

SECTION A

PART I: Multiple Choice Questions [30 marks]

Choose the correct answer and write down the letter of your chosen answer in the Answer Booklet against the question number e.g. 31 (d). Each question carries ONE mark. Any double writing, smudgy answers or writing more than one choice shall not be evaluated.

1. Which of the following central tendency should be used to represent the soil type of any locality?
 - a) Mean
 - b) Median
 - c) Mode
 - d) All of the above

2. Which one of the following is NOT a PRA tool?
 - a) Transect walk
 - b) Resource mapping
 - c) Mind mapping
 - d) Venn Diagram

3. One decimal of land is equal to _____ square meter.
 - a) 40.5
 - b) 45.5
 - c) 35.5
 - d) 50.5

4. Self-pollination is a form of
 - a) Inbreeding
 - b) Outbreeding
 - c) Random mating
 - d) None of the above

5. According to the RNR census 2019, the reported fallow agricultural land in the country is about _____ acre.
 - a) 55000
 - b) 66000
 - c) 77000
 - d) 88000

6. The scientific study of fungi is known as
 - a) Parasitology
 - b) Phycology
 - c) Mycology
 - d) Myology

7. *Corylusavellana* is a scientific name for
- Arecanut
 - Chestnut
 - Cashew
 - Hazelnut
8. The alternative form of a gene is known as
- Transgene
 - Mixed gene
 - Psuedogene
 - Alleles
9. Whiptail in cauliflower is caused due to
- excess of boron.
 - deficiency of boron.
 - excess of molybdenum.
 - deficiency of molybdenum.
10. Powdery mildew disease is caused by
- Bacteria
 - Fungus
 - Virus
 - None of the above
11. Which of the following is not an essential micronutrient for plant growth?
- Iron
 - Zinc
 - Magnesium
 - Manganese
12. When we say maize belongs to Poaceae, we are referring to its
- Order
 - Family
 - Sub-family
 - Genus
13. Organic carbon is a measure of
- Available n in soil
 - Available p in soil
 - Available k in soil
 - Available mg in soil
14. UG-99 is a serious disease of the
- Rice
 - Wheat
 - Chilli
 - Buckwheat

15. What is the role of Rhizobium bacteria found in the nodules on the legume plants?
- They provide energy for root growth.
 - They provide an available source of nitrogen to the plant.
 - They provide resistance to plant pathogens.
 - They assist in absorbing water and plant nutrients.
16. When is the World Soil day celebrated?
- December 5
 - October 16
 - June 5
 - June 17
17. A farmer decides to stop growing a crop A and instead use the land to grow crop B. The amount of potential profit lost by not growing crop A represent the farmer's
- Opportunity costs
 - Variable costs
 - Marginal cost
 - Fixed costs
18. Cropping pattern is define as
- the proportion of area under different crops.
 - growing different crops in a recurrent succession.
 - the proportion of area under different crops at a particular point of time.
 - a method of growing different crops.
19. "Yusi Map" is an improved Bhutanese variety of
- Rice
 - Apple
 - Potato
 - Strawberry
20. Monili form antennae is in
- Termite*
 - Cockroach*
 - Beetle*
 - Grasshopper*
21. Which of the following is not an essential amino acid?
- Histidine
 - Proline
 - Leucine
 - Methionine

22. Hybrid is also known as
- Homozygous
 - Heterozygous
 - Often homozygous
 - None of the above
23. A farmer in Punakha planted rice as first crop and after harvesting it, he introduced potato as second crop in the field. This type of cropping pattern is known as
- Relay
 - Sequential
 - Mix
 - Differential
24. Minimum, optimum and maximum temperature for growth of individual plant is called
- Average temperature
 - Suitable temperature
 - Cardinal temperature
 - Kelvin temperature
25. At low pH or acidic condition, _____ gets fixed in the soil.
- nitrogen
 - potassium
 - phosphorus
 - hydrogen
26. Potato is propagated through
- Tuber
 - Micro tuber
 - TPS (True Potato Seed)
 - All of the above
27. The response of the plant to the relative length of day and night is called
- Thermoperiodism
 - Photoperiodism
 - Light intensity
 - Day length
28. Foundation seed is produced from
- Nucleus seeds
 - Quality seeds
 - Breeder seeds
 - Certified seeds

29. According to the Bhutan Labour Force Survey report 2018, the agriculture sector provides employment to _____ percentage of employed population.
- 70%
 - 54%
 - 60%
 - 48%
30. A plant bearing both male and female flower on the same plant is called
- Diocious
 - Monocious
 - Polygamous
 - None of the above

PART II – Short Answer Questions [20 marks]

This part has 4 Short Answer Questions. Answer ALL the questions. Each question carries 5 marks.

1. What is Composting? Briefly explain how compost improves the Soil. (2+3 marks)
2. What you mean by agro-forestry? Briefly discuss its ecological and economic benefits in Bhutanese farming system. (1+4 marks)
3. Briefly describe the following terms. (5x1 marks)
 - Saprophyte
 - Carbon sink
 - Backcross breeding
 - Permanent wilting percentage
 - Disease triangle
4. What do you mean by *Organic Standards* and *Certified Organic* in the context of organic farming? Describe briefly the LOAS and Third Party organic certification system available in Bhutan. (1+1+3 marks)

SECTION B: Case Study

Choose either Case I OR Case II from this section. Each case study carries 50 marks. Mark for each sub-question is indicated in the brackets.

CASE I

Climate change is a global concern and food & agriculture is often considered as the cause of and solution for climate change. Bhutan is not spared from its impact too. Over the years, we have observed changing patterns of climate and many extreme weather events. In this context:

1. Briefly define climate change and global warming and describe why Food and Agricultural sector is considered cause of climate change. (10 marks)
2. Discuss the effects of climate change on the four pillars of food security. (20 marks)
3. Explain how Bhutanese agriculture is vulnerable to climate change. (20 marks)

CASE II

Despite decades of plans to promote food self-sufficiency, Bhutan still remains hugely dependent on food import to meet the demand of the population. The urgency to enhance self-sufficiency in food production is felt even greater due to event like Covid-19 pandemic and its impact.

In view of above scenario and the country's desire to attain food self-sufficiency, discuss major *issues leading to continued import* of food with focus on rice and vegetables and suggest *your strategy* in details to mitigate it and enhance food self-sufficiency. (25+25 marks)

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