

SECTION A [50 MARKS]
ANSWER ALL QUESTIONS

Question 1

- a) **Direction: For multiple choice questions, there are four alternatives: A, B, C, and D. Choose the correct alternative and circle it. Do not circle more than ONE alternative. If there is more than one choice circled, No score will be awarded.** [20]
- i. The process of applying fertiliser in the field before planting the crops is known as
- A top dressing.
 - B side dressing.
 - C basal dressing.
 - D split application.
- ii. The concept of Integrated Plant Nutrient Management (IPNM) is to replace soil nutrients used by the crops. Which statement best supports the requirement during its application?
- A Use more farmyard manure during the IPNM to prevent soil pollution.
 - B For effective IPNM, always grow legume plants to supplement the soil nutrient.
 - C The IPNM should be applied in the field where cultivation is done for the first time.
 - D The effects of previous crops and the residual effect of fertiliser must be taken care of during the application of IPNM.
- iii. Vegetative propagation occurs
- A only naturally producing genetically similar plants.
 - B only artificially producing genetically similar plants.
 - C both naturally and artificially producing genetically different plants.
 - D both naturally and artificially producing genetically identical plants.
- iv. During the cultivation of shiitake mushroom, spawn filling in logs must be done immediately after drilling holes to
- A. keep the hole warm and fresh.
 - B. avoid the exposure of spawn to sunlight.
 - C. ensure faster maturity of the mycelium faster.
 - D. prevent holes from getting exposed to germs.

- v. Grafting is essential to produce “true-to-type” variety of apple trees. You are provided with two varieties of apple trees.
- I. Apple Tree A - has desirable characters of good colour, good size fruit and taste.
 - II. Apple Tree B - is diseases resistant and drought tolerant
- How would you produce sturdy and productive trees from these two varieties using the technique?
- A rootstock should be apple “A”, and scion can be any type
 - B scions should be apple “B”, and rootstock can be any type
 - C scions should be apple “B”, and rootstock should be apple “A”
 - D scions should be apple “A”, and rootstock should be apple “B”

- vi. For the shiitake mushroom cultivation, it is better to fell the trees during winter than the summer season.

Which one of the following best supports the above statement?

- A During winter, wood is relatively dormant, and the bark is firm.
 - B It is easier felling logs during winter as trees have no leaves.
 - C Summer is scorching and is very difficult to carry laborious work.
 - D During summer, wood will be heavy due to more content of cell sap.
- vii. Besides producing milk, meat and fine fibres, farmers in many parts of the world rear goats
- A. for biological control of troublesome weeds.
 - B. for religious offerings and commercial purposes.
 - C. because it can survive on wasted fodder resources.
 - D. because it can thrive on limited resources including weeds.
- viii. “They are a tiny breed goat with straight ears and adapted to different climatic conditions. They are highly prolific and well known for triplet kidding. It is reared for dual purposes by farmers.”
- The statement best describes
- A Boer goats.
 - B Beetal goats.
 - C Barbari goats.
 - D Jamnapari goats.

- ix. Diseases contribute to high mortalities in goats and reduce animal performance. If you are rearing goats, which one of the following techniques would you apply to keep the flock healthy?
- A maintain the health of the flock by vaccinating them on time
 - B always feed them in the stall and never tether on the ground
 - C have provision for good housing and clean fresh water daily
 - D maintain provision of clean fresh water, dry, warm and well-ventilated housing and feed adequately daily
- x. Exotic Jersey or Brown Swiss bulls are used to continuously breed females of less developed breeds from generation to generation. After five-six generations, a population resembling the exotic breed results. Identify the breeding method implemented.
- A outcrossing
 - B grading-up
 - C cross breeding
 - D outbreeding
- xi. Which one of the following best describes the principle of health in organic farming?
- A Organic agriculture should be based on living ecological systems and circles, work with them, emulate them, help sustain them, and not lead to imbalances.
 - B Organic agriculture should build on relationships that ensure fairness with regard to the common environment and life opportunities.
 - C Organic agriculture should sustain and enhance the health of soil, plant, animals and human as one.
 - D Organic agriculture should enhance the healthy relationship ensuring living beings co-exist in the ecosystem.
- xii. What is the primary objective of practising tissue culture?
- A to grow plants free of viruses and diseases
 - B to obtain high-frequency shoot regeneration
 - C to initiate the growth of plants in small numbers
 - D to breed plants as it is more successful than other methods

- xiii. “Farmers in Paro cultivate paddy as the main food crop. However, one common practice among them is the use of weedicides. One of the reasons is the labour shortage. They said if they do not resort to using weedicides, it would be a daunting task to suppress the weeds once it outgrows.”

Source: BBS, June 2, 2021

If you are the Dzongkhag Agriculture Officer, what approach would you suggest to minimise the use of weedicides?

- A let them use fermented plant extract
 - B procure herbicides, metribuzin to use in the field
 - C make farmers practice planting in rows/lines to reduce weed growth
 - D suggest to use bio-herbicides such as natural vinegar and citric acid
- xiv. Yeshey’s class garden is infested with large white butterfly larvae. What approach should be taken to get rid of the pest?
- A use chemical pesticides to get rid of larvae
 - B work out a plan to cultivate different crops in the next season
 - C remove the crop from the garden and keep fallow for some time
 - D prepare bio-pesticides of artemisia liquid extract to use as a spray
- xv. *“A farmer who wants to select a plant with resistance is resistant to pest will look for the plants that survive an insect attack. Farmer B desiring larger fruits will save seeds from plants yielding the biggest fruits in the field.”*

The statement given above is related to

- A horticulture.
 - B organic farming.
 - C seed and sapling production.
 - D principles of plant and animal breeding.
- xvi. The Agriculture Research and Development Centres in Bhutan are centres
- A for improving local farming tools.
 - B that give financial help to the farmers.
 - C that supplies quality seeds to the farmers.
 - D for improving local crops and their varieties.

xvii. How is farm mechanisation crucial to farmers?

- A helps in compaction of soil
- B assists in the displacement of workers
- C helps in controlling pests and diseases
- D important input for farmers to perform timely farm operations

xviii. “On top of labour shortage, the farming community is affected by the continuous rural to urban migration.”

How would you solve the problem of labour shortage back in your village?

- A using potential farm machinery
- B farming on a small-scale landholding
- C planting low volume, high-value crops
- D switching from agriculture to dairy farming

xix. What is the main objective of hydroponics farming?

- A to use the water resources efficiently
- B to avoid the conventional way of growing vegetables
- C to produce higher quantities of vegetables in the market
- D to grow and produce food at any time of the year from a small space with fewer resources

xx. “The Ministry of Agriculture has instructed several districts to grow onions and tomatoes as an immediate intervention to address the shortage in the country following India’s ban on their exports.”

(Source: <https://www.freshplaza.com/article/9251004/onion-production-becomes-mandatory-in-bhutan-districts>)

Which method of hydroponics would you use to grow onions?

- A drip system
- B ebb and flow system
- C nutrient film technique
- D deep water culture technique

- b) Read the following sentences carefully. Write T if you think the statement is True or F if you think the statement is False in the space provided. [5]

i. Protected cultivation works on the principle of greenhouse effect.		
ii. Pea seed is considered immature if it breaks away from each other and is free of moisture when squeezed.		
iii. To keep the mushrooms fresh after harvesting, it should be stored at a temperature of 4-5° C.		
iv. Goats are one of the earliest ruminants to be domesticate.		
v. Plants with larger roots can be cultivated with the Ebb and Flow System of hydroponics.		

- c) Direction: Match each item under Column A with the most appropriate item in column B. Rewrite the correct pairs by writing the alphabet against the number in the space provided. [5]

Answer	Column A	Column B
	i. Mating to concentrate the inheritance of desired characters of some favoured individuals.	a) genetic improvement
	ii. A way of farming that improves the health of the soil, plants, animals, insect and the entire agro-ecosystem.	b) cross breeding
	iii. Plant breeding methods or plant breeding procedures.	c) line breeding
	iv. A critical activity and physically demanding job with a major determinant factor of the final product.	d) organic farming
	v. Salts and water in plants are absorbed by the outer layer of plants.	e) weeding
		f) cloning
		g) hydroponics

d) Fill in the blanks with appropriate word/s.

[5]

i. The place where plants are raised with special care until they are ready for transplantation is known as _____.	
ii. The most important factor which contributes to the efficiency of production in goats is known as _____.	
iii. The advantage of _____ is for improving quality of animals within the breed.	
iv. A technique of converting wastes into humus-rich manure to improve the fertility and productivity of the soil is _____.	
v. Rice cultivation in Bhutan is carried out as high as _____ meters above the sea level in Bumthang.	

e) Answer the following questions briefly.

- i. You are provided with urea and farm yard manure to be used appropriately in developing fields for crop production.

[2]

How would you make the best use of these in the process of growing crops?

- ii. One method of determining the quality of seeds is by assessing their physical appearances. What are the desirable physical characteristics of quality seed? List down at least **THREE**. [3]

- iii. Many farmers face difficulty in drying mushrooms in summer. Suggest **TWO** ways of quality drying. [2]

- iv. The sanitation of milk is most important to keep it clean and safe for human consumption. If you were a dairy farmer, how would you maintain the farm and keep it free from harmful bacteria and other disease causing organisms? State **TWO** ways. [2]

- v. The Royal Government of Bhutan is gearing towards organic farming through a long term National Organic Flagship Programme under the Ministry of Agriculture and Forests. Why do you think this programme would take time to achieve the desired results? [2]

vi. Discuss the pros and cons of cloning with **TWO** points each.

[2]

vii. Aquaponics has become increasingly popular in recent years. It is likely to be one of the widely accepted methods of food production in the future. Mention **TWO** disadvantages.

[2]

SECTION B [50 MARKS]
ATTEMPT ANY FIVE QUESTIONS

Question 2

- a) How will you differentiate organic manures and bio-fertilisers? State **FOUR** differences

[4]

[illegible]

Question 3

- a) Hand weeding is one common method of removing rice weed called Shochum (*Potamogeton distinctus*). Mention **FOUR** other methods of removing Shochum.

[4]

[illegible]

Question 4

- a) There are two types of mushroom cultivation based on the use of the substrate, wood logs and straw. Which method do you think is best suited in Bhutan? Support your answer with **FOUR** reasons. **[4]**

Question 5

- a) Tawla was constructing a pen next to his residence to start a mini goat farm. It was found that the construction was a conventional type and lacked basic amenities. What suggestions would you give him for the construction of a proper pen? List **FIVE** procedures. **[5]**

Question 6

- a) Compost provides the nutrient to the crops and improves the structure and texture of the soil. Describes **FOUR** ways how compost improves the biological, chemical and physical characteristics of the soil.

[4]

- b) Effective microorganism consists of three bacteria, namely lactic acid, photosynthetic and yeast bacteria. Explain how each microbe specifically function for crops and livestock?

[6]

Question 7

- a) Why do the majority of Bhutanese farmers choose power tiller over tractor for land preparation? State **FOUR** advantages. **[4]**

b) Is hydroponic farming commercially viable? Justify your answer with **SIX** relevant points. **[6]**

This page is intentionally left blank.

This page is intentionally left blank.