draai die staaf toe met sagte plaatmetaal, bv. aluminium en knyp dit in die bankskroef vas. (2)

b.o.

3.1.6

- Om wrywing te verminder
 - Vergemaklik snyproses
 - Verseker 'n netjieser afwerking
- enige 1 (1)
- (10)

- 3.2.1 B –Masjienskroef (1)
 C – tafel (1)
 D – kolom / pilaar (1)

3.2.2 Om te verhoed dat die punt van die boor deurbreek tot op die werkstuk en die skroef beskadig word. (1)

3.2.3

- Draai maskeerband om die punt van die boor.
 - Verstel die boortafel tot op vereiste hoogte
- enige 1 (2)

3.2.4 Boer eers 'n kleiner gidsgaatjie en daarna die verlangde grootte gat. (2)

3.2.5

- Die boor "skreeu" vanweë oormatige wrywing
 - Oormatige toevoerdruk is nodig om deur materiale te boor
 - Wanneer meer as een snysel (boorkrul) per gat afgegee word.
- enige 2 (2)

(10)
[25]

VRAAG 4

4.1.1 Mikrometer / buite (1)

4.1.2 A – werkstuk / staaf / ronde staaf (1)

B – huls (1)

C – gevoelskroef (1)

D – staalraam (1)

4.1.3 een honderdste van 'n mm (0,01 mm) (1)

4.1.4

- moet nie laat rondlê tussen ander gereedskap nie
 - vee die aambeeld af en gee dit olie voordat uit dit bêre
 - hanteer versigtig moenie oor forseer of te styf vasdraai nie
- enige 2 (1)
(1)

4.1.5 vernierpasser (nonius-)
 mikrometer dieptemeter
 binne mikrometer
 wysermeter

any 2 (2)

(10)

4.2.1 Gereedskapstaal (1)

4.2.2 60° (1)

4.2.3 Wanneer boor of merk op ronde staafmetaal (1)

4.2.4 A – kantbeitel / ritsbeitel (1)

B – platbeitel (1)

4.2.5.1 halfronde beitel (1)

b.o.

4.2.5.2 driekantvyl

(1)

4.2.6 Trekvyllwerk

(1)

4.2.7 Om te verhoed dat die lem vassteek in die gleuf

(1)

4.2.8 Bolpenhamer

(1)

(10)

[20]

VRAAG 5

5.1.1 A – Tapsdraaiwerk

(1)

B – Regs kantsny / vlaksnywerk

(1)

C – Afsteek / afsnywerk

(1)

D – Uitboorwerk

(1)

5.1.2

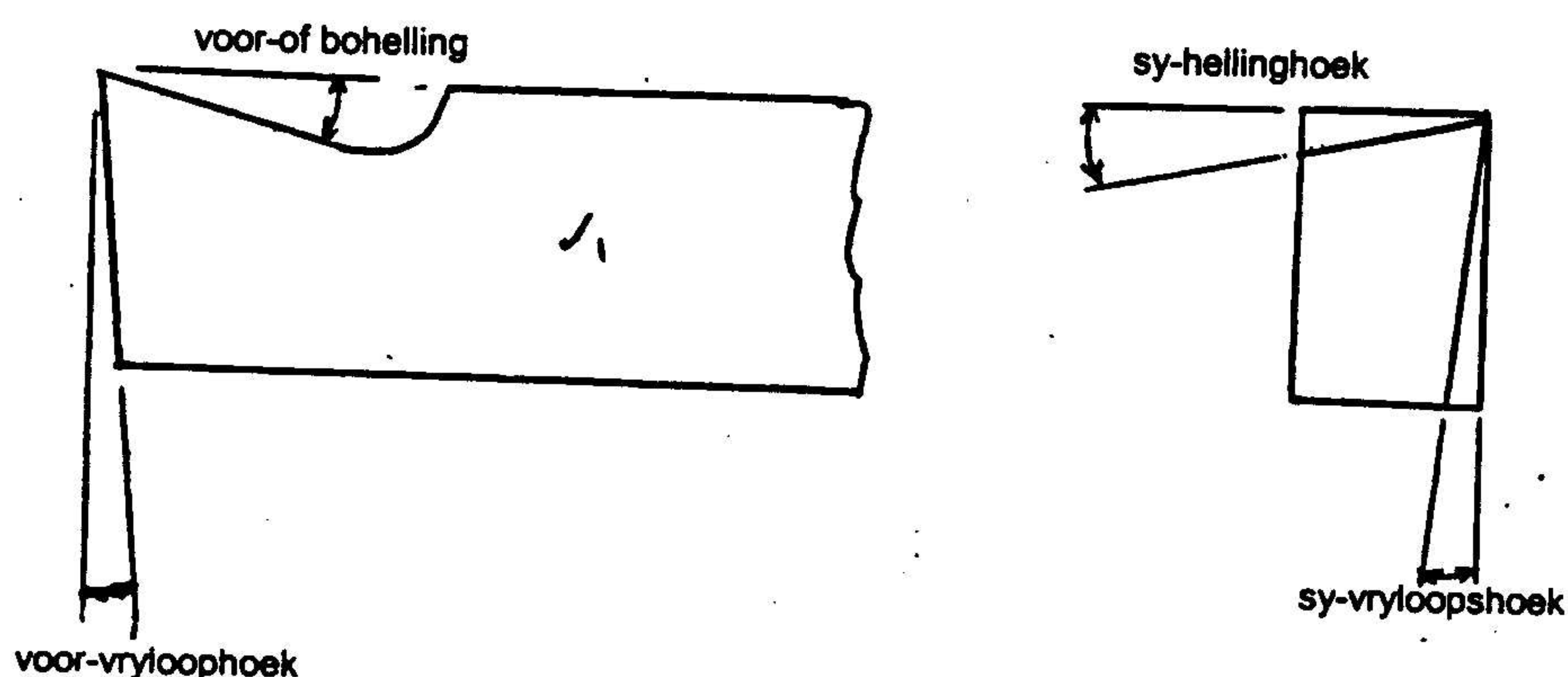
- Slyphoeke moet korrek geslyp word
- Profiel van gereedskap (die beitel) moet korrek en skerp wees
- gereedskap moet ingestel word tot op senterhoogte
- gereedskap mag nie te vër verby die beitelhouer uitsteek nie
- masjien moet stewig staan
- alle beweegbare sleë moet korrek ingestel wees

(3)

(enige 3)

5.1.3

(5)



- 5.1.4 C – die gereedskap (metaaldraaibank-) is tot op die korrekte hoogte gestel om effektiewe snywerk te verseker (senterhoogte)
- By A sal die werkstuk oorrol – geen snywerk vind plaas
- By B sny die gereedskap min of glad nie

(2)

5.1.5

- om werkstukke te ondersteun tydens die draaiproses / kartelwerk
- om te boor op die draaibank (boorkloupkop)

(1)

(1)

5.1.6

- Werkstuk moet stewig vasgehou word of gesentreer word deur draaibankstut.
- Kartelwiel moet haaks wees met die middelhoogte van die werkstuk met minimum oorhelling vir stewigheid.
- masjien moet teen 'n lae spoed gestel word (outomaties)
- die kartelpatroon word geskep as die gereedskap oor die werkstuk beweeg.

(1)

(1)

(1)

(1)

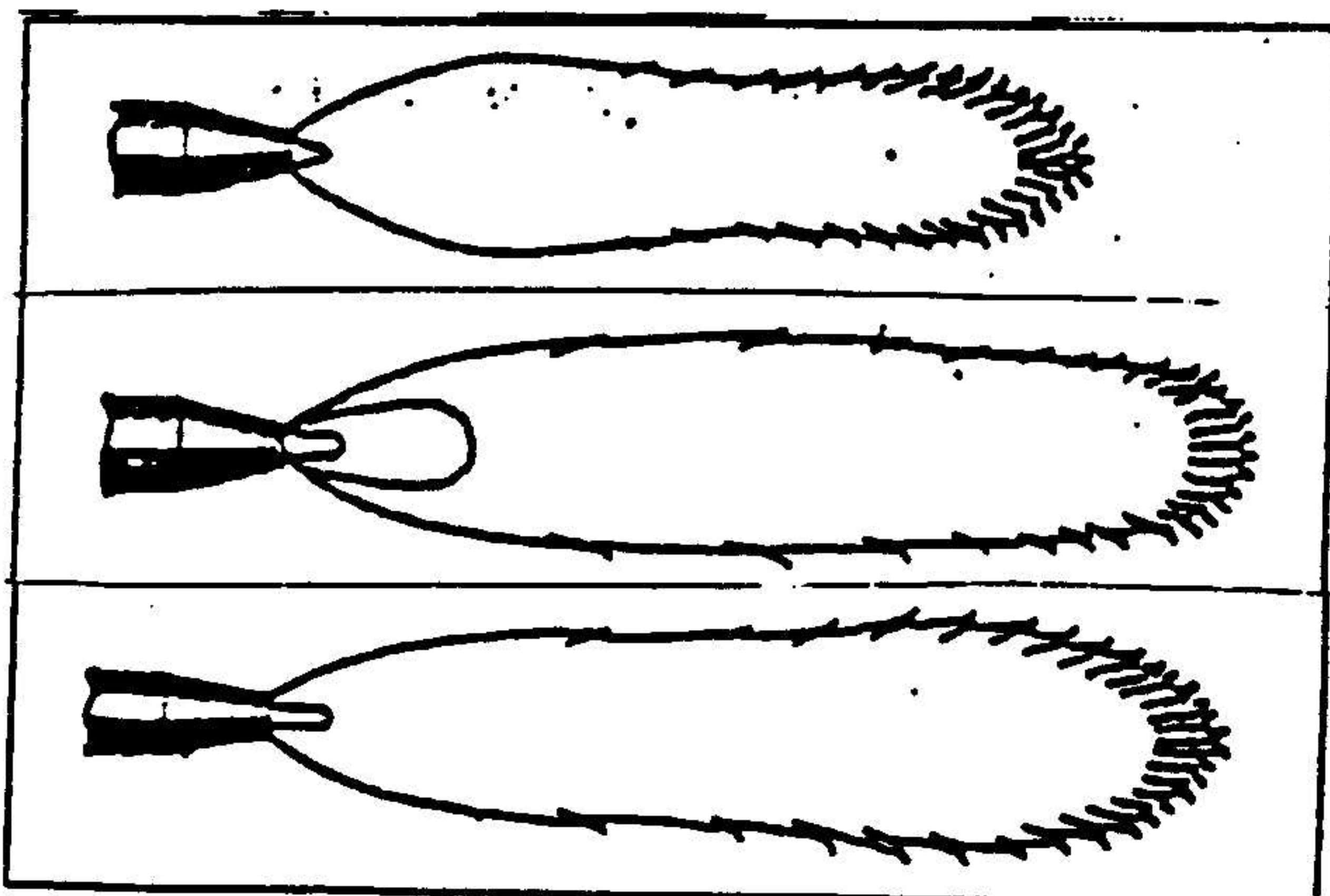
b.o.

VRAAG 6

6.1.1 Sweiswerk, sweissoldeerwerk, snywerk, soldeerwerk, verhit metaal vir vormwerk. ens.

(2)

6.1.2



A – Oksiderende vlam = sweis van geelkoper en vir sweissoldeerwerk

(1)

B – aankool/karburerende vlam = gebruik vir harde bekleding en oppervlakverharding met die toevoeging van koolstof .d.m.v. die vlam

(1)

C – neutrale vlam = sweis van sagte staal, vlekvrystaal, gietyster, koper en aluminium.

(1)

6.1.3 (a) blou / swart

(1)

6.1.3 (b) maroen/rooi

(1)

6.1.4 (a) linkswaartse sweis

(1)

6.1.4 (b) regswaartse sweis

(1)

6.1.5 (a) vonkaansteker / vuursteen

6.1.5 (b) sweisspuitstukskoonmaakdraad

6.1.5 Om te verseker dat albei kante van die sweisstafie eweredig gesmelt/gesmelt word, asook die vulstaal.

(2)

6.1.7.1 Draai eers die asetileen en daarna die suurstofkraan toe op die silinders

(1)

6.1.7.2 Sluit die silinderkleppe

(1)

6.1.7.3 Maak die blaaspypkleppe een op 'n slag oop om die drukking in die pype (slange) te verlig.

(1)

6.1.7.4 Verlig die drukking op die drukreëlaardiafragma deur die drukstelskroef los te draai.

(1)

[20]

VRAAG 7

7.1 Sterk, koste-effektief, bespaar tyd / vinnige metoek, veilige metoek } enige twee
baie effektief

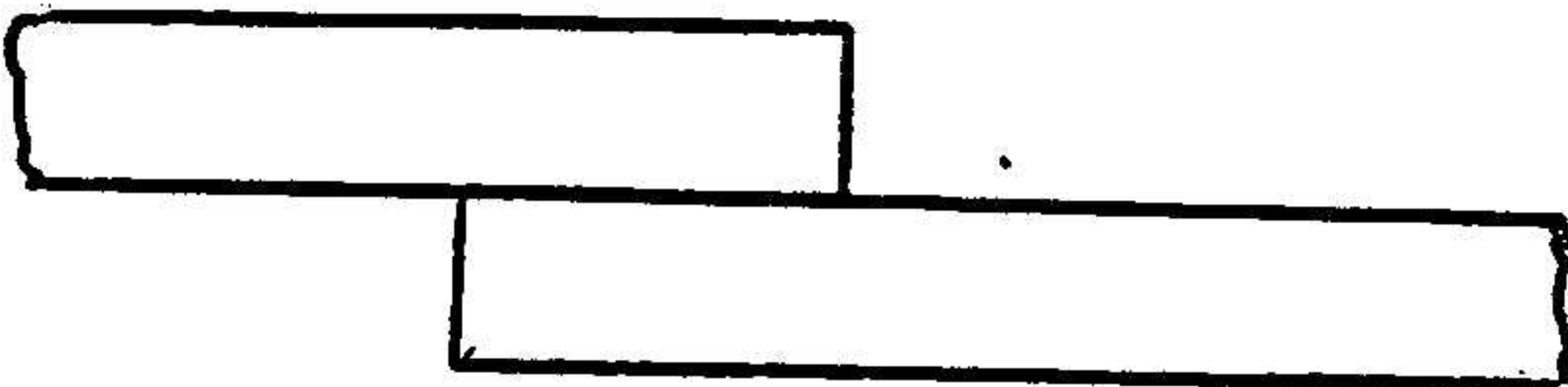
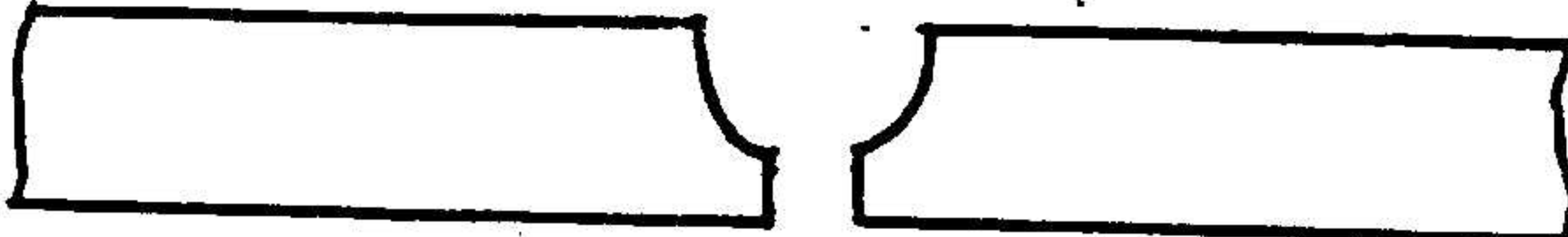
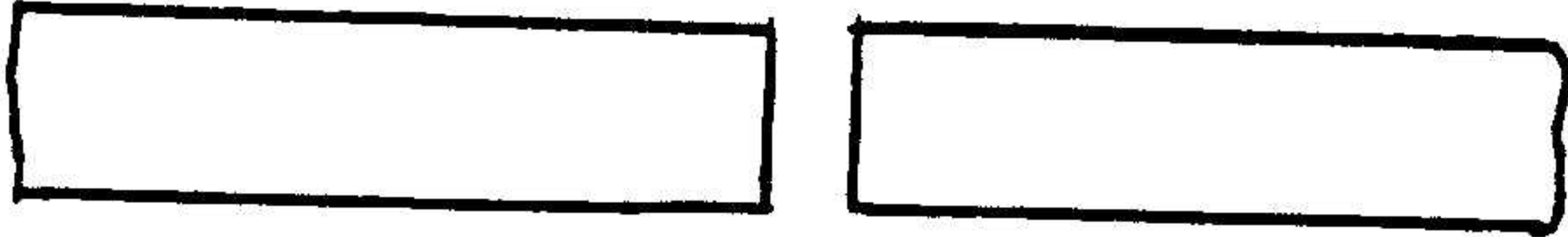
(2)

7.2

- korrekte keuse van elektrode
- keuse van korrekte grootte elektrode
- korrekte sweisstroom
- korrekte booglengte
- korrekte elektrode-tot-werkhoek
- korrekte werkspoed
- korrekte voorbereiding van werkstukke

enige 4

(4)

- 7.3 A – vulstaaf / metaaldraad (nis) (1)
B – vloeimiddelbedekking (1)
- 7.4 (a) vlam is te warm of die stroom is te sterk/elektrode is te dun. (1)
(b) sweistroom te hoog, verkeerde elektrode-tot-werkhoek. (1)
(c) Stroom te laag; slak nie verwyder na elke sweislopie nie, elektrodehoek is verkeerd, las is verkeerd voorberei, deurdringing is onvoldoende. (1)
(d) Plate is vuil, metaal word te vinnig gesmelt, sweismetaal word te vinnig afgekoel. (1)
- 7.5 A – Effektiewe keëldikte / kraaldikte (1)
B – Smeltvlak / Sweislasvlak (1)
C – Beenlengte (1)
D – Wortel (1)
- 7.6
- 7.6.1  oorslaglas (1)
- 7.6.2  x- knoopsweis (1)
- 7.6.3  u-knoopsweis (1)
- 7.6.4  vierkantige knoopsweis (1)
- 7.7
- Dra 'n helm / gesigskerm met goedgekeurde donker lens, voorskoot, handskoene
 - Werksplek moet goed geventileer wees.
 - Geen vlambare materiale moet in die gebied wees nie.
 - Kabels moet droog en skoongehou word, goed geïsoleer
 - Enige geskikte veiligheidsmaatreël
- } enige 2 (2)

[20]

VRAAG 8

- 8.1 A – Koolstofelektrodes (8)
B – Waterverkoelde mure
C – Waterverkoelde dak
D – Rotasiebasis
E – Kantelsilinder
F – Gietlepel
G – Tapgat
H – Herd

8.1.2

- kan gebruik word om alle tipes metaal te vervaardig
- temperatuur / hiltetoediening kan maklik en noukeurig beheer word
- fosfor en swaelinhoud kan tot 'n minimum beperk word
- slakverminderingsmetode verseker effektiewe legeringsbehoud
- Minder vloeimiddels deoksidasiemiddels word benodig wat 'n beter en skoner staal as eindproduk lewer.

enige 2

(2)

- 8.1.3 ysterhoudende – bevat yster
nie-ysterhoudende – geen yster

(1)

(1)

8.1.4 ysterhoudende

(1)

8.1.5 staal, sagte staal / lae-koolstofstof, hoë koolstofstaal

(1)

8.1.6.1 korosiebestand / sterk

(1)

8.1.6.2 verbeter sterkte en hardheid

(1)

8.1.7

- mediese en chirurgiese
- lemme (sole, beitels, ens.)
- skroewe (vliegtuie, bote, skepe, ens.)
- gereedskap
- eetgerei / messe en vurke

enige 4

[20]

VRAAG 9

9.1

- Die erts word vergruis en gesmelt tot 'n fyn poeier.
- Die poeier word met water en ander chemikalieë gemeng in flotteerselle om 'n flodder te vorm.
- Die koperdeeltjies word nou van die res geskei deur 'n proses wat skuimflottasie genoem word.
- Lug word van onder af in die flotteersel ingeforseer.
- Borrels beweeg deur die flodder wat die koperdeeltjies versamel en na die oppervlak laat opstyg.
- 'n Chemiese middel wat as 'n versamelaar dien en deel van die flodder uitmaak, versamel die koperdeeltjies en maak dit waterbestand, sodat dit saam met die borrels na bo styg.
- 'n Skuimmiddel word ook met die flodder gemeng om die borrels te stabiliseer en te verhoed dat dit bars.
- Die skuim wat die soliede kopermineraal bevat, word afgeskep, gewas en droog gemaak.

(8)

- 9.2 Nie-ysterhoudend, bevat nie yster nie, nie-magneties (2)
- 9.3 Deur dit te verhit tot dofrooi en vinnig in koue water te dompel (2)
- 9.4
- vervaardiging (2)
 - vervaardiging van elektriese kables, water en gaspype bedrading vir motore muntstukke, ornamente, elektroniese bane, (enige 2) (1)
- 9.5.1 terpentyn / oplosbare olie (1)
- 9.5.2 geen / oplosbare olie (1)
- 9.6.1 rekbaarheid (1)
- 9.6.2 smeebaarheid (1)
- 9.7
- om smeltpunt te verlaag tot onder die gemiddelde metaalkomponent
 - om sterker en taaier metaal te verkry
 - om kleur te verander
 - om 'n korrosiebestande metaal te vervaardig
 - om hardheid te verbeter
 - om gieteienskappe te verbeter
 - om elektriese weerstand te verhoog
 - om metaal teen slytasie te beskerm
 - om sterker / taaier metaal te skep
- enige 2
- [20]

VRAAG 10

- 10.1
- Identifiseer van behoeftes-probleem geïdentifiseer en doelwitte geformuleer (2)
 - Ontwikkeling van voorstel navorsing, idees en ontwikkeling van moontlike oplossing (2)
 - Ontwerp en vervaardiging – die ontwerp word ontwikkel en gemaak (2)
 - Evaluering-oplossing word geëvalueer, aangepas, in gebruik gestel. (2)
- 10.2 Enige praktiese ontwerp is aanvaarbaar (5)
- Enige vorm van skets is toelaatbaar
- Punte sal toegeken word vir kreatiwiteit en oorspronklikheid
- 10.3 snylys moet die volgende aspekte bevat. (5)

ITEM	BESKRYWING	HOEVEELHEID	GROOTTE	MATERIAAL
1.				
2.				
3.				

- 10.4 Verp, spuitverf, verchroming (elektroplatering) of enige ander uitvoerbare metode van afwerking. (2)
- [20]

$$200 + 2 = 100$$

EINDE