

CUET PG 2026 Environmental Sciences Question Paper with Solutions(Memory Based)

Time Allowed :1 Hours 30 min	Maximum Marks :300	Total Questions :75
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General Instructions

1. The exam lasts 90 minutes (1 hour 30 minutes).
2. There are 75 Multiple Choice Questions (MCQs) to be answered.
3. +4 marks for every correct answer. -1 mark (negative marking) for every incorrect answer. 0 marks for unanswered or un-attempted questions.
4. For any discrepancy in questions, the English version is considered final (except for language-specific papers).
5. Click one of the four options to choose an answer.
6. You must click "Save & Next" to confirm your response. Only saved answers are considered for evaluation.
7. Use "Mark for Review & Next" to flag a question for later. You can unselect or change your answer using the "Clear Response" button.
8. All calculations must be done on the Rough Sheets provided at the centre. These must be returned to the invigilator after the exam.

1. Which of the following layers of the atmosphere contains the ozone layer that absorbs UV radiation?

- (A) Troposphere
- (B) Stratosphere
- (C) Mesosphere
- (D) Thermosphere

Correct Answer: (2) Stratosphere

Solution:

Concept:

Earth's atmosphere is divided into several layers based on temperature variation with altitude. These layers are:

- **Troposphere** – The lowest layer where weather phenomena occur.
- **Stratosphere** – The second layer that contains the **ozone layer**.
- **Mesosphere** – The layer where meteors burn up.
- **Thermosphere** – The upper layer where auroras occur and satellites orbit.

The **ozone layer** is a region rich in ozone (O_3) molecules located mainly in the **stratosphere**, approximately 15–35 km above the Earth's surface. It plays a crucial role in absorbing harmful ultraviolet (UV) radiation from the Sun.

Step 1: Identifying the atmospheric layer containing ozone.

The ozone layer is concentrated in the **stratosphere**, where ozone molecules absorb most of the Sun's harmful ultraviolet radiation.

Step 2: Eliminating other options.

- **Troposphere:** Contains weather systems but not the ozone layer.
- **Mesosphere:** Known for meteor burning, not ozone concentration.
- **Thermosphere:** Very thin air, contains ionized gases but not the ozone layer.

Thus, the correct atmospheric layer containing the ozone layer is the **Stratosphere**.

Quick Tip

Remember the order of atmospheric layers from Earth's surface upward: **Troposphere** → **Stratosphere** → **Mesosphere** → **Thermosphere**. The **ozone layer** is located in the **Stratosphere**.

2. In Bowen's Reaction Series, which mineral is the first to crystallize from a cooling silicate magma?

- (A) Quartz
- (B) Olivine
- (C) Biotite
- (D) Muscovite

Correct Answer: (B) Olivine

Solution:

Concept:

Bowen's Reaction Series describes the order in which minerals crystallize from a cooling magma. As magma cools, minerals form at different temperatures depending on their chemical composition.

The series is divided into two main branches:

- **Discontinuous series:** Olivine → Pyroxene → Amphibole → Biotite
- **Continuous series:** Calcium-rich plagioclase → Sodium-rich plagioclase

Minerals at the **top of the series crystallize at the highest temperatures**. Minerals toward the bottom crystallize at lower temperatures.

Step 1: Understanding the highest temperature mineral.

At very high temperatures (about 1200°C), the first mineral to crystallize from a cooling silicate magma is **Olivine**. It is rich in magnesium and iron and forms early during magma cooling.

Step 2: Position of other minerals in the series.

- **Quartz:** Crystallizes at the lowest temperatures.
- **Biotite:** Forms later in the discontinuous branch.
- **Muscovite:** Forms at relatively low temperatures.

Since **Olivine** crystallizes first at the highest temperature, it is the correct answer.

Quick Tip

In Bowen's Reaction Series, remember the order of the discontinuous branch: **Olivine** → **Pyroxene** → **Amphibole** → **Biotite**. The mineral that crystallizes first from magma is **Olivine**.

3. What is the primary chemical responsible for Minamata disease in humans?

- (A) Lead
- (B) Mercury
- (C) Arsenic
- (D) Cadmium

Correct Answer: (2) Mercury

Solution:

Concept:

Minamata disease is a severe neurological disorder caused by poisoning from **methylmercury**, an organic form of mercury. It occurs when humans consume fish or shellfish contaminated with mercury compounds released into water bodies.

The disease was first discovered in **1956 in Minamata Bay, Japan**, where industrial wastewater from a chemical factory discharged mercury into the sea. This mercury accumulated in aquatic organisms and entered the human food chain through **biomagnification**.

Exposure to methylmercury damages the **central nervous system**, leading to serious health problems.

Step 1: Identifying the toxic chemical responsible.

The primary chemical responsible for Minamata disease is **methylmercury**, which is a highly toxic compound of **mercury**. It accumulates in fish and shellfish and enters the human body through consumption.

Step 2: Understanding the symptoms caused by mercury poisoning.

Some common symptoms of Minamata disease include:

- Loss of coordination

- Numbness in hands and feet
- Muscle weakness
- Vision and hearing impairment
- In severe cases, paralysis and death

Since the disease is caused by mercury contamination, the correct answer is **Mercury**.

Quick Tip

Minamata disease is caused by **methylmercury poisoning** due to consumption of contaminated seafood. Remember: **Minamata** → **Mercury pollution**.

4. Calculate the energy of a photon (in Joules) with a wavelength of 500 nm, given $h = 6.6 \times 10^{-34}$ Js.

- (A) 3.96×10^{-19} J
- (B) 1.98×10^{-19} J
- (C) 5.00×10^{-19} J
- (D) 7.92×10^{-19} J

Correct Answer: (1) 3.96×10^{-19} J

Solution:

Concept:

The energy of a photon is given by the Planck–Einstein relation:

$$E = \frac{hc}{\lambda}$$

where:

- E = Energy of the photon
- h = Planck's constant = 6.6×10^{-34} Js
- c = Speed of light = 3×10^8 m/s
- λ = Wavelength of the photon

Before substituting, convert the wavelength from nanometers to meters:

$$500 \text{ nm} = 500 \times 10^{-9} \text{ m} = 5 \times 10^{-7} \text{ m}$$

Step 1: Substitute the values into the photon energy formula.

$$E = \frac{(6.6 \times 10^{-34})(3 \times 10^8)}{5 \times 10^{-7}}$$

Step 2: Simplify the numerator.

$$6.6 \times 3 = 19.8$$

$$E = \frac{19.8 \times 10^{-26}}{5 \times 10^{-7}}$$

Step 3: Divide the coefficients and adjust powers of ten.

$$E = 3.96 \times 10^{-19} \text{ J}$$

Thus, the energy of the photon is:

$$E = 3.96 \times 10^{-19} \text{ J}$$

Quick Tip

To quickly estimate photon energy, remember the formula $E = \frac{hc}{\lambda}$. Shorter wavelengths correspond to **higher photon energy**.

5. Which global agreement specifically targets the phase-out of Ozone Depleting Substances (ODS)?

- (A) Kyoto Protocol
- (B) Paris Agreement
- (C) Montreal Protocol
- (D) Basel Convention

Correct Answer: (3) Montreal Protocol

Solution:

Concept:

Ozone Depleting Substances (ODS) are chemicals that damage the **ozone layer** in the stratosphere. Examples include chlorofluorocarbons (CFCs), halons, carbon tetrachloride, and methyl chloroform. These substances release chlorine or bromine atoms in the atmosphere, which break down ozone molecules and reduce the protective ozone shield.

To address this global environmental problem, countries signed the **Montreal Protocol** in 1987. This international treaty aims to **phase out the production and consumption of ozone-depleting substances** worldwide.

Step 1: Identifying the treaty related to ozone protection.

The **Montreal Protocol on Substances that Deplete the Ozone Layer** was adopted in 1987 and is considered one of the most successful environmental agreements. It established a timetable for reducing and eventually eliminating the use of ODS.

Step 2: Eliminating the other options.

- **Kyoto Protocol:** Focuses on reducing greenhouse gas emissions to combat climate change.
- **Paris Agreement:** A global treaty addressing climate change and limiting global warming.
- **Basel Convention:** Regulates the transboundary movement and disposal of hazardous wastes.

Since the agreement that specifically targets the **phase-out of ozone-depleting substances** is the **Montreal Protocol**, it is the correct answer.

Quick Tip

Montreal Protocol (1987) → Protects the ozone layer by phasing out **CFCs and other ODS**. Remember: **Montreal = Ozone protection**.

6. In an aquatic ecosystem, what does a high Biological Oxygen Demand (BOD) value indicate about water quality?

- (A) High dissolved oxygen and clean water
- (B) Low organic pollution in water
- (C) High level of organic pollution and poor water quality
- (D) High mineral content in water

Correct Answer: (3) High level of organic pollution and poor water quality

Solution:

Concept:

Biological Oxygen Demand (BOD) is a measure of the amount of dissolved oxygen required by microorganisms to decompose organic matter present in water. It is commonly used as an indicator of the level of organic pollution in aquatic ecosystems.

When organic wastes such as sewage, agricultural runoff, or industrial effluents enter water bodies, microorganisms break down these substances using dissolved oxygen.

- **High BOD** → Large amount of organic matter present → Microorganisms consume more oxygen.
- **Low BOD** → Less organic pollution → Water is relatively clean.

If too much oxygen is consumed during decomposition, aquatic organisms like fish and invertebrates may suffer due to oxygen depletion.

Step 1: Understanding what a high BOD value represents.

A high BOD value means microorganisms require a large amount of oxygen to break down the organic material present in the water.

Step 2: Implication for water quality.

Because oxygen is heavily consumed, less dissolved oxygen remains available for aquatic life. This condition leads to **poor water quality and high organic pollution**. Therefore, a **high BOD indicates polluted water with high organic matter content**.

Quick Tip

BOD is directly proportional to water pollution. Higher BOD → More organic waste → Lower dissolved oxygen → Poor water quality.

7. According to the Mohs Scale of Hardness, which mineral has a relative hardness value of 9?

- (A) Quartz
- (B) Diamond
- (C) Corundum
- (D) Topaz

Correct Answer: (3) Corundum

Solution:

Concept:

The **Mohs Scale of Hardness** is a qualitative scale used to measure the resistance of a mineral to scratching. It was developed by the German mineralogist Friedrich Mohs in 1812. The scale ranges from **1 (softest) to 10 (hardest)**.

The standard Mohs hardness scale is:

- 1 – Talc
- 2 – Gypsum
- 3 – Calcite
- 4 – Fluorite
- 5 – Apatite
- 6 – Orthoclase Feldspar
- 7 – Quartz
- 8 – Topaz
- 9 – Corundum
- 10 – Diamond

Step 1: Identify the mineral corresponding to hardness value 9.

From the Mohs hardness scale, the mineral with a hardness value of **9** is **Corundum**. Corundum is composed mainly of aluminum oxide (Al_2O_3) and includes gemstones such as ruby and sapphire.

Step 2: Eliminate other options.

- **Quartz** has hardness **7**.
- **Topaz** has hardness **8**.
- **Diamond** has hardness **10**, the hardest natural mineral.

Thus, the mineral with a Mohs hardness of **9** is **Corundum**.

Quick Tip

Remember the top three minerals in Mohs hardness scale: **Quartz (7) → Topaz (8) → Corundum (9) → Diamond (10)**. Diamond is the hardest natural mineral.

8. Which type of ecological pyramid can never be inverted in any ecosystem?

- (A) Pyramid of Numbers
- (B) Pyramid of Biomass
- (C) Pyramid of Energy
- (D) Pyramid of Population

Correct Answer: (3) Pyramid of Energy

Solution:

Concept:

Ecological pyramids represent the trophic structure and energy flow within an ecosystem. There are three main types of ecological pyramids:

- **Pyramid of Numbers** – Shows the number of organisms at each trophic level.
- **Pyramid of Biomass** – Represents the total biomass present at each trophic level.
- **Pyramid of Energy** – Illustrates the flow of energy through different trophic levels.

Energy transfer in ecosystems follows the **Second Law of Thermodynamics**. During each transfer from one trophic level to the next, a large portion of energy is lost as heat, and only a small fraction (about 10%) is passed on to the next level.

Step 1: Understanding energy flow in ecosystems.

Because energy is continuously lost at each trophic level, the amount of energy available decreases from producers to higher consumers.

Thus, the energy pyramid always has a **broad base (producers)** and a **narrow top (top consumers)**.

Step 2: Why other pyramids may be inverted.

- **Pyramid of Numbers** can be inverted (e.g., a single tree supporting many insects).
- **Pyramid of Biomass** can be inverted in aquatic ecosystems where phytoplankton biomass is smaller than zooplankton.

However, the **Pyramid of Energy** can **never be inverted** because energy always decreases as it moves up the trophic levels.

Quick Tip

Energy pyramids are always upright. This is because energy decreases at each trophic level due to heat loss during metabolic processes.

9. The Kyoto Protocol was primarily designed to reduce the emission of which type of gases?

- (A) Ozone-depleting gases
- (B) Greenhouse gases
- (C) Noble gases
- (D) Radioactive gases

Correct Answer: (2) Greenhouse gases

Solution:

Concept:

The **Kyoto Protocol** is an international environmental treaty adopted in **1997 in Kyoto, Japan**. It was developed under the **United Nations Framework Convention on Climate Change (UNFCCC)** to address the problem of global warming.

The main objective of the Kyoto Protocol is to reduce the emission of **greenhouse gases (GHGs)** that contribute to climate change by trapping heat in the Earth's atmosphere.

Major greenhouse gases targeted under the Kyoto Protocol include:

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulfur hexafluoride (SF_6)

Step 1: Identify the purpose of the Kyoto Protocol.

The Kyoto Protocol established legally binding targets for developed countries to reduce their **greenhouse gas emissions** to combat global warming.

Step 2: Eliminate the other options.

- **Ozone-depleting gases** are regulated under the **Montreal Protocol**.
- **Noble gases** are chemically inert and not associated with climate change.
- **Radioactive gases** are not the focus of the Kyoto Protocol.

Thus, the Kyoto Protocol primarily aims to reduce the emission of **greenhouse gases**.

Quick Tip

Kyoto Protocol → Greenhouse gas reduction → Climate change mitigation.
It set legally binding emission reduction targets for developed countries.

10. Which plant group is considered the "amphibians of the plant kingdom" due to their requirement for water during fertilization?

- (A) Pteridophytes
- (B) Gymnosperms
- (C) Bryophytes
- (D) Angiosperms

Correct Answer: (3) Bryophytes

Solution:

Concept:

Bryophytes are small, non-vascular plants that typically grow in moist and shaded environments. They include plants such as *mosses*, *liverworts*, and *hornworts*. These plants lack true roots, stems, and vascular tissues (xylem and phloem).

Bryophytes are often referred to as the "**amphibians of the plant kingdom**" because although they live on land, they require **water for sexual reproduction**.

Step 1: Understanding why bryophytes need water.

During fertilization, the male gametes (sperm) of bryophytes are **motile** and must swim through a thin film of water to reach the female gamete (egg) present in the archegonium.

Thus, the presence of water is essential for successful fertilization.

Step 2: Eliminating other options.

- **Pteridophytes** also require water for fertilization but are vascular plants and are not commonly called amphibians of the plant kingdom.
- **Gymnosperms** reproduce through seeds and pollen; fertilization does not require external water.
- **Angiosperms** are flowering plants where fertilization occurs through pollen tubes and does not require water.

Therefore, the plant group known as the "**amphibians of the plant kingdom**" is **Bryophytes**.

Quick Tip

Bryophytes = Amphibians of the plant kingdom because they live on land but require **water for fertilization**.

11. What is the main process by which nitrogen is returned to the atmosphere from the soil?

- (A) Nitrogen fixation
- (B) Ammonification
- (C) Denitrification
- (D) Nitrification

Correct Answer: (3) Denitrification

Solution:

Concept:

The **nitrogen cycle** describes the movement of nitrogen through the atmosphere, soil, water, and living organisms. Nitrogen undergoes several biological and chemical transformations in this cycle.

Important processes in the nitrogen cycle include:

- **Nitrogen Fixation** – Conversion of atmospheric nitrogen (N_2) into ammonia (NH_3) by nitrogen-fixing bacteria.
- **Nitrification** – Conversion of ammonia into nitrites (NO_2^-) and then nitrates (NO_3^-).
- **Ammonification** – Conversion of organic nitrogen from dead organisms and wastes into ammonia.
- **Denitrification** – Conversion of nitrates back into nitrogen gas (N_2) which returns to the atmosphere.

Step 1: Understanding how nitrogen returns to the atmosphere.

The process that releases nitrogen gas back into the atmosphere is **denitrification**. In this process, certain bacteria convert nitrates (NO_3^-) present in the soil into nitrogen gas (N_2) or nitrous oxide (N_2O).

Step 2: Role of denitrifying bacteria.

Denitrification is carried out by anaerobic bacteria such as *Pseudomonas* and *Clostridium*, especially in waterlogged or oxygen-poor soils.

Step 3: Eliminating other options.

- **Nitrogen fixation** converts atmospheric nitrogen into usable forms.
- **Nitrification** converts ammonia into nitrates.
- **Ammonification** converts organic nitrogen into ammonia.

Thus, the process responsible for returning nitrogen to the atmosphere is **denitrification**.

Quick Tip

Denitrification = Nitrates \rightarrow Nitrogen gas. It is the key step that returns nitrogen back to the atmosphere in the nitrogen cycle.

12. In the context of waste management, what does the term leachate refer to?

- (A) Gas released from decomposing waste
- (B) Liquid that drains or percolates through waste and carries dissolved substances
- (C) Solid residue left after waste incineration
- (D) Recycled organic compost material

Correct Answer: (2) Liquid that drains or percolates through waste and carries dissolved substances

Solution:

Concept:

In waste management, **leachate** refers to the contaminated liquid that forms when water (often rainwater) passes through waste materials in landfills. As the water moves through the waste, it dissolves and carries various chemical substances, organic matter, and pollutants.

Leachate may contain:

- Organic compounds
- Heavy metals
- Toxic chemicals
- Microorganisms

Because of these dissolved contaminants, leachate can pose serious risks to **soil and groundwater quality** if it is not properly managed.

Step 1: Understanding how leachate forms.

When precipitation or surface water infiltrates a landfill, it percolates through the layers of waste and dissolves soluble materials. This process produces a polluted liquid known as **leachate**.

Step 2: Environmental significance.

Leachate is a major environmental concern in landfill management because it can contaminate nearby groundwater and surface water bodies if not properly collected and treated.

Step 3: Eliminating other options.

- **Gas released from decomposing waste** refers to landfill gas (mainly methane and carbon dioxide).
- **Solid residue after incineration** is known as ash.
- **Recycled organic compost material** refers to compost.

Therefore, leachate is the **liquid that drains through waste and carries dissolved contaminants**.

Quick Tip

Leachate = Contaminated liquid formed when water percolates through landfill waste. Proper landfill liners and treatment systems are used to prevent groundwater contamination.

13. Which Indian state is most associated with the controversial practice of rat-hole mining?

- (A) Jharkhand
- (B) Meghalaya
- (C) Odisha
- (D) Chhattisgarh

Correct Answer: (2) Meghalaya

Solution:

Concept:

Rat-hole mining is a form of coal mining in which narrow horizontal tunnels are dug into hillsides to extract coal. These tunnels are often very small and unsafe, allowing miners to crawl inside to remove coal manually.

This mining practice is most commonly associated with the state of **Meghalaya** in northeastern India. The method became controversial due to:

- Unsafe working conditions for miners
- Frequent mining accidents
- Environmental damage
- Water pollution due to acid mine drainage

Because of these concerns, the **National Green Tribunal (NGT)** banned rat-hole mining in Meghalaya in **2014**.

Step 1: Identify the state known for rat-hole mining.

Rat-hole mining has been widely practiced in the coal-rich areas of the **Jaintia Hills and East Khasi Hills** districts of Meghalaya.

Step 2: Eliminate other options.

- **Jharkhand** – Known for large-scale mechanized coal mining.
- **Odisha** – Known for iron ore and bauxite mining.
- **Chhattisgarh** – Major coal and mineral mining but not rat-hole mining.

Thus, the Indian state most associated with the controversial practice of **rat-hole mining** is **Meghalaya**.

Quick Tip

Rat-hole mining is mainly associated with **Meghalaya** and was banned by the **National Green Tribunal (NGT) in 2014** due to environmental and safety concerns.

14. The Environment Protection Act of India was enacted in which year following the Bhopal Gas Tragedy?

- (A) 1982
- (B) 1984
- (C) 1986
- (D) 1991

Correct Answer: (3) 1986

Solution:

Concept:

The **Environment (Protection) Act** is a comprehensive legislation enacted by the Government of India to provide a framework for the protection and improvement of the environment. The need for this law became urgent after the **Bhopal Gas Tragedy of 1984**, one of the world's worst industrial disasters. The tragedy exposed serious gaps in environmental safety and industrial regulation in India.

As a response, the Indian government enacted the **Environment (Protection) Act in 1986**. The Act empowers the central government to take measures to:

- Protect and improve environmental quality
- Prevent and control pollution
- Regulate industrial activities that may harm the environment

Step 1: Understanding the historical context.

The Bhopal Gas Tragedy occurred in **1984** due to the leakage of methyl isocyanate gas from the Union Carbide pesticide plant in Bhopal, Madhya Pradesh.

Step 2: Government response.

To strengthen environmental governance and ensure stricter environmental protection, the government passed the **Environment (Protection) Act in 1986**.

Step 3: Eliminating other options.

- **1982** – No major environmental legislation enacted related to the Bhopal disaster.
- **1984** – Year of the Bhopal Gas Tragedy.
- **1991** – Associated with economic reforms, not this Act.

Thus, the Environment Protection Act was enacted in **1986**.

Quick Tip

Environment (Protection) Act – 1986 was enacted after the **Bhopal Gas Tragedy (1984)** to strengthen environmental regulation in India.

15. Which heavy metal is most commonly associated with Itai-Itai disease?

- (A) Mercury
- (B) Lead
- (C) Cadmium
- (D) Arsenic

Correct Answer: (3) Cadmium

Solution:

Concept:

Itai-Itai disease is a painful condition caused by chronic poisoning from the heavy metal **cadmium**. The disease was first reported in the **Toyama Prefecture of Japan** in the early 20th century.

Cadmium pollution occurred due to the release of industrial waste from mining activities into nearby rivers. The contaminated water was used for irrigation, leading to cadmium accumulation in **rice crops**. Long-term consumption of this contaminated rice caused severe cadmium poisoning in humans.

Cadmium mainly affects the **kidneys and bones**.

Step 1: Understanding the meaning of "Itai-Itai".

The term "**Itai-Itai**" in Japanese means "**ouch-ouch**", referring to the intense bone pain experienced by patients suffering from the disease.

Step 2: Effects of cadmium poisoning.

Cadmium accumulation in the body leads to:

- Severe bone pain
- Bone softening (osteomalacia)
- Kidney damage
- Fragile bones and fractures

Step 3: Eliminating other options.

- **Mercury** causes **Minamata disease**.
- **Lead** causes **lead poisoning** affecting the nervous system.
- **Arsenic** causes skin lesions and arsenicosis.

Thus, the heavy metal associated with **Itai-Itai disease** is **Cadmium**.

Quick Tip

Itai-Itai disease → **Cadmium poisoning**. Remember: **Minamata** → **Mercury**,
Itai-Itai → **Cadmium**.
