

## GAUTENG DEPARTMENT OF EDUCATION

## SENIOR CERTIFICATE EXAMINATION

POSSIBLE ANSWERS FOR :      AGRICULTURAL SCIENCE HG

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QUESTION 1A

1.1	C
1.2	D
1.3	B
1.4	D / C
1.5	A
1.6	A
1.7	A
1.8	C
1.9	C
1.10	A
1.11	D
1.12	A
1.13	A
1.14	C
1.15	A
1.16	B
1.17	A
1.18	C
1.19	C
1.20	D
1.21	D
1.22	D
1.23	D
1.24	C
1.25	C
1.26	D
1.27	D
1.28	A
1.29	A / D
1.30	D
1.31	D
1.32	C
1.33	B
1.34	C
1.35	A
1.36	A
1.37	C
1.38	A
1.39	B
1.40	A

40x2=[80]

## QUESTION 1B

- 1.41 Quartz
- 1.42 Haematite
- 1.43 Cohesion
- 1.44 Transpiration
- 1.45 Seepage percolation
- 1.46 Vermiculite
- 1.47 Podzolisation
- 1.48 Chloroplast
- 1.49 Parthenocarpy
- 1.50 Zygote

10x2=[20]

**QUESTION 1C**

- 1.51 (i) H  
(ii) D  
(iii) A  
(iv) E  
(v) B
- 1.52 (i) E  
(ii) H  
(iii) C  
(iv) G  
(v) A

10x2=[20]

**TOTAL FOR SECTION A: [120]****SECTION B  
QUESTION 2**

- 2.1.1 shortage oxygen – excess water  
iron compounds chemical change  
ferrous compounds are formed  
limonite present (5)
- 2.1.2 oxidation – iron compounds  
form ferric compounds  
haematite may be present (3)
- 2.1.3 little iron present  
formed out of sandstone  
low organic matter (3)



- 2.1.4 high percentage organic matter  
carbon manganese present (2)
- 2.2.1 soil is water-logged – must be drained – root crops (2)
- 2.2.2 relatively warm  
increased chemical reactions germination  
well aerated and drained (2)
- 2.2.3 soil will be drained and deep  
poor organic matter (2)
- 2.3.1 flood irrigation rapid absorption  
air in the soil pores compressed  
aggregates broken up
- 2.3.2 heavy implements – compaction  
smear action
- 2.3.3 tilling dry soil – powder aggregates if soil is wet smearing
- 2.3.4 continual cultivation – increased  
oxygen – microbe activity is stimulated  
rapid decomposition (8)
- 2.4.1 Cohesion forces between same particles  
Adhesion forces between different particles (2)
- 2.4.2 adhesion water: thin film water absorbed can only be removed by strong  
heating  
cohesion water: layer of water outside adhesion – attracted to one another by  
cohesion forces (2)
- 2.4.3 swelling water percentage cohesion water  
outside adhesion water – strongly  
attracted inaccessible to plants  
deadwater percentage adhesion water plus percentage soaking / swelling  
water (2)
- 2.4.4 wilting point: soil does not have enough accessible water for growth  
field capacity: percentage water retained by soil after irrigation and drainage (2)
- 2.5 strong forces of electrostatic attraction between soil particles and water  
molecules  
water molecules spread as a thin film  
adsorption leads to a lowering of motion energy  
more than one layer of water molecules is adsorbed  
this type of water does not move and is unavailable to plants  
the energy by which water is attracted to colloids decrease (5)  
[40]



**QUESTION 3**

- 3.1 Active acidity is caused by  $H^+$  ions in soil solution  
 Reserve acidity is caused by  $H^+$  and  $Al^{3+}$  ions adsorbed on the colloids (4)
- 3.2.1  $CO_2$  dissolves in water forms carbonic acid  
 $H_2CO_3$  dissociates into  $H^+$  and  $CO_2$   
 The  $H^+$  can replace basic ions from colloid  
 The absorbed  $H^+$  causes the soil pH to decrease.
- 3.2.2 Plant nutrients content can be changed  
 Fertilizers will dissolve and dissociate the release cations  
 cations in soil solution – replaced adsorbed cations  
 adsorbed cations serve as reserve nutrients  
 as plant roots absorb cations they are replaced
- 3.2.3 Cation can be leached out from soil during heavy rains  
 if basic cations leach – soil will acidify  
 leaching can be useful to regain the correct pH (12)
- 3.3 Continuous cultivation – good aeration will increase decomposition  
 good aerated and warm coarsely textured soils lower humus  
 warmer regions – humus lower due to increased microbe activity  
 a dense plant growth – high humus  
 cold and poor vlei conditions – organic matter accumulates  
 inclusion of rest crop – organic matter will accumulate (12)
- 3.4 water: hydrolysis – react with water forms new mineral, more porous and  
 erosive hydration – water molecules move in between platelets of minerals  
 acids: carbonic acid – makes insoluble limestone soluble  
 oxygen reacts with iron compounds become unstable  
 oxidation  
 reduction (7)
- 3.5 Master horizons are demarcated  
 diagnostic horizons are identified  
 soil form can be determined  
 series characteristics are determined  
 soil series characteristics are determined (5)  
**[40]**

**QUESTION 4**

- 4.1 solar energy activates electrons in the chlorophyll  
 activated electrons split  $H_2O$  into O and H  
 O released into atmosphere  
 H combines with NADP to form  $NADPH_2$   
 Part of energy from chlorophyll electrons used to form ATP (6)



4.2.1	Root Hairs	4.2.5	Cell division	
4.2.2	Extension region	4.2.6	Cell wall	
4.2.3	Root cap	4.2.7	Tonoplast	
4.2.4	Region for absorption	4.2.8	Vacuole	(8)

4.3.1 Macro (1)

4.3.2 Nitrates (1)

4.3.3 Plant animal microbe protein (3)

4.3.4 A wide C: N ratio of organic matter means that organic matter is poor in nitrogen while decomposing such organic matter – microbes utilise the accessible nitrogen for themselves. (2)

4.3.5 growth period lengthened – ripening delayed  
stalks weaker  
vegetative growth stimulated – production low  
plants are more susceptible to diseases (3)

4.4.1  $\frac{2}{10}$  nitrogen

$\frac{3}{10}$  phosphorus

$\frac{5}{10}$  potassium

figure in brackets percentage of nutrients per 100 kg of mixture (4)

4.4.2 Nitrogen  $\frac{2}{10}$  of 10 kg = 2 kg

X  $\frac{2}{10} \times \cancel{20}^{20} = \cancel{4}^4\%$  of 20%

Phosphorus  $\frac{3}{10}$  of 10 kg = 3 kg

X  $\frac{3}{10} \times \cancel{20}^{20} = \cancel{6}^6\%$

Potassium  $\frac{5}{10}$  of 10 kg = 5 kg

X  $\frac{5}{10} \times \cancel{20}^{20} = \cancel{10}^{10}\%$

(4)



- 4.5      The type of feed concentrates  
             more concentrates than hay  
             age of manure  
             the older manure less nitrogen  
             quantity of bedding and quality  
             straw less nitrogen  
             storage and decomposition  
             nitrogen is well stored well rated  
             farm manure is more available
- (8)  
**[40]**

### QUESTION 5

- 5.1.1    The cheapest and quickest method  
             toxic quantities near germinating  
             seeds are prevented  
             deeper root system is promoted
- (3)
- 5.1.2    before, during or after planting or sowing
- (2)
- 5.1.3    even distribution of fertiliser over the whole surface
- (2)
- |                    |            |  |
|--------------------|------------|--|
| (a) Stigma         | (f) Ovary  |  |
| (b) Style          | (g) Locule |  |
| (c) Anther         | (h) Ovule  |  |
| (d) Filament Crown | (i) Septum |  |
| (e) Petal          | (j) Sepal  |  |
- (10)



- 5.3.1 Starch-free. Develops when the endosperm is absorbed by the cotyledons and becomes enlarged starch containing. Cotyledons remain small – endosperm remains in seed. (4)
- 5.3.2 Vegetative parthenocarpy is fruit setting and development of fruit without the stimulus of pollination. Stimulative parthenocarpy is setting of fruit and further development with pollination as stimulus. (4)
- 5.4
- |                       |                     |
|-----------------------|---------------------|
| Monocotyledonous      | Dicotyledonous      |
| Absence of petals     | Bright petals       |
| Absence of pedicel    | Pedicel             |
| Absence of receptacle | Receptacle          |
| Gluma for protection  | Sepal corolla       |
| Large anthers         | Small anthers       |
| Large feathery stigma | Small sticky stigma |
- (6)
- 5.5 Grafting transfer of a part of a plant  
Budding is the transfer of a bud from a budding stem to a root stem (4)
- 5.6 Runners  
Stem tubers  
Grafted rooted cuttings  
Runners  
Root tubers  
Rhizomes (5)

[40]

**QUESTION 6**

- 6.1.1 (i) pituitary gland  
(ii) ovary  
(iii) ripe follicle  
(iv) ovum  
(v) infundibulum  
(vi) corpus luteum (6)
- 6.1.2 (a) FSH  
(b) LH  
(c) Oestrogen  
(d) Progesterone (4)



- 6.2.1 (a) LTH (1)  
 (b) Oxytocin (1)  
 (c) Alveoli (1)  
 (d) Nervous stimuli for milk  
 • to be released are  
 • washing of udder  
 • drinking action of calf  
 • sounds in milking stable

The hormone oxytocin transported from brain to udder  
 contractions force milk out  
 last five to seven minutes

(6)

- 6.2.2 (a) colostrum (1)  
 (b) yellow colour – higher nutrient content (1)  
 (c) eight week (1)  
 (d) 305 days (1)  
 (e) butter fat content lowest when lactation is at maximum (1)

- 6.3 (1) vesicular gland  
 (2) bladder  
 (3) vas deferens  
 (4) penis  
 (5) ~~mussel~~ muscle  
 (6) testis  
 (7) anus  
 (8) cowper gland  
 (9) prostate (9)

- 6.4 (1) cross breeding  
 (2) in breeding  
 (3) line breeding  
 (4) upgrading  
 (5) species crossing  
 (6) in breeding / line breeding  
 (7) in breeding (7)  
**[40]**

### QUESTION 7

- 7.1.1 parotis  
 sublingualis  
 submandibularis (3)
- 7.1.2 bile (1)
- 7.1.3 duodenum jejunum ileum (3)
- 7.1.4 caecum colon rectum (3)



- 7.2 Synthesis of amino acids – from urea  
 Microbe protein is synthesized from food by organisms  
 Synthesis of vitamins – soluble  
 Vit B complex and fat soluble  
 Vit K  
 Hydrolysis of protein in rumen by microbes to form amino acids and ammonia  
 – can be absorbed in the rumen.  
 Digestion of cellulose – cannot be hydrolyzed by the enzyme amylase  
 They secrete enzyme cellulase which hydrolyse cellulose (8)
- 7.3 Blindness in the dark  
 Deformation of the cornea  
 Bacterial infection in mucus membranes  
 Abnormal development in skeleton  
 Scaly skin  
 Lowered fertility  
 Slow growth rate (8)
- 7.4 Potential feed energy  
 ↓  
 Digestible energy  
 ↓  
 Metabolic energy  
 ↓  
 Nett energy
- energy loss in manure  
 energy loss through gases  
 energy loss through urine  
 energy loss through heat
- (8)
- 7.5 Type of plant  
 Stage when plant is cut and prepared  
 Method of hay making  
 Preparation method  
 Supplementary with NPN  
 Supplementary with energy (6)  
**[40]**

### QUESTION 8

- 8.1 Aerial photographs of the region are taken for information in connection with  
 topography, drainage  
 Survey area is visited – to indicate information such as fences, roads, etc.  
 Preliminary mapping of land and veld types is done  
 Position of profile test holes are indicated  
 Profile test holes are studied; horizons and soil forms are identified  
 Morphological properties are described  
 All acquired information is analysed (6)
- 8.2.1 Spray irrigation (1)



- 8.2.2 Wheel move system  
Travelling sprinkler system  
Rain circle system  
Centre pivot system  
Conventional spray system (5)
- 8.2.3 Highly permeable soil  
On shallow soil with low water capacity where uniform application is essential  
Soil where the surface is undulating with steep inclinations  
Stream of water too weak for flood  
Land with different infiltration rates  
Cooling must be done  
Small amounts of water per irrigation are needed  
Labour problems (6)
- 8.3 Combat disease organisms – harmful insects  
Organic content of soil is maintained  
Continuous cultivation leads to a reduction  
Prevent one sided utilisation of plant nutrients  
Certain crops are heavy feeders  
Soil fertility can be maintained  
Soil exhausting must be alternated with soil improving crops  
Two or more crops can be cultivated  
Soil can be fully utilised  
Labour is better utilised – slack periods  
Risk of crop failures are spread (8)
- 8.4 Perishability of products  
Cheap products needs more space (hay)  
Seasonal fluctuations  
Standardisation  
Marketing through middleman  
Produce over a long term  
Large number of producers  
Some products produce only certain areas (8)
- 8.5 Availability is limited  
Differ to its production capacity  
Soil is durable  
Soil is indestructible  
Good soil is limited  
Found in specific environment  
Subject to the law of diminishing returns (6)
- [40]**

**TOTAL FOR SECTION B: [280]**

**TOTAL: 400**