

*Answer **ALL** questions (Compulsory)*

## Question 1

**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.

a) A sustainable agriculture system aims to maintain and enhance biological and economic productivity. Therefore, sustainable agriculture requires a sustainable

[1]

- A Biological System.
- B Agriculture System.
- C Economic System.
- D Food System.

b) Climate change is an inevitable process and Bhutan's agriculture is highly vulnerable to the impact of climate change. Suggest **THREE** measures to protect Bhutan's agriculture from the impacts of climate change.

[3]

c) Mulching with plastic film is one of the reactive adaptations mostly practiced in high altitude agro-ecological zone. Examine **THREE** benefits and **THREE** challenges of such technological adaptation.

[6]



## Question 2

a) Agro-meteorology refers to agriculture meteorology. It is a branch of Physics which deals with:

[1]

- A Mesosphere.
- B Atmosphere.
- C Troposphere.
- D Exosphere.

b) Dhan Maya Limbu planted cabbages in her field in Tsirang. One day, the weather forecast predicts the formation of frost that night. Being an illiterate farmer, she seeks suggestion from you to protect her cabbages. Give **THREE** suggestions to protect her cabbages from being damaged by frost?

[3]

c) Some of the places in Bhutan experience long period of drought season during paddy cultivation. Many farmers are worried about the delay in rainfall. What methods do you suggest to the people to ensure that water is made available for cultivation?

Explain **THREE** methods.

[6]

### Question 3

a) The breeding method that is rarely used for improvement of crop plants is [1]

- A plant introduction.
- B mutation breeding
- C hybrid breeding.
- D mass selection.

b) Ap Penjor, who depends on his two acres of land and 19 cattle says that for a decade his farm was free from high breeding plants and animals. What would be the outcome of his farm, if he does not select high breeding plants and animals? Mention **THREE** points.

[3]

c) Write **TWO** advantages of each breeding of cross-pollinated species given below:

[4]

- i. Mass Selection
- ii. Hybrid Varieties

d) Genetically modified crops are plants used in agriculture whose DNA has been modified using genetic engineering method. Write **TWO** benefits of using genetically modified crops?

[2]

### Question 4.

a) Some of the character traits of exotic cow breeds are given below:

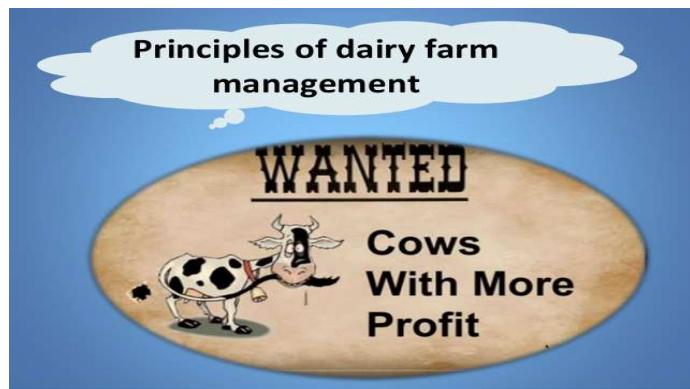
[1]

- I. Produces more milk than all other breeds.
- II. Milk contains higher fat than that of any other breeds.
- III. Have dark hooves.
- IV. Dish shaped face and compact body.

Which pair represents the correct inherent traits of Jersey breeds?

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

b) The figure given below shows the principles of dairy farm management.



Source: Internet

If you want your cows to make more profit, what **THREE** key factors would you suggest the dairy farms?

[3]

c) Grading up is the practice of breeding in which the sires (male parent) of exotic breed are mated with local female and their off spring from one generation to another. A population resembling the exotic breed results after five to six generation of grading. Point out THREE merits and THREE demerits of upgraded animals.

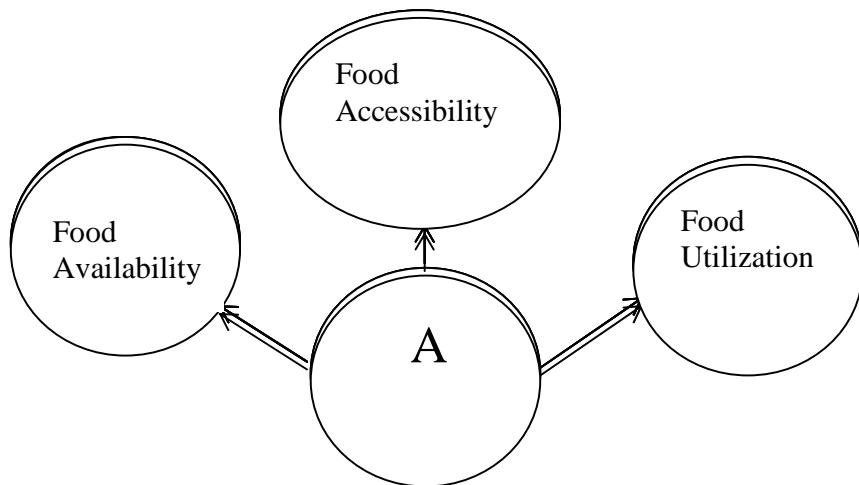
[6]

### Question 5.

a) Name the research and Development Centre that started research on crop variety in 1982? [1]

- A Wengkhar
- B Yusipang
- C Bhur
- D Bajo

b) Use the diagram below to answer question bi.



i. Identify and label box “A” in the above diagram. [1]

ii. To facilitate seed and planting materials production, farmers can register to shoulder responsibility of producing seed and planting materials with National Seed Center. They are known as 'Registered Seed Grower'. National Seed Center provides certain benefit to the Registered Seed Grower. If you were a Registered Seed Grower from your village, how would you help your community? Mention **TWO** points.

[2]

c) The quality of seed is determined by the percentage of seeds germinated. You have placed 11 plants and each plant has 10 seeds. Out of 110 seeds only 70 seeds have germinated.

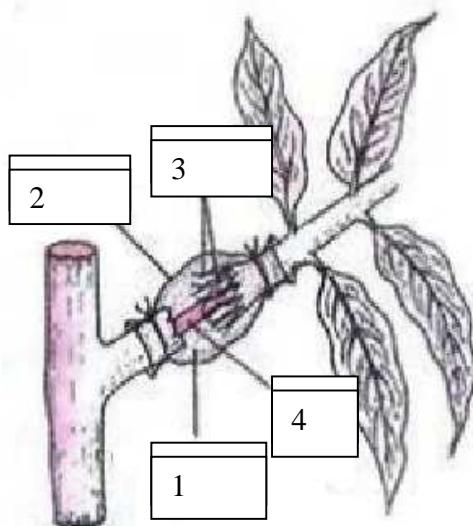
i. Calculate the percentage of germination rate?

[2]

ii. How would you ensure that there is increase in germination rate?

[2]

iii. Layering involves placing a part of the plant stem under favourable conditions for rooting. The diagram below represents an air layering method. Label the boxes with appropriate term. [2]



### Question 6

a) The compost made using earthworm is [1]

- A Heap compost.
- B Vermi compost.
- C De compost.
- D EM Compost.

b) "Bhutan's vision to become organic by 2020 is questionable", said the National Organic Programme's coordinator during the first day of national workshop on a road map for organic agriculture policy in Bhutan. Can you propose **THREE** measures to achieve the above vision by 2020?

[3]

c) Refer the illustration below and support the argument.



Source: internet

Which carrot do you think has a better scope in the market? Why? Justify your answer with **THREE** reasons.

[6]

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### Question 7

a) The term ‘horticulture’ means [1]

- A agro-forestry.
- B cultivation of paddy.
- C cultivation of fruits.
- D cultivation of garden.

b) “Horticulture plays an important role in making a sustainable livelihood security and healthy life”. Justify the statement with **THREE** reasons. [3]

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c) Do you think protected cultivation is a sustainable way of growing vegetables in school garden? Give **THREE** justifications.

[6]

## Question 8

a) All the following are advantages of growing mushroom in Bhutan **EXCEPT** [1]

- A It is a source of income generations.
- B It carries nutritional benefits.
- C It is a booming business in Bhutan.
- D It eliminates poverty.

b) i. Would you prefer growing vegetables in your garden OR buying from the market?  
Justify with **ONE** reason. [1]

ii. "The woman was in the forest collecting mushroom and wild potatoes when the bear attacked her suddenly. She is said to have suffered critical injuries on her face, hands and legs". (BBS, July 14, 2017) Do you think government should restrict people from collecting wild mushroom? Support your answer with **TWO** reasons. [2]

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c) The procedure for Mushroom cultivation on straw is given randomly. Arrange the procedure in proper sequence.

[6]

- a) Transfer the mixtures of straw and rice bran into gunny bags.
- b) Take out the straw and allow cooling to a temperature of 25°C.
- c) Soak the chopped straw in water for certain duration.
- d) In case of paddy straw, soaking is enough for few hours but wheat straw need to be soaked for longer duration.
- e) Add a small amount of water in a drum, place wooden frame at the bottom and place the gunny bags with mixture on it.
- f) Chop the straw or grass into small pieces of 5-6cm long.
- g) Add rice bran to the straw in the ratio of 1:10 and mix thoroughly.
- h) Place substrate in the shade maintaining appropriate moisture and temperature.
- i) Heap the soaked straw to drain out excess water.
- j) Steam the bags of straw with additives to sterilize.
- k) Add mushroom seed to cool sterilized materials and mix it thoroughly.
- l) Sterilization of straw begins once water starts boiling.

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## Question 9

- a) Plantation is raised along the highways, cities and parks with ornamental flowering plants for aesthetic purpose.

The above statement best describe about

[1]

- A Avenue plantation
- B Private forest plantation
- C Normal plantation
- D Industrial plantation

b) A study on farmer's income from community forest led by one of the lecturer of College of National Resources in Lobesa, found that forest resources contribute about only 0.3 percent of the total household income. This is relatively low compared to that of neighbouring countries. If you were policy makers on community forest, what changes would you make in the policy to solve the above problem? Mention **THREE** points.

[3]

c) Explain **THREE** differences between community and private forest. [6]

## Question 10

a) Where is National Agriculture machinery /centre located in Bhutan?

[1]

- A Bondey
- B Bajo
- C Bhur
- D Khangma

b) i. Define the following terms:

[2]

- a) Crop rotation
- b) Green manures

ii. Give **ONE** benefit of agro forestry practices.

[1]

c) The diagram below depicts the process of harvesting in Bhutan.

**Figure 1**



**Figure 2**



How is figure 1 different from figure 2? Write **SIX** differences.

[6]