

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]

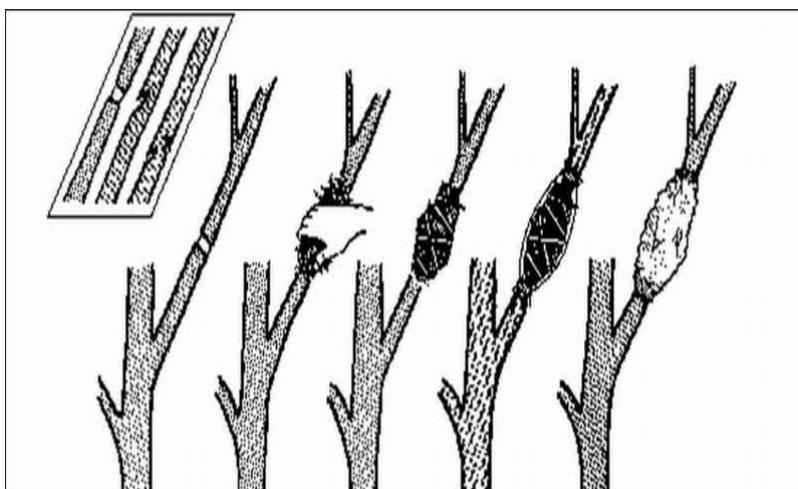
i. Sangay wants to replenish the fertility of his fields using Azolla. This bio-fertilizer contains

- A rhizobium.
- B mycorrhiza.
- C cyanobacteria.
- D large quantity of humus.

ii. What is the main idea of Integrated Plant Nutrient Management?

- A to complement the use of organic fertilizers
- B to introduce legumes to the cropping system
- C to complement the use of chemical fertilizers
- D to replenish soil nutrients removed by the crops

iii. Grafting, air layering, stem cutting and tissue culture are different types of vegetative propagation.



Source: <https://www.google.com/search?q=air+layering&sxs>

The figure given above best describes

- A grafting.
- B air layering.
- C stem cutting.
- D tissue culture.

iv. Dorji, a research officer of ARDC Yusipang wanted to determine the germination rate of kidney beans. He sowed 72 seeds and found only 60 seeds had germinated. Calculate the germination rate of kidney beans.

A 81.3%
B 82.3%
C 83.3%
D 84.3%

v. In Bhutan, farmers cultivating paddy usually opt for random transplantation. Some of the advantages are

- requires less labourers compared to line planting,
- helps to avoid wide spacing and
- method is practised if less weed pressure is expected.

Based on the advantages of random transplantation how would you define this type of transplantation?

A. Plantation practised with definite space maintained between the plants using plant guides, markers and mechanical planters.
B. Transplantation practised without definite space between the plants.
C. Plantation method practised without definite space in line between plants.
D. Transplantation method that uses Butachlor to control weeds.

vi. In log mushroom farming, you need to seal the inoculated holes of the log with wax. What is the reason for sealing?

A To speed up the mycelium growth.
B To aid spawn to maintain temperature and moisture
C To prevent spawn from getting exposed to extreme cold weather.
D To prevent spawn from drying up and to protect it from diseases and other competitive fungi.

vii. The following processes are involved in Shitake mushroom cultivation. However, the processes are not in correct sequence.

1. Dipping of billets
2. Sealing the holes on the logs
3. Incubating the logs
4. Inoculating spawn in the logs

Choose the most correct sequence for the cultivation.

A. 4, 2, 3 and 1
B. 2, 4, 3 and 1
C. 3, 2, 1 and 4
D. 1, 2, 4 and 3

viii. Which goat breed originated from Switzerland?

- A Alpine
- B Beetal
- C Nubian
- D Sannen

ix. What is meant by prolificacy?

- A genetic potential of the kid
- B efficiency of production
- C ability to survive and reproduce
- D number of kids born per doe

x. *"This is a domesticated form of Wild Guar, and it is a rare bovine species indigenous in the North-East hilly region of India. It has a prominent dorsal ridge on the crest of the shoulder, flat forehead and big horn with large base. These animals are mostly brownish black and have white stocking."*

The above paragraph best describes a

- A Jatsha.
- B Mithun.
- C Nublang.
- D Ja Tsham.

xi. To produce Thrabam calves with higher milk production, birth rate and resistance to diseases, the mother Thrabam must be bred properly. The most appropriate method of breeding such calves is

- A line breeding.
- B close breeding.
- C pure breeding.
- D cross breeding.

xii. Which organic farming practices would you choose to help maintain soil health of your kitchen garden?

- A trap crops
- B over-tilling
- C monoculture
- D crop rotation

xiii. Select the most appropriate option in managing pest organically.

- A use garlic cloves
- B grow trap crops
- C introduce lady bugs in the garden
- D all of the above

xiv. What approaches would you use to encourage farmers in your locality to grow organic crops? Identify the best strategies from the list given below.

- I. Depending on imported food
- II. Practising crop rotation
- III. By using on farm resources
- IV. Increasing the use of imported farm inputs
- V. Increasing local food trade within the country
- VI. Reducing the production cost

- A I, II, V, VI
- B II, III, V, VI
- C II, III, IV, VI
- D IV, V, VI, I

xv. As the Dzongkhag Livestock Officer of Gasa, what will be the single most important animal breeding technique you would share with the farmers?

- A produce disease free breeds
- B increase the number of progenies
- C improve desired qualities of breeds
- D improve desired ears, horns and colour in breeds

xvi. Variety release procedure is referred to the protocols and administrative procedures used in releasing a new variety of crop for seed production and distribution. Any new variety to be released must compulsorily pass

- A distinctness, maturity and stability test.
- B distinctness, originality and stability test.
- C distinctness, uniformity and stability test.
- D distinctness, uniformity and maturity test.

xvii. What is the role of Bhutan Agriculture and Food Regulatory Authority in seed and seed system in Bhutan?

- A It provides seeds at a minimal price.
- B It maintains the specific purity and identity of the seed.
- C It maintains satisfactory genetic and purity of seeds through certification.
- D It provides the resources for the initial increase of the foundation seed.

xviii. In the 11th Five Year Plan, the Royal Government of Bhutan supplied a power tiller each to every gewog centre to

- A help farmers focus on producing varieties of crops.
- B help farmers carry construction materials and necessary items.
- C alleviate the drudgery, improve labour productivity and food production.
- D encourage mass urban dwellers to migrate back to rural areas to take up farming.

xix. Hydroponics farming is

- A growing vegetables in containers.
- B practice of growing crops in a vertically stacked layer.
- C the system of farming in which soil is replaced with nutrient-rich water.
- D the process of growing plants in a mist environment without the use of soil or an aggregate medium.

xx. Hydroponic farming is preferred over soil-based farming for growing vegetables because in hydroponics

- A less pesticides are required.
- B high technical skills are required.
- C soil borne diseases do not exist.
- D intense monoculture is operated.

b) **Read each statement given below carefully. Write *T* if you think a statement is True or *F* if you think the statement is False in the space provided.** [5]

1. Green manuring is the process of incorporating green matters into the soil.	
2. In vegetative propagation, plant reproduce through a process called pollination.	
3. Fresh aromatic plants and weeds are fermented with EM to make EMAS.	
4. In genetic engineering, the genetic make-up of an organism is altered using recombinant DNA technology.	
5. Aquaponics requires expensive chemical inputs, wastes more water and requires more space for the growth of plants.	

c) **Fill in the blanks with appropriate word/s.** [5]

- i. Goats suffering from _____ diseases will show symptoms like tightly inflated flanks, discomfort and eventually dies.
- ii. Breeding of a Jersey cow with a Jersey bull is the best example of _____ breeding.
- iii. To get maximum return, different crops are grown in different plots every year. This process is termed as _____.
- iv. In gene cloning, the genomic DNA is treated with specific enzymes called _____ enzymes.

v. Some vegetables are grown in air or misty environment without the use of soil. This technique is known as _____.

d) **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]

Column A	Column B
i. Growing of white patches of fluffy mycelium	a) olericulture
ii. Produce true types of varieties	b) foundation seed
iii. Keeping the specific genetic identity and purity of the plant	c) grafting
iv. Occupying the space and feed on the nutrients from the log	d) trichoderma
v. Production and marketing of vegetables	e) competitor fungi
	f) breeder seed
	g) horticulture

Column A	Column B
i.	
ii.	
iii.	
iv.	
v.	

e) **Answer the following questions briefly.**

i. Interpret compound fertilizers in your own words.

[1]

ii. List **TWO** benefits of producing seeds and saplings to encourage other farmers in the village. [2]

iii. Drying of mushrooms over the hearth should be avoided. State a reason. [1]

iv. You have started a goat farming and recently noticed that some of your goats have stinking hooves with deterioration of inner ridges. Write **TWO** causes of this disease.

[2]

v. Inbreeding is of two types, close inbreeding and line inbreeding. Compare them with **TWO** points each.

[2]

vi. Livestock is an integral part of a complete integrated organic farming. Outline **TWO** rationales for the inclusion. [2]

vii. Plant introduction is one of the scientific approaches of plant breeding used by breeders. As an AgFS student, how would you convince the farmers in your locality to take up this approach? Mention THREE points. [3]

viii. Define farm mechanization.

[1]

ix. Aquaponics has become increasingly popular in recent years. Give **ONE** reason.

[1]

SECTION B [50 MARKS]
ATTEMPT ANY FIVE QUESTIONS

Question 2

a) Due to COVID-19 pandemic the Royal Government of Bhutan had to reprioritize the 12th Five Year Plan in which agriculture sector received greater importance. Programs to supply materials to build protected cultivation structures on cost sharing basis to growing high value vegetables and crops were vigorously initiated.

Explain how protected cultivation structures have benefited the farmers and the consumers across the kingdom? Justify your answer with **FOUR** benefits.

[4]

b) You have learnt how to plan for the construction of protected structures in “Introduction to Advance Horticulture in Bhutan”. Narrate any **THREE** requirements to build a greenhouse.

Question 3

[4]

a) Increasing number of farmers in Bhutan have started using plastic mulching to raise nurseries for chillies. If you are the Focal Agriculture Teacher looking after School Agriculture Program (SAP), will you recommend the use of plastic mulching in SAP gardens? Support your statement with **FOUR** reasons.

b) Explain **THREE** seed multiplication systems which retains seed quality.

[6]

Question 4

[5]

a) Write in your own words how billets are incubated? List down all **FIVE** critical procedures.

b) Explain how adaptability, reproduction, prolificacy, growth rate and carcass characteristics are related to the Goat Breeding plan. [5]

Question 5

[5]

a) The table given below shows the number of Nublang-Thrabam and Jersey Cross for three years. The population of Jersey Cross has remained above one hundred thousand, but the population of Nublang-Thrabam has been declining steadily.

Cattle Breeds	Year		
	2018	2019	2020
Nublang-Thrabam	100282	97940	86492
Jersey Cross	107281	109437	108381

If you are the Program Director of Regional Livestock Development Centre at Rubesa, Wangdue Phodrang, list **FIVE** measures you would take to increase the population of Nublang-Thrabam in the next five years?

b) Effective Microorganism Technology is one of the best farming technologies used by farmers in most parts of the world. Should it be recommended for usage in Bhutan? Give **FIVE** reasons to support your answer. [5]

Question 6

[3]

a) List down **SIX** farm machineries used in Bhutan to replace human labour and animal-powered activities.

b) "GMOs are designed to be extra — extra healthy, extra fast-growing, and extra resistant to weather or pests," says Megan L. Norris, PhD, a biomedical researcher at the UT Southwestern Medical Center." However, some experts are concerned that, **"they carry health risks"**.

In line with the above statement evaluate **SEVEN** disadvantages of GM Crops.

Question 7

[4]

a) Write the names of the hydroponic systems in the space provided.

Sl. No.	Diagram	Name
1		

2		
3		
4		

b) Different studies have claimed that vegetables produced from hydroponics are better than those from soil based conventional cultivation. Provide **SIX** reasons to support your answer.

[6]

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