

SECTION A (40 MARKS)
ANSWER ALL QUESTIONS

Question 1

a) 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]

i. Bhutanese families use sunlight to dry vegetables, crops and meat. Traditionally, goods were left to dry in the field, on rooftops or on strings that were not very effective and hygienic.

The above information best describes solar

- A driers.
- B thermal.
- C cookers.
- D photovoltaic system.

ii. To address pressure on the environment, solid wastes are burnt under suitable temperature and conditions by

- A burying.
- B recycling.
- C composting.
- D incinerating.

iii. Following are the reasons for the feasibility of hydropower development in Bhutan **EXCEPT**

- A water free of silt.
- B solid rock structure.
- C swift flowing rivers.
- D constant supply of water.

iv. International cooperation has provided Bhutan with opportunities and exposure to sustainable development in a wide range of fields such as access to knowledge and effective management. The convention that aims to control the transboundary movement of hazardous wastes and their disposal is

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

v. Greenhouse effect is caused due to

- A strong radiation from the sun.
- B intense heat in the atmosphere.
- C absorption of solar radiation by greenhouse gases and preventing it from escaping.
- D trapping of solar radiation by greenhouse gases and scattering it into the upper atmosphere.

vi. A rich biodiversity is very important for sustainable development and provides the provision of food and water. Thus, it has contributed to the development of

- A environment.
- B human culture.
- C species diversity.
- D human population.

vii. Which of the following suggestions would you incorporate to reduce ecological footprint?

- I switch to renewable energy
- II reduce the use of water
- III recycle responsibly
- IV eat more meat
- V drive less

Choose the **CORRECT** answer from the list below:

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

viii. Ten Cordycep collectors from Laya lost their lives after their temporary camp at Ri-Drupzhi was washed away by landslides on June 16, 2021. This is a

- A biological disaster.
- B hydrological disaster.
- C climatological disaster.
- D meteorological disaster.

ix. Which one of the following land use has a more negative impact on the environment in Bhutan?

- A settlement for people
- B pasture for grazing animals
- C forest for timber production
- D agriculture for crop production

x. The statements given below show land use patterns and their impact. Which of the following has a positive impact on the environment?

- A Pasture land → cattle → manure
- B Settlement → houses → urbanization
- C Forest → carbon sink → watershed
- D Agriculture → shifting cultivation → fertilizer

xi. An evacuation plan that will be followed by a school in the event of a disaster such as an earthquake or a fire in order to minimize the impact can be referred to as

- A disaster relief.
- B an emergency plan.
- C disaster preparedness.
- D disaster rehabilitation.

xii. Farmer growing beans along with other crops is an example of

- A nitrification.
- B denitrification.
- C ammonification.
- D nitrogen fixation.

xiii. Suppose the number of tigers and leopards increases steadily in the Wangchuck Centennial National Park, what will happen to its carrying capacity?

- A increases
- B decreases
- C remains same
- D becomes stable

xiv. Species diversity is the number and relative abundance of species found in a given ecosystem. Example - woodland forest comprising 4-5 different species of trees.
The increasing species diversity will

- A increase the efficiency of an ecosystem only.
- B increase the productivity of an ecosystem only.
- C increase the efficiency and productivity of an ecosystem.
- D not affect the efficiency and productivity of an ecosystem.

xv. The ability of an ecosystem to adjust to any disturbances in the locality is called

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

xvi. Bhutan encourages environmentally and socially preferable goods and services, and infrastructure at affordable prices as sustainable consumption and production habits.

Which one of the following best describes the above statement?

- A sustainable lifestyle
- B sustainable marketing
- C sustainable procurement
- D sustainable transportation

xvii. Table given below shows the ecological footprint point score of a 15 year old child.

Category	Score
1. Water use	60
2. Food	200
3. Energy	150
4. Shelter	40
Ecological Footprint = Grand Total divided by 100 =....Hectares (To convert into global hectares, multiply hectares by 2.5)	

The ecological footprint of the child in global hectares is

- A 5.4 gha.
- B 4.5 gha.
- C 11.25 gha.
- D 11.52 gha.

xviii. Ap Jambay has 20 acres of land. Out of 20 acres, 5 acres is forest, 3 acres is used for fishery, 7 acres is used for growing crops and the remaining 5 acres is not useable due to pollution. The bio-productive land is

- A 5 acres.
- B 7 acres.
- C 15 acres.
- D 20 acres.

xix. Several government agencies are involved in the effort of conserving biodiversity in Bhutan. Which one of the following organizations is engaged in the protection and management of forest?

- A Department of Livestock
- B National Environment Commission
- C Department of Forests and Park Services
- D Bhutan Agriculture and food Regulatory Authority

xx. A village can produce 1000 kg of food per week to support 800 people. What share of food will each person get?

- A 1.25 kg
- B 1.24 kg
- C 1.23 kg
- D 1.22 kg

xxi. Which anthropogenic factor degrades natural resources the most?

- A settlement
- B construction
- C deforestation
- D population explosion

xxii. The growth and life cycle of alpine plants and animals are disrupted because of the lack of snow and snow-melt water. This changes the species composition, structure and functioning of alpine meadows leading to habitat alteration and the disappearance of species.

The above information describes the loss of biodiversity due to

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

xxiii. Conserving energy is an important way to reduce strain on the environment. Energy needs to be conserved not only to cut energy costs, but also to preserve the resources for the future.

Which of the following are the strategies to conserve energy?

- I Implementation of taxes on all energy consumption
- II Informing the consumers to use energy-efficient appliances
- III Implementation of passive solar design while constructing a house

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

xxiv. The basic requirements for human beings are provided by

- A nature.
- B agriculture.
- C urbanization.
- D industrialization.

xxv. The pattern of land use continuously changes from one form to another like agriculture to settlement. This change is called land use

- A change.
- B conversion.
- C modification.
- D transformation.

b) Fill in the blanks with appropriate word(s).

[5]

i. The complete cyclic path of essential elements of living matter is called _____.	
ii. The inability to resist a hazard or to respond when a disaster has occurred is termed as _____.	
iii. An attempt to document and identify biological species living in a park is called _____.	
iv. Stronger hurricanes, heat waves and heavy precipitation are the effects of _____.	
v. The life cycle events such as plants sprouting flower, migration of birds and animals and insects hatching are called _____.	

c) State TRUE or FALSE against the statements in the space given below.

[5]

i. The process of transforming natural resources by a living organism is called consumption.	
ii. The health of an ecosystem depends on the number of an organism of same species.	
iii. The success of food chain depends on phenological events.	
iv. Old batteries from the cars are referred to as hazardous wastes.	
v. Sustainable consumption is the consumption of goods and services that are socially equitable and economically viable.	

d) Match each item under column A with the most appropriate item in column B. [5]
 Write the correct alphabet in the space provided under the 'answer' column.

Answer	Column A	Column B
	i. Impact of biogeochemical cycle	a. phenology
	ii. Long term measures for reducing the risk and impact of a hazard or disaster	b. extreme climatic conditions
	iii. Information and fundamental knowledge about patterns and processes in nature	c. phenological changes
	iv. Consequences of hydropower dam construction	d. disaster preparedness
	v. Major changes in the efficiency of bio-productive areas in the ecosystem	e. food security
		f. emission of greenhouse gases
		g. disaster mitigation

SECTION B (60 MARKS)
ANSWER ANY SIX QUESTIONS

Question 2

a) Why is Bhutan referred to as a Bird's Paradise on the Earth? [1]

b) Land degradation occurs mostly during the summer season which affects the health of the environment. Suggest **TWO** measures to prevent land degradation in Bhutan. [2]

c) Explain any **TWO** factors affecting phenology. [2]

d) Give **ONE** difference between extrinsic and intrinsic factors with an example each in [2] the table given below.

Extrinsic factors	Intrinsic factors	

e) Organic farming is one of the means for sustainable development. Justify with [3] **THREE** relevant points.

Question 3

a) What do you understand by Green Tax?

[1]

b) The biogeochemical cycle is important to maintain the constant flow of nutrients in an ecosystem. However, they are disturbed naturally as well by human activities. How do humans disrupt the cycle? Mention any **TWO**.

[2]

c) Disaster Risk Reduction (DDR) protects the lives and livelihoods of communities and [2]
individuals who are most vulnerable to disasters or emergencies.
Suggest **FOUR** ways to reduce such risks.

d) Write **TWO** importance of ecological footprint. [2]

e) You live in an apartment in the heart of a city and waste management has become a major concern. Create a plan to start a waste management program to address this. Explain any **THREE**.

[3]

Question 4

a) Define sustainable development.

[1]

b) Land dumping is a common method of waste disposal in Bhutan. Why?

[2]

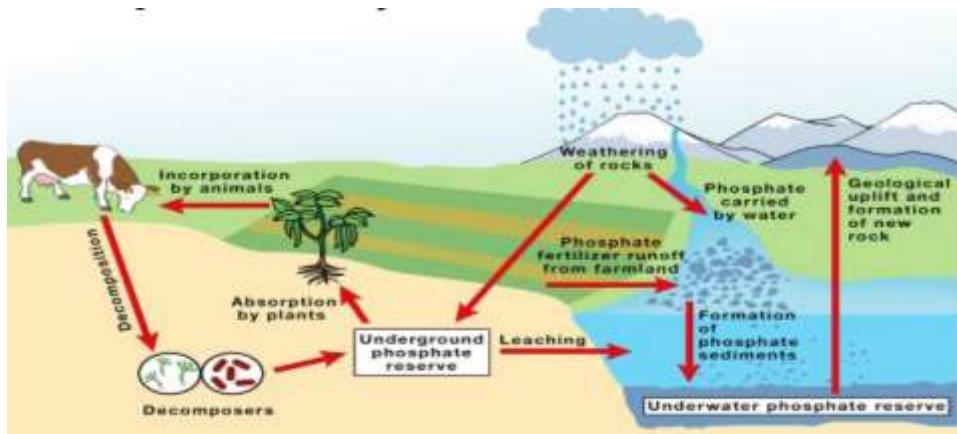
c) Differentiate between exponential growth and logistic growth of a population.
Mention **THREE**.

[3]

Exponential growth	Logistic growth

d) Study the figure of a phosphorous cycle.

[2]



<https://microbiologyclass.com/phosphorus-cycle/>

How do plants and animals participate in the phosphorus cycle?

e) The pressures on natural resources either deteriorate the quality of the available resources or reduce their availability. This leads to natural resource degradation. Suggest any **TWO** measures to prevent natural resource degradation.

[2]

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Question 5

a) Explain Simpson's Index of Diversity.

[1]

b) Implementing sustainable development initiative is one of the challenges of Bhutan. [1]
Mention **ONE** challenge.

c) Bhutan is vulnerable to a range of natural disasters, including floods, earthquakes and landslides. Mention **ONE** way to reduce the impact from each of the disasters mentioned. [3]

d) A group of people throw trash from their vehicle. What would be your short and long-term reaction? Mention **TWO** points each. [2]

e) Poaching of endangered animals such as tigers, leopards and elephants owing to the demand of their body parts in the black market is a growing concern. Mention **THREE** ways by which you can conserve endangered animals. [3]

Question 6

a) Explain **ONE** way to reduce greenhouse effect. [1]

b) Bhutan is rich in natural resources and has been able to conserve it. However, they are increasingly coming under pressure. What could be the reasons? Mention any **THREE**. [3]

c) The Royal Government of Bhutan wants you to carry out a research to find the impacts of hydropower. Give any **FOUR**. [2]

d) Define ecosystem stability. [1]

e) Approximately 80% of the population of Bhutan is involved in agriculture to produce food and generate income. How do you think climate change will affect the lives of farmers? Justify with **THREE** evidences. [3]

Question 7

a) What do you understand by carbon cycle?

[1]

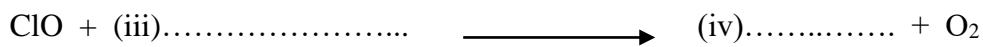
b) Explain **TWO** consequences of over consumption of resources on the environment.

[2]

c) Species diversity plays a significant role in the wellbeing of an ecosystem. Suggest **TWO** ways to protect species diversity in Bhutan [2]

d) The following chemical reactions show how ozone layer is destroyed in the presence of greenhouse gas. [2]

Complete the chemical reactions.



e) Bhutan absorbs roughly seven million tons of carbon dioxide annually and produces around two million tons of carbon dioxide. Thus, Bhutan is a carbon negative country in the world. How did Bhutan manage to achieve this? Give **THREE** reasons. [3]

Question 8

a) How do the vehicles fueled by fossils affect climate change? [1]

b) Explain the differences in the aims of UNESCO World Heritage Convention and International Plant Protection Convention. [2]

UNESCO World Heritage Convention	International Plant Protection Convention

c) There are several national parks and protected areas in Bhutan. Do you think that there is a need for additional parks in our country? Justify with **TWO** points. [2]

d) Land has been used for various purposes such as agriculture and pasture lands. [2]
Mention **ONE** negative impact of each.

e) As a part of Biodiversity Action Plan, what would be some conservative strategies that you would incorporate? Mention any **THREE**. [3]

Question 9

a) Maintaining ecosystem stability is important. Justify. [1]

b) What do you think are the possible reasons for the increase in Black-necked crane population in Phobjikha? Give **THREE** reasons. [3]

c) What happens to the population growth when the resources are limited? [1]

d) Energy efficient appliances with Energy Star Rating save money. Validate with **TWO** points. [2]

e) Based on which multilateral environmental agreement has Bhutan formulated and implemented a number of climate change projects? [3]
Mention its **TWO** aims.

