

## SECTION A

(50 Marks)

**Answer ALL questions.**

### Question 1

**I** 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 is more than one choice circled, **NO** score will be awarded. **[25 Marks]**

1) The relationship between two species of plants or animals in which one benefits at the expense of the other is known as

- A predation.
- B parasitism.
- C mutualism.
- D commensalism.

2) Waste from cattle are used by farmers to increase the crop yield because manure provides

- A cobalt.
- B calcium.
- C nitrogen.
- D magnesium.

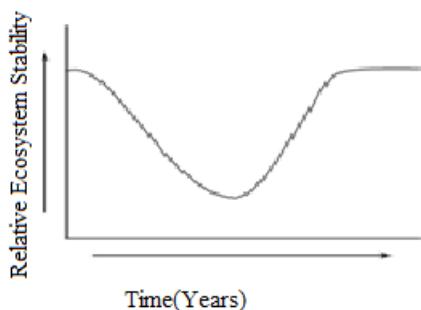
3) Phoresy is one of the types of commensalism.  
Which **one** of the following events best describes phoresy?

- A One animal attaches itself to the other for transport.
- B The second organism is used for permanent housing.
- C One organism feeds on the waste produced by the other.
- D One organism creates a suitable environment for the other.

4) Rich people tend to consume more and produce more waste. This practice threatens our existence and that of many organisms on the planet.  
The above statements best describes

- A conservation.
- B over-harvesting.
- C ecological footprint.
- D sustainable economy.

5) The graph below shows changes in the stability of an ecosystem over a period of time.



Which statement depicts the change in ecosystem stability?

- A The ecosystem remains unchanged.
- B The stable ecosystem cannot be altered.
- C The ecosystem can be altered but can recover.
- D The ecosystem can be altered but cannot recover.

6) The ability of an ecosystem to recover from ecological imbalance is called

- A resistance.
- B resilience.
- C recreation.
- D regeneration.

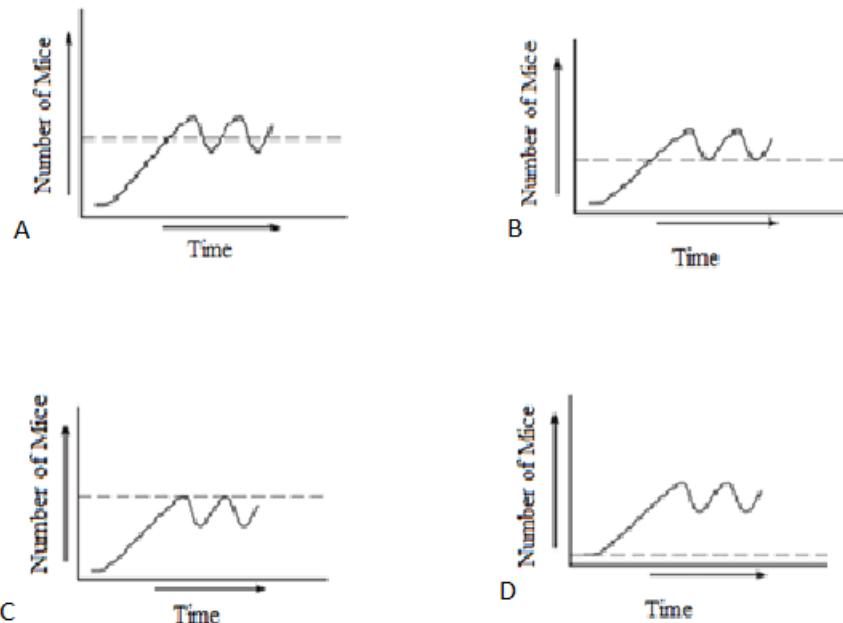
7) One of the goals of the Convention on Biological Diversity is 'sustainable use of the components of biodiversity'. This goal

- A prevents overharvesting.
- B affects life style adversely.
- C increases ecological footprint.
- D decreases the country's economy.

8) Research says that DDT and other pesticides used over fifty years ago are still affecting the environment today. This information is used by our policy makers to ban the import of certain vegetables which contain harmful chemicals mainly to

- A develop healthy lifestyle.
- B implement government rules.
- C reduce resource consumption.
- D increase the income of our farmers.

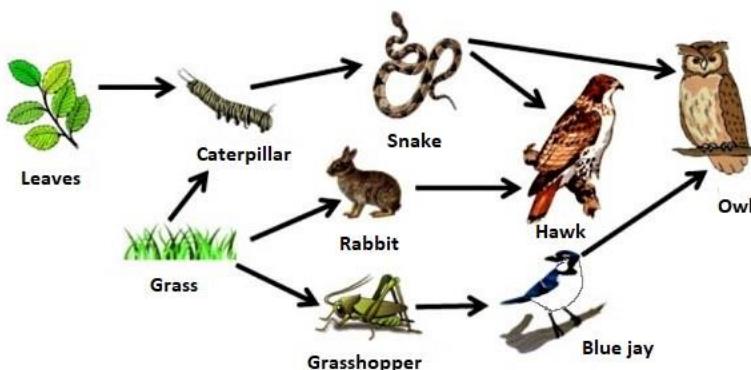
9) The dashed line in the graph indicating the carrying capacity for a mouse population is correctly shown in



10) When habitats are destroyed, organisms that occupy the habitats migrate or there will be population decline making them vulnerable to extinction. This happens because

- A of reduced carrying capacity.
- B of increased carrying capacity.
- C organisms never stay in one habitat.
- D organisms can easily adapt to a new environment.

11) In the figure below, identify the secondary consumers.



- A owl, hawk, blue Jay
- B snake, hawk, blue Jay
- C snake, rabbit, grasshopper
- D caterpillar, rabbit, grasshopper

12) Loss of top soil due to surface run-off is common in our country which sometimes disrupt people's lives negatively. Some of the solutions are listed below.

- I. All farmers to build walls
- II. Plant more trees
- III. Be environment literate

Which **one** is the best combination to prevent loss of top soil?

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

13) Exposure to ultra violet radiation could have serious impacts on physiological processes in plants and animals. Identify the layer of gas that protects us from such radiation.

- A ozone
- B oxygen
- C nitrogen
- D carbon dioxide

14) Read the dialogue between two friends.

Pema: "In recent years I feel it is getting hotter."

Geyphel: "Now even crop production is decreasing."

Pema: "Water sources are also drying up."

Geyphel: "True, often we are getting sick these days."

What do you think the friends are talking about?

- A Human health
- B Heavy precipitation
- C Impact of climate change
- D Crop production over the decade

15) Which **one** of these is the biodiversity conservation initiative taken by our government?

- A Implementation of Green tax policy
- B Inviting tourists from other countries
- C Establishment of parks and sanctuaries
- D Implementation of environmental impact assessment

(The diagram is to be used with Question no.16)



16) The diagram best explains the effects of

- A weather.
- B global warming.
- C climate change.
- D green house gases.

17) *Potamogeton distinctus*, a water weed is known to have caused loss to our rice producing farmers through competition and breeding. Such species destroy the unique genetic types.

The above description best explains the threat to biodiversity due to

- A climate change.
- B invasive species.
- C crop production.
- D habitat destruction.

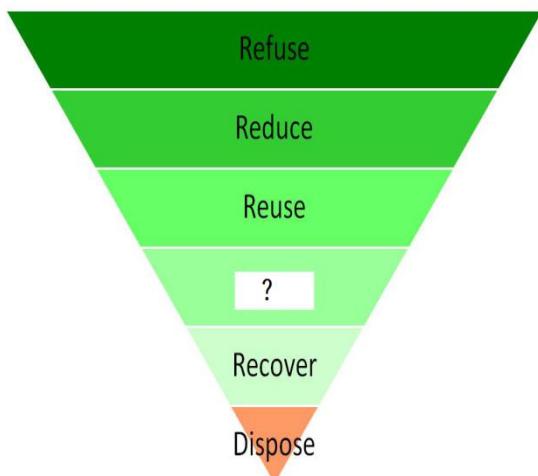
18) Bhutanese farmers are still practicing traditional farming in many parts of our country. What is the main advantage of traditional farming over modern farming practices?

- A high yield
- B low quality
- C greater genetic variation
- D better adaptability to climatic condition

19) Slash and burn practices in shifting cultivation is an age-old practice known to our farmers. This is considered to be one of the dominant factors contributing to

- A water pollution.
- B land degradation.
- C less crop production.
- D green house gas emission.

20) Managing waste is one of the strategies to manage land.



Which activity listed below is the most appropriate to fit in the blank space in the given diagram above?

- A Dump waste in proper landfill
- B Turning waste into new products
- C Using less manufacturing materials
- D Not accepting plastic containers

21) The main idea of conserving energy is for the purpose of

- A energy security.
- B cutting on the electricity bills.
- C protecting the hydro power plant.
- D encouraging the use of firewood.

22) Energy source considered clean and renewable with minimal environmental impact is



I                    II                    III

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

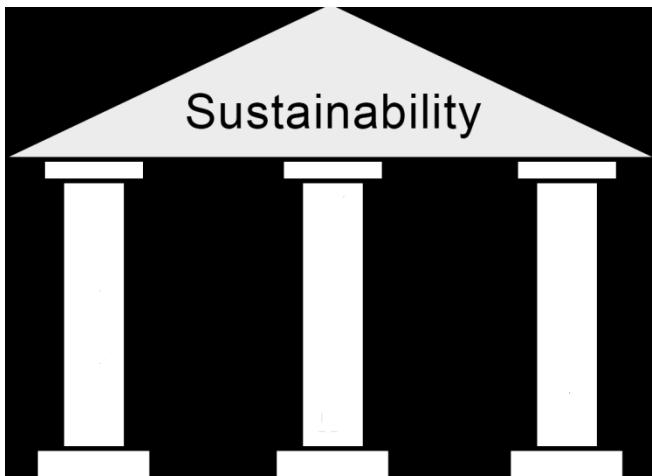
23) Promotion of eco-friendly design and construction materials for infrastructure is one of the initiatives taken towards sustainable development. The statement best describes

- A entertainment industry.
- B green construction industry.
- C partnership with civil society.
- D waste management enterprise.

24) If a nation has issues with trans-boundary movement of hazardous waste and their disposal, which of the following United National Environment Conventions would intervene to support?

- A Basel Convention
- B UNESCO World Heritage Convention
- C International Plant Protection Convention
- D Vienna Convention for the Protection of Ozone Layer

25) Three pillars that support the sustainable development effort are



- A wealth, power and location.
- B wealth, location and social equity.
- C economy, environment and power.
- D economy, environment and social equity.

**II Fill in the blanks with appropriate words. [5 marks]**

- i) The process of extensive extraction of non-wood forest products to the point of exhaustion is .....
- ii) The duration of carrying capacity ..... depends on the stored resources needed to support the increased population of an ecosystem.

iii) Research shows that there is constant rise in the global temperature over the years. The probable cause for the rise is due to ..... activities.

iv) Old phones, DVDs and floppies are outdated and considered as hazardous .....

v) Consumption of goods and services that bring minimal impact on the environment and which are socially equitable and economically viable is termed as ..... consumption.

**III Match the word or phrase of Column A correctly against the word or phrase in Column B. Rewrite the matching pair by writing the numbers against the alphabets in the space provided.**

**[5 marks]**

	<b>Column A</b>		<b>Column B</b>
a	Typical vegetable garden with a variety of insects living in it	i	biological disaster
b	Grassland on which both yaks and sheep graze has now degraded	ii	competition
c	Spread of typhoid in a town affecting a large population	iii	energy conservation
d	Growing and protecting the native Rhododendron species at Thrimshingla National Park	iv	energy Star
e	Decision to buy energy star rated appliances for home use	v	in-situ conservation
		vi	species diversity

a	
b	
c	
d	
e	

**IV. State TRUE or FALSE for the statements given below. Rewrite the false statements. [5 Marks]**

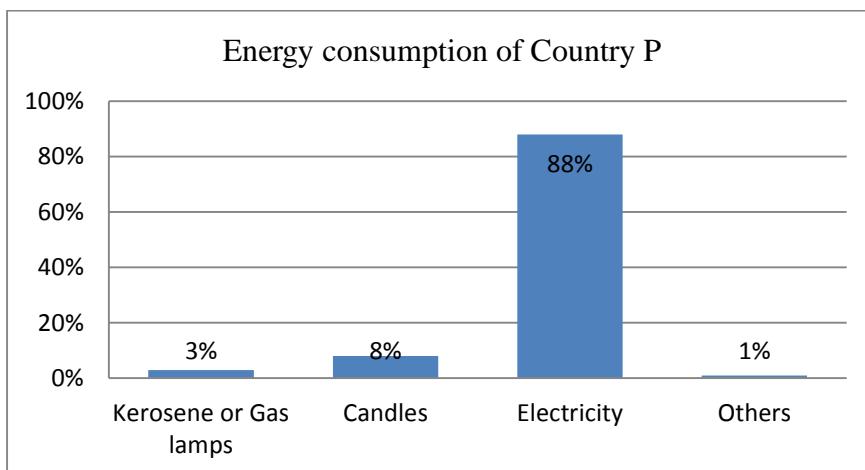
- a) The balance in the number of species and their population in an ecosystem is biotic potential of a species.
- b) Advancement in science and technology has brought about major changes in the people's lifestyle.
- c) Greater rate of transpiration and evaporation are the results of enhanced greenhouse effect.
- d) Grazing land availed on lease by the communities from the government is called *kamzhing*.
- e) Since our country lies in the Himalayas, we are less vulnerable to climate change.

**V Answer the following questions.**

**[10 Marks]**

a) Mock drills practised in schools in the event of an earthquake are beneficial to the students. Do you agree? Justify. **[2]**


b) Energy consumption of a country P is illustrated in the graph below.



What benefits will Country P have by using a greater amount of electricity than other sources of energy? **[2]**



c) Dzongkhag livestock officers have initiated the establishment of numerous poultry farms with imported breed of chicken. You as the director of conservation initiative of Bhutan, suggest an alternative to promote the rearing of local chickens to conserve the genetic resource. [2]


d) White-bellied heron is an endangered species found in Punatshang Chhu river basin. It is threatened due to the establishment of a hydro power plant. Propose a measure to protect this bird. [2]


e) Construction of hydropower plants is beneficial to the public. However, these activities have degraded our forest, water and land resources to some extent. What **TWO** rules would you suggest to reduce the impact of degradation of our natural resources? [2]


**Section B (50 Marks)**  
**Answer any FIVE questions**

**Question 2**

a) Use the following data to calculate Simpson's diversity index (D). What is your conclusion from the value of D about the species diversity? [2]

<b>Sl No</b>	<b>Name of Plants</b>	<b>Number (n)</b>	<b>n(n-1)</b>
1	Rose	4	12
2	Marigold	5	20
3	Dahlia	3	6
4	Hibiscus	2	2
5	Sunflower	1	0

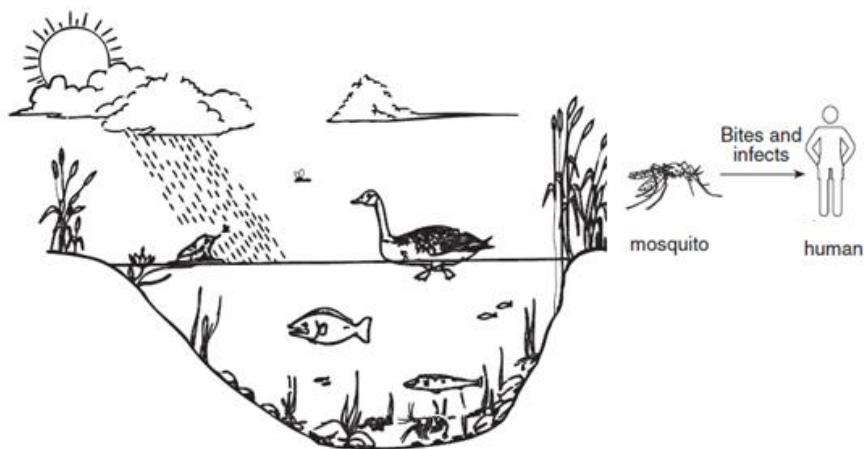


b) What is biogeochemical cycle? [2]


c) What is the relationship between population and carrying capacity in an ecosystem? [1]


d) Write any **TWO** differences between extrinsic and intrinsic factors that influences an ecosystem stability. [2]


e) Many organisms interact with each other to maintain a balance in nature. Identify **THREE** types of interactions and describe each interaction with examples from the diagram given below. [3]




### Question 3

a) Logging is the extraction of wood from the forest to generate income for a country. How will logging increase or decrease the productivity of an ecosystem? [2]

b) Lifestyle refers to the way people live. Write any **TWO** social factors that influence lifestyle. [2]


c) 'Forest is an important bio-productive area in Bhutan'. Give **TWO** reasons to support the statement. [2]


d) How important is a stable ecosystem? [1]


e) Read the excerpt given below.

The pressure on *Sokshing* in Radhi will grow as the population increases over the years. Firewood will still remain the main source of energy as possibilities to seek alternative sources such as cooking gas or electrical appliances are limited. The degraded *Sokshing* must be allowed to be replenished by enrichment plantations otherwise further degradation of *Sokshing* will continue. This may also result in the increase of thefts of *Sokshing*, which could provoke conflicts among the community members. One possible way of resolving these issues is establishment of appropriate local institutions to manage such a type of property.

(Source: *Journal of Bhutan Studies* by Sangay Wangchuk)

i) Identify **ONE** factor leading to *Sokshing* degradation in Radhi gewog. [1]


ii) What would be some of the possible social problems? [1]


iii) Name any local management body that manages forest products at present. [1]


## Question 4

a) Why do you think Bhutan should maintain 60% forest cover at all times to come? [2]

b) If the prevailing agricultural system produces  $X$  calories and if each person needs a minimum of  $Y$  calories to survive, then

i) derive the formula to calculate carrying capacity of the system. [1]


ii) explain carrying capacity in your own words. [2]



c) Forest fires are common in Bhutan and it is a national concern. Suggest **TWO** ways to prevent forest fire. [2]


d) Refer the diagram ‘cycle of disasters’. Which phase do you think is important? Explain how you would successfully respond to carry out the chosen phase in the event of a disaster? [3]



### Question 5

a) Name **ONE** geophysical type of disaster not common to Bhutan. [1]


b) Write any **TWO** importance of studying phenology. [2]


c) Why are electric cars encouraged by our government? [1]


d) Our Constitution mandates forest cover in perpetuity. We live in a carbon negative country. Suggest **THREE** messages to educate the general public to maintain carbon negative environment for all times to come. [3]

e) There are many protected areas in Bhutan which have improved the livelihood of the Bhutanese. Do you agree or disagree with this view? Support your statement with **THREE** reasons. [3]


## Question 6

a) What is ecotourism? [1]


b) Write any **TWO** objectives of enacting Biodiversity Act in Bhutan. [2]



c) Modern farming is encouraged through various initiatives like training tours and use of machineries. Although, modern farming has the advantages in productivity and ease of farming, it has also some disadvantages. Write **FOUR** disadvantages. [2]


d) Write **TWO** challenges of agricultural farming in Bhutan. [2]



e) Electricity is our main source of energy and economy. In order to produce electricity, river systems are crucial. Write **THREE** ways to maintain constant water supply in our streams and rivers. [3]


## Question 7

a) What is energy conservation? [2]

b) How is UNESCO World Heritage helpful to Bhutan? [2]

c) An illiterate man grazing his cattle passes his time on 'WeChat'. You as an educated citizen would like to add 'Safe and smart technology' as another global goal. What are the some of the dangers you foresee with the use of such technology? [3]

d) A research done on solar and wind resource assessment for Bhutan using satellite data says that Bhutan has high potential for solar energy. Mention **THREE** benefits of using solar energy? [3]

