

SECTION A [50 MARKS]
ANSWER ALL QUESTION

Question 1

a) **Direction: For each question, 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 are more than one circled, NO score will be awarded.** [20]

i. *Goned* is an aromatic plant characterized by possessing calming properties. It has been grown for seed and soil. Which of the following are the major *Goned* cultivating Dzongkhags?

- I Paro
- II Haa
- III Dagana
- IV Bumthang

- A I, II and III
- B I, II and IV
- C I, III and IV
- D II, III and IV

ii. Farmers follow important intercultural management practices to increase the productivity of tomatoes. Which practice is shown in the diagram below?



- A staking
- B pruning
- C training
- D mulching

iii. Aum Karma is planning to grow a perennial herbaceous vegetable. If you are an agriculture extension officer, which vegetable would you recommend to her?

- A chilli
- B carrot
- C tomato
- D asparagus

iv. To quickly convert your backyard space into a lawn, which of the following lawn installation methods would you choose?

- A seeding
- B sodding
- C plugging
- D stolonizing

v. What element of landscape design is best portrayed in the picture below?



- A line
- B form
- C colour
- D texture

vi. Farmers are recommended to intercrop onions with most vegetables. What is the main advantage of intercropping onions with other vegetables?

- A Onions can be used to reduce pest attacks on other vegetables.
- B Onions do not compete for nutrients with other vegetables.
- C Staking is not required for other vegetables.
- D Onions help to fix nitrogen into the soil.

vii. Though chemical fertilizers increase crop production, their overuse has adverse effects on soil, human health and the environment. The table given below shows the recommended fertilizer requirement for apple trees.

Age of tree (years)	FYM/compost (kg/Tree)	Calcium Ammonium Nitrate (CAN) (gram/Tree)	Single Super Phosphate (gram/Tree)	Muriate of Potash (MOP) (gram/Tree)
1 – 3	5 – 15	100 – 300	40 – 120	25 - 75
4 – 6	20 – 30	500 – 1000	240 – 500	150 - 300
7 – 9	35 – 45	1200 – 1400	700 – 900	500 – 700
10 and above	45 - 60	1600	1100	900

How many kilograms of MOP would you recommend for 100 apple trees that are more than 10 years old?

- A 9 kg
- B 90 kg
- C 900 kg
- D 9000 kg

viii. Bhutanese farmers aspire to raise high productive cattle. It is difficult to raise certain breeds of cattle due to geographical terrains. Which of the following cattle breed is most suitable to raise in Paro?

- A Jersey
- B Jersey cross
- C Brown swiss
- D Holstein Friesian

ix. Floriculture is growing and marketing of flowers. Which of the following statement is true regarding vegetative propagation of rose plants?

- A Occurs naturally and artificially producing genetically identical rose plants.
- B Occurs naturally and artificially producing genetically different rose plants.
- C Occurs artificially producing genetically similar rose plants.
- D Occurs naturally producing genetically similar rose plants.

x. Vertical farming aims for higher productivity in smaller spaces. Given below are the characteristics of vertical farming **EXCEPT** they

- A make creative reuse of land.
- B are grown under natural conditions.
- C are grown under controlled conditions.
- D are based on a soil-free growing medium.

xi. Dorji suffers from asthma and acute stomach ulcer. The best medicinal plant to treat such disease is

- A Ruta.
- B Muna.
- C Gonod.
- D Gurgum.

xii. One of the major problem faced by farmers cultivating carrots is carrot fly. The larvae of the fly tunnel into the roots. The symptoms of carrot fly infestation are

- I leaves turn red
- II dark lesions girdle the stem
- III wilting and later yellowing of leaves

- A I, II and III.
- B I and II only.
- C I and III only.
- D II and III only.

xiii. You are planning to grow apple trees on a hilly terrain. Which type of orchard layout would you use?

- A square system
- B contour system
- C hexagonal system
- D rectangular system

xiv. The best way to raise disease resistant cattle is by

- A isolating the cattle.
- B inseminating the cattle.
- C intra breeding the cattle.
- D cross breeding the cattle.

xv. What conditions are required to grow healthy Azaleas?

- I grows better under trees
- II well drained soil
- III acidic soil
- IV clay soil

- A I, II and III
- B I, II and IV
- C II, III and IV
- D I, II, III and IV

xvi. Which practice is followed by majority of the urban dwellers to grow food for their consumption?

- A aeroponic
- B aquaponic
- C hydroponic
- D container garden

xvii. *Cordyceps sinensis* has immense medicinal value but is on the verge of extinction due to

- I climate change
- II over harvesting
- III environmental degradation
- IV deployment of more foresters

- A I, II and III.
- B I, II and IV.
- C I, III and IV.
- D III and IV only.

xviii. Sakteng is located at about 3000 meter above sea level. The people of Sakteng cultivate potato, barley, mustard and wheat. In which agro-ecological zone does Sakteng fall?

- A alpine
- B cool temperate
- C dry subtropical
- D warm temperate

xix. Mango tree propagation is accomplished by either planting seeds or through grafting. However, farmers prefer grafting over planting seeds for propagation. Which of the following are the advantages of grafting?

- I plants bear fruits early
- II gives true type of plants
- III genetically different type

- A I, II and III
- B I and II only
- C I and III only
- D II and III only

xx. The cow in the figure below suffers from a highly contagious and viral disease. There is a rise in body temperature followed by inflammation of the oral cavity and formation of vesicles. The mucosa of the lips, gums, dental pad and tongue get eroded.



The symptoms best describes

- A anthrax.
- B black quarter.
- C foot and mouth.
- D haemorrhagic septicaemia.

b) Write TRUE or FALSE for the following statements in the space provided.

[5]

i. Manu is used for lowering cholesterol, curing asthma, bronchial diseases and for cardiac implications and cough.	
ii. Holstein Friesian is the largest dairy breed used in dairy operations.	
iii. To avoid milk fever, it is best to draw all milk from the udder for a day or two after calving.	
iv. The elements of landscape design include line, form, texture, repetition, proportion and colour.	
v. The most critical processes in packing and marketing of fruits and vegetables are sorting and grading.	

c) 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. 	a) Front hooves are larger than the rear hooves, reflecting the weight it carries in its massive head, horns, and neck, broad hooves and well-developed false hooves.
ii. 	b) Has a medium body, small head, sharp horns, black and white colour, and carries a thick coat all year round.
iii. 	c) It is a grazing animal accustomed to travelling great distances. The horns are spread outward and the live weight ranges from 180 to 550 kg.
iv. 	d) It can survive in rugged hilly terrains and has short symmetrical outward-facing horns, a massive ridge on the back, white socks and rippling muscles.
v. 	e) It is the smallest of the dairy breed with high milk production, the live weight ranges from 500 to 700 kg, and the muzzle is black with a light encircling ring.
	f) Mostly black and white, largest dairy breed and live weight over 680 kg.
	g) The colour of this breed varies from a light fawn to almost black, large in size, extremely strong and the live weight ranges from 500 to 800 kg.

i.	
ii.	
iii.	
iv.	
v.	

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

[5]

- i. Bhutan has a rich diversity of medicinal and aromatic plants, hence our country is known as.....
- ii. The culture of flowers, plants for food, comfort and beauty is known as.....
- iii. The visible features of an area of land often considered in terms of their aesthetic appeal is known as
- iv. The process of preserving food in common salt or vinegar, spices and edible oil is called
- v. The practice of growing crops in vertically stacked layers for optimum plant growth and soil less farming is called farming.

e) Answer the following questions briefly.

- i. State **ONE** ideal climatic condition and **ONE** ideal soil requirement for growing mango trees.

[2]

- ii. What is harvest maturity?

[2]

iii. List down **TWO** advantages of Vertical Farming.

[2]

iv. Farmers use locally available organic matter like artemisia leaves as a mulching material for the cultivation of chilli. Mention **TWO** benefits of using artemisia leaves as mulching material.

[1]

v. An increase in profits of farmers, traders and handlers will be seen once post-harvest loss is addressed. How can we reduce post-harvest losses of fruits and vegetables? List **TWO** measures.

[2]

vi. The major pest problem for farmers cultivating chilli is cutworms. The cutworms attack the seedlings of chilli, tomato, cabbage and maize. If you are a farmer, what measures would you take to control the cutworms? State **TWO** control measures. [2]

vii. Sangay, a floriculturist selects a rose cutting with two or three leaves attached for propagating it. Explain with **TWO** reasons why he chooses the cutting with the leaves attached. [2]

viii. Focalized accents are objects or plants that would directly attract an observer's attention. As a landscape designer, why should you avoid incorporating too many focal points into the landscape? [1]

ix. Farmers in Bhutan face difficulty in controlling post-harvest pests and diseases of fruits and vegetables which result in revenue losses. How would you minimize the post-harvest pests and diseases? List **ONE** measure. [1]

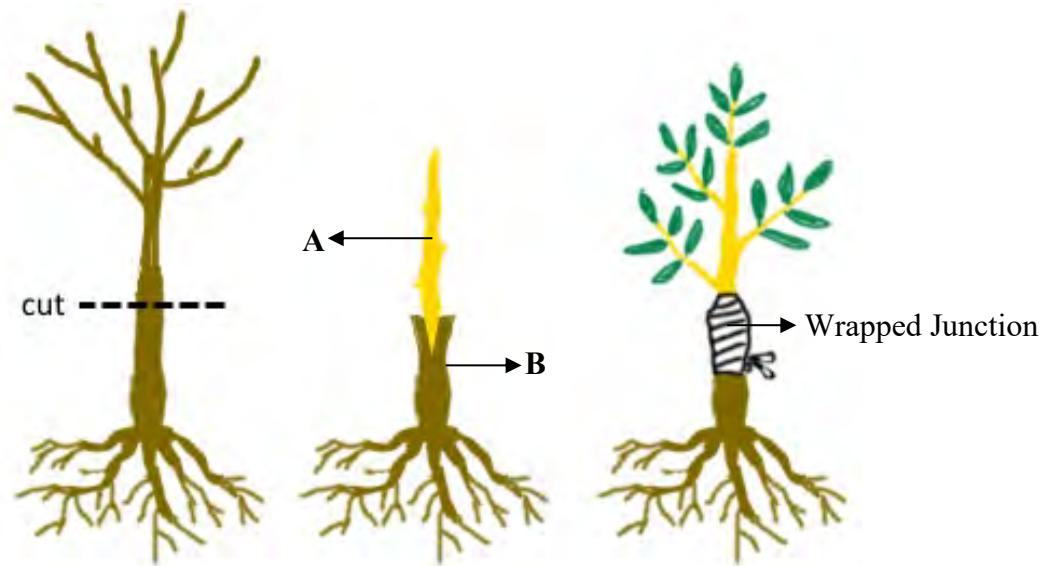
SECTION B [50 MARKS]
ATTEMPT ANY FIVE QUESTIONS

Question 2

a) “Bhutan has a lot of scope to become the future entrepreneurship in the fields of cultivation and commercialization of medicine and aromatic plants, and spices”. Justify the above statement with **FOUR** reasons. [4]

b) Post-harvest physiologists distinguish three stages in the life span of fruits and vegetables. Explain these **THREE** stages briefly. [3]

c) Karma uses the propagation technique shown in the diagram below to propagate citrus trees. Study the diagram and answer the questions that follow.



i. Name the parts labelled A and B.

[1]

ii. Identify the propagation technique used in the diagram.

[1]

iii. Why is local citrus favoured as a seedling in Bhutan?

[1]

Question 3

a) Plant propagation is the process by which a new plant is grown from various sources like seeds, cuttings and other plant parts. New petunia can be propagated from seeds or cutting. Which method of propagation would you choose to propagate it and write the steps involved?

[4]

b) Crops can be grown using hydroponic, where nutrients are delivered directly to their roots. Explain aquaponic farming. What are the **FOUR** common components of every aquaponic system?

[4]

c) Complete the table given below. [2]

Name of the Medicinal and Aromatic Plants	Descriptions	Uses	
1.....	It is one of the important cash crops for the farmers of the subtropical region in Bhutan. It best thrives in well drained soils like sandy loam soil, clay loam, red loam or lateritic loam.	The rhizomes are mainly used as spices, beverages, medicine and confectionaries.	
2.....	It is best grown in forest loamy soils with gentle to medium slopes. Staking is needed to avoid lodging of plants from heavy rain and wind, and mulching is done at the plant base.	It is used in ayurvedic preparations and as a spice to prepare premium products like masala.	

Question 4

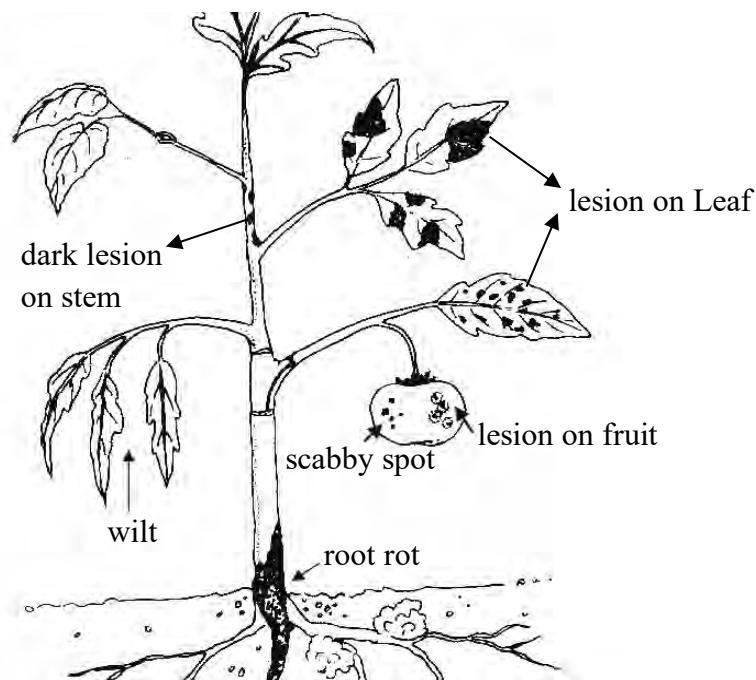
a) Our Bhutanese farmers in general suffer from low returns from dairy farming. As a Livestock Extension Officer, what **FOUR** good management practices would you suggest to increase production? [4]

b) Comparing to apples imported from Kashmir, Bhutanese apples fetches a relatively lower price. Of many attributes, one could be due to poor pack-house handling process. What **FOUR** pack-house handling processes would you suggest to apple growers so that they can fetch a better price? [4]

c) Outline with **TWO** justifications how dairy farming plays an important part in the context of the Bhutanese agriculture system. [2]

Question 5

a) Lhaden is an agriculture entrepreneur who focuses on the cultivation of tomatoes. The major problem she faces is the disease of the tomatoes. The affected plants is shown below.



i. Identify the disease.

[1]

ii. What measures would you recommend to control this disease? State **FOUR**.

[4]

b) Banana is the new cash crop for the people of Brumbi village in Zhemgang. Farmers there took up mass banana farming after they found a ready market with the Khengrig Namsum Cooperative. What important management practices would you recommend to the farmers to increase the production of bananas? Mention **THREE**.

[3]

c) Calf scours are the most common symptoms of illness in young calves. They can be caused by several different viruses and occur in the first month of a calf's life. Mention **TWO** ways to control this illness. [2]

Question 6

a) Complete the table given below. [6]

Principles of Designing Landscape

1.	Equalization of visual weight from one area of landscape composition to another.
Proportion	2.

3.	Harmonious relationship among all elements.	
4.	Incorporating sculptures, water features or a specimen plant.	
Repetition	5.	
6.	Repeating one or more elements such as line (creating a pattern), form, texture and colour.	

b) Postharvest handling of potatoes is an important factor not only in preventing post-harvest losses but also in maintaining its safety and nutritional quality. Suggest **TWO** postharvest management of potatoes to reduce losses. [2]

c) In container gardening, why do we need to make holes in the pot or the container? [2]

Question 7

a) You are invited as a guest speaker for an awareness program to educate farmers on Mastitis a common cattle disease. Create a presentation note including symptoms and control measures of Mastitis to teach the farmers about it.

[4]

b) The agriculture ministry has asked the dzongkhags to grow onions as an immediate intervention to address its shortage in the country following India's ban on onion exports. The farmers in many dzongkhags have started to grow onion to meet the domestic demand. Mention **FOUR** care and management practices that would help farmers to increase the production of onions.

[4]

c) Write **TWO** importance of including foliage and flower colour in landscape design.

[2]



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