

Read the question carefully and address exactly what is asked, avoiding unnecessary deviation.

Start with a clear and relevant introduction that shows understanding of the topic.

Structure the answer logically: introduction, explanation/analysis, and a brief conclusion.

Use correct scientific terminology (e.g., biodiversity, sustainability, carbon cycle, eutrophication).

Explain concepts clearly and accurately, avoiding vague or generalized statements.

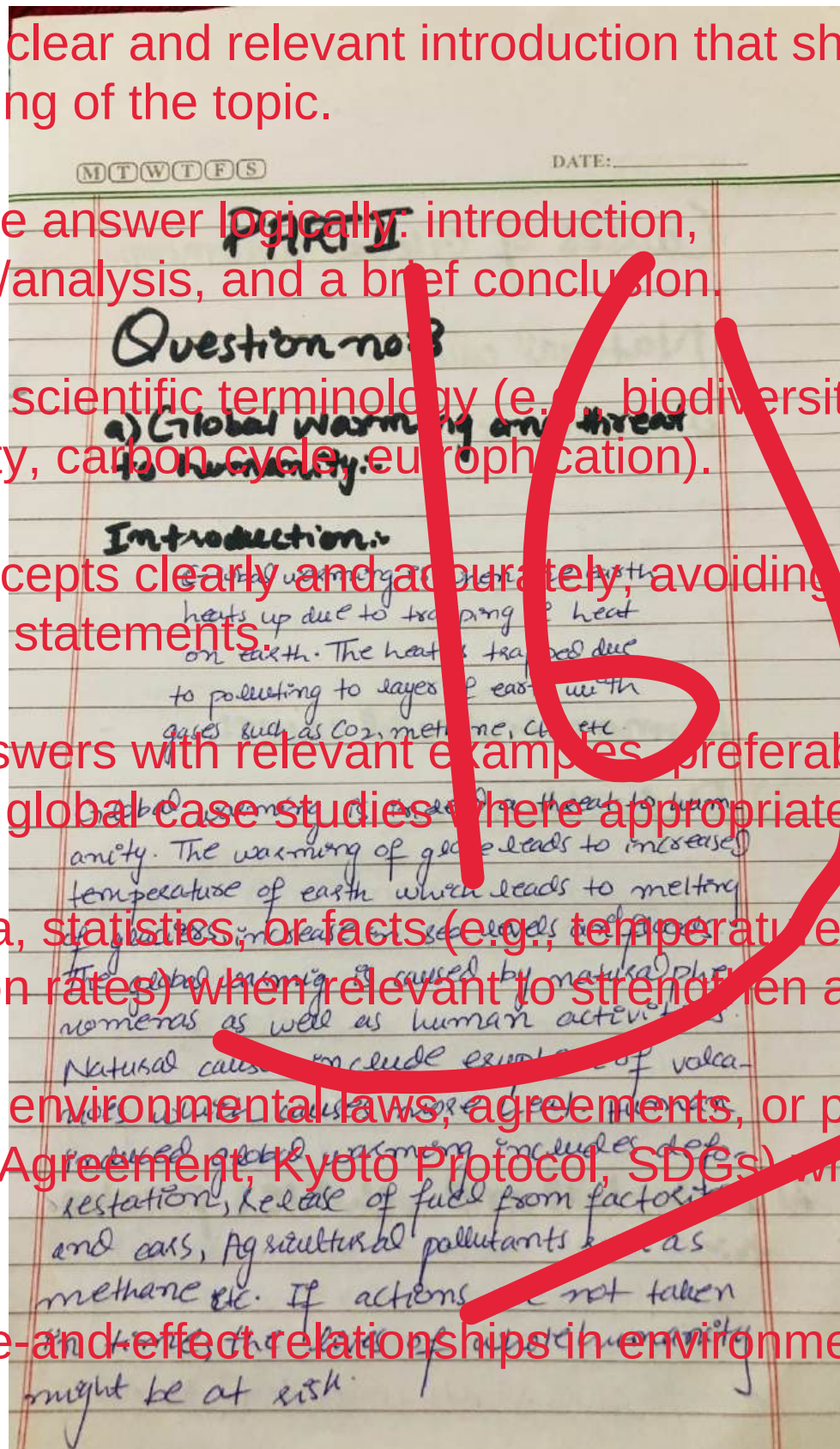
Support answers with relevant examples, preferably from Pakistan or global case studies where appropriate.

Include data, statistics, or facts (e.g., temperature rise, deforestation rates) when relevant to strengthen arguments.

Incorporate environmental laws, agreements, or protocols (e.g., Paris Agreement, Kyoto Protocol, SDGs) where applicable.

Show cause-and-effect relationships in environmental processes.

Focus on analysis and application rather than rote definitions.



Causes of Global Warming:-

Natural causes:-

1) Volcanoes:-

When volcanoes erupt, massive temperature is released which is one of the contributors of global warming. The recent explosion of volcano in Ethiopia after 12000 years is the latest examples.

Human induced causes:-

1) Deforestation:-

Forests are cut by human beings for building houses and other commercial activities. Due to deforestation, the CO_2 is increasing, because plants are the main absorbers of CO_2 . With increased CO_2 in the atmosphere, the earth is getting heated rapidly.

2) Industrial and vehicle's pollution:-

Cars and industries are the major polluters and contributors of the heat of atmosphere. It releases CO_2 , O_2 and other harmful gases which contribute to the

polluting of environment.

Impact on humanity:

↳ Increased floods:

The rapid melting of glaciers due to heat is causing floods. Global South is worst affected from the floods. Pakistan experience worst floods in 2010, 2022 and now 2025. It has caused immense loss of billions of dollars.

↳ Impact on infrastructure:

These temperature induced floods are damaging infrastructure. whole villages are submerged into water. Recent trend shows that urban areas are also getting affected such as DHA (defence housing authority).

↳ Migration:

Rural population tend to be more affected. During periods of disaster, infrastructure gets destroyed and people move from one place to another. This leads to concentration of population in one place, which results in resource scarcity etc.

Impact on agriculture:

Increasing temperature is impacting agriculture as well. Some crops are not used to high temperature or low or rapid rainfall and it leads to decline in agriculture and hence food security.

Resource Constraints:-

When disasters increase, the pressure on government also increases for the rehabilitation. The developing countries are mostly getting affected in this regard because the government cannot handle this pressure in an already strained economy.

Biodiversity loss:-

Increasing temperature leads to biodiversity loss as well. Snow leopard in Pakistan is at threat of extinction due to melting of glaciers. Marine turtles perform nesting on beach but due to increase in temperatures there is chance of increase in birth of female marine turtles which will lead to decline in population of male marine turtles.

Conclusion:-

Global warming is indeed threat to humanity. It is mainly driven by human beings. It is leading to rapid melting of glaciers, increased floods, biodiversity loss, and natural loss. A strict global consensus should be developed to restrict industrial emissions and resort toward renewable energy resources.

b) Biodiversity loss.

Introduction:-

Biodiversity loss refers to the reduction in genetics of species of plants and animals, extinction, manual removal on local and global level.

**United Nations
environment protection
agency.**

Biodiversity loss is a global threat. According to **WHO** biodiversity induced economic losses are estimated to trillion dollars annually. The extinction of plants and animals are impacting economies as well. Pollen bees are at threat of extinction. They are mostly responsible for pollinating

agricultural crops. Its extinction has led to the loss of 235 million dollars. Causes of loss of Biodiversity include climate change, deforestation, hunting by humans, overuse by the local populations (unsustainable use), unfavourable habitat, spread of diseases due to pollution which leads to death of plants and animals. Its effects are that many economically viable plants and animals are getting extinct, decline in agricultural yield. However, if timely measures are taken, these problems can be countered such as global agreements, strict implementation of national strategies for Biodiversity conservation, educating local communities for sustainable use, in situ conservation, strict regulatory action against those who exploit it.

Causes of loss of Biodiversity:

a) Climate change:

Climate change is causing rapid shift in weather patterns. Temperatures are rising at an unprecedented scale. Due to which many species are getting affected and are declining at a rapid rate. Monsoons, which is the

national bird of Pakistan was reported at the verge of extinction until efforts were made by national government to conserve it. The melting glaciers of Himalayas are causing snow leopards to migrate to lower regions which are not suitable for it. Agricultural yield is also declining due to increased heat waves and rainfalls.

Deforestation:-

Deforestation is causing biodiversity loss. Forests are home to millions of species of plants and animals. As a result of forests being cut down at massive scale, these species are losing their homes and are getting extinct.

Overhunting:-

Overhunting of animals by humans are also a reason behind its decline. Sparrow hunting, ostrich hunting, deer etc are prevalent in Sindh and Balochistan provinces of Pakistan.

Overuse by local populations:-

and indigenous local populations mostly depend on native plants and animals for their livelihoods with no other source of income. This unsustainable use leads to extinction of these native species. Polar bears is hunted by natives living in polar regions, which is why it is at the throat of extinction.

Spread of Diseases due to pollution:-

The immune system of ^{some} animals is not used to the pollutants. These pollutants cause rapid spread of diseases and ultimately death.

Effects:-

Impact on economy:-

Human beings are dependent on plants and animals for their livelihoods. It is used in pharmaceutical industry, Textile industry, construction industry and its extraction will lead to massive economic loss. According to the report of WHO, the economic loss of biodiversity loss is whopping 10 trillion dollars annually.

Decline in agricultural yield:-

Some crops are specific to their particular weather pattern. Change in that pattern will cause decline in agricultural yield.

Measures to counter Biodiversity loss:-

Implementation of Global agreements:-

Global convention as a convention on Biodiversity conservation 1992, Montreal protocol, Agenda 21, Rio earth summit 1992, COP 15 (specially conducted for environmental conservation) should be implemented in its true spirit by the national governments through effective policy measures.

Educating and equipping local communities:-

Local and indigenous communities should be educated about the sustainable use of these resources. They should also be economically equipped and empowered through employment programmes, skill set programmes and social protection programmes. It

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would lead to the reversal of the species that are on decline.

In-situ conservation:-

The species that are at threat of extinction at dangerous levels should be conserved through in-situ conservation. Such as building National parks and zoos, providing favourable conditions for these species to survive and reproduce. ~~Some~~ Some specimens should be reproduced in labs that are at threat of extinction.

Conclusion:-

Biodiversity is an important aspect of ecology. It is essential for environmental stability. Its preservation should be utmost priority of human beings.

Question no: 4

Answer:-

Technological options to con-

Water air pollution:-

Introduction:-

Air pollution is defined as the presence of such particles in the air that are above the average ratio and is contaminating the environment and atmosphere.

Air pollution is mostly caused by human activities. Such as pollutants like CO_2 , O_3 , CH_4 , NO_x released from vehicles and industrial activities. Or methane released by goat used for agricultural land. Air pollution has huge impact on human health and other species. It can cause throat cancer, reddened eye, kidney disease etc. Due to its negative impacts it must be countered properly. With the advent of technology these efforts become more effective. Areas contributing to more pollution can be tracked through satellite imagery etc.

Satellite imaging:-

Satellite can be used to determine which areas are contributing to pollution. India

is employing AI satellite imaging to recognize areas that are causing air pollution due to soot burning.

b) Answer:-

Adaptation measures by Pakistan to counter climate change:-

Introduction:-

Climate change is becoming one of the worst challenges for Pakistan. The rise in temperatures, melting of glaciers, floods, etc which is impacting economy and livelihoods for people. Pakistan can tackle climate change by strengthening its disaster management authorities at central and provincial level, by creating carbon credits to reduce CO₂ emissions, producing climate resilient agricultural crops, by building climate resilient infrastructure, educating local communities about disaster management etc. But there are challenges to adaptation of the measures i.e. lack of coordination between provinces and centre i.e. federal and provincial disaster management authorities, lack of funding to build climate resilient infrastructure etc.

Strengthening of Disaster ^{Risk} management authorities:

The major problem that lies with Pakistan is that there is lack of coordination between federal and provincial authorities. The federal and provincial disaster management authorities are not at par with each other which makes this challenge more difficult to tackle.

Creating carbon credits to reduce CO₂ emissions:

International institutions have set targets that whichever country reduce CO₂ emission will be granted with carbon credits i.e. monetary benefits. If Pakistan implements these measures it will not reduce CO₂ and hence temperatures and its disasters, but will also get monetary benefits out of it to tackle with other climate induced challenges.

Producing climate resilient ag. ~~cultural~~ crops:

Such crops should be produced in labs that are resilient to climate processes. It can be done by exporting them from other countries such as China and USA. Through which Pakistan will not experience challenge of food insecurity during climate disaster.

less.

Building of climate resilient infrastructure:- Current infrastructure in rural as well as urban areas is not resilient to climate change. Such Building should be built that does not get impacted by floods. Sewage systems should be improved to regulate the flow of water during periods of high rainfall.

Educating local communities about disaster management:-

In resource scarce country like Pakistan timely response of disaster management authorities is always late. So educating local communities that are more vulnerable to such tragedies should be taught and equipped with first aid. Communities in Gilgit Baltistan northern areas should be taught properly.

Challenges to Adoption of Such Measures:-

1) Lack of coordination b/w institutions:-

The Pakistan, there is lack of coordination between disaster management authorities on national and provincial level which makes implementation of policies harder.

Lack of funding to build climate resilient infrastructure.

There is a lack of funding to build climate resilient infrastructure. Pakistan is already a fragile economy and does not have access to these funds.

Conclusion:-

Pakistan is worst affected country by climate change so these needs to be funding and policy to tackle with these challenges.

Question no: 6

a) Population explosion:-

One of the many domestic challenges that Pakistan is facing is population

crisis. Currently, population of Pakistan is 241 million and is expected to reach 300 million by 2050. According to the world population report, population of Pakistan is growing at an alarming rate of 2.1% per year. Global average is 1% per year. It has even surpassed its South Asian counterparts. Population of Sri Lanka, Bangladesh and India grows at an average rate of 1.1% annually. Pakistan is already a resource scarce country and it will be really difficult to address the employment, education and food needs of such expanding population. This demographic explosion is a threat to the already weak economy of Pakistan.

Food Insecurity:

Food insecurity is a global issue. It is mainly due to climate change, economic weakness etc. Global north and African countries are mostly affected by it.