**443/1**

**AGRICULTURE**

**PAPER 1**

**LANJET EXAMINATION (2021)**

**Kenya certificate of Secondary Education (K.C.S.E)**

**MARKING SCHEME**

**SECTION A (30 Marks)**

1. Ways in which agriculture promotes industrial growth in Kenya. (1 mark)

* ***Provides market for industrial goods.***
* ***Provides capital for industrial growth.***
* ***Provides raw materials for industries.***

2. Factors considered when choosing a farming system (2mks)

* ***Aims/objectives of a farmer***
* ***Environmental factors of soil type***
* ***Farmers knowledge and skills concerning enterprise***
* ***Availability of resources of : labour, capital***
* ***Cultural factors***
* ***Government policy***
* ***Market availability***

1. Natural factors that encourage soil erosion (2mks)

* ***Steepness of the slope***
* ***Rainfall amount***
* ***Type soil***
* ***Size of watershed/ size of catchment area***
* ***Rainfall intensity***
* ***Length of slope***
* ***Bareness of soil***
* ***Prevalence of strong winds***
* ***Soil depth***

4. Four ways in which soil is deprived of its fertility. (2 marks)

* ***Monocropping / monoculture.***
* ***Continuous cropping***
* ***Change of soil PH***
* ***Accumulation of salts.***
* ***Burning.***
* ***Leaching***

5. Four factors considered when selecting a site for a tomato nursery bed. (2 marks)

* ***Nearness to a source of water.***
* ***Well drained deep fertile soil.***
* ***Gentle slope.***
* ***Previous cropping.***
* ***Secure place.***
* ***Accessibility***
* ***Sheltered but not shaded.***

6. F**our** reasons for intercropping. (2 marks)

* + - ***Maximise production;***
    - ***Maximise utilization of nutrients in the soil;***
    - ***Control weeds;***
    - ***Control pests/diseases;***
    - ***Diversification’/spread risks***
    - ***Maximise labour utilisation/save costs on labour.***
    - ***Improve soil fertility if legumes are included.***
    - ***Maximise utilisation of land.***
    - ***Conserve soil/water (cover cropping);***

7. F**our** advantages of intensive farming. (2 marks)

* + - * ***Increases production per unit area;***
      * ***Farm supervision is easy;***
      * ***Maximises utilization of available land;***
      * ***Ideal for densely populated areas/small land holdings;***
      * ***Utilizes technology to increase production.***

**8**. F**our** reasons why land should be prepared early in readiness for planting. (2 marks)

* ***Allow time for weeds to dry and decompose;***
* ***Allow for proper soil aeration;***
* ***Allow timely planting / subsequent operations;***
* ***Allow time for soil clods to disintegrate/soften.***

9. F**our** reasons for deep ploughing during land preparation. (2 marks)

* ***Facilitates aeration;***
* ***Facilitates drainage;***
* ***Breaks hard pans/facilitates water infiltration;***
* ***Bring up previously leached nutrients;***
* ***Facilitate development of deep rooted crops;***
* ***Expose lower soil layers to weathering;***
* ***Expose soil borne pests and disease agents.***
* ***Remove deeply rooted weeds.***

10 Two reasons for conserving forage crops. (1mk)

* ***To avoid wastage in times of planting***
* ***To ensure enough supply throughout the year***
* ***To earn income from selling excess forage***
* ***To ensure good utilization of land.***

11. Two types of labour records kept in the farm. (1mk)

* ***Master roll***
* ***Labour utilization analysis record***

12. Two ways in which mulch control the soil erosion. (1mk)

* ***Reduce speed of surface run – off***
* ***Insulates the soil reducing direct conduct between the soil and the agents of erosion.***

13. a) Define the following terms as used in soil fertility (2mks)

1. Macro-nutrients

* ***Macro-nutrients are nutrients required by plants in large quantities***

1. Micro-nutrients

* ***Micro- nutrients are nutrients required by plants in small quantities***

b) Roles of nitrogen as a macro-nutrient in plant nutrition (2mks)

* ***Protein formation***
* ***Forms part of chlorophyll molecule***
* ***Encourages vegetation growth***
* ***Increases size of grains/ increases yields***
* ***Regulates availability of phosphorus and potassium in plants***

c) Methods that can be used to detect nutrient deficiency in crops (2mks)

* ***Observing deficiency symptoms***
* ***Analysis of plant parts***
* ***Soil analysis/ soil testing***

d) Two ionic forms through which element nitrogen is absorbed by plants (2mks)

* ***Nitrate form/ NO3***
* ***NH4+ /Ammonium ion***

14. Factors considered when classifying crop pests (2mks)

* ***Crop attacked /mode of felling***
* ***Whether field /storage pest/stage of attack***
* ***Crop part attacked***
* ***Science classification e.g. insect mite, rodent***

**SECTION B (20 Marks)**

15. (a)Identify the production function curves labelled**A** and**B**. (2 marks)

**A** ***Increasing returns production function curve***

**B *Constant returns production function curve***

(b) What does the law derived from the production function labelled**C** state? (1 mark)

***The Law of diminishing returns.***

***If successive units of one variable input are added to fixed quantities of other inputs, a***

***point is reached where additional (marginal/extra) product per additional unit of input declines.***

(c) (i)Which**one** of the three production function curves is rare in Agriculture? (1mk)

***B***

(ii)Give a reason for your answer in (c)(i) above. (1 mark)

***Other factors influence / limit agriculture production.***

16.

1. Name the types of grafting labeled A and C above. (2 marks)

A ***Side grafting***

C ***Whip / tongue grafting***

1. Name any two crops propagated by method C. (2 marks)

* ***Pear.***
* ***Plum.***
* ***Avocado.***
* ***Citrus spp***

1. Give any two tools or materials used in propagation method C. (2 marks)

* ***Budding knife.***
* ***Grafting tape.***
* ***Grafting wax.***

1. Give four advantages of using grafting as a method of improving avocado fruits. (2mks)

* ***Plants mature early***
* ***It is possible to produce crops that would otherwise not be propagated through other means like use of seeds***
* ***It is possible to use root stock with certain beneficial traits such as drought and disease resistance.***
* ***More than one type of plant variety can be produced on the same rootstock***
* ***It makes possible to repair damaged plant parts,***
* ***Crop variety obtained may have higher /more desirable qualities in terms of taste and size.***

17. Calculate the plant population in a 5.4 hectare plot of a bean crop planted at the spacing 45cm x 20cm.

Assume one plant per hole. (4 marks)

***Plant population = Area of land***

***Spacing***

***1 ha = 10000m2***

***5.4 ha = 54000m2***

***= 54000m2***

***0.45 x 0.2m***

***= 600,000 bean plants.***

**18.**

1. Identify the feature that the diagram above represents in the study of soil (1mk)

* ***Soil profile***

1. What is the name given to the part labeled p(1mk)

* ***Transitional Zone***

1. Give a reason why part b is also referred to as layer of accumulation (1mk)

* ***This is the soil horizon in which the leached nutrients accumulate***

**SECTION C (40 Marks)**

18. a) Explain ten ways in which the Kenyan government can improve maize production to ensure food security in the country. (10mks)

* + - ***Farmers training on improved methods of maize production***
    - ***Provision of extensive services to advice farmers on modern maize production, techniques***
    - ***Provision of subsidies on maize inputs***
    - ***Provision of credit facilities e.g. AFC***
    - ***Imposing high taxation on imported maize and maize products to discourage importation***
    - ***Quality control to ensure production of high quality maize that can attract foreign market.***
    - ***Supporting research into new and improved varieties of maize for high yields***
    - ***Farm input supplies***
    - ***Provision of marketing services***
    - ***Provision of drying and storage facilities***
    - ***Provision of tractor hire services***
    - ***Ensuing effective pest/ disease/ weed control***

b) Explain five ways in which soil fertility can be maintained. (6 mks)

* ***Adding manure to the soil to enrich it with nutrients.***
* ***Using inorganic fertilizers which release nutrients in forms that are readily available to plants.***
* ***Practicing crop rotation to ensure balanced nutrients use.***
* ***Using appropriate tillage, for instance minimum tillage.***
* ***Regulating soil PH though liming***
* ***Controlling soil erosion***
* ***Practicing a forestation and reforestation***
* ***By irrigation which increases availability and uptake of plant nutrients and reclaims saline soil***
* ***through mulching***
* ***By weeding to reduce competition for nutrients.***
* ***By practicing inter cropping preferably with legume to enhance nitrogen fixation.***

c) Highlight four reasons for pruning coffee (4mks)

* ***To train the plant so that it can have the required shape***
* ***To remove the diseased and the unwanted parts of a plant such as extra suckers, leaves, branches, flowers or even stems***
* ***To control cropping***
* ***To facilitate picking***
* ***For ease penetration of the spray***
* ***To control pest and diseases.***

**19**. (a)Explain**eight** cultural methods of soil and water conservation. (8 marks)

* ***Grass/Filter strips:- reduce speed of flowing water/filter soil;***
  + - ***Cover cropping:- prevents surface flow/reduces impact of rain drops/prevents evaporation/***
    - ***volatilization;***
    - ***Contour farming:- creates ridges of soil which hold up water/reduce speed of run-off;***
    - ***Mulching:- reduces impact of rain drops/prevents evaporation/surface run-off;***
    - ***Rotational grazing:- allows grass to recover for soil and water conservation;***
    - ***Crop rotation:- maintain soil cover for protection against erosion/improves soil structure***
    - ***thus increasing infiltration;***
    - ***Inter cropping:- provides adequate cover on the soil;***
    - ***Strip cropping:- the different strips reduce speed of run-off/filter soil;***
    - ***Grassed/vegetated waterways:- slow the speed of water/trap eroded soil;***
    - ***Afforestation/Re-afforestation; Act as water catchments/stabilizes soil/canopy***
    - ***intercepts raindrops/wind;***
    - ***Agroforestry - stabilises soil/canopy intercepts raindrops/act as water catchment/wind;***
    - ***Use of manures/fertilizers; Promotes vegetative growth which covers soil against***
    - ***evaporation and erosion;***
    - ***Correct spacing of crops;  Ensure adequate soil cover.***

(b)Explain**four** ways in which:

(i) HIV/AIDS limits agricultural production (4 marks)

* ***Shortage of labour;***
* ***Lack of motivation to invest in agriculture***

* ***Increased cost of living leading to low investment in agriculture/lack of resources for Agricultural production.;***
* ***Government and NGOs are spending a lot of time and resources controlling the disease instead of investment in agriculture.***
* ***Lack of market for agricultual produce.***

(ii)Government policy improves agricultural production (4 marks)

* ***Establishment of national food security policy to supply free farm input to***

***farmers to improve production;***

* ***Facilitate soil conservation;***
* ***Imposes laws to regulate quality of agriculture products;***
* ***Imposes laws to regulate production and sale of agricultural produce to ensure sustainability;***
* ***Imposes high taxes on imported agricultural products;***
* ***Providing subsidies on agricultural inputs, e.g. fertilizers;***
* ***Establishment of government agencies to supply inputs and market agricultural products;***
* ***Construction of bulky handling and storage facilities for agricultural products;***
* ***Funding research into new and improved agricultural production technologies;·***
* ***Ensures control of parasites/diseases/weeds is done effectively;***
* ***Provision of extension services/education.***

(iii)Low level of education and technology influences agriculture.(4 marks)

* ***Improper timing of routine practices;***
* ***Lack of agricultural skills***
* ***Low production of low quality ;***
* ***Inappropriate decision - making e.g. disease observation and control;***
* ***Delayed adoption of new and improved production technologies.***
* ***Lack of knowledge to apply / types and / of inputs;***
* ***Inability to collect market information.***

1. Describe production of tomatoes under the following subheadings.
2. Ecological requirements. (5 marks)

* ***Moderate rainfall 760mm – 1300mm p.a***
* ***Warm climate of 200 c – 250c (day); 150c – 170c (night)***
* ***Altitude of 0 – 2100m above sea level.***
* ***Deep well drained fertile soils.***

1. Nursery establishment and management. (8 marks)

* ***Select a suitable site.***
* ***Prepare the nursery bed to a fine tilth.***
* ***Make drills using a finger or stick, 10 – 15cm apart.***
* ***Drill seeds.***
* ***Cover seeds lightly.***
* ***Nursery bed should measure 1m wide.***
* ***Mulch.***
* ***Watering.***
* ***Remove the mulch and erect a shade.***
* ***Control weeds, pests and diseases.***
* ***Pricking out.***
* ***Hardening off.***

1. Control of pests. (2 marks)

* ***American bollworm – spray with appreciate insecticides.***
* ***Cutworm – use appropriate pesticides.***
* ***Red spider mite – use appropriate pesticides***
* ***Nematodes - crop rotation***
* ***Fumigate soil.***

1. Harvesting and marketing. (5 marks)

* ***Hand picking - for canning when fully ripe***
* ***For fresh market pick when reddish color starts to appear.***
* ***Large wooden crates used to transport tomatoes.***
* ***Fruits should be level with the tops of crates to allow piling of crates on top of each other without squashing the fruits.***
* ***Total yields 100 tonnes per hectare.***