GAUTENG DEPARTMENT OF EDUCATION
SENIOR CERTIFICATE EXAMINATION

POSSIBLE ANSWERS FOR : FARM MECHANICS SG
(Second Paper: Theory)

SECTION A
QUESTION 1

1.1	C
1.2	B
1.3	A
1.4	C
1.5	A

1.6	C
1.7	C
1.8	C
1.9	C
1.10	B

1.11	B
1.12	D
1.13	A
1.14	B
1.15	D

(15)

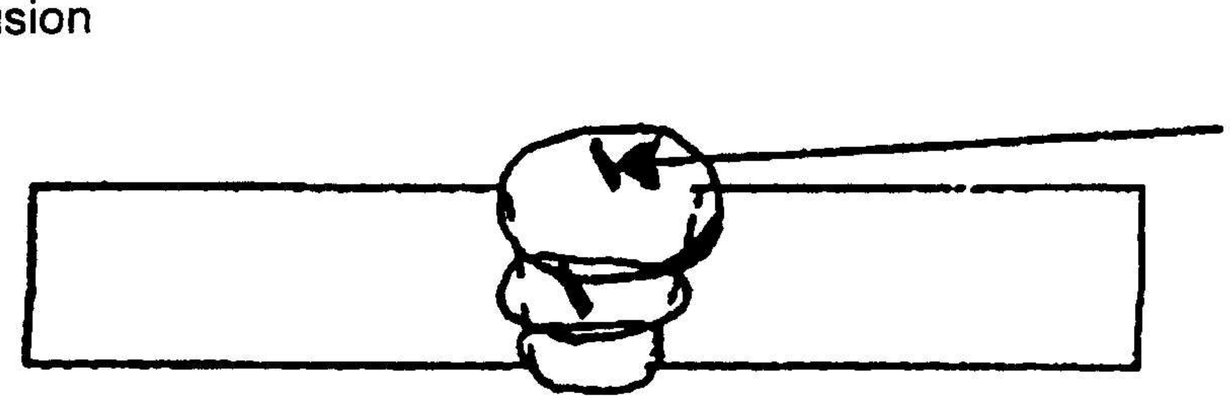
QUESTION 2

2.1	L
2.2	K
2.3	B
2.4	J
2.5	I
2.6	G
2.7	F
2.8	E
2.9	D
2.10	?

(10)
[25]

SECTION B
QUESTION 3

3.1.1 Slag inclusion



(4)

3.2

		Stainless steel	Mild steel
A	Durability	Very durable (does not easily bend or fracture)	Poor (bends easily and wears quickly)
B	Mouldability	Reshapes with difficulty even at very high temperatures	Very well (Malleable and forgeable)
C	Weldability	Welds well if the correct welding rods are used	Very well
D	Being conductive of heat	Very well	Very well
E	Being resistant to corrosion	Very well	Poor (rust easily)

(10)

3.3.1 **ADHESION**
Welding metal flows over base metal without burning into the base metal. (2)

3.3.2 **SHRINKING OF WELDING JOINTS**
When metal is heated it expands and when it cools down it shrinks. The shrinking of welding joints as well as weld runs, causes distortion of sheets when they cool down. Shrinking takes place in all directions. (2)

3.3.3 **ARC WELDING**
Electrical energy is utilised in the shape of an arc to supply the heat necessary for metals to fuse together. An electrical arc is created when an electrical current runs through 2 electrodes somewhat apart.

- The welding rod is one electrode.
- The metal being welded is the other electrode. (2)

3.4 = Cooling the cutting tool
= Cooling the implements
= As both the cutting tool and workpiece are cooled, high cutting speed leads to higher production.
= Shavings are washed from the machine bed.
= A smoother finish can be given to the work piece.
= Corrosion of machine bed is prevented.
= Coolants lubricate the machine bed. (5)
[25]

QUESTION 4

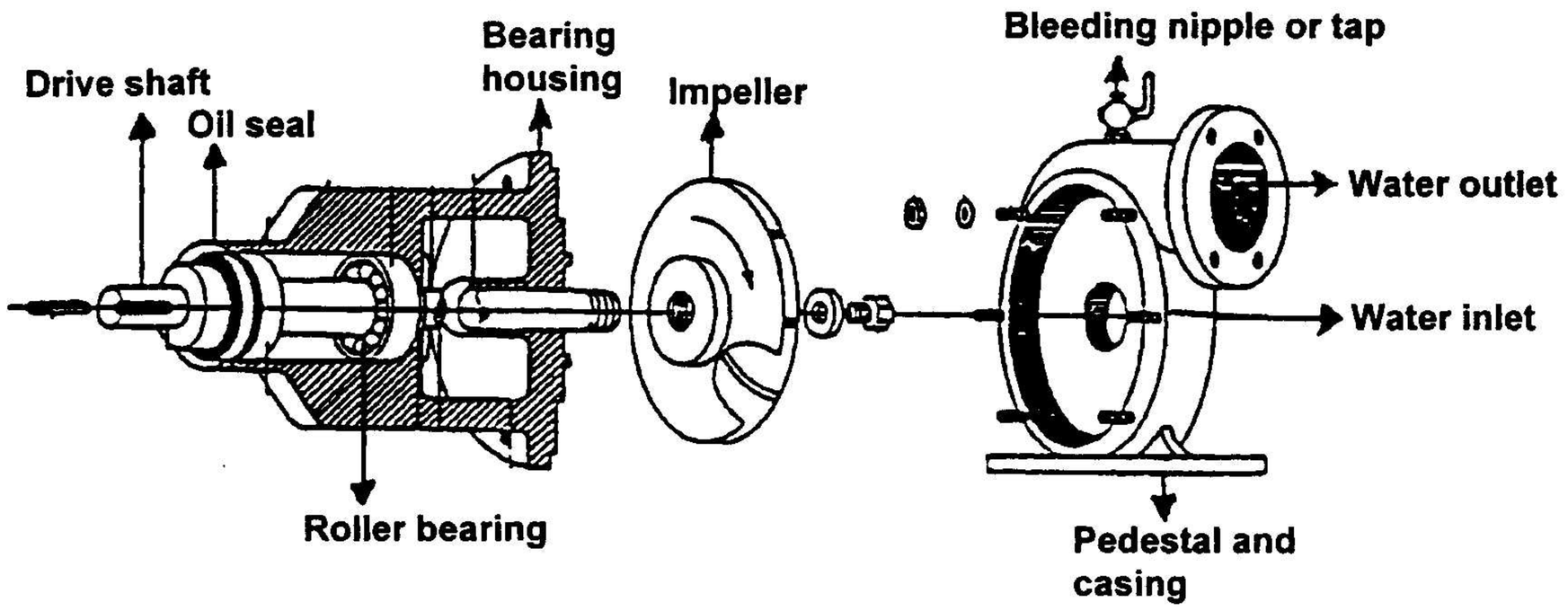
		Submersible pump	Rotary pump	Centrifugal pump
4.1.1	Installation	Easy to install	Easy to install	Not so easy to install
4.1.2	Durability	Under circumstances it can last a lifetime	Under circumstances it can last a lifetime	Not as durable as the other pumps
4.1.3	Drive	Electrical motor	Driven by any power unit, petrol, or diesel engine or electrical motor	Driven by any power unit, petrol, diesel engine or electrical motor
4.1.4	Output	1 – 42 cubic metres of water per hour	The supply is in direct ratio to the pump speed	The supply is in direct ratio to the pump speed as well as the type of impeller used
4.1.5	Purpose	Borehole pump	Pumps water out of very deep boreholes	Pumps water out of rivers, dams, swimming pools

(15)

4.2.1 **EXPLANATION**

- The impeller starts to rotate fast in the direction of the arrow in the drawing.
- The vanes of the impeller force the water outwards and the water is then forced through the outlet pipe.
- The water moving out is replaced by water sucked into the pump via the foot valve and suction pipe connected to the inlet.
- The latter action is possible because there is no air that can be compressed in the system. (5)

4.2.2



The centrifugal pump

½ x 10 = (5)

QUESTION 5

5.1.1 A Auger
B The pick-up wheel
C Packing arms
D Baling chamber (4)

5.1.2 A The roller is wide enough to pick up hay from one wind row.
B The teeth rotate in order to place the hay on the combine plates so that the hay comes into contact with the feeding auger.
C It is imperative that the height of the pick-up wheel is adjustable to accommodate varying field conditions. (5)

5.2

Ram-type baler	Round-type baler
Transport and storage space are optimally utilized	One man operation
Bales can be handled manually	Rope consumption 25 – 50% lower for similar tonnage
Baling process is continuous	Simplistic working
Bales are stored easily	Can bale until rain starts
	Roofed storage not necessary

(10)

5.3 A Do not easily slip off pulleys.
B V-belts draw tighter round pulleys because of V-profile.
C Lubrication is never necessary.
D V-belts are relatively strong.
E V-belts do not stretch or shrink as easily as flat belts.
F V-belts last longer than flat belts. (6)
[25]

QUESTION 6

6.1 (a) It should engage smoothly and not jam, slip or shudder.

(b) It should be capable of transferring the maximum load of engine without slip.

(c) When the clutch is disengaged, it should do so completely and not tend to drag.

(d) The clutch should be of such a nature that it can be engaged or disengaged comfortably by hand or foot.

(e) The friction material used on the clutch plate should not only be highly wear-resistant, but should also be able to withstand high temperatures which are generated when the clutch slips. (5)

6.2 **Two types:**

(1) Conventional type (divided in spiralcone and hypoid differentials)
(2) Planetary type (3)

	Air cooled	Water cooled
6.3		
6.3.1	Difficult to achieve even cooling	It absorbs heat very well
6.3.2	Does not run the risk of being damaged because of a cooling system that can freeze up	Circulates easily over a wide temperature range. Risk of being damaged is there, it can freeze up
6.3.3	Much bigger fan needed	Much smaller fan
6.3.4	Light in weight (more weights must be put on an air-cooled tractor than a water-cooled tractor)	Heavy in weight
6.3.5	More simple, more compact	Water cooling is used for all types of engines and is less compact.

(10)

6.4 Radiator (1)

6.5 (a) To open and close the contact points at the right moment and to supply the spark to the correct spark plug.

(b) To supply the spark to the spark plug at the right time when the piston is under pressure.

(c) When engine speed increases the distributor must advance the spark slightly. (60

[25]

[100]

TOTAL: 125

GAUTENGSE DEPARTEMENT VAN ONDERWYS
SENIORSERTIFIKAAT-EKSAMEN

MOONTLIKE ANTWOORDE VIR : PLAASWERKTUIGKUNDE SG
(Tweede Vraestel: Teorie)

AFDELING A
VRAAG 1

1.1	C
1.2	B
1.3	A
1.4	C
1.5	A

1.6	C
1.7	C
1.8	C
1.9	C
1.10	B

1.11	B
1.12	D
1.13	A
1.14	B
1.15	D

(15)

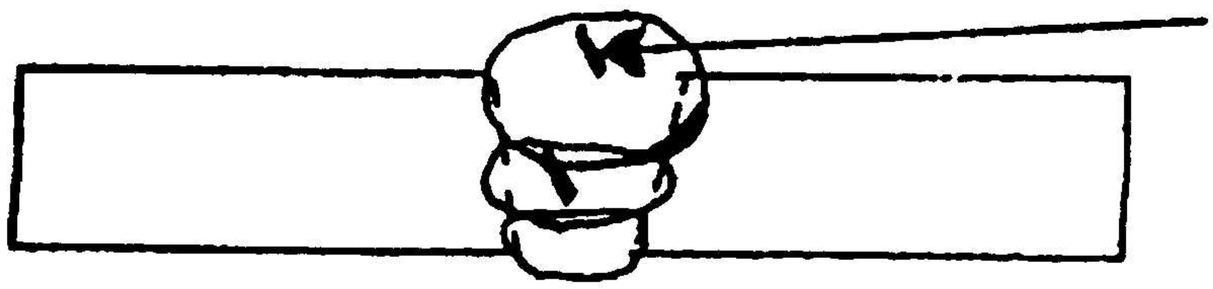
VRAAG 2

2.1	L
2.2	K
2.3	B
2.4	J
2.5	I
2.6	G
2.7	F
2.8	E
2.9	D
2.10	?

(10)
[25]

AFDELING B
VRAAG 3

3.1.1 Slakinsluiting



(4)

3.2

		Vlekvrye staal	Sagte staal
A	Duursaamheid	Baie duursaam (buig en breek nie maklik nie)	Swak (buig maklik en slyt maklik weg)
B	Vormbaarheid	Moeilik vervormbaar selfs by baie hoë temperature	Baie goed rekbaar, pletbaar en smeerbaar
C	Sweisbaarheid	Sweis goed mits die regte sweisstafie gebruik word	Sweis baie goed
D	Gelei hitte	Baie goed	Baie goed
E	Korosiebestandheid	Baie goed bestand teen korosie	Swak (Roes baie maklik)

(10)

3.3.1 **ADHESIE**
Sweismetaal vloei oor moedermetaal sonder dat dit in die metaal inbrand. (2)

3.3.2 **KRIMPING VAN SWEISLASTE**
Wanneer metaal verhit word, sit dit uit en wanneer dit afkoel, krimp dit. Die krimping van sweislaste, asook sweislopies veroorsaak verwringing as dit afkoel. Verwringing vind in alle rigtings plaas. (2)

3.3.3 **BOOGSWEISING**
Elektriese energie word in die vorm van 'n boog gebruik om die nodige hitte te verskaf wat metale laat saamsmelt. 'n Elektriese boog ontstaan wanneer 'n elektriese stroom vloei deur 2 elektrodes wat effens van mekaar verwyder is.

- Die sweisstaaf is die een elektrode.
- Die metaal wat gesweis word is die ander elektrode. (2)

3.4 = Beitel word koel gehou
= Werktuie word koel gehou
= Aangesien die beitel en die werkstuk koel gehou word, kan daar vinniger gesny en hoër produksie gehandhaaf word.
= Snysels word van masjienbed afgespoel
= Gladde afwerking word aan werkstuk verleen
= Verroesting van masjienbed en slee word voorkom
= Koelmiddels smeer oor die masjienbed (5)
[25]

VRAAG 4

		Dompelpomp	Draaiskroef pomp	Sentrifugale pomp
4.1.1	Installasie	Maklik om te installeer	Maklik om te installeer	Nie so maklik om te installeer nie.
4.1.2	Duursaam-heid	Onder sekere kondisies kan dit 'n leeftyd hou	Ook lewenslank onder sekere omstandighede	Nie so duursaam soos die ander pompe nie
4.1.3	Aandrywing	Elektriese motor	Aangedryf deur enige krageenheid, petrol- of dieselenjin, of elektriese motor	Aandrywing deur enige kragtoetstel, enjin, petrol, diesel, of elektriese motor
4.1.4	Lewering	1 – 42 kubieke meters van H_2O per uur	Lewering is in direkte verhouding tot pompspoed	Lewering is in die direkte verhouding tot die pompspoed (asook die tipe stuwer wat gebruik word)
4.1.5	Doel	Boorgatpomp	Pomp H_2O uit baie diep boorgate	Pomp water uit riviere, damme en swembaddens.

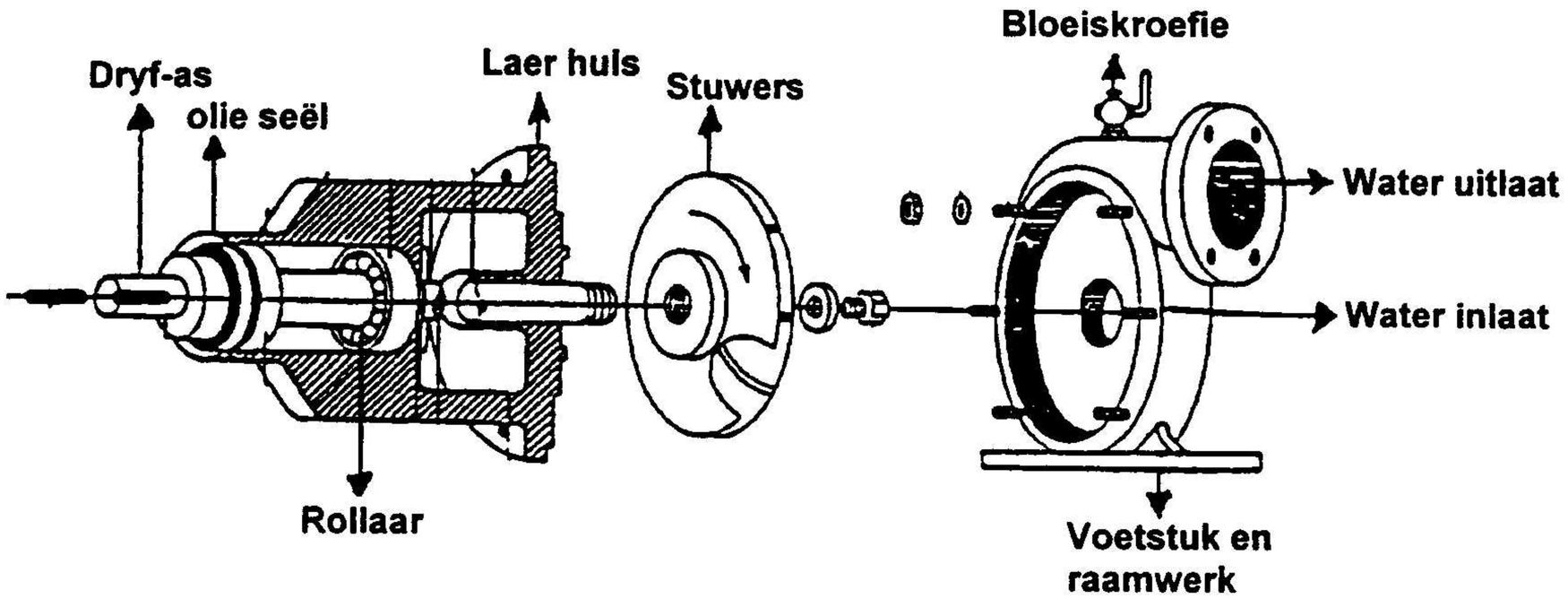
(15)

4.2.1 **VERDUIDELIKING**

- Stuwer begin vinnig draai in die rigting wat op die pyltjie word in die tekening aandui.
- Vinne in stuwer forseer die H_2O uitwaarts, die H_2O word by die uitlaatpyp uitgeforseer.
- Uitbewegende H_2O se plek word met H_2O gevul wat deur die voetklep via die suigpyp wat met die inlaat gesuig word.
- Laasgenoemde aksie is moontlik omdat daar geen lug in die sisteem is wat saamgepers kan word nie.

(5)

4.2.2



Die sentrifugale pomp

½ x 10 = (5)

VRAAG 5

5.1.1 A Awegaar
B Optelrollers of opraperwiel
C Vingers van die dwarsvoerder (Pakkerarms)
D Baalkamer (4)

5.1.2 A Dit is wyd genoeg om een windry op te tel.
B Die tande draai sodat dit die hooi op die stroperplaat plaas sodat dit in aanraking met die voerawegaar kom.
C Dit is noodsaaklik dat die hoogte van die opraperwiel verstelbaar moet wees om by verskillende landstoestande aan te kan pas. (5)

5.2

Ramtipe-baler	Ronde baler
Vervoer en opberging word optimaal benut	Eenman operasie
Kan bale met die hand hanteer	Verbruik 25 – 50% tou vir dieselfde tonnemaat
Baalproses in kontinu	Eenvoudige werking
Bale maklik (geboer) gestoor	Kan baal tot reën begin
	Bergplek onderdak nie nodig

(10)

5.3 A Val nie maklik van die katrolle af nie.
B V-profielbande van katrolle trek al stywer omdat dit V-vormig is.
C Hoef nooit gesmeer te word nie.
D V-bande is relatief sterk.
E V-bande rek en krimp nie so maklik soos plat bande nie.
F Dit het 'n langer lewe as platbande. (6)
[25]

VRAAG 6

6.1 (a) Moet egalig opekring gee sonder om vas te slaan, te gly of rukkerig te werk.

(b) In staat wees om maksimum vrag van die enjin af oor te dra sonder om te gly.

(c) Wanneer die koppelaar ontkoppel word, moet dit volledig ontkoppel en nie geneig wees om te sleep nie.

(d) Die koppelaar moet van so 'n aard wees dat dit met die voet of hand gekoppel en ontkoppel kan word.

(e) Die wrywingsmateriaal wat vir 'n koppelaar gebruik word moet nie alleen 'n hoë mate van weerstand teen slytasie bied nie, maar moet ook in staat wees om die hoë temperature wat ontwikkel wanneer die koppelaar gly te weerstaan. (5)

6.2 **Twee hoof tipes:**

(1) Konvensionele tipe (word verdeel in spiraalkeël en hipoiede ewenaars)
(2) Planetêre tipe (3)

6.3

	Lugverkoeling	Waterverkoeling
6.3.1	Moeiliker om egalige verkoeling te verkry.	In staat om hitte goed te absorbeer.
6.3.2	Verkoelingstelsel sal nie vries in koue nagte nie.	Sirkuleer maklik oor 'n wyer temperatuur gebied. Gevaar is wel daar vir vries.
6.3.3	Groter waaier word benodig.	Kleiner waaier word benodig.
6.3.4	Lig in gewig (meer gewigte moet aangebring word op 'n lugverkoelde trekker as 'n waterverkoelde trekker.)	Swaarder in gewig.
6.3.5	Eenvoudige konstruksie. Meer kompak.	Word by alle groottes en tipe enjins aangetref. Minder kompak.

(10)

6.4 Verkoeler (1)

6.5 (a) Om die verdelerpunte op die regte tydstip oop en toe te maak om sodoende die vonk na die regte vonkprop toe te stuur.

(b) Om 'n vonk na die regte vonkprop toe te stuur op die regte tyd wanneer die suier onder druk verkeer.

(c) Die verdeler moet in staat wees om die tydstip waarop die vonk gelewer word in 'n mate te vervroeg wanneer die enjinspoed toeneem. (60

[25]

[100]

TOTAAL: 125