

POSSIBLE ANSWERS FOR:

AGRICULTURAL SCIENCE HG

SECTION A**QUESTION 1 A
MULTIPLE-CHOICE QUESTIONS**

- | | | |
|-----|------------|--------|
| 1.1 | 1.1.1 D | 1.21 A |
| | 1.1.2 B | 1.22 A |
| | 1.1.3 A | 1.23 A |
| | 1.1.4 C | 1.24 B |
| | 1.1.5 A | 1.25 D |
| | 1.1.6 C | 1.26 B |
| | 1.1.7 A | 1.27 D |
| | 1.1.8 C | 1.28 C |
| | 1.1.9 A | 1.29 D |
| | 1.1.10 B/C | 1.30 A |
| | 1.1.11 A | |
| | 1.1.12 A | |
| | 1.1.13 A | |
| | 1.1.14 B | |
| | 1.1.15 D | |
| | 1.1.16 B | |
| | 1.1.17 D | |
| | 1.1.18 C | |
| | 1.1.19 D | |
| | 1.1.20 A | |

30x2=(60)

QUESTION 1 B

- | | |
|-----|---------------------------------|
| 1.2 | 1.2.1 Cohesion |
| | 1.2.2 Carbonic acid |
| | 1.2.3 Vermiculite |
| | 1.2.4 Cardiac opening |
| | 1.2.5 Iodene |
| | 1.2.6 Homothermic (Warmblooded) |
| | 1.2.7 Polyzigotic/Non-identical |
| | 1.2.8 Mitosis |
| | 1.2.9 Chloroplast |
| | 1.2.10 Cropfactor |

10x2=(20)

QUESTION 1 C

- 1.3.1 L Use on sandy acid soil
- 1.3.2 G Leafspraying
- 1.3.3 A Gass and liquid
- 1.3.4 E Small leaf disease
- 1.3.5 I Leaves curl
- 1.3.6 B Saucer leaf disease
- 1.3.7 K Green V pattern on base of leaves
- 1.3.8 J Boiling water disease
- 1.3.9 H Reserve fertiliser for orchards
- 1.3.10 C 46% N.

10X2(20)

SECTION B**QUESTION 2**

- 2.1.1 (i) O
(ii) R
(iii) Subsoil
(iv) Substrata
(v) Solum (5)
- 2.1.2 climate
vegetation
topography
man cultivation - tilling [4]
- 2.1.3 (a) young soil
eroded soil
wet soil (6)
- 2.1.4 B
Clay may be washed from the A-horizont to the B-horizont
B has a finer texture
Vegetation enrich A with humus
can lead to crumb structure
Continuous soil cultivation or tilage can form a plough layer in B (5)
- 2.2 Soil moisture
- 2.2.1 Adhesion – adsorbed – by soil colloids
soaking water – out of rich for the plant roots
Free water – macro-pores are filled with water not enough air – roots can therefore not function normally.
- 2.2.2 Guard against ex ensure nitrogen fertilization – they will develop a very large number of leaves and therefore a large leaf surface. Select cultivars with a low transpiration ratio – they require a small quantity of water.
Choose cultivars with a very short growing season – use less water.
Eradicate weeds – weeds use water (8)

- 2.3 Seeds germinate quicker. Optimum growth and production of crops take place at a temperature of 25° C. Warm soils deliver early crops and cold soils late crops. Morning sun has a great influence on the ripening process of crops. Avoid southern slopes – frost damage. Soil microbes prefer soil temperatures of 25° C. High temperatures activate the soil microbes – destroy organic matter. High temperature – quicker chemical reaction. At high temperature soil water will dissolve more plant nutrients. High evaporation at a high temperature. (8)
- 2.4 Workers
- 2.4.1 Physical planning of the farming activity. Economic planning of the farming activity. Planning of the production process. Daily planning. Supervision. Efficient mechanisation. Adequate living conditions. Training. (8)
- 2.5.1 Ca (2)
- 2.5.2 Will go higher (2)
- 2.5.3 To apply agricultural lime (2)
- 2.5.4 Rainy season (just before) (2)
- 2.5.5 Too much water, leaching out of basic substances. (2)
- [60]

QUESTION 3

- 3.1 Reproduction
- 3.1.1 (a) uterushom
(b) Caruncle
(c) uterine body
(d) Fallopian tube
(e) Ovary
(f) Ceruks
(g) Fornix
(h) vagina
(i) Urethral or ifice
(j) bladder opening
(k) clitorus
(l) Vulva. (12)
- 3.1.2 Ampulla in the Fallipian tube. (2)
- 3.1.3 progesterone (2)
- 3.1.4 11 days (2)
- 3.1.5 Abdominal
diaphragm
uterus (3)
- 3.1.6 Relaxin (2)

- 3.2 Capital
- 3.2.1 Produced goods or equipment which can be utilised for further production (2)
- 3.2.2 Fixed capital – land buildings, dams, kraals
Movable and livestock implements
Working or floating. Feed fertiliser. Fuel.
Fixed – permanent nature
Movable – medium term
Working – required for the actual production process (6)
- 3.2.3 (i) Capital is scarce. The capital yield of farming is usually low. A large capital investment is required for farming. There is a great demand for capital.
- (ii) Farming capital is subject to a very high risk. Agricultural production is based on biological production. It is subject to a very high income risk.
- (iii) Over-capitalisation. Too much capital is invested in relation to the other production factors.
- (iv) Under-capitalisation. The production factors are not optimally utilised. (8)
- hydrolysis of protein in fodder mostly takes place in the rumen by microbes to form amino acids and simpler nitrogen compounds like ammonia
 - ammonia can be absorbed in the rumen or used by microbes for the forming of new amino acids and cell proteins. (9)
- 3.3 Natural pastures
- 3.3.1 Scrub (Fynbos or Macchia)
Forest types
Savannah
Grasslands
Semi-desert (5)
- 3.3.2 Maximum animal production may be ensured – without affecting plant cover detrimentally.
Soundveld – management aims at the stabilisation of the natural vegetation. A sound knowledge of vegetation is necessary. This includes a knowledge of plant succession. Of the reaction of vegetation to grazing and of the growth processes and live cycles of the plants. A compromise between the requirements of the plant and those of the animal must be achieved. There must be a pattern of intermittent rest periods. Animals must be rotated. (7)
- 3.4 Efficient preventative measure against diseases (1) It causes a decrease in the accuracy of the other diseases of the sexual organs. Many cows can be served (1). Economical breeding method. (1) Variety of bulls may be used (1) Increases the commercial value of herd. (1) Because mating diseases are eliminated the calving percentage is better. (1) Overseas bulls can be used. (1) Seed can be frozen and be used after his death. (1)

QUESTION 4

- 4.1.1 (a) Oesophagus
 (b) Rumen
 (c) Omasums
 (d) Reticulum
 (e) Small intestine Duoderum.
 (f) Abomosum (6)

4.1.2 Abomasum and Omasum (4)

4.1.3 Cellulose is a chain-like polysaccharide. Cellulose consist of B glucose building blocks. (1) It therefore cannot be hydrolysed by the enzyme amylase and therefore it can not be digested by farm animals. The cellulytic bacteria secrete (1) the enzyme cellulose (1) which can hydrolyse between 50 and 80% of the cellulose (1). It is broken down to volatile fatty acids and gasses. (1) The longest part of the volatile fatty acids are directly absorbed by the blood vessels in the wall of the rumen reticulum and omasum. (1) (8)

4.1.4 Tripsinogen
 Enterokinase
 Erepsin (2)

- 4.1.5 (a) glucose (1)
 (b) fatty acids and glycerol (2)
 (c) aminoacids (1)

4.2 Preservation of plant material (1). The soluble carbohydrates found in the plant material will be fermented. (1) Can be kept for virtually unlimited time (1). Tasty and palatable (1). Virtually any crop can be silaged. Exposure to air for long periods lowers the value of silage. Mouldy silage must not be fed. Protein-rich materials does not make good silage. Silage is bulky very digestible. (10)

$$4.3 \quad NR = 1: \frac{\% \text{ digestable non nitrogen substances}}{\% \text{ digestible proteins}}$$

$$1: \frac{72}{12}$$

$$1: 6$$

Not wide or narrow (5)

4.4 Marketing

4.4.1 The exceptionally low prices which were received during the depression years.

- 4.4.2 At least 75% of all the members in a particular area are members of a particular co-operative. A co-operative acts as an agent for it's members. Co-operative may also act as gents on behalf of one or other Control Board. Capital which is required is proved. (2)
- 4.4.3 Stabilising of the price. Limitation of the growing gap between income of farmers and that of other group. Narrowing the gap between producer prices and consumer prices. Co-ordinating the interests of all concern. Improve productivity. (4)
- 4.5 Breeding
- 4.5.1 Tends to lower the viability of the progeny. (1) Undesirable genes are made homozygotic. (1) Undesirable characteristics may be established. (1) Can gives rise to defective animals. (1) Only expert can apply this system. (1) The constitution, production and fertility of animals are sometimes effected. (1) (7)
- 4.5.2 Heteroses or hybrid power is derived. (2)
- 4.5.3 It helps to uncover undesirable recessive characteristics. It fostern uniform families. It increases hereditary. It increases the number of homzygotic gene pairs. (4)
- [60]

QUESTION 5

- 5.1.1 Urea
- 5.1.2 Potassium sulphate.
- 5.1.3 LAN
- 5.1.4 Dolomatic agricultural lime.
- 5.1.5 Supperphosphate
- 5.1.6 LAN
- 5.1.7 Urea
- 5.2 Alkaline soil
- 5.2.1 Black colour of soil. White salt precipitate on the clods. Signs of chlorosis. Strongly developed column structure. After irrigation water remains on soil surface. Wet soil is slippery and muddy. (4)
- 5.2.2 The cause of the brack must be removed if still possible. Installed drainage ditches or pipes. Apply gypsum if the sodium is predominantly adsorbed on the soil colloid. Flood soil with water to leached out Na_2SO_4 . Establish brack resistant crops. (6)

- 5.3 The slope of the land and the direction in which its slopes both exert a considerable influence on the soil temperature. The more vertical the sun's rays striking the soil surface, the more heat energy that surface receives. The heat is concentrated on a smaller area. Ground with a northerly slope will therefore receive a greater number of rays from the sun. Most of the ground in South Africa receives their sun rays from a northern direction. Seed will germinate quicker. Growth is faster. Morning sun has a great influence on the ripening process of crops.

(10)

- 5.4.1 Dry material = $100 - 10\% = 90\%$
 $15 \text{ kg} \times 90$
 $= 13,5 \text{ kg}$ (5)
- 5.4.2 Less soluble than urea and for this reason it is completely safe. (2)
- 5.4.3 During winter. No green grass that contains Vit. A. (2)
- 5.4.4 Liver (2)
- 5.4.5 Night blindness. Keratomolaise. Lowered resistance against bacterial infections. Normal development of the skeleton will be influenced. Weakness in muscular co-ordination. Lowered fertility. Degeneration of the nervous system. Loss of appetite. Retardation in the normal growth. (4)
- 5.5.1 Contain a large number of simple pistils on the same receptacle. Each pistil develops into its own independent fruit – large number of fruit on one fruit stalk. Each fruit has its own seed e.g. strawberries, raspberries.
- 5.5.2 Formed from an inflorescence. The collection of fruits then grows into one single fruit. Pineapples – figs. (10)
[50]
- 5.5.3 Fruits which develop not only from the ripened ovary – but also from other developed structures. In the case of the apple the receptacle is involved. It can also be part of the pedicel as in the case of the pear.

QUESTION 6

- 6.1.1 Sulphur. (2)
- 6.1.2 Iron. (2)
- 6.1.3 Iodine. (2)
- 6.1.4 Magnesium. (2)
- 6.1.5 Zinc. (2)
[10]
- 6.2 Plant-reproduction
- 6.2.2 A. Stigma
- B. Anther.
- C. Style
- D. Filament crown.
- E. Petal-corolla.
- F. Ovary
- G. Locule
- H. Ovule
- I. Sepal corolla
- J. Septum
- K. Receptal
- L. Pedicel (12)

6.2.2 The vegetative nucleus controls the growth direction of the pollen tube. The generative nuclei each divide into two to form two male gametes. One male gamete combines with ovum to form zygote. The other male gamete combines with the endospermic cell. (4)

6.2.3 If the cotyledons absorb all the endosperms during the development of the embryo, then the cotyledons will be very large. This is known as starch free seed because the seed contains no starch. Where the cotyledons do not absorb all the endosperm of starch, the rest of the seed will still contain endosperm or starch. (4)
[40]

- water is applied directly to crops
- it can be used on soils with high or low infiltration rates
- steep slopes can be irrigated
- brackish soil and saline water may be used
- less water is needed and little labour required
- fertilisers, insecticides and herbicides can be added to the irrigation water
- less energy is required to distribute the water (5)

6.3. Farm manure

6.3.1 Farm manure usually contains all three main nutrients elements. (1) Virtually all the other macro-elements and the most important micro-elements (1). It contains a lot of protein. (1) It is also an important source of reserve nitrogen. The increased organic fraction also increases the organic colloid. (1) The adsorption capacity CAC of the soil increases. (1) More nutrients will be adsorbed. (6)

6.3.2 It is determined by

- (a) The degree of decomposition of the manure. Well decomposed farm manure nitrogen will be form more accessible.
- (b) The C:N ratio of the bedding in the manure. The wider the C:N ratio the longer it will take to decompose. The nitrogen therefore remains longer in the inaccessible form. (4)
[10]

6.4 Plant nutrition

- 6.4.1 (a) The 2:1 type of clay such as vermiculite and illite can adsorb potassium ions (K^+) in large quantities. This potassium is released from the clays quite readily. The 1:1 type of clay – kaolinite clays will absorb very few K^+ ions.
- (b) In very acidic soils the potassium ions are held more strongly and will therefore be much less accessible. (6)

- 6.4.2 (a) Organic matter which is poor in nitrogen gives rise to the assimilation of all the accessible nitrogen in the soil. The soil microbes decomposed this material, they utilise the accessible nitrogen for themselves. Nitrogen hunger occurs. The wider the C:N ratio the longer this period will be. (3)
- (b) The organic source of nitrogen must first be changed by microbes to ammonium and nitrate forms. Micro activity in turn is strongly influenced by environmental factors. Soil pH air and moisture. (3)
- (c) Ammonium ions are adsorbed on the soil colloids, and are less accessible to plant roots. Clay soil with a high clay colloid content will have an ammonium-nitrogen content which is less accessible. (3)
- [15]
- 6.5 Use of pesticides in to high concentrations. (1) Injudicious application of pesticides. (1) Unnecessary application of pesticides. (1) Soil erosion, pollution of water. (1) Through wrong irrigation practices. (1) Over-gracing. (1) (5)
- [60]