GAUTENG DEPARTMENT OF EDUCATION

SENIOR CERTIFICATE EXAMINATION

AGRICULTURAL SCIENCE SG

SECTION A

QUESTION 1A

1.1	A	1.11	A	
1.2	C	1.12	B	
1.3	C	1.13	B	
1.4	B	1.14	C	
1.5	C	1.15	D	
1.6	D	1.16	B	
1.7	C	1.17	A	
1.8	D	1.18	C	
1.9	B	1.19	A	
1.10	C	1.20	A	20X2= (40)

QUESTION 1B

1.21	Glycogen	
1.22	Peristalsis	
1.23	Ovulation	
1.24	Hydrolysis	
1.25	Transpiration	
1.26	Southern slope	
1.27	Soil profile	
1.28	Pistil	
1.29	Savannah	
1.30	Self pollination / Neighbour	10X2= (20)

QUESTION 1C

1.31	Ceiling price	
1.32	Market	
1.33	Semi-desert	
1.34	Two male gamete	
1.35	Cryptochidism	(5)

QUESTION 1D

1.36	Injections / supplementary rations (1 only)	(1)
1.37	Urea / buiret	(1)
1.38	Antibiotics / hormones / thyroid regulars / tranquilizers (1 only)	(1)
1.39	Mineral licks / drinking troughs / dosing / supplementary ration injections / Soil sods	(2)
		(5)

TOTAL FOR SECTION A: [70]

SECTION B

QUESTION 2

2.1 2.1.1

White brack	Black brack
Alkalinity	Salinity

(2)

2.1.2

Ca^{2+} $Cl \pm SO_4$ =of $mg^{2+}K^+$	Na^+

(4)

2.1.3 **Reclamation – Black brack**

- Physical and chemical observations to determine symptoms brackishness
- Remove all causes of black brack
- Improve soil drainage
- Apply gypsum in case of black brack
- Apply heavy flood irrigation to leach soluble salts
- Plant brack resistant crops (6)

2.2 **Organic matter**

- High temperature
- Good soil aeration
- Soil moisture
- Microbe activity
- Soil reaction (5)

2.3 **Structure development**

- Colloidal material
- Type of clay mineral
- Climate
- Alternate wetting and drying
- Plant roots (5)

2.4 **Water losses**

2.4.1 Run-off
2.4.2 Transpiration
2.4.3 Evaporation
2.4.4 Percolation/seepage (5)
2.4.5 Transpiration

2.5 5.5.1 E
5.5.2 B
5.5.3 C/A
5.5.4 D
5.5.5 D
5.5.6 E (6)

2.6

A.	Oesophagus	F.	Colon
B.	Simple stomach	G.	Anus
C.	Duodenum	H.	Rectum
D.	Jejenum	I.	Caecum
E.	Ileum	J.	Fundus

(10)

2.7.1 A. = Tensiometer
B. = A-pan (2)

2.7.2 Drafting and implementation of a programme for water application to soil at fixed times and in fixed quantities in order to supply in the water requirements of a crop. (2)

2.7.3 ET = Evapotranspiration
EO = Evaporation from the evaporation pan
F = Crop factor (3)
[50]

QUESTION 3

3.1 **Drainage**

3.1.1 Artificial removal of excess water from the soil surface or root zone of the crop. (2)

3.1.2 **Planning drainage**
Soil structure must be determined
Depth of the soil water level is determined
Occurrence of compacted layers or clay banks are determined
Determine the type of irrigation to be used
The type of crop to be planted
Visible signs of wet or brackish areas are determined (6)

3.1.3 A. pipe
B. stone
C. open (3)

3.2 **Calculation**

% Total Digestible Nutrients – Digestible Protein
80-8 = $\frac{72}{8}$ = 9
VV = 1:9

% DN / % DP
% 72 / % 8
1:9 (6)

3.3
- Type of plant used
- Stage when plant is cut and prepared
- Method of hay making
- Preparation method e.g. milling
- Supplementing hay with NPN
- Supplementing hay with molasses
- Supplementary ration with protein (7)

3.4
A. Spermatogonium (2n)
B. Primary spermatocyte (2n)
C. 1st meiotic division
D. Secondary spermatocytes (n)
E. 2nd meiotic division
F. Spermatids (n)
G. Sperm (n) (7)

3.5 **Lack of libido**
- Sexual immaturity: influenced by breed and feeding
- Lack of experience: especially if grown up in seclusion
- Over-exertion, for example too many cows per bull or even if bull is physically over-exerted
- Malnutrition such as under or overfeeding or unbalanced rations
- Psychological factors: such as temperament, change in handling, routine or environment
- Disease: as associated with high body temperatures. (10)
(5 only)

3.6 **Advantages – upgrading**
- Most economical method of improving a herd
- New breed gradually improved into new environment
- No specialised knowledge required
- Possibility of deficient progeny very small (4)

[45]

QUESTION 4

4.1 **Functions of water**

- Solvent for different substances
- Transport medium of dissolved substances
- Temperature stabilizer
- Helps with processes such as absorption, secretion and excretion
- Vital agent of most chemical reactions in plants (5)

4.2 **Deficient nutrients**

4.2.1 zinc
4.2.2 molybdenum
4.2.3 boron
4.2.4 iron (4)

4.3 **Urea – uses**

- Used for top dressing – slight burning
- Suitable for fertilizing by means of micro irrigation
- Used for fertilizing of leaf spraying
- Applied in quantities of 50 – 100 kg/ha (4)

4.4 4.4.1

A.	pistil	F.	ovum
B.	stigma	H.	endosperm cell
C.	style	I.	ovule
D.	ovary	J.	germ sac
E.	integument	K.	antipodal cells
F.	auxiliary cells	L.	umbilicus

(12)

4.4.2
a) female cell
b) cell that will provide the food for the embryo
c) endosperm cell attachment
d) future seed coat (8)

4.5 **Double fertilization:** One male gamete fuses with the ovum to form a zygote. Second makes gamete fuse with the endosperm cell to form the endosperm which serves as food for the embryo. (4)

4.6 **Vegetative propagation**

4.6.1 **Rhizome** – thickened underground stem which grows parallel to the soil surface
4.6.2 **Bulb** – short thickened underground stem with fleshy leaves in which food is stored.
4.6.3 **Runner** – a shoot from mother plant with long reins which develop adventitious root
4.6.4 **Tuber** – thickened underground stem in which food is stored (8)
[45]

QUESTION 5

5.1 **Soil functions**

- Stores and releases water for plant use
- Provides air for respiration of plant roots and micro organisms
- Releases nutrients to plants
- Serves as a growth medium for plants
- Allows infiltration of water (10)

5.2 **Soil surveying**

- Aerial photographs are taken
- Survey area is visited
- Preliminary mapping of land and veld types is done and profile test holes are indicated
- Horizons and soil forms are identified
- Description of morphological properties
- All acquired information interpreted (6)

5.3 **Veld types**

- Savannah
- Forest
- Grassland
- Semi-desert
- Scrub (5)

5.4 **Irrigation**

5.4.1
1. Drip irrigation
2. Micro spray (2)

5.4.2 **Advantages**

- Water is applied directly to crops
- Steep slopes can be irrigated
- Less water needed
- Little labour required
- Less energy required to distribute water
- Can be used on soils with high and low infiltration rates (3)

(3 only)

5.4.3 **Disadvantages**

- Limited root growth
- Accumulation of salts at root zone
- Nozzles subjected to clogging
- Depth distribution at risk of horizontal distribution in sandy soil
- May lead to crust formation (5)

5.5 **Crop rotation**

5.5.1 Cultivation of different crops in succession on the same land seasonally or annually (1)

5.5.2 **Advantages**

- Combat certain disease organization
- Organic content of the soil is maintained
- Prevents one-sided utilization of plant nutrient
- Soil fertility can be maintained
- Labour better utilized
- Soil fully utilized – shallow and deep rooted crops alternated
- Risk of crop failure spread
- Two or more crops can be cultivated (8)

5.6 **Requirements - photosynthesis**

- Water
- Energy radiant / heat / solar
- $C0_2$
- Chlorophyll
- Suitable temperature (5)

[45]

QUESTION 6

6.1

- Use of pesticides in too high concentrations
- Application of pesticides when the wind blows
- Unnecessary application of pesticides
- Soil erosion pollution
- Wrong irrigation methods
- Over grazing (6)

6.2 **Economic characteristics of soil**

- Durability
- Indestructibility
- Limited
- Specific environment
- Law of diminishing returns
- Differs with respect to its production capacity
- Availability (7)

6.3 **Labour problems**

Scarcity of labour: because of more attractive working conditions in the cities.
Competition from industries: the great demand on the physical working conditions in the cities.
Competition from industries: the great demand on physical endurance of a person as well as low profit margin in agricultural industry are reasons for promising workers to leave farming for work in industries.
Lack of training: causes low degree of proficiency and productivity of farm works.
Industries: attract most skilled labourers therefore unskilled labour is often regarded as expensive labour. (10)

6.4 **Management skills**

Technical proficiency: understanding of and ability in a specific type of activity.
Humanitarian skill: co-operation with people.
Conceptual skills: ability to regard farming as an unitary concept and how the components fit together. (6)

6.5 **Managerial principles**

- Planning
- Organisation
- Motivation
- Decision-making
- Control (5)

6.6 **Co-operatives**

6.6.1 **Agricultural co-operative** private production requirements to members as cheaply as possible and sell products in a profitable way.
Commercial consumer co-operatives provide the consumer's needs as cheaply as possible. (4)

6.6.2 **Controlled marketing**

- Stabilising of prices
- Improve productivity and efficiency in production process
- Co-ordinate the interests of producers, consumers, commerce and processing industries
- Limit the gap between the income of farmers and that of other groups (5)
- Narrow the gap between prices of consumers and producers

6.6.3 **Free-marketing:** producer markets his products to whom he wishes at whatever prices he wishes. (2)
[45]

TOTAL FOR SECTION B: [230]

TOTAL: 300

Moontlike Antwoorde November - 2004

GAUTENGSE DEPARTEMENT VAN ONDERWYS

SENIORSERTIFIKAAT EKSAMEN

LANDBOUWETENSKAP SG

AFDELING A

VRAAG 1A

1.1	A	1.11	A	
1.2	C	1.12	B	
1.3	C	1.13	B	
1.4	B	1.14	C	
1.5	C	1.15	D	
1.6	D	1.16	B	
1.7	C	1.17	A	
1.8	D	1.18	C	
1.9	B	1.19	A	
1.10	C	1.20	A	20x2= (40)

VRAAG 1B

1.21	Glikogeen	
1.22	Peristalse	
1.23	Ovulasie	
1.24	Hidrolise	
1.25	Transpirasie	
1.26	Suidelike hang	
1.27	Grondprofiel	
1.28	Stamper	
1.29	Savanna	
1.30	Selfbestuiwing/Kruis	10x2= (20)

VRAAG 1C

1.31	Plafonprys	
1.32	Mark	
1.33	Halfwoestyn	
1.34	Manlike gamete	
1.35	Kriptorchidisme	(5)

VRAAG 1D

1.36	Inspuitings/aanvullende rantsoene (slegs 1)	(1)
1.37	Ureum / buiret	(1)
1.38	Antibiotika/hormone/skildklierreguleerders/verdowingsmiddels (slegs 1)	(1)
1.39	Mineraallekke/drinktroë/dosering/aanvullende rantsoeninspuitings/grondkluite	(2)
		(5)

TOTAAL VIR AFDELING A: [70]

AFDELING B

VRAAG 2

2.1 2.1.1

Witbrak	Swartbrak
Alkalirigheid	Souterigheid

(2)

2.1.2 Ca^{2+} Cl+SO_4=of $mg^{2+}K^+$ | Na^+ (4)

2.1.3 **Herwinning – swartbrak**

- Fisiese en chemiese waarnemings om simptome van brak te bepaal
- Verwyder alle oorsake van swartbrak
- Verbeter gronddreinering
- Dien gips toe in die geval van swartbrak
- Dien swaar vloedbesproeiing toe om oplosbare soute te dreineer
- Plant brakbestande gewasse

(6)

2.2 **Organiese stowwe**

- Hoë temperatuur
- Goeie grondbelugting
- Grondvog
- Mikrobe-aktiwiteit
- Grondreaksie

(5)

2.3 **Struktuurontwikkeling**

- Kolloïdale materiaal
- Tipe kleimineraal
- Klimaat
- Afwisselend natmaak en uitdroging
- Plantwortels

(5)

2.4 **Waterverliese**

2.4.1 Afloop
2.4.2 Transpirasie
2.4.3 Verdamping
2.4.4 Perkalasie
2.4.5 Transpirasie

(5)

2.5 5.5.1 E
5.5.2 B
5.5.3 C/A
5.5.4 D
5.5.5 D
5.5.6 E (6)

2.6

A.	Slukderm	F.	Kolon
B.	Eenvoudige maag	G.	Anus
C.	Duodenum	H.	Rektum
D.	Jejenum	I.	Caecum
E.	Ileum	J.	Fundus

(10)

2.7.1 A. = Tensiometer
B. = A-pan (2)

2.7.2 Opstel en implementering van 'n program vir watertoediening op vaste tye en in vaste hoeveelhede op grond om aan die waterbehoeftes van 'n oes te voldoen. (2)

2.7.3 ET = evapotranspirasie/verdampingstranspirasie
EO = verdamping uit die verdampingspan
F = oesfaktor (3)
[50]

VRAAG 3

3.1 **Dreinering**

3.1.1 Kunsmatige verwydering van oortollige water van die grondoppervlak of die wortelstreek van die oes. (2)

3.1.2 **Beplande dreinering**
Grondstruktuur moet bepaal word
Diepte van grondwatervlak word bepaal
Voorkoms van saamgepersde lae kleibanke word bepaal
Bepaal watter soort besproeiing gebruik moet word
Bepaal die tipe oes wat geplant moet word
Sigbare aanduidings van nat of brak dele word bepaal (6)

3.1.3 A. pypdrein
B. klipdrein
C. oop drein (3)

3.2 **Berekening**

% Totale Verteerbare Voedingstowwe – Verteerbare Proteïen
80-8
1:72

% DN / % DP
% 72 / % 8
1:90 (6)

3.3
– Tipe plant wat gebruik is
– Stadium waarop plant afgesny en voorberei is
– Metode van hooimaak
– Voorbereidingsmetode, bv. maal
– Aanvulling van hooi met NPN
– Aanvulling van hooi met melasse
– Aanvullende proteïen in rantsoen (7)

3.4
A. Spermatogonia (2n)
B. Primêre spermatosiete (2n)
C. 1^{e} meiotiese deling
D. Sekondêre spermatosiete (n)
E. 2^{e} meiotiese deling
F. Spermatiede (n)
G. Sperm (n) (7)

3.5 **Gebrek aan geslagsdrang**
– Seksuele onvolwassenheid: beïnvloed deur ras en voeding
– Gebrek aan ervaring – veral as hy in afsondering groot geword het
– Oorinspanning, byvoorbeeld as daar te veel koeie per bul is of selfs as die bul fisies ooreis is
– Wanvoeding soos onder- of oorvoeding of ongebalanseerde rantsoene
– Sielkundige faktore soos temperament, verandering in hantering, roetine of omgewing
– Siekte: soos die wat met hoë liggaamstemperatuur geassosieer word.

(slegs 5) (10)

3.6 **Voordele opgradering**
– Mees ekonomiese manier waarop kudde verbeter kan word
– Nuwe ras word geleidelik in nuwe omgewing ingelyf
– Geen spesiale kennis nodig nie
– Moontlikheid van swak voorgeslag baie gering (4)
[45]

VRAAG 4

4.1 **Funksies van water**

– Oplosmiddel vir verskillende stowwe
– Vervoermedium van opgeloste stowwe
– Temperatuur stabiliseerder
– Help met prosesse soos absorpsie, afskeiding en uitskeiding
– Noodsaaklike agens vir die meeste chemiese reaksies in plante (5)

4.2 **Tekorte aan voedingselemente**

4.2.1 sink
4.2.2 molibdeen (Mo)
4.2.3 boor
4.2.4 yster (4)

4.3 **Ureum – gebruike**

– Gebruik vir topbemesting – brand effens
– Geskik vir bemesting deur middel van mikrobesproeiing
– Gebruik vir bemesting deur blaarbesproeiing
– Toegedien in hoeveelhede 50 – 100 kg/ha (4)

4.4 4.4.1

A.	stamper	G.	ovum
B.	stempel	H.	endospermsel
C.	styl	I.	ovulum
D.	vrugbeginsel	J.	kiemsak
E.	integument	K.	antipodale selle
F.	hulpselle	L.	naelstring (12)

4.4.2
a) vroulike sel
b) sel wat voedsel vir die embrio sal verskaf
c) aanhegting
d) toekomstige saadbedekking (8)

4.5 **Dubbel bevrugting:** Een manlike gameet versmelt met die ovum om 'n sigoot te vorm. Tweede maak 'n gameet wat met die endosperm versmelt om die endosperm te vorm wat dien as voedsel vir die embrio. (4)

4.6 **Vegetatiewe voortplanting**

4.6.1 **Risoom** – verdikte ondergrondse stam wat parallel met die grondoppervlakte groei
4.6.2 **Bol** – kort, verdikte ondergrondse stam met vlesige blare waarin voedsel gestoor word
4.6.3 **Steggie** – 'n loot van die moederplant met lang takkies wat wortels vorm
4.6.4 **Uitloper** – verdikte ondergrondse stam waarin voedsel gestoor word (8)

[45]

VRAAG 5

5.1 **Grondfunksies**

- Stoor en stel water vry vir plante om te gebruik
- Verskaf lug vir respirasie van plantwortels en mikro-organismes
- Stel voedingstowwe vry aan plante
- Dien as 'n groeimedium vir plante
- Laat infiltrasie van water toe (10)

5.2 **Grondopnames**

- Lugfoto's word geneem
- Opnamegebied word besoek
- Voorlopige kartering van grond en veldtipes word gedoen en profieltoetsgate word aangedui
- Horisonte en grondvorms word geïdentifiseer
- Beskrywing van morfologiese eienskappe
- Alle inligting wat verkry is, word geïnterpreteer (6)

5.3 **Veldtipes**

- Savanne
- Bos
- Grasland
- Halfwoestyn
- Struike (5)

5.4 **Besproeiing**

5.4.1
1. Drupbesproeiing
2. Mikrobesproeiing (2)

5.4.2 **Voordele**

- Water word direk op die oes aangewend
- Steil hange kan besproei word
- Minder water is nodig
- Min arbeid is nodig
- Minder krag nodig om water te versprei
- Kan op grond met hoë en lae infiltrasietempos gebruik word (slegs 3) (3)

5.4.3 **Nadele**

- Beperkte wortelgroei
- Opbou van soute in wortelstreek
- Sproeikoppe geneig om verstop te raak
- Diepteverspreiding kan in gebreke bly ten koste van horisontale verspreiding in sandgrond
- Kan lei tot korsvorming (5)

5.5 **Wisselbou**

5.5.1 Verbouiing van verskillende oeste na mekaar op dieselfde land seisoenaal of jaarliks seisoenaal of jaarliks (1)

5.5.2 **Voordele**

- Voorkom ontstaan van siektes
- Organiese inhoud van grond word in stand gehou
- Voorkom eensydige benutting van plantvoedingstowwe
- Grondvrugbaarheid kan in stand gehou word
- Arbeid kan beter aangewend word
- Grond volkome benut as lak- en diepgewortelde oeste afgewissel word
- Risiko van oesmislukking versprei
- Twee of meer oeste kan verbou word (8)

5.6 **Vereistes vir fotosintese**

- water
- uitstralings-/hitte-/sonenergie
- $C0_2$
- Chlorofil
- geskikte temperatuur (5)

[45]

VRAAG 6

6.1

- Gebruik van plaagdoders in té hoë konsentrasies
- Aanwending van plaagdoders as die wind waai
- Onnodige aanwending van plaagdoders
- Gronderosiebesoedeling
- Verkeerde besproeiingsmetodes
- Oorbeweiding (6)

6.2 **Ekonomiese kenmerke van grond**

- Duursaamheid
- Onvernietigbaarheid
- Beperk
- Spesifieke omgewing
- Wet van dalende meer opbrengs
- Verskil met betrekking tot produksiekapasiteit
- Beskikbaarheid (7)

6.3 **Arbeidsprobleme**

Skaarsste van arbeid: vanweë meer aanloklike werksomstandighede in die stede
Kompetisie met nywerhede: die groot impak op die fisieke werksomstandighede in die stede
Kompetisie van nywerhede: die groot eis op fisieke uithouvermoë asook die lae winsgrens in die landbouindustrie is redes hoekom belowende werkers die plase verlaat en in nywerhede gaan werk
Gebrek aan opleiding: veroorsaak 'n lae vlak van behendigheid en produktiwiteit van plaaswerkers
Nywerhede: trek meestal geskoolde arbeiders, daarom word ongeskoolde arbeid as duur arbeid beskou (10)

6.4 **Bestuursvaardighede**

Tegniese vaardigheid: begrip van en in staat wees om 'n spesifieke aktiwiteit uit te voer
Menslike vaardigheid: moet met mense kan werk
Konseptuele vaardighede: vermoë om boerdery as 'n globale konsep te verstaan en weet hoe dele by mekaar pas (6)

6.5 **Bestuursbeginsels**

- Beplanning
- Organisasie
- Motivering
- Besluitneming
- Beheer (5)

6.6 **Koöperasies**

6.6.1 **Landboukundige koöperasies:** private produksievereistes aan lede so goedkoop as moontlik en verkoop hulle produkte op 'n winsgewende manier
Kommersiële verbruikers: koöperasies verskaf aan die verbruiker se behoeftes so goedkoop as moontlik (4)

6.6.2 **Beheerde bemarking**

- Stabilisering van pryse
- Verbeter produktiwiteit en doeltreffende produksieproses
- Koördineer belange van vervaardigers
- Verklein die gaping in boere se inkomste
- Verklein die gaping tussen verbruikers se pryse en vervaardigers (5)

6.6.3 **Vrye bemarking**: vervaardiger bemark sy produkte aan wie hy wil en vra die prys wat hy wil (2)

[45]

TOTAAL VIR AFDELING B: [230]

TOTAAL: 300