ICSE Board Class 12, 2026 Environmental Science Question Paper with Solutions

Time Allowed :3 Hours	**Maximum Marks :**70	**Total questions :**38

General Instructions

Read the following instructions very carefully and strictly follow them:

1. The paper is divided into Section A and Section B.
2. Section A includes objective-type questions.
3. All questions in Section A are compulsory.
4. Section B includes short answer, and long answer type questions.
5. Answers must be written legibly within the word limit.
6. Use of unfair means or electronic devices is prohibited.
7. Follow the correct format and instructions for each section.

1. What are life strategies? State their types. Mention any four characteristics of each of the types stated by you.

Correct Answer: Biological approaches to survival and reproduction, categorized as r-strategists and K-strategists.

Solution:

Step 1: Understanding the Concept:

Life strategies refer to the set of biological traits and behaviors evolved by species to optimize their survival and reproductive success in specific environmental conditions. These strategies are often categorized along a continuum known as r/K selection theory.

Step 2 : Detailed Explanation:

Types of Life Strategies:

1. **r-strategists (Opportunistic):** Species that emphasize high growth rates, typically in unstable or unpredictable environments.
2. **K-strategists (Equilibrium):** Species that exist near the carrying capacity (K) of their environment, typically in stable conditions.

Characteristics of r-strategists:

- **Body Size:** Generally small body size.
- **Reproduction:** Produce a large number of offspring in a single reproductive event.
- **Maturity:** Reach sexual maturity at an early age.
- **Parental Care:** Little to no parental care is provided to the offspring.

Characteristics of K-strategists:

- **Body Size:** Generally large body size.
- **Reproduction:** Produce a few offspring at a time.
- **Maturity:** Reach sexual maturity later in life.
- **Parental Care:** High level of parental care to ensure offspring survival.

Step 3: Final Answer:

Life strategies are evolved patterns for survival. The two main types are r-strategists (high reproduction, low care, e.g., bacteria, insects) and K-strategists (low reproduction, high care, e.g., humans, elephants).

Quick Tip

To remember: **'r'** stands for **'Rate'** (high reproductive rate) and **'K'** stands for **'Kapazität'** (German for capacity, referring to species that live near the environment's carrying capacity).

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2. Discuss four indicators of water quality and give one significance of each of them.

Correct Answer: DO, BOD, pH, and Turbidity.

Solution:

Step 1: Understanding the Concept:

Water quality indicators are physical, chemical, and biological parameters used to assess the

health of an aquatic ecosystem and its suitability for specific uses.

Step 2 : Detailed Explanation:

1. **Dissolved Oxygen (DO):** The amount of gaseous oxygen dissolved in the water.

Significance: It is vital for the survival of fish and other aquatic organisms. Low DO levels (hypoxia) can lead to mass ”fish kills.”

2. **Biological Oxygen Demand (BOD):** The amount of oxygen required by aerobic microorganisms to decompose organic matter in water.

Significance: High BOD indicates a high level of organic pollution (like sewage), which depletes oxygen and harms aquatic life.

3. **pH Level:** A measure of how acidic or basic the water is on a scale of 0 to 14.

Significance: Most aquatic organisms prefer a neutral range (6.5–8.5). Extreme pH can be toxic and affects the solubility of heavy metals.

4. **Turbidity:** A measure of water clarity based on the amount of suspended solids.

Significance: High turbidity blocks sunlight, preventing photosynthesis in aquatic plants and can clog the gills of fish.

Step 3: Final Answer:

The primary indicators are DO (essential for life), BOD (measures pollution), pH (chemical health), and Turbidity (clarity/light penetration).

Quick Tip

Remember the inverse relationship: As **Organic Pollution** increases, **BOD** increases, while **DO** decreases.

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3. What are the different techniques of monitoring air quality of a place? Discuss briefly any two of the methods.

Correct Answer: Passive sampling, Active sampling, Continuous monitoring, and Remote sensing.

Solution:

Step 1: Understanding the Concept:

Air quality monitoring involves the systematic measurement of pollutants like $PM_{2.5}$, PM_{10}, SO_x, NO_x, and O_3 to assess environmental health and compliance with standards.

Step 2 : Detailed Explanation:

Techniques of Monitoring:

- Passive Sampling (using diffusive samplers).
- Active Sampling (pumping air through a filter/medium).
- Continuous Real-time Monitoring (using automated sensors).
- Remote Sensing (using satellites or LIDAR).

Discussion of Two Methods:

1. **Continuous Online Monitoring:** This method uses automated electronic sensors to provide real-time data on pollutant concentrations. It is highly accurate and allows for immediate public health warnings (e.g., AQI updates).

2. **Passive Sampling:** This involves using simple tubes or badges that absorb pollutants from the air via natural diffusion. While they don't provide real-time data, they are low-cost, don't require power, and are excellent for identifying long-term trends over wide areas.

Step 3: Final Answer:

Air monitoring is done through various physical and electronic means, with Continuous Monitoring being the most precise for real-time analysis, and Passive Sampling being a cost-effective alternative for long-term study.

Quick Tip

For exams, mention the **Air Quality Index (AQI)**, which is the standard numerical value calculated based on these monitoring techniques to communicate air health to the public.

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4. 'Women empowerment can bring about a major change in human population'. Discuss.

Correct Answer: Empowerment leads to lower fertility rates, improved family health, and sustainable population growth.

Solution:

Step 1: Understanding the Concept:

Women's empowerment—including education, economic independence, and reproductive rights—is directly linked to demographic transitions in a society.

Step 2 : Detailed Explanation:

1. **Education and Fertility Rates:** Educated women tend to marry later and have fewer children. There is a strong negative correlation between a woman's years of schooling and the Total Fertility Rate (TFR).

2. **Economic Independence:** Empowered women who join the workforce often choose to have smaller families to balance career and domestic life, leading to population stabilization.

3. **Health and Child Survival:** Empowered mothers have better access to healthcare and nutrition, leading to lower infant mortality rates. When child survival is high, parents naturally opt for fewer children.

4. **Reproductive Choice:** Empowerment gives women the agency to use family planning methods and contraceptives, preventing unplanned pregnancies.

5. **Delayed Marriage:** Social and legal empowerment delays the age of marriage, which shortens the total reproductive span of a woman's life.

Step 3: Final Answer:

Women empowerment is a key driver for stabilizing population growth. It shifts the focus from quantity to quality of life, leading to a sustainable demographic structure for the nation.

Quick Tip

Remember the demographic phrase: **"Education is the best contraceptive."** This highlights how socio-economic empowerment naturally controls population growth without coercive measures.

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5. State any two points to highlight the role of Biosphere Reserves in conservation.

Correct Answer: Ecosystem conservation and Sustainable Development.

Solution:

Step 1: Understanding the Concept:

Biosphere Reserves are protected areas meant for the conservation of plants and animals, while also promoting sustainable relationships between people and the environment.

Step 2 : Detailed Explanation:

1. **In-situ Conservation:** They protect entire landscapes, ecosystems, and genetic diversity within their natural habitats, ensuring the survival of endangered species (e.g., Nilgiri Biosphere Reserve).

2. **Sustainable Development:** Unlike strict national parks, Biosphere Reserves include a ”Buffer Zone” and ”Transition Zone” where local communities can engage in eco-friendly economic activities, reconciling human development with nature conservation.

Step 3: Final Answer:

Biosphere Reserves serve to conserve biodiversity at all levels and act as ”learning places” for sustainable development by involving local communities in environmental protection.

Quick Tip

Biosphere Reserves follow a zonation pattern: **Core Area** (No human activity), **Buffer Zone** (Research/Tourism), and **Transition Zone** (Sustainable settlements).

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6. Define ecological footprint.

Correct Answer: A measure of human demand on nature’s ecosystems.

Solution:

Step 1: Understanding the Concept:

The ecological footprint is a resource accounting tool used to measure how much of the earth’s regenerative capacity is being used by human activities.

Step 2 : Detailed Explanation:

It is defined as the total area of biologically productive land and water (in **Global Hectares**) required to:

1. Produce the resources a population consumes.

2. Absorb the waste (especially carbon emissions) that the population generates.

If a population's footprint exceeds the available "Biocapacity," it leads to ecological deficit or "overshoot."

Step 3: Final Answer:

The ecological footprint is the amount of nature's resources we use compared to how much nature can replenish, serving as an indicator of environmental sustainability.

Quick Tip

A sustainable footprint is one that remains below the earth's **Biocapacity**. Currently, humanity's footprint is estimated to be around 1.7 earths, meaning we are consuming resources faster than they can regenerate.

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7. What is meant by Globalization? Discuss any six advantages of globalization. Also, give four impacts of globalization on the environment.

Correct Answer: Global integration of economies and cultures; benefits include growth and choice; impacts include pollution and resource depletion.

Solution:

Step 1: Understanding the Concept:

Globalization is the process of increasing interconnection and interdependence among countries, driven by international trade, investment, and information technology.

Step 2 : Detailed Explanation:

Six Advantages of Globalization:

1. **Economic Growth:** Facilitates free trade, leading to increased GDP and global wealth.
2. **Consumer Choice:** Provides consumers with access to a wider variety of goods and services from around the world at competitive prices.
3. **Technological Transfer:** Allows developing nations to access advanced technologies and innovations from developed countries.
4. **Employment Opportunities:** Foreign Direct Investment (FDI) creates jobs in developing nations.
5. **Cultural Exchange:** Promotes understanding between different cultures through the flow

of media, tourism, and people.

6. **Poverty Reduction:** Trade-led growth has helped lift millions out of poverty in regions like Southeast Asia.

Four Impacts of Globalization on the Environment:

1. **Increased Greenhouse Gas Emissions:** Global trade relies on long-distance transportation (ships, planes), significantly increasing carbon footprints.

2. **Resource Depletion:** High global demand leads to over-exploitation of natural resources like timber, minerals, and water.

3. **Pollution:** Industrial relocation to "pollution havens" (countries with weak regulations) causes severe local air and water pollution.

4. **Loss of Biodiversity:** Habitat destruction occurs to make way for global infrastructure and industrial agriculture (e.g., palm oil plantations).

Step 3: Final Answer:

Globalization integrates the world economically and culturally but presents a double-edged sword: while it promotes prosperity and choice, it accelerates environmental degradation through increased consumption and emissions.

Quick Tip

When discussing advantages, use the term **"Comparative Advantage"**—it's the economic theory that globalization allows every country to produce what it is best at.

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8. 'TNCs have a detrimental effect on the environment'. Justify this statement by discussing any four ways in which TNCs play a negative role.

Correct Answer: Justification via pollution havens, resource extraction, waste dumping, and unsustainable consumption.

Solution:

Step 1: Understanding the Concept:

Transnational Corporations (TNCs) are massive companies operating in multiple countries. Their drive for profit often leads to externalizing environmental costs.

Step 2 : Detailed Explanation:

Four ways TNCs negatively impact the environment:

1. **Pollution Havens:** TNCs often move their manufacturing units to developing countries with lax environmental laws to save costs, leading to high local pollution.

2. **Intensive Resource Extraction:** TNCs in mining or oil industries often engage in large-scale extraction that causes soil erosion, deforestation, and groundwater contamination.

3. **Hazardous Waste Management:** To cut costs, some TNCs engage in illegal dumping of industrial or toxic waste, often in poorer regions or international waters.

4. **Promoting Over-consumption:** Through aggressive global marketing, TNCs promote a culture of ”throwaway” consumerism, leading to massive increases in municipal solid waste and plastic pollution.

Step 3: Final Answer:

The detrimental role of TNCs stems from prioritizing short-term financial gains over long-term environmental sustainability, often exploiting legal loopholes in developing nations.

Quick Tip

To balance your answer, you can mention that some TNCs are now adopting **Corporate Social Responsibility (CSR)** to mitigate these effects, though the core profit motive often conflicts with this.
