

MINISTRY OF EDUCATION

FIJI YEAR 13 CERTIFICATE EXAMINATION 2018

AGRICULTURAL SCIENCE

DETAILED SOLUTION

Time Allowed: 3 hours

(An extra 10 minutes is allowed for reading this paper)

INSTRUCTIONS

1. Write your **Index Number** on the front page and inside the back flap of the **Answer Booklet**.
2. Write **all** your answers in the **Answer Booklet** provided.
3. If you use extra sheets of paper, be sure to show clearly the question number(s) being answered and to tie each sheet in your **Answer Booklet** at the appropriate places. Ensure that your **Index Number** is written on the extra sheets.
4. Answer **all** the questions with a blue **or** black ballpoint or ink pen. Do **not** use **red** ink pen. You may use a pencil **only** for drawing.
5. You may use a calculator, provided it is silent, battery-operated and non-programmable.
6. There are **three** sections in the paper. Sections A and B are **compulsory**. **Note the options in Section C.**

SUMMARY OF QUESTIONS

SECTION	QUESTION TYPE	MARK	SUGGESTED TIME
A	There are twenty multiple-choice questions. All the questions are compulsory.	20	36 minutes
B	There are six short answer questions. All the questions are compulsory.	60	108 minutes
C	There are five essay questions. Answer any two questions.	20	36 minutes
TOTAL		100	180 minutes

SECTION A MULTIPLE-CHOICE QUESTIONS

[20 marks]

The multiple-choice questions in this section are **all** compulsory.
Each question is worth **1** mark.

INSTRUCTIONS FOR MULTIPLE-CHOICE QUESTIONS

1. In your **Answer Booklet**, **circle** the letter which represents the **best** answer. **If you change your mind**, put a line through your first choice and circle the letter of your next choice.

For example:

8	A	B	C	D
---	---	--------------	---	---

2. **If you change your mind** again and like your first answer better, put a line through your second circle and tick (✓) your first answer.

For example:

8	A	B ✓	C	D
---	---	----------------	--------------	---

3. **No mark** will be given if you circle more than one letter for a question.

- Which of the following agriculture commodities is considered the **top exported** product of Fiji?
 - Taro
 - Ginger
 - Yaqona
 - Pawpaw

Ref: Agricultural Science Year 13 Textbook: page 9
- The term that refers to the official lowering of the worth of one country's currency is
 - duty: tax levied of items, services or transactions.
 - subsidy: form of cash payment or tax reduction that is always given by the government.
 - devaluation: official lowering of the value of one country's currency in terms of one or more foreign currencies.**
 - balance of trade: the difference between a country's total imports and exports.
- Which of the following is an **environmental** benefit of green economy?
 - Increased Gross Domestic Product: economic benefit
 - Effective use of natural resources**
 - Improved quality of life: social
 - Reduced inequality: social

3.

4. The movement of the piston from one dead centre to another is called a
- A. stroke: movement of the piston from one dead centre to another.
 - B. rotation: one rotation completes a cycle.
 - C. revolution: turn, spin or rotate.
 - D. combustion: the process of burning something.
5. The function of the spark plug in an engine is to
- A. spray fuel: fuel injectors.
 - B. remove burnt gases: exhaust valves.
 - C. ignite the fuel and air mixture: spark plug.
 - D. connect the piston to the crankshaft: connecting rod.
6. The short term goal of a **commercial** farmer is to
- A. increase the herd size of the farm.
 - B. maximise production cost.
 - C. buy a combine harvester.
 - D. maximise profit.
- A, B and C are long term goals.
7. Cash on hand, fertilizer, crops and livestock for sale are items that are usually used within a year and are known as
- A. non-current liabilities: obligations that are due and payable beyond one year.
 - B. non-current assets: have a life greater than one year.
 - C. current liabilities: include all debts and obligations and are due within the next 12 months.
 - D. current assets: items that will be consumed within a year.
8. The farmer wanted to apply for a loan from the Fiji Development Bank to extend the farm size and was required to produce a statement on the worth of the farm business by 30th March, 2018. The farmer is going to produce a statement of the farm's
- A. balance sheet: financial snapshot of the business at a specific point.
 - B. cash flow budget: estimate of cash flow in and cash flow out of a business within a period of time.
 - C. income statement: statement of profit and loss.
 - D. net worth statement: shows the financial position of a business at a given time.

Turn Over

9. The soil water that facilitates the uptake of nutrients by plant roots in the soil is
- A. adhesion water: a thin film of water is tightly held by the soil particles and is not available to plants.
 - B. cohesion water.
 - C. gravitational water: form of water, which reaches at the soil water table due to the gravitational force after the rainfall.
 - D. hygroscopic water: absorbed from the atmosphere and held very tightly by the soil particles.
10. The nutritional deficiencies in soil can be identified by
- A. plant analysis and soil testing.
 - B. soil testing and the study of soil colour.
 - C. plant testing and the study of soil colour.
 - D. plant analysis and the study of soil formation.
- Soil colour is used for testing soil fertility and drainage.
Soil formation: how soil is formed that is determined by physical, chemical and biological factors.
11. The pH of an alkaline soil does not change when the recommended amount of gypsum is applied so is described as having a high rate of
- A. porosity: air and water relationship of the soil.
 - B. turgidity: the state of being **turgid** or swollen, especially due to high fluid content.
 - C. buffering.
 - D. productivity: is determined by the yield of the soil.
12. The plant breeding method that produces **superior** characteristics in plants is
- A. inbreeding: pure breeds are produced.
 - B. outbreeding: increases the number of heterozygous offspring's.
 - C. line breeding: reduces genetic diversity, increased prevalence of genetic disorders.
 - D. cross breeding.
13. Which of the following statements is an **advantage** of urban agriculture?
- A. Lack of security of tenure
 - B. Contributes to food security
 - C. Legal restrictions and economic impediments
 - D. Spread of diseases due to usage of waste water
- A, C and D are disadvantages.

14. The **best** method of organic farming recommended for households with limited space to grow vegetables at home is
- A. permaculture: development for agricultural ecosystems intended to be sustainable.
 - B. vertical farming.**
 - C. compost farming: using compost in farming.
 - D. horizontal farming: farming that has more space to plant.

15. The major province that produces **kumala** in Fiji is

- A. Ba.
- B. Ra.
- C. Tailevu.**
- D. Cakaudrove.

Ref: Agricultural Science Year 13 Textbook: page 122

16. Vegetables grown in a backyard garden will also grow well as a container-grown plant. Which of the following **fruit** vegetables are recommended for large containers in organic container gardening?

- A. Okra**
- B. Herbs
- C. Lettuce
- D. Cabbage

Ref: Agricultural Science Year 13 Textbook: page 111

17. Which of the following ecosystems is referred to as the **rainforests of the sea**?

- A. Ocean
- B. Estuaries
- C. Coral reefs**
- D. Intertidal zone

Ref: Agricultural Science Year 13 Textbook: page 150

18. Tilapia fish were introduced at the Nacocolevu Agriculture Research Station in 1954 **mainly** to supplement

- A. weed control: Carps.
- B. protein for pigs: Tilapia.**
- C. pond maintenance.
- D. breeding purposes.

Turn Over

19. Which of the following statements is a **disadvantage** of raising fish in open net pens?
- A. Extra feed can be supplied: advantage
 - B. Water is kept fresh by the current: advantage
 - C. Waste is washed away by the current: advantage
 - D. **Waste from the fish pollutes wild habitats**
20. The solution to solving the problem of aquatic organisms not adapting to the local environment is to
- A. strict size limit of harvested organisms: No size limits.
 - B. conduct community awareness: Habitat destruction.
 - C. fence the area securely: predators and pests.
 - D. **practice crossbreeding.**

SECTION B**SHORT ANSWER QUESTIONS****[60 marks]**

The **six** questions in this section are **all** compulsory.
Each question is worth **10** marks.

QUESTION 1**(10 marks)**

- (a) **Explain one way in which crop scheduling could improve trading in Fiji.** **(2 marks)**
Any one of the following
- Crop scheduling i.e. seeds and seedling arrangement and timing of seed sowing to set a cyclic pattern of 3 to 4 weeks of transplanting of vegetables – depending on the type of vegetables, for consistency of production.
 - Crop scheduling and frequency of sowing short term fruit / vegetables such as, Eggplant Cucumbers, Capsicum, Watermelon, and Rock melon for consistency of supplies on the local market.
 - Phase planting/planting in stages : interval for continuous supply
 - Cropping calendar: to avoid glut
 - Avoid wastage
 - Avoid less supply
- (b) **State one way in which food security could be achieved.** **(1 mark)**
Any one of the following
- Increase investments in sustainable agriculture.
 - Transform food production and consumption patterns.
 - Greater public and private productive investment in family farming.
 - Adapting agricultural practices to climate change.
 - Fostering local food markets.
 - Improving property rights over land and water.
 - Backyard farming/organic farming/sustainable farming methods.

7.

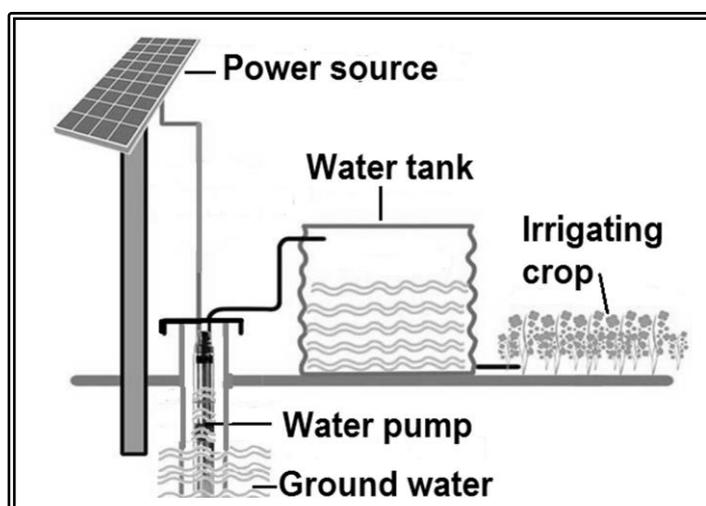
- (c) Justify **one** reason why countries in the world are taking the initiative in focusing on the **green revolution**. (2 marks)

To counter environmental issues for e.g. climate change, eradicate social issues for e.g. improve on food security, reduce poverty, improve living standard, improve local production and improve on economic growth for e.g. increase revenue, improve on quality of products.

- (d) Describe the role of the **World Trade Organisation** in securing markets for Fiji. (2 marks)

- It helps Fiji pursue free trade and minimise trade distortions.
- Open trade
- Trade liberalization

- (e) The illustration below shows a type of renewable energy used for providing power to an irrigation system.



Source: <http://www.pluginindia.com/uploads/1/1/8/5/> org.

- Identify the type of renewable energy shown above. (1 mark)
Solar energy

- (f) State **one** reason why rice is Fiji's highest imported agricultural commodity. (1 mark)

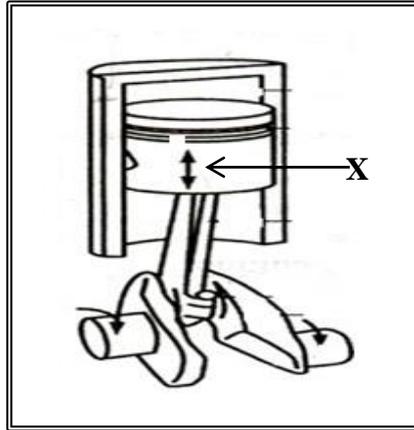
Any one of the following

- To meet the demand for rice.
- Rice is cheaper than other staples.
- Rice is the major staple for Fijis population
- Decrease in production/supply

Turn Over

SECTION B (continued)

- (g) The diagram below illustrates the internal combustion engine.



Source: Agricultural Science Year 13 Textbook, Ministry of Education, 2018

Describe the function of the part labelled X.

(1 mark)

Any one of the following

- The main function of piston is to give tight seal to the cylinder through bore and slide freely inside of cylinder.
- Compresses air or air and fuel mixture in the cylinder
- Used to push burnt gas/exhaust gas out of the cylinder.

QUESTION 2

(10 marks)

- (a) **Explain one reason why tractor maintenance is important.**

(2 marks)

- This avoid machines breaking down easily, wearing out and also keeps the machines working so that work is not delayed.
- Saves time
- To maintain efficiency
To last long

- (b) **Differentiate between a spark ignition engine and a compression ignition engine in relation to the size of the engine.**

(2 marks)

Spark ignition engine are small **whereas** compression ignition engine are big.
Spark ignition are small and light whereas compression engine are big and heavy

(c) State the function of the **radiator** in the cooling system of an engine. (1 mark)

- To get rid of the heat carried out of the engine in the water
- Cools engines/avoid over heating/avoid breakdown of engines

(d) A farmer purchased a tractor which had useful life of 10 years for \$75,000.00. The residual value is \$5,000.00 and the rate of depreciation is 10%. Using the **Reducing Balance Method** calculate the depreciation for the tractor for the **2nd year** and the **3rd year**.

	Net Value \$	Residual Value \$	Rate %	Depreciation \$
Year 1	75,000.00	5,000.00	10	7,000.00
Year 2	68,000.00	5,000.00	10	(i)
Year 3	(ii)	5,000.00	10	(iii)

(3 marks)

	Net Value \$		Residual Value \$	Rate %		Depreciation \$
Yr 1	75,000.00	-	5,000.00	10	x	7,000.00
Yr 2	68,000.00	-	5,000.00	10	x	6,300.00
Yr 3	61,700.00	-	5,000.00	10	x	5,670.00
	i. \$6,300.00					
	ii. \$61,700.00					
	iii. \$5,670.00					

(e) Describe **one** cause of depreciation of farm implements. (1 mark)

Any one of the following

- Wear and tear

Refers to a decline in the efficiency of an asset due to its constant use. When an asset loses its efficiency, its value goes down and depreciation arises.

- Time

The value of assets may decrease due to the passage of time even if it is not in use.

- Obsolescence

Changes in technology are external factors which are responsible for throwing out assets even if those are in good condition. For example seed drill have become obsolete with the introduction of combined seed and fertilizer drill; the farmers have discarded the seed drill although they are in good condition

- Gradual deterioration

Turn Over

SECTION B (continued)

- (f) **Name one type of inventory kept on the farm.** (1 mark)

Any one of the following

- Livestock
- Fertiliser
- Stored stock feed
- Seed
- Machinery and tools
- Agrochemicals
- Standing crop

QUESTION 3**(10 marks)**

- (a) **State one importance of keeping labour records.** (1 mark)

Any one of the following

- It is important to keep labour records as it would assist the farmer in evaluating their performance in terms of work done and the output.
- Labour records keeps information regarding the labourers bio-data, their skills, family background, health status, attitude and any other information that the farmer needs to have knowledge of.
- Recorded of employees evidence
- Management of FNPF, labour services
- Tax returns
- Labour disputes
- Calculation of wages, leaves, future references

- (b) **State one importance of having labourers on the farm.** (1 mark)

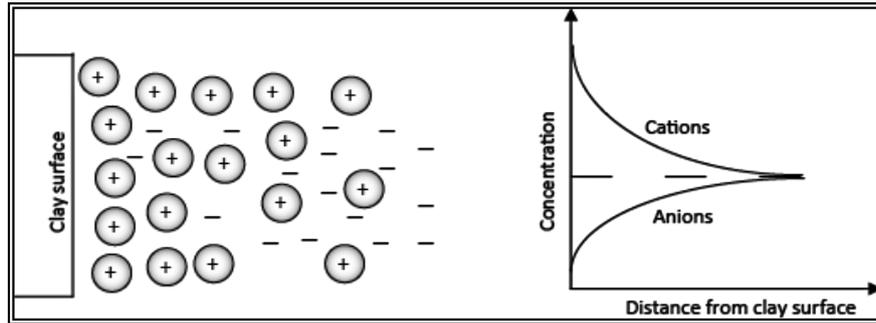
Labourers are very important as they carry out operations on the farm. Without labourers there will be no production.

- (c) **Explain one importance of preparing a cash flow plan.** (2 marks)

Any one of the following

- It safeguards the farmer from protection against loan defaults or foreclosure.
- Cash flow indicates an on-going ability to generate and use cash.
- Facilitates the preparation of sound financial policies.
- Helps to evaluate the current cash position.
- Projected cash flow statements helps to know the future cash position of a concern so as to enable a farm to plan and coordinate its financial operations properly.
- It helps in taking loan from banks and other financial institutions. The repayment capacity of the farm can be understood by going through the cash flow statements.
- Helps the management in making short-term financial decision.
- The statements explain the cause of poor cash position in spite of substantial profits in a farm by throwing light on various applications of cash made by the farm.
- Money coming in and money going out
- Movement of cash within the business
- Indicates cash in and cash out

- (d) The illustration below shows the relationship of cations and anions on the clay surface.



Source: Agricultural Science Year 13 Textbook, Ministry of Education, 2018

Describe **one** feature of the relationship between cations and clay micelles as represented in the illustration above. (2 marks)

Any one of the following

- The concentration of cations is greatest near the surface of the micelle surface (clay surface) where the negative charges are the greatest.
- Equilibrium tends to be established between the number of cations adsorbed and the number of cations in the solution.

- (e) List **one** way in which ions are supplied to the ion pool in the soil solution. (1 mark)

Any one of the following

- Precipitation and secondary mineral formation
- Dissolution
- Anion exchange reaction
- Cation exchange reaction
- Leaching
- Organic matter decomposition
- Mineralisation
- Green manuring
- Composting
- Addition of fertilizers
- Weathering

- (f) State **one** importance of Cation Exchange Capacity (CEC) in soil management. (1 mark)

Any one of the following

- It indicates the nutrient holding capacity of a soil.
- It determines how often and how much lime must be applied.
- Cation exchange capacity determines how crop nutrients other than lime can be applied.
- On high cation exchange capacity soils anhydrous ammonia is the cheapest form of nitrogen fertilizer.
- ECE affects pH
- On low CEC soils it may leach through the soils after heavy rain or escape in the atmosphere.
- Indicates amount of clay in the soil which affects water holding capacity

Turn Over

SECTION B (continued)

- (g) Distinguish between **nutrient deficiency** and **nutrient toxicity** in relation to availability of nutrients. (2 marks)

Nutrient deficiency is the lack of plant available nutrients whereas nutrient toxicity is the excess nutrient uptake by plants.

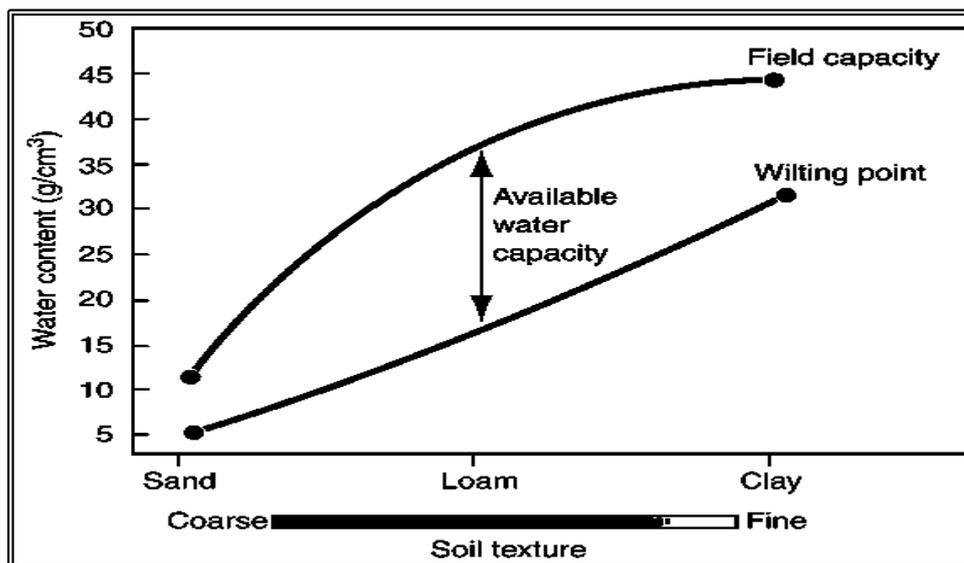
QUESTION 4 (10 marks)

- (a) Describe **one** symptom of nitrogen deficiency in plants. (1 mark)

Any one of the following

- Leaves are small and light green.
- Lower leaves lighter than upper ones.
- Not much leaf drop.
- Weak stalks.
- Cereal seeds become shrivel
- Stunted growth
- Chlorosis /discoloration of lower leaf

- (b) The illustration below shows soil moisture potential.



Source: Agricultural Science Year 13 Textbook, Ministry of Education, 2018

- Study the graph and explain why sandy soil will be the first to require irrigation in a short drought. (2 marks)

- Because the available water content is less.
- Particles are large and water cannot be stored for a long time (It drains out quickly or soil dries up quickly).
- Large pore space, sandy soils warm up quickly
- Sandy soil have lower WHC

- (c) Explain **one** reason why **outbreeding** results in an increase in the number of **heterozygous** offspring produced. (2 marks)

Any one of the following

- Because the recessive alleles are masked by the dominant genes.
- Crossing of unrelated genes, genes are not related resulting in different species

- (d) Explain **one** advantage of **permaculture**. (2 marks)

Any one of the following

- **Reduced Cost**

Using all the natural components of the ecosystem like composting the waste into useful organic matter and manure, farmers save up a lot of money.

- **Less Waste**

Waste products are recycled and manure back to the earth in the form of compost..

- **Chemical Resistance**

Natural fertilizers and mulch are used for farming and gardening. This helps the farmer in resisting the produce from being exposed to the harmful chemicals.

- **Less Pollution**

The natural way of agricultural cultivation, pollution is reduced

- **Develops Community Values**

Develop values like creating pollution, helping fellow beings, and using only how much is needed.

- **Zoning**

Zoning means arranging the produce depending on what ripens first and what needs more attention. The ripe fruits and vegetables are harvested first and the latter ones, as and when they ripen.

- **Self- reliance and diversity**

Anyone can produce a diverse range of produce. It brings about the sense of self-reliance, as one can grow whatever it needs and to be consumed. Also, if there is some surplus, then, there are ways of preserving them and using them later.

- **Promotes Green Living**

Permaculture uses natural fertilizers, natural pesticides, and freshwater reserves. It undoubtedly promotes green living of the backyard style.

- **Helpful in Improving Environmental Conditions**

Teaches different ways of attaining sufficient and sustainable agriculture in a way beneficial for the environment

- **Can be applied in any functioning systems**

Permaculture can be applied in different agricultural systems that are already functioning.

- Food security
- Closed system: system manages itself
- Sustainable practice

- (e) Discuss the **three** steps in preparing a soil medium for container gardening in school. (3 marks)

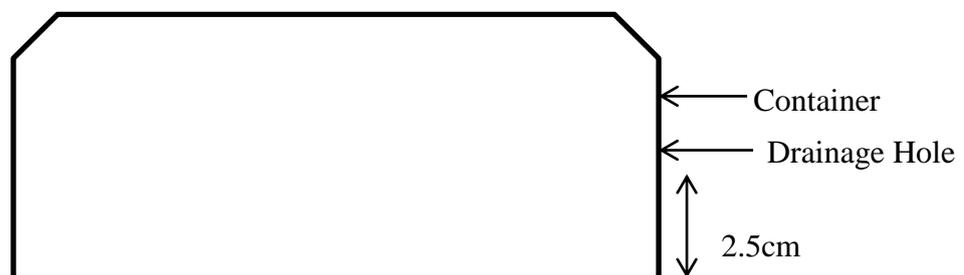
Any 3 of the following in order

1. Identify the type of soil available/collect sample of soil.
2. Ideal soil mixture is selected accordingly.
3. Soil mixture ratio is prepared and mixed thoroughly.
4. The container is filled with soil mixture medium up to 1 inch from top of the container.

Turn Over

QUESTION 5**(10 marks)**

- (a) **State one importance of plant breeding.** **(1 mark)**
Any one of the following(importance of plant breeding)
Food Security
 -developing varieties with higher productivity and better yield stability.
Social Benefits
 -developing more profitable varieties for poverty alleviation.
Economic benefits
 -developing drought resistant varieties that help reduce production costs, improving viability in marginal agribusinesses.
 -more profitable agribusiness results in more revenue and higher gross domestic product.
Environmental benefits
 -developing varieties less dependent on pesticides or more efficient in water and nutrient use.
- Develop new desired characteristics
 - Improve yield, crop production, variety, crop resistancy
- (b) **Bamboo, pandanus, paper mulberry and heart of palm are identified as potential crops. Define the term potential crops.** **(1 mark)**
Any of the following
- Potential crop is a crop having or showing the capacity to become or develop into a major prospect in the future.
 - Crops that earn money, can be profitable
 - Crops that have potential market, can be exported, has commercial value, economic value
- (c) **A student decides to use a container to plant lettuce in. The student was advised to construct drainage holes 2.5cm from the bottom of the container as illustrated in the diagram below.**



Explain the purpose of constructing the drainage hole 2.5cm from the bottom of the container. **(2 marks)**

Any of the following

- The space from the bottom and height of the drainage holes around the container will serve as water storage for plant use.
- Water is always available for plant use
- To avoid water loss from plants and avoid wilting
- To prevent leaching/loss of nutrients
- Improve aeration

- (d) **Select one crop that you have studied and explain one potential use of the product produced.** (2 marks)

Any of the following depending on crop chosen(potential use)

- Vegetable
- Fruits
- Medicinal
- Animal fodder
- Fuelwood
- Fibre and clothing
- Rope, cordage and string
- Leaf vegetable

- (e) **Name an aromatic plant that is used to control pest and diseases in organic container gardening.** (1 mark)
Lemon grass, mint and marigold(any scented planted) other names is accepted e.g taumole, dhanian or corriander, lantana, co boi, coleus

- (f) **An aquatic farmer noticed that the aquatic organisms raised on the farm were light and small. Discuss how the farmer can improve the quality of the aquatic organism produced from the farm.** (3 marks)

Any three from the list given

- **Checking water quality/Monitor water level:**
clean source of water so that the pond water is kept at a constant level and water stays inside the pond.
- **Feeding**
Nutritious and healthy feed available at all times and ample amount
- **Record keeping**
Proper records kept for decision making and alternatives can be planned
- **Control of pest/weed and predators**
Compete for feed, space and therefore lower production
- **Cut grass on the verges regularly**
- Cross breeding
- Favourable environmental conditions
- Reduce stocking rate
- Match stocking rate to pond size

Turn Over

QUESTION 6**(10 marks)**

- (a) **State one disadvantage of roof gardening.** **(1 mark)**
Any one of the following
- Needs regular maintenance
 - Establishment cost is high
 - Attracts pest, insects which can be harmful to human
 - Needs close monitoring in terms of drainage and irrigation
 - Suitable for only certain type of crops and vegetables.
- (b) **Explain one need for commercial aquaculture.** **(2 marks)**
Any one of the following
- Develop aquaculture in rural areas as a long-term alternative to the limited inshore fisheries resources
 - Promote sustainable aquaculture development as a means of creating food security income, employment as well as increasing foreign exchange earnings
 - To improve exports and aquaculture has been identified as one with great potential
 - To substitute imports of fish and fishery product.
 - For the establishment of new industries (will take care of itself)
 - For food security
 - Increase in demand of aquaculture product
 - Diet change
- (c) **Distinguish between a pond and a river in relation to water flow in a fresh water ecosystem.** **(2 marks)**
- Water movement is slow in a pond whereas water movement in a river is fast.
 - Water is still in a pond whereas water is moving in a river
 - Water is stagnant in a pond whereas water is flowing in river
- (d) **State one reason why grass carp was introduced to Fiji.** **(1 mark)**
- To control water weeds
- (e) **Describe one way in which water quantity and quality is maintained in an intensive system of aquaculture.** **(1 mark)**
- By the use engineered systems with pumps and aerators.
 - Testing water and adding fresh water/ aerating ponds.

- (f) Fiji is surrounded with a diversified ecosystem and has potential resources in our rivers and seas. Select a **potential** livestock that you have studied and

(i) describe when it is ready to be harvested

(1 mark)

	Prawns	Crabs	Mussel
Time	5-7 months	3-8 months	Harvest size
Weight	Harvest size weight	Local mrkt 400-800g Export mrkt Male- 500g Female -250g	
Color change	Greenish/blackish tint with bright blue orange claws		

(i) state **one** importance of the selected livestock

(1 mark)

Any one of the following

- Income
- Food
- Leisure
- Materials
- Ornamentals/pets

- (g) State **one** basic requirement of aquatic organisms.

(1 mark)

Any one of the list given below

- Adequate temperature
- Disease free space
- Pollution free space
- Security
- Pest free space
- Water
- Light
- Shelter/shade
- Food
- Correct temperature
- Oxygenated water

Turn Over

SECTION C**ESSAY QUESTIONS****[20 marks]**

There are five essay questions in this section. Answer **any two** questions. Write an essay of approximately **180-200** words to answer each question.

Please note that the allocation of marks for the content has been included for each question and **1** mark is allocated to the structure of the essay. Each question is worth **10** marks.

In this section, you are given an opportunity to show that you can:

- (i) select ideas relevant to the topic;
- (ii) use appropriate examples; and
- (iii) communicate information clearly and logically.

QUESTION 1

Import and export trade play important roles in the development of the economy of Fiji.

With reference to the above statement, discuss **three** ways in which the following issues impact international trade

- **transportation** **(3 marks)**
- **guidance and regulations** **(3 marks)**
- **consumer behaviour** **(3 marks)**

Transportation

Different modes of transport offer different quality of service in particular with respect to speed and reliability – in return for different freight charges.

- Transport costs shape not only the volume of trade, but also the choice of transport mode. Most goods are transported by ship, but a striking development in recent years has been the growing volume of goods shipped by air. Furthermore, planes tend to carry more valuable goods over longer distances. For example goods that will be transported to America from Fiji will longer to reach the destination by ship, but if plane mode is used it will take less time. Because ship mode is cheaper companies or suppliers will prefer to use ship mode compared to plane mode which is expensive.
- The transport mode will be determined by the type of good that is to be transported for e.g. importing fresh fruit or other perishable items, speed is important. Transport by ship or road may not be quick enough.

- **Transport availability**

The availability of transport will also determine the arrival of the product to the destination and also prolonging the process thus there will be chances of deteriorating of products. For example availability of transport will depend on the type of roads, weather and technical problem.

Guidance and regulations

- The Fiji Biosecurity Services Division works to remove trade barriers and improve access in key markets for Fiji's primary and processed food industries. For example there are policies or regulations that need to be adhered to safeguard our countries from entry of unwanted disease or pest. Biosecurity of Fiji ensures that products that are exported to New Zealand meet the New Zealand buying criteria for example the size of the dalo and the weight.
- Products or services going out of the country (export) will depend on the receiving country's rules and regulations. The price of products or services will depend on the country's product criteria. For example papaya needs to be half ripe, the size, the weight and the packaging material is very important criteria to be adhered to.
- Products and services coming into the country (import) will depend on the receiving country's rules and regulations. The price of products or services will depend on the country's product criteria. For example fruits coming to Fiji from New Zealand and Australia need to be packed in proper boxes and kept chilled.

Consumer behavior

This involves people who purchase produce or products, as well as the people who actually use them. It deals with the buying decision and use of the products. Understanding consumer behavior is crucial for:

Any 3 of the following

- effective marketing: price, supplier, demand, type of market
- helping managers identify appropriate people to target for example age, race, religious beliefs.
- design products: brand name, package, cost, availability, who are the customers
- communicate attractive offerings: advertisement, target customers, types of advertisement, media.
- Every element of the marketing plan benefits from an understanding of the customer, and with the rapid pace of change in consumer markets today this is only going to become more important.

Turn Over

SECTION C (continued)**QUESTION 2****Maintaining farm machinery is vital to farm mechanisation.**

With reference to the above statement, discuss **three**

- factors that affect the function of machines and their effects **(3 marks)**
- methods of ensuring machines are protected from the factors identified in paragraph 1 **(3 marks)**
- regular maintenance procedures needed for the engine oil system **(3 marks)**

Enemies of machines

There are 3 main enemies you must protect machines from:

- i. **Wear** – grease and oil are used to protect moving parts from wear by lubricating them as the parts move.
- ii. **Dirt** – filters are used to catch and hold dirt before it gets inside and damages parts.
- iii. **Heat** – the cooling system protects the machine from overheating. The water must be checked regularly to see that it does not run out or the engine will overheat and damage. The fan and other cooling components must be functioning well.

Methods of protecting machines from the enemies of machines**Wear**

The parts in a machine rub and turn against each other until they get hot and begin to wear. Lubricants and bearings help protect engines from friction and wear.

- i. Lubricants – protect machine parts from friction. Friction is reduced therefore wear is reduced.
- ii. Bearings - also protect machines from wear and allows smooth running of the machine. Must be lubricated with grease or oil in order that they work well.

Dirt

Regular cleaning and maintenance such as changing the oil filter, air filter, etc, will prevent wear. Dirt and grit can easily make their way into the machine which will scratch and wear moving parts. Machines have filters to catch and hold dust and dirt so it can't get inside and cause damage.

Types of Filters: - there are filters for oil, fuel and air.

Oil filter

An oil filter is a filter designed to remove contaminants from engine oil, transmission oil, lubricating oil, or hydraulic oil.

Oil is pumped through the oil filter where dirt is caught in a filter screen so it cannot go further inside and damage the machine.

Fuel filter

A fuel filter is a filter in the fuel line that screens out dirt and dust particles from the fuel, normally made into cartridges containing a filter paper. They are found in most internal combustion engines.

Collects dirt before it can get into the fuel system and cause blockage and damage to the engine.

a) Air filter

Engines pull in lots of air. The air is pulled in through an air filter which catches and holds dust and trash so it cannot get into the engine and damage it.

Heat

There are two kinds of cooling systems for engines.

Water cooled engines – cools itself by pumping a liquid (usually water) through the engines the water jacket. As the coolant (water) flows throughout the water jackets in the engine, it carries away heat.

Air cooled engine – cools itself by blowing air over fins or hot surface with a fan and. The blast of air carries away heat.

Regular maintenance for the engine oil system

The engine oil systems job is to reduce friction, help cool the engine, create a seal between the piston rings and cylinder walls.

- i. A crank case or oil sump – stores oil.
- ii. Filters – traps and hold dirt.
 - Check oil level daily
 - Regular maintenance needed is:
 - Keep the right amount of oil in the system.
 - Use the recommended kind of oil only.
 - Change the oil filter at the recommended time.
 - Keep fittings tight so that there is no leakage.

Turn Over

SECTION C (continued)**QUESTION 3****Soil pH contributes to the growth and performance of crops.**

With reference to the above statement, discuss **three**

- sources of soil acidity **(3 marks)**
- effects of soil acidity on plant growth **(3 marks)**
- methods of managing soil acidity **(3 marks)**

Sources of soil acidity (Any 3 of the following)

- Respiration by plant roots and other soil organisms produces carbon dioxide that reacts with water in soil to form weak carbonic acid (H_2CO_3). This is a weak acid which contributes H^+ to the soil solution thus increasing soil acidity.
- Acidity is produced when organic matter is mineralized, nitrogen and sulphur are oxidized to nitric acid (HNO_3) and sulfuric acid (H_2SO_4), respectively adding more H^+ ions to soil solution making the soil more acidic.
- Natural or normal precipitation reacts with carbon dioxide of atmosphere to give a weak carbonic acid. The results of these conditions add acidity continuously to soils.
- Degree of leaching – cations replaced by H^+ ions and aluminum ions.
- Type of parent material (high in Al and S increases soil acidity)
- Nutrient uptake – A continuous removable of minor and major nutrients from soil makes soil acidic such as the H, Al, S, ions increases in concentration.
- Addition of Sulphur & Ammonium fertilizers in excess increases soil acidity. E.g. ammonium sulphate.

Effects if soil acidity on plant growth (Any 3 of the following)

- Some plants simply do not grow well at a low pH.
- The activities of many of the following organisms are reduced:
 - -nitrogen fixing bacteria that convert ammonium to nitrates
 - -organisms that break down organic matter.
- Low levels of Ca & Mg are present in soil so deficiencies occur.
- Elements such as aluminium and manganese become so soluble and they are toxic to plant growth.
- Phosphorus and molybdenum may become insoluble and unavailable.
- Various agricultural chemicals, especially certain herbicides (weed control chemicals) and nematicides are not effective.

Management of soil acidity (Any of the following)**If too high**

- addition of liming materials like calcium carbonate and magnesium carbonate
- addition of organic matter such as compost

If too low

- improving soil drainage
- use acidifying fertilizers such as ammonium sulfate

QUESTION 4

The 2018 International Day of Forest was celebrated on the 21st of March and the theme was *Lets' make our cities greener, healthier, happier places to live.*

With reference to the above statement, discuss **three**

- ways in which we can make our cities greener **(3 marks)**
- Government roles in supporting the **Go Green Concept** **(3 marks)**
- benefits of the **Go Green Concept** in terms of sustainability **(3 marks)**

Ways in which we can make our cities greener (Any 3 of the following)

- Sustainable garbage processing
Recycling of used materials
- Creating parks
Lungs of cities
Trees clean the air and the parks themselves give the citizens a place where they can relax
- Generating electricity using sustainable resources
Renewable energy (hydropower, wind turbine, biogas, biofuel, solar)
- Government that leads by example
- Urban gardening
- Green transport
- Energy – efficient buildings
- Encouraging of grassroots – efforts that will engage the citizens

Government roles in supporting the ‘Go Green Concept’ (Any 3 of the following)

- Creating awareness to community
- To be taught in schools
- Government to make sustainability a key element of their planning
- Implement green systems in the work place
- Energy management programs
- Mote training on the green concept

Benefits of the ‘Go Green Concept’ (Any 3 of the following)

- Environment preservation
- Economic profitability
- Most efficient use of non – renewable resources
- Protection of public health
- Social and economic equity

Turn Over

QUESTION 5

Planning is one of the most important processes in running a business.

With reference to the above statement, discuss **three**

- importance of a business plan **(3 marks)**
- components of a business plan **(3 marks)**
- reasons why a business plan is written **(3 marks)**

(Importance of a business plan (Any 3 of the following))

- Keeping the farmer focused on the goals and strategies
- Obtaining financing from outside sources
- Guiding the managing of a business
- Communicating clearly with interested parties
- Showing the farmer that the business has chances of success
- Showing the farmer that he has the ability to manage the business
- Showing there is a good market for the product or services
- Comparing how the actual business performance differs from the forecasted performance

Components of a business plan (Any 3 of the following)

- Personal details of the business
- Details of the business idea
- Legal form of business
- Important factors of success of the business
- Risks involved
- Future plan
- Marketing plan

Reasons why a business plan is written (Any 3 of the following)

- When thinking of going into business
- Before starting the business
- When updating the business is required
- When new information is obtained
- When new experiences are gained

THE END

