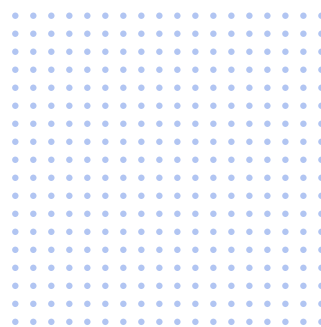




FOR ICSE CLASS 9 EXAM PREPARATION

ICSE Class 9 2027 Sample Paper · Environmental Science

EXAM

ICSE Class 9

YEAR

2027

TYPE

Sample Paper

SUBJECT

Environmental Science

INCLUDES

Marking Scheme



CLASS IX – SPECIMEN QUESTION PAPER

ENVIRONMENTAL SCIENCE

Maximum Marks: 80

Time allowed: Two hours

1. Answers to this Paper must be written on the paper provided separately.
 2. You will **not** be allowed to write during first 15 minutes.
 3. This time is to be spent in reading the question paper.
 4. **The time given at the head of this Paper is the time allowed for writing the answers.**
-
5. Attempt **all** questions.
 6. The intended marks for questions or parts of questions are given in brackets [].

Instruction for the Supervising Examiner

Kindly read aloud the Instructions given above to all the candidates present in the Examination Hall.

SECTION A (40 Marks)

(Attempt **all** questions from this **Section**.)

Question 1

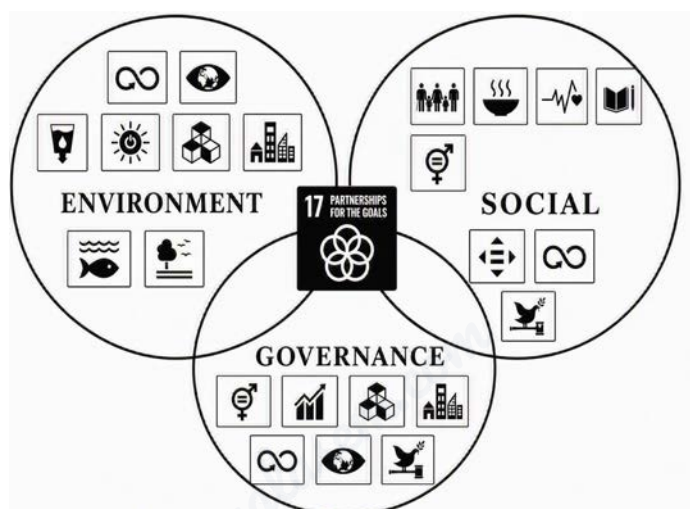
- (i) Choose the correct answers to the questions from the given options. [10]

(Do not copy the questions, write the correct answers only.)

1. Leapfrog approach : Sustainable technology :: Rainwater harvesting :

- (a) Water conservation
 - (b) Water pollution
 - (c) Ground water depletion
 - (d) Sewage treatment
2. Which of the following is an abiotic component of the ecosystem?
- (a) Trees
 - (b) Bacteria
 - (c) Sunlight
 - (d) Lichens
3. Loss of bio-cultural diversity will most directly affect the:
- (a) Traditional Knowledge Systems
 - (b) Industrial productivity
 - (c) Satellite communication
 - (d) Urban transport system
4. Identify the **INCORRECT** pair:
- (a) Air Pollution – Vehicular Emissions
 - (b) Water Pollution – Industrial Effluents
 - (c) Biodiversity Loss – Habitat Destruction
 - (d) Sustainable Development – Resource Wastage

5. The movement of nutrients in the environment forms the:
- Biosphere
 - Water cycle
 - Biogeochemical cycle
 - Carbon cycle
6. Observe the diagram given below and identify the concept being suggested:



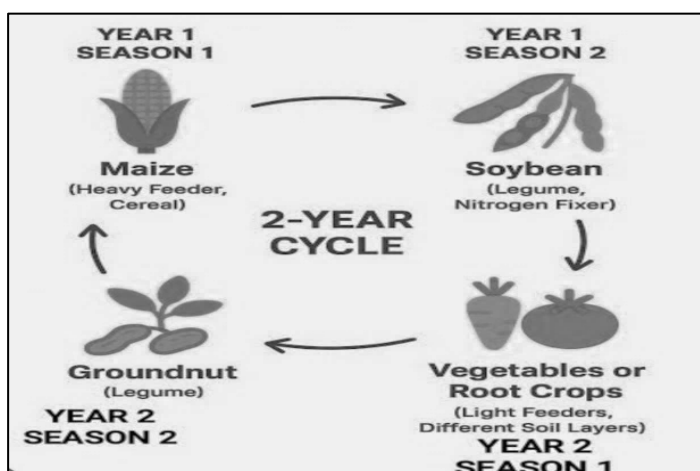
- Disaster management
 - Life skills
 - Sustainable development
 - Industrial development
7. Which of the following is the cause of resource depletion in developing and underdeveloped countries?
- Population explosion
 - Increased demand in energy
 - Consumer driven lifestyle
 - Advanced technology

8. Match Column I with Column II:

Column I	Column II
1. Carbon Footprint	A. Monitoring electricity consumption
2. Energy Audit	B. Sustainable resource use
3. Environmental Ethics	C. Greenhouse gas emissions
4. Water Budgeting	D. Tracking water use

- (a) 1-C, 2-A, 3-B, 4-D
- (b) 1-A, 2-C, 3-D, 4-B
- (c) 1-C, 2-D, 3-A, 4-B
- (d) 1-B, 2-C, 3-D, 4-A

9. Identify the purpose of the cropping system illustrated in the picture given below:



- (a) Removal of soil nutrients
- (b) Natural replenishment of soil fertility
- (c) Increases the attack of pests
- (d) Promotes cultivation of only cereal crops

10. Which feature best explains why the Western Ghats qualify as a biodiversity hotspot?
- (a) Large geographical area
 - (b) Presence of many rivers
 - (c) High agricultural productivity
 - (d) Large variety of species

(ii) Answer the following questions:

[6]

- (a) Name the zone of the earth where land, air and water function together to support living organisms.
- (b) Write *any one* characteristic of a stable ecosystem.
- (c) The biological process in which different species can live in the same habitat at the same time is known as _____ (*Coevolution / Coexistence*).
- (d) What is the purpose of traditional structures such as the *stepwells* of Rajasthan and *zings* of Ladakh?
- (e) A school asked its students to examine the types and quantities of waste generated in the classrooms and canteen and to plan measures for segregation and recycling.

Which *type of environmental audit* would help the school to assess this situation?

- (f) The Polluter Pays Principle (PPP) is one of the 27 Principles of the Rio Earth Summit 1992. Which environmental ethic does this principle assert?

Question 2

- (i) What are *producers* in an ecosystem? Why are they considered the foundation of ecosystems? [2]
- (ii) To establish a transport network between a few cities, a vast tract of tropical rainforest was completely cleared. State *two* ways in which the removal of the forest directly disrupts the atmospheric balance of the carbon cycle. [2]
- (iii) What are *indicator species*? What is their role in the ecosystem? [2]
- (iv) Name the ecological interaction in which one species hunts, kills and feeds on another species. Give *one* suitable example. [2]

Question 3

- (i) What is the *carrying capacity* of an ecosystem? Give *one* example to explain this concept. [2]
- (ii) *In India, cities like Mumbai and Ahmedabad grew rapidly due to textile and manufacturing industries, attracting migrants and expanding urban infrastructure.* [2]

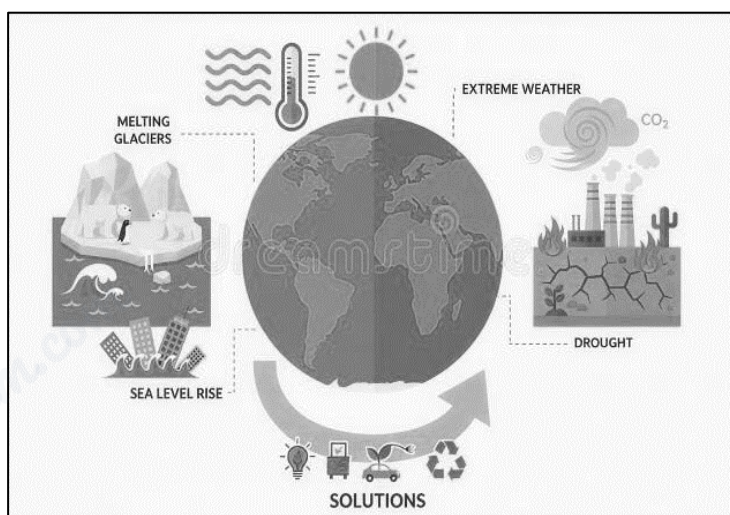
With reference to the above statement, mention *two* ways how industrialisation and urbanisation are related.
- (iii) List *two* ways in which deforestation affects climate change. [2]
- (iv) State *two* benefits of Yoga to overcome the issues of today's modern lifestyle. [2]

Question 4

- (i) *A city finds an increase in smoke concentration in the air due to vehicular emissions. Students investigate the sources of this smoke, collect air-quality data and examine its effects on human health.* [2]

Identify the environmental problem described above and state *one* health impact of vehicular air pollution.
- (ii) State *any two* benefits of adopting clean energy technologies. [2]

- (iii) Observe the picture given below and answer the questions that follow: [2]



- (a) Identify the environmental issue represented in the diagram.
- (b) State *any one* impact of this issue.
- (iv) Explain *any two* causes of biodiversity loss. [2]

SECTION B (40 Marks)

(Attempt **any four** questions from this **Section**.)

Question 5

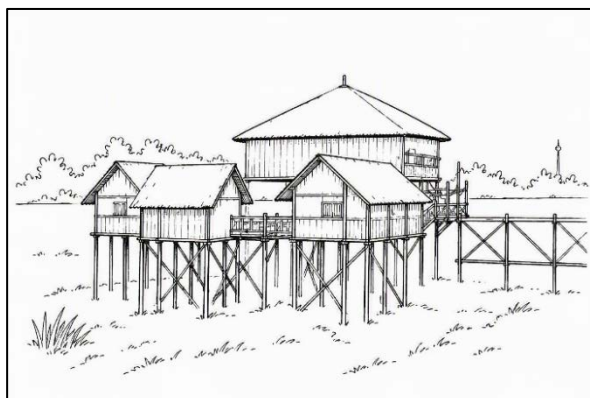
- (i) African elephants uproot trees and clear thick bushes as they feed. This behaviour prevents forests from dominating the area and helps in maintaining an open grassland where herbivores graze and lions hunt effectively. [5]
- (a) What are *Keystone Species*? Explain why the elephant fits this definition.
- (b) Identify the type of interspecies interaction where grazing herbivores benefit from the cleared land while the elephants remain unaffected.
- (c) Name the biological process that breaks down elephant waste and explain how this impacts the abiotic soil.
- (ii) (a) What is the role of *denitrifying bacteria* in maintaining the balance of nitrogen between the biotic and abiotic components of the environment? [5]
- (b) Explain *three* ways in which *estuaries* and *mangroves* help in protecting the coastal environment.

Question 6

- (i) Bengaluru has witnessed one of the highest population influxes owing to the city's rapid economic growth, especially in IT and various technology sectors. [5]

-(<https://bpac.in>, 25th August, 2023)

- (a) Based on the above case study, explain *any three ways* in which the rising population and increased consumption of resources put pressure on natural resources in Bengaluru.
- (b) Suggest *two* sustainable methods to reduce such stress on natural resources.
- (ii) Study the picture given below and answer the following questions: [5]



- (a) Name *one* region in India where these types of houses are commonly found.
- (b) Mention *two* reasons for the unique feature adopted for the construction of these types of houses.
- (c) State *two* reasons why this type of construction is considered as a sustainable practice.

Question 7

- (i) *Loss of biodiversity threatens human survival.* [5]
- (a) Justify the above statement giving *three* reasons.
- (b) Mention *one* natural cause and *one* man-made cause for the loss of biodiversity in India.

- (ii) The picture given below illustrates *Intensive Livestock Farming* in India. [5]



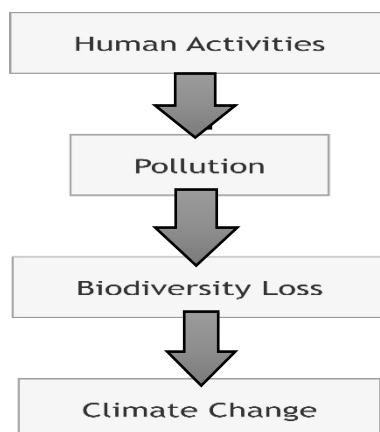
- Mention *two* reasons why this practice is popular in India.
- Give *two* ecological impacts of this practice.
- State *one* measure to reduce the ecological hazards caused by this practice.

Question 8

- Name *any two* Indian harvest festivals. Mention *any three* ways in which these festivals act as a cultural mechanism for biodiversity conservation. [5]
- Mention *three* environmental consequences and *two* social impacts of unsustainable developmental practices in India. [5]

Question 9

- (i) The diagram below shows the relationship between human activities and climate change: [5]



- Explain the relationship depicted in the diagram.
- Suggest *three* actions that can help break this chronology.

- (ii) (a) Define *Environmental Ethics*. [5]
- (b) Explain *three* ways in which environmental ethics can influence sustainable behaviour at home and school.

Question 10

- (i) (a) Explain the concept of *handprint*. [5]
- (b) Describe *any three* positive environmental actions that can help build sustainable communities.
- (ii) A city experiences increasing temperatures, polluted air and loss of green spaces. [5]
- (a) Suggest *two* measures to address the environmental issues experienced by the city.
- (b) Identify *any three* components of the Triple Planetary Crisis in this situation.



CLASS IX – SPECIMEN
DRAFT MARKING SCHEME – ENVIRONMENTAL SCIENCE

SECTION A (40 Marks)			
Question 1			[10]
(i)	1.	(a) Water conservation	
	2.	(c) Sunlight	
	3.	(a) Traditional Knowledge Systems	
	4.	(d) Sustainable Development – Resource Wastage	
	5.	(c) Biogeochemical cycle	
	6.	(c) Sustainable development	
	7.	(a) Population explosion	
	8.	(a) 1-C, 2-A, 3-B, 4-D	
	9.	(b) Natural replenishment of soil fertility	
	10.	(d) Large variety of species	
(ii)	(a)	Biosphere	[6]
	(b)	More biodiversity / dynamic energy flow / effective nutrient cycling / balanced trophic levels / resilience to ecological disturbance / self-regulation (homeostatic mechanism), low pollution, and minimal human impact. (Any one)	
	(c)	Coexistence	
	(d)	Rainwater harvesting / conservation of water (Any one)	
	(e)	Waste audit	
	(f)	Those who pollute must pay for the environmental damage they cause	
Question 2			
(i)	Producers are green plants, algae, and some bacteria that prepare their own food by photosynthesis using sunlight, carbon dioxide, and water. They are considered the foundation of an ecosystem because they: 1. Convert solar energy into chemical energy (food), which supports all other organisms. 2. Provide food and energy directly or indirectly to all consumers, forming the first trophic level of every food chain. (Any one)		[2]

(ii)	1. Fewer trees are available to absorb carbon dioxide (CO₂) through photosynthesis, causing the concentration of CO₂ in the atmosphere to increase. 2. The increased atmospheric CO₂ is partly absorbed by the ocean, increasing carbonic acid formation and reducing the pH of the sea water, making it acidic.	[2]
(iii)	Indicator species are organisms whose presence, absence, or abundance reflects the health and quality of an ecosystem or environmental conditions. Role in the ecosystem: They provide an early warning of environmental changes such as pollution, habitat degradation, or climate change, helping scientists monitor and protect ecosystems. Examples: Lichens indicate air quality, while frogs indicate the health of freshwater ecosystems.	[2]
(iv)	The interspecies interaction is called Predation. Example: A tiger hunting and feeding on a deer / A frog feeding on insects/ A spider trapping and feeding on a fly/ An owl hunting and feeding on a mouse. (Any one)	[2]
Question 3		
(i)	Carrying capacity is the maximum population of a species that an ecosystem can support sustainably with its available resources. Example: A pond can support only a certain number of fish (e.g., 500). If the fish population exceeds this limit, food and oxygen become insufficient, causing the population to decrease back to the carrying capacity.	[2]
(ii)	Industrialisation creates employment opportunities. This attracts people from rural areas to cities in search of jobs and this leads to rapid urbanisation. Urbanisation supports industrial growth by providing better infrastructure, such as transport, housing, electricity, and communication, along with a large workforce and markets for goods.	[2]
(iii)	Two ways in which deforestation affects climate change: 1. Increases atmospheric CO₂ because fewer trees absorb carbon dioxide through photosynthesis. 2. Raises global temperatures by strengthening the greenhouse effect. 3. Disrupts the water cycle by reducing transpiration, leading to changes in rainfall patterns. 4. Increases the frequency of droughts in many regions due to reduced moisture recycling. Reduces the Earth's carbon sink, making it harder to remove excess CO₂ from the atmosphere. 5. Causes extreme weather conditions such as heat waves and irregular rainfall.	[2]

	6. Accelerates desertification in vulnerable regions by reducing vegetation cover. 7. Decreases natural cooling provided by forests, causing higher land surface temperatures. <i>(Any two)</i>	
(iv)	Benefits of Yoga: 1. Improves physical fitness by increasing flexibility, strength, balance, and posture. 2. Promotes mental well-being by reducing stress and anxiety. 3. Improves concentration. 4. Enhances breathing efficiency and lung capacity. 5. Improves blood circulation and heart health. 6. Helps maintain a healthy body weight. 7. Improves sleep quality. <i>(Any two)</i>	[2]
Question 4		
(i)	Environmental problem: Vehicular air pollution. Health impact: It can cause respiratory problems such as asthma, bronchitis or breathing difficulties.	[2]
(ii)	Two benefits of adopting renewable energy technologies: 1. Reduces pollution and greenhouse gas emissions, helping to slow climate change and improve air quality. 2. Conserves non-renewable resources by reducing dependence on fossil fuels such as coal, oil, and natural gas.	[2]
(iii)	(a) The environmental issue represented is Global Warming. (b) Impacts of Global Warming: 1. It causes the melting of glaciers and polar ice caps, leading to a rise in sea level. 2. Changes in rainfall patterns, causing floods and droughts. 3. Loss of biodiversity due to habitat destruction. 4. Reduced agricultural productivity in many regions. 5. Increased occurrence of extreme weather events such as cyclones and storms. <i>(Any one)</i>	[2]
(iv)	Causes of biodiversity loss: 1. Habitat destruction: Forests are cleared for agriculture, industries, roads, and urban development, destroying the natural habitats of plants and animals.	[2]

	2. Pollution: Air, water, and soil pollution harm living organisms, degrade ecosystems, and reduce the survival and reproduction of many species. 3. Climate change: Rising temperatures and changing rainfall patterns alter habitats, making them unsuitable for many species. 4. Overexploitation: Excessive hunting, fishing, logging, and collection of wildlife reduce the population and may lead to extinction of species. 5. Invasive alien species: Non-native species compete with or prey on native species, disrupting ecosystems. (Any two)	
SECTION B (40 Marks)		
Question 5		
(i)	(a) Keystone species are species that have a huge impact on the structure and functioning of an ecosystem, even though its population size may be small. African elephants are keystone species because they uproot trees and clear dense bushes while feeding, preventing forests from overtaking grasslands. This maintains open habitats and grasslands that support grazing herbivores and predators such as lions, thereby preserving ecosystem balance. (b) Commensalism – the grazing herbivores benefit from the open grassland created by elephants, while the elephants are neither helped nor harmed. (c) The biological process is decomposition (carried out by decomposers such as bacteria and fungi). Impact on the abiotic soil: Decomposition releases nutrients such as nitrogen and phosphorus into the soil. This enriches soil fertility, improves soil quality, and supports healthy plant growth.	[2] [1] [2]
(ii)	(a) Nitrogen fixation is the process by which atmospheric nitrogen gas (N_2) is converted into usable nitrogen compounds such as ammonia (NH_3) or ammonium ions (NH_4^+) by nitrogen-fixing bacteria (e.g., Rhizobium and Azotobacter), lightning, or industrial processes. This makes nitrogen available to plants for growth. Denitrifying bacteria (such as Pseudomonas and Thiobacillus) convert nitrates (NO_3^-) present in the soil into nitrogen gas (N_2), which is released back into the atmosphere. (b) Ways in which estuaries and mangroves help in protecting the coastal environment: 1. Protect the coastline from erosion: Their dense roots bind the soil and reduce erosion caused by waves and tidal currents.	[2] [3]

	2. Act as natural barriers: They absorb and reduce the force of storms, cyclones and tidal waves, thereby protecting coastal areas from flooding and damage. 3. Support biodiversity and maintain water quality: They provide breeding and nursery grounds for many fish and other organisms, while also trapping sediments and pollutants from water.	
Question 6		
(i)	(a) Ways in which the rising population and increased consumption of resources put pressure on natural resources: 1. Increased demand for water leads to over-extraction of groundwater and water shortages. 2. Greater demand for housing and infrastructure results in deforestation, loss of green spaces, and urban sprawl. 3. Higher energy consumption increases the use of electricity and fossil fuels, contributing to air pollution and greenhouse gas emissions. 4. More waste generation puts pressure on waste management systems, causing land and water pollution. 5. Increased demand for transport leads to traffic congestion, higher fuel consumption, and air pollution. <i>(Any three)</i> (b) Sustainable methods to reduce stress on natural resources: 1. Promote rainwater harvesting and water conservation measures. 2. Encourage public transport, cycling, and electric vehicles to reduce fuel consumption and pollution. 3. Implement waste segregation, recycling, and composting. 4. Increase afforestation and development of urban green spaces. 5. Promote energy-efficient buildings and the use of renewable energy such as solar power. <i>(Any two)</i>	[3] [2]
(ii)	(a) Assam (Arunachal Pradesh or other flood-prone North-Eastern states.) (b) Reasons for the unique feature: 1. The houses are built on stilts to protect them from seasonal floods and waterlogging. 2. The raised platform keeps residents safe from wild animals, snakes, and insects and allows better air circulation.	[1] [2]

	(c) This type of construction is considered a sustainable practice because: 1. The houses are built using locally available, renewable materials such as bamboo, wood, and thatch, reducing the carbon footprint. 2. The elevated design works with the natural environment, minimising flood damage and reducing the need for major land modification.	[2]
Question 7		
(i)	(a) Loss of biodiversity threatens human survival because: 1. It disrupts food chains and food webs, upsetting the ecological balance and affecting the survival of other organisms. 2. It reduces ecosystem services such as pollination, soil formation, nutrient cycling, water purification and climate regulation. 3. It decreases ecosystem stability and resilience, making ecosystems less able to withstand and recover from environmental changes and natural disasters. (b) Causes of biodiversity loss in India: • Natural cause: Floods / droughts / cyclones (<i>Any one</i>) • Man-made cause: Deforestation and destruction of natural habitats (<i>Any one</i>)	[3] [2]
(ii)	(a) 1. It produces a large quantity of milk, meat, eggs, and other animal products to meet the growing demand of the increasing population. 2. It increases productivity and profitability by rearing a large number of animals in a limited space using scientific feeding and management practices. (b) 1. Large quantities of animal waste can pollute soil and nearby water bodies if not treated properly. 2. Methane and other greenhouse gases released by livestock contribute to global warming and climate change. (c) 1. Treat animal waste through biogas plants. 2. Composting and proper manure management to prevent pollution and generate renewable energy. 3. Controlled use of antibiotics. 4. Improved waste treatment systems. 5. Adoption of sustainable livestock farming practices. (<i>Any one</i>)	[2] [2] [1]

Question 8		
(i)	The Indian festivals associated with agriculture: • Pongal • Baisakhi • Makar Sankranti • Onam • Nuakhai • Lohri • Magh Bihu (Any two) The reasons why these festivals act as a cultural mechanism for biodiversity conservation are: 1. They promote the cultivation and conservation of indigenous crop varieties by celebrating local harvests. 2. They encourage the protection of plants, animals, rivers, and forests through traditional customs and rituals, fostering respect for nature. 3. They preserve traditional farming practices and indigenous knowledge, which support sustainable use of natural resources.	[5]
(ii)	Environmental consequences: 1. Deforestation and habitat destruction, leading to loss of biodiversity. 2. Air, water, and soil pollution due to industrialisation, urbanisation, and improper waste disposal. 3. Climate change and global warming caused by increased greenhouse gas emissions. 4. Land degradation and soil erosion. 5. Depletion of natural resources such as groundwater, forests, and fossil fuels. (Any three) Social impacts: 1. Health problems such as respiratory diseases, water-borne illnesses, and heat-related illnesses caused by pollution. 2. Displacement of local communities due to large infrastructure projects, mining, dams, and urban expansion. 3. Loss of livelihoods for farmers, fishermen, and forest-dependent communities. 4. Increased poverty and inequality due to unequal access to natural resources. (Any two)	[3] [2]

Question 9		
(i)	(a) Human activities such as deforestation, industrialisation, urbanisation, and burning of fossil fuels cause air, water, and soil pollution. Pollution destroys natural habitats and harms plants and animals, resulting in biodiversity loss. The loss of biodiversity reduces the ability of ecosystems to absorb carbon dioxide and maintain ecological balance, thereby accelerating climate change.	[2]
	(b) Three actions that can help break this chronology: 1. Increase afforestation and protect forests to conserve biodiversity and absorb carbon dioxide. 2. Reduce pollution by using renewable energy, energy-efficient technologies, and cleaner fuels. 3. Adopt the 3Rs (Reduce, Reuse, Recycle) and ensure proper waste management. 4. Conserve biodiversity by protecting wildlife habitats and expanding protected areas. 5. Promote sustainable agriculture and responsible use of natural resources. <i>(Any three)</i>	[3]
(ii)	(a) Environmental Ethics - Are the moral principles and values that guide human behaviour towards the environment, encouraging the responsible use, conservation, and protection of natural resources for the well-being of present and future generations.	[2]
	(b) The three ways in which environmental ethics can influence sustainable behaviour at home and school are: 1. Conserve natural resources by switching off lights, fans, and taps when not in use, thereby saving electricity and water. 2. Practise the 3Rs (Reduce, Reuse, Recycle) by minimising waste, reusing materials, and segregating waste for recycling. 3. Protect biodiversity by planting and caring for trees, maintaining school gardens, and avoiding damage to plants and animals. 4. Promoting responsible use of resources: It encourages individuals to save water, electricity and paper by avoiding wastage and using resources judiciously. 5. Encouraging proper waste management: It develops a sense of responsibility to reduce, reuse and recycle materials, avoid single-use plastics and dispose of waste properly. 6. Developing care and respect for nature: It motivates students and family members to protect plants and animals, maintain cleanliness and participate in activities such as tree planting and keeping the surroundings clean. <i>(Any two)</i>	[3]

Question 10		
(i)	(a) A handprint is the positive impact created by an individual or community through actions that help protect and improve the environment. A handprint focuses on actions that contribute to sustainability.	[2]
	(b) Three positive environmental actions to help build sustainable communities: 1. Conserve natural resources by saving water, electricity, and other essential resources. 2. Reduce pollution and waste through waste segregation, recycling, composting, and avoiding single-use plastics. 3. Promote biodiversity by planting trees and protecting local ecosystems. 4. Encourage community participation in environmental campaigns, cleanliness drives, and awareness programmes. 5. Improve public health and quality of life by maintaining a cleaner and greener environment. (Any three)	[3]
(ii)	(a) Two measures to address the environmental issues: 1. Increase green cover by planting trees, developing urban forests, and protecting existing parks to reduce temperatures and conserve biodiversity. 2. Reduce air pollution by promoting public transport, electric vehicles, renewable energy, and enforcing strict emission standards for industries and vehicles. 3. Conserve and restore green spaces by protecting wetlands, parks, and urban biodiversity through sustainable land-use planning. 4. Promote energy-efficient and green buildings to reduce the urban heat island effect. 5. Encourage community participation through tree-planting drives, waste management, and environmental awareness programmes. (Any two)	[2]
	(b) The three components of the Triple Planetary Crisis are: 1. Climate Change – Evident from the increasing temperatures. 2. Pollution – Evident from the polluted air. 3. Biodiversity Loss (Nature Loss) – Evident from the loss of green spaces, which destroys habitats and reduces biodiversity.	[3]