**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***

 3. 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. 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***

 14 a) 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***

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

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

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

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

 15. 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)**

 16. (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) State the law derived from the production function labelled C. (1mk)

***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.***

17.

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.***

 18. 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.***

**19.**

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)**

20. 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 six 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.***

**21**. (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) State **four** factors that determine the choice of irrigation method to be used in the farm. (2mks)

* ***Topography***
* ***Capital available***
* ***Soil type***
* ***Availability of water***
* ***Type of crop to be grown***
* ***Profit margin***

22. a) Describe six factors that determine the stage of harvesting crops. (6mks

* ***Concentration of required chemicals***
* ***Prevailing weather conditions***
* ***Market demand***
* ***Attack by pests and diseases.***
* ***Labour demand/ labour availability.***
* ***Moisture contents.***
* ***Intended use of the crop***
1. Production of carrots
2. Planting
* ***Seeds are sown at 1cm depth***
* ***Firm soil after sowing***
* ***Apply phosphatic fertilizer at the rate of 200kg /ha***
* ***Use seed rate of 4kg/ha***
1. Field Management
* ***Thin to 5 cm between plants***
* ***Irrigate when necessary***
* ***Top dress at rate of 600kgN/ha***
* ***Keep field weed free by uprooting***
* ***Earthing up is done***
* ***Control pests using appropriate herbicides***
* ***Control diseases (6mks)***
1. Harvesting
* ***Carrots mature in 3-5 months***
* ***Pull off tubers/uproot tubers by use of hand or carrot lifter (2mks)***
1. Describe three importance of agroforestry (3mks)
* ***Source of income from sale of tree products e.g. fruits and timber***
* ***Source of wood fuel***
* ***Regulation of Micro climates***
* ***Soil and water conservation***
* ***Increase land productivity per unit area***
* ***Recycling of nutrients after decomposition***