

GAUTENG DEPARTMENT OF EDUCATION

SENIOR CERTIFICATE EXAMINATION

AGRICULTURAL SCIENCE HG

QUESTION 1A

1.1	D	1.16	D
1.2	D	1.17	D
1.3	C	1.18	A
1.4	A	1.19	B
1.5	C	1.20	C
1.6	B	1.21	A
1.7	B	1.22	A
1.8	A	1.23	A
1.9	C	1.24	B
1.10	C	1.25	D
1.11	C	1.26	A
1.12	C	1.27	C
1.13	B	1.28	D
1.14	D	1.29	C
1.15	A	1.30	D

30x2=[60]

QUESTION 1B

- 1.31.1 25° C
- 1.31.2 Bulk density (Massadigtheid)
- 1.31.3 Keratomalaise
- 1.31.4 Peristalse / Peristalsis (E)
- 1.31.5 Carotenoids
- 1.31.6 Leaf application
- 1.31.7 Succession
- 1.31.8 Climate
- 1.31.9 Floor
- 1.31.10 Credit

10x2=[20]

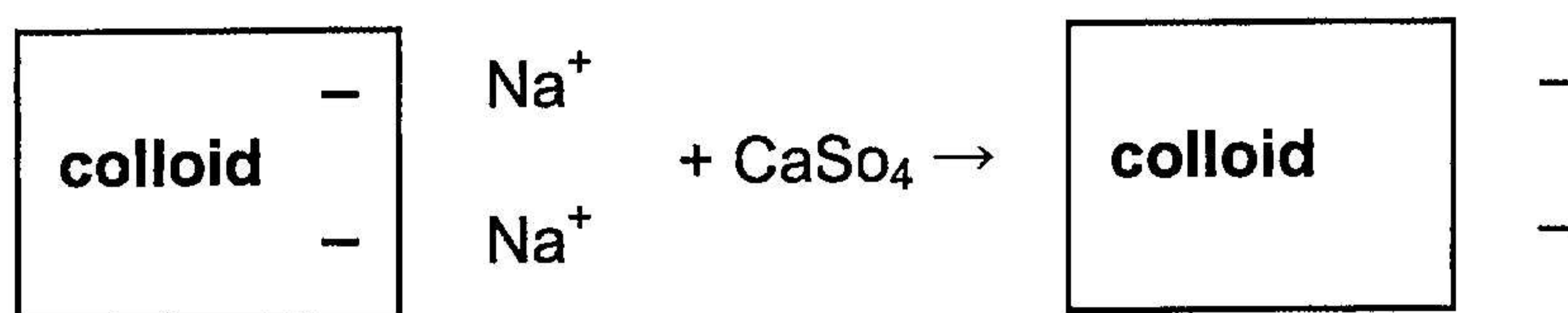
- 1.32.1 Silt
- 1.32.2 Soil profile
- 1.32.3 Water capacity
- 1.32.4 Digestible energy
- 1.32.5 Nutritive ratio
- 1.32.6 Broad application
- 1.32.7 Multiple fruits
- 1.32.8 Freemartin
- 1.32.9 Monoculture
- 1.32.10 Overcapitalisation 10x2=[20]

SECTION B

QUESTION 2

- 2.1 Flood irrigation – air compressed and aggregates are broken up
Rain drops batter aggregates and break them up – soil compaction
Ploughing – weaken structure smearing
Cultivation increases rate of decay of organic matter – deterioration of structure
Soil tilled too dry – powdered and destroyed aggregates. (8)
- 2.2 O – upper layer, fresh and partly decomposed organic material
A – close to soil surface, mineral particles mixed with decayed organic material
B – concentration of clay, presence of oxides of iron and aluminium
C – unconsolidated material, includes weathered rock
R – solid rock (13)
- 2.3 Water molecules are electrically neutral
Electrical molecules are unequally distributed
Water molecules strongly polar and attracting one another
Soil particles become electrically charged by induction
Strong force of electrostatic attraction occurs between particles
Process known as adsorption of water
Leads to a lowering of the motion energy of the water molecule (8)
- 2.4 Active acidity represented by H^+ ions in the soil solution
Reserve acidity represented by H^+ and Al^{3+} which are adsorbed on the soil colloids. (4)

2.5



Na_2SO_4 is soluble – leached out together with other excess salts.

(7)

2.6

Soils which are regularly cultivated – rapid decay of humus
 Sandy soils warmer – humus content lower
 Warmer regions humus quantity much lower than colder regions
 Favourable climatic conditions – more dense the plant cover, higher the humus
 Under vlei conditions soil microbes are affected – organic matter accumulates- darker
 Inclusion of a perennial rest crop, leads to the accumulation of humus

(10)
[50]

QUESTION 3

3.1.1

- A oesophagus
- B crop
- C proventriculus
- D gizzard
- E caeca
- F intestine
- G colon
- H cloaca

(8)

3.1.2

- (a) C. proventriculus
- (b) F. small intestine
- (c) D. gizzard
- (d) B. crop
- (e) F. intestine

(5)

3.1.3

Antiseptic
 Activates pepsinogen
 Creates a passive medium rennin, pepsin
 Change polysaccharide sucrose to glucose and fructose

(5)

3.2

Digestion of cellulose – chain-like polysaccharide – main constituent of cell walls – cellulose cannot be hydrolysed by amylase – cellulolytic bacteria secrete cellulase which can hydrolyse cellulose

Synthesis amino acids – building block of protein – necessary for growth – production – ruminant can synthesize all essential as well as non essential amino acids – NPN can be used

Hydrolysis of proteins – large quantity of protein is changed by rumen microbes to amino acids – and simpler nitrogen compounds – ammonia

Synthesis of vitamins – vitamins are organic compounds – function as catalysts. Vit. K and B complex are synthesized by micro organisms. (9)

3.3 Night blindness
Keratomalaise
Lowered resistance against bacterial infection
Normal development of skeleton
Changes in bone formation
Lowered fertility
Degeneration of the nervous system
Retardation in the normal growth
Anorexia (8)

3.4 24 kg – 12 % moisture
 $\frac{24}{100} \times \frac{12}{1} = 2,88$
24 – 2,88 = 21,12 kg DM

10 kg – 25 %
 $\frac{10}{100} \times \frac{25}{1} = 2,5$
10 – 2,5 kg = 7,5 kg Dmis
21,12 – 7,5 kg = 13,62 kg

13,62 kg of 21,12 = 64,4 % (8)

3.5 Composition of the feed
Composition of the ration
Preparation of the feed
Type of animal
Quantity of feed
Age of the plant
Individuality (7)
[50]

QUESTION 4

4.1 Spermatogonium (2n)
Primary spermatocyte zn
First meiotic division
Secondary spermatocytes
Second meiotic division
Spermatids
Sperm (7)

- 4.2 A Ovary
B Rectum
C Anus
D Fallopian tube
E Cervix
F Vulva
G Vagina
H Uterine body
I Uterine horn
J Bladder (10)
- 4.3 Pro-estrus – preparations are made for the following oestrus (3)
characterised by the development of the Graafian Follicles (3)
Oestrus – sexual activity – mating
Met-oestrus – ripe ovum is released (3)
preparation for pregnancy finalised
Di-estrus – rest period – animal sexually inactive, corpus luteum develop fully (3) (12)
- 4.4.1 Leads to groups of animals coming into oestrus at the same time as being inseminated simultaneously (1)
- 4.4.2 Removal of the corpus luteum
Administering of progesterone
Administering of oestrogen
Administering of gonadotropic hormones (4)
- 4.4.3 Cows come into oestrus at the same time
Simplifies AI
Leads to a greater uniformity
Simplifies management (4)
- 4.5 Infection
Malnutrition
Injudicious administration
Defects of the ovum
Congenital defects
Hormone disturbances
Severe disturbances such as transport
Climatic factors (5)
- 4.6 Mating diseases may be transmitted
A bull of which the progeny test is not yet known
Careless handling of semen – unsatisfactory results
Cows can be injured
Often limited choice of bulls
Inbreeding may occur
Greater management demands
Difficult to inseminate certain heifers (7)

[50]

QUESTION 5

- 5.1 The chlorophyll pigment – necessary to absorb the sun's radiant
Sufficient sunlight – primary source of all energy
Suitable temperature – photosynthesis is controlled by enzymes
environmental temperature of great importance
Enough carbon dioxide present – the higher the concentration, the c – for
carbohydrates
greater the tempo of photosynthesis
Optimal soil moisture conditions – water molecules are split – also
necessary for plants physiological processes (10)
- 5.2.1 Mono-calcium phosphate Most
Di-calcium phosphate
Tri-calcium phosphate Less (6)
- 5.2.2 (a) 6,5 to 7,5 (1)
(b) very alkaline soil inaccessible as well as low pH and high Fe. (3)
(c) Makes it inaccessible in a very acid soil-iron occurs in a soluble form.
Phosphorus reacts with iron to become very inaccessible. (3)
(d) During the decomposition of organic matter, the phosphorus
compounds are assimilated by the microbes. In this form they are
temporarily inaccessible also acids are formed - p more accessible. (2)
- 5.3.1 Limestone ammonium nitrate (1)
- 5.3.2 Percentage of nitrogen present (1)
- 5.3.3 Nitrate anion (NO_3^-) available
Ammonium cation NH_4^+ adsorbed (2)
- 5.3.4 (a) spread over whole surface
(b) after plants have germinated during sowing
(c) with seed
(d) to neutralise the acid (4)
- 5.3.5 Urea (2)
- 5.4 In the case of white brack osmosis is badly affected – normal absorption of
water cannot take place
Concentration of salts may also be so high – can be toxic
Case of alkaline soil – the soil is structureless – dry soil is hard
Wet soil changes into muddy conditions
Because of the bad aeration of alkaline brack soils microbial activity takes
place very slowly
Denitrification will take place – harmful to plants (10)

- 5.5 Organic fraction in the soil will be increased
 Contains all three main nutrients
 Important source of reserve nitrogen
 Increase the organic colloid
 Provides CO₂ to microbes – numbers will increase.

(5)
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QUESTION 6

- 6.1 A pollen grain
 B pollen tube
 C male gametes
 D vegetative nucleus
 E integument
 F auxiliary cells
 G ovum
 H endosperm cell
 I ovule
 J germ sac

(10)

- 6.2 The floral covers of the wheat flowers perform the same function as the sepals of the dicotyledonous flower, i.e. protective
 The petal crown or corolla is totally absent, wheat flower is either self or wind-pollinated
 Anthers of the wheat flower are much larger – contain a tremendous quantity of pollen
 Stigma of the wheat flower is feathery – to provide a larger surface for pollen grains

(8)

- 6.3 Rhizomes
 Bulbs
 Cuttings or slips
 Runners
 Tubers
 Grafting
 Budding

(6)

- 6.4 Soil stores and releases water, the property of soil varies from sandy soil little water retention to clay soil great water retention.
 Allows air movement – respiration for plant roots and micro organisms – the total quantity and size of the pores determine the air movement.
 Releases plant nutrients to plant, determined by the concentration of adsorbed cations
 Serves as a growth medium for plants – plant roots can spread to serve as an anchor

(8)

- 6.5 Determine the capacity of the soil under cultivation
 Determine how much water the irrigation system can deliver in mm per hour
 Moisten soil till veld capacity is reached
 Set up an evaporation pan in the vicinity of the land-samp climatic conditions
 Read the evaporation pan level every third day
 When $\pm 75\%$ of the soil veld capacity has been reached, supplementary irrigation can be given (6)
- 6.6 The topography
 Quantity of water
 Infiltration tempo of the soil
 The type of crop which will be cultivated
 Method of cultivation which will be utilised (6)
- 6.7 **Advantages**
 Labour-saving
 Vegetative growth of plants better correlated
 Weed and pest control are made easier
 Water saving (4)
- Disadvantages**
 Blockages often occur
 Insufficient moisture distribution may occur in coarse-textured soils (2)
- [50]

QUESTION 7

- 7.1 Seedbed preparation – loose open subsoil – crumbly soil surface
 Cultivation of the crop during the growing season – encourage water infiltration – encourage soil aeration
 General weed control – saving moisture and plant nutrients
 Introduction of organic material – crop remains and organic fertilisers are mixed
 Introduction of other fertilisers – this is done where the fertilisers are not soluble in water (12)
- 7.2 Combat diseases
 Maintenance of a high organic fraction
 Prevents one-sided utilisation of plant nutrients
 Is a more economical way of maintaining soil fertility
 Two or more crops
 Different root depths, better utilisation of the soil in general
 Decreases slack periods
 Distributes the risk of crop failures (8)

- 7.3 Availability is limited
Soils differs with respect to production
Soil is durable
Soil is indestructible
Good agricultural soil is limited
Found in a specific environment
Subject to the law of diminishing returns (5)
- 7.4 Capital is scarce
Subject to a very high risk
Over-capitalisation
Under-capitalisation
High interest rates (7)
- 7.5 Method of anticipating change
Focuses on the aims and objectives
A lack of planning
Prevent the farming activities from functioning smoothly
Inefficiency becomes more obvious
Objectives and standards are set
Improves the entrepreneur's insight (6)
- 7.6 System must be adaptable
Should make provision for any deviation
Must be flexible
Must be economical in terms of time and money
Must be simple and clear to understand
Must lead to corrective action (6)
- 7.7 Perishability
Large volume – low unit value
Standardisation
Seasonal fluctuations
Often locality restricted
Middlemen are usually required
Production over long term
Co-ordinated action by producers (6)

[50]

TOTAL: 400