CUET UG Environmental Science (307) - 2025 Question Paper with Solutions

Time Allowed :1 Hour	Maximum Marks :250	Total Questions :50

General Instructions

Read the following instructions very carefully and strictly follow them:

1. The test is of 1 hour duration.
2. The question paper consists of 50 questions. The maximum marks are 250.
3. 5 marks are awarded for every correct answer, and 1 mark is deducted for every wrong answer.

1. The Ecological Debt Day (Earth shoot day) is calculated as follows:

(A) (World Biocapacity / World Water footprint) x 365
(B) (World Biocapacity / World Carbon footprint) x 365
(C) (World Biocapacity / World Ecological footprint) x 365
(D) (World Biocapacity / World Ecosystem Services) x 365

Correct Answer: (C) (World Biocapacity / World Ecological footprint) x 365

Solution:

Step 1: Understanding the Concept:
Earth Overshoot Day (formerly known as Ecological Debt Day) marks the date when humanity's demand for ecological resources and services in a given year exceeds what Earth can regenerate in that year.

Step 2: Key Formula or Approach:
The calculation is designed to find the number of days in a year for which Earth's biocapacity is sufficient to provide for humanity's Ecological Footprint. The formula is:

$$\text{Earth Overshoot Day} = \left(\frac{\text{World Biocapacity}}{\text{World Ecological Footprint}} \right) \times 365$$

Step 3: Detailed Explanation:
World Biocapacity refers to the capacity of ecosystems to regenerate what humanity demands from them.
World Ecological Footprint is the measure of humanity's demand on nature, i.e., the quantity of nature it takes to support people or an economy.
The formula essentially compares the planet's supply (biocapacity) with human demand (ecological footprint). Dividing the supply by the demand gives a fraction, which, when multiplied

by 365, indicates the day of the year when demand starts to outstrip supply.

Step 4: Final Answer:
Based on the official formula, the correct calculation is (World Biocapacity / World Ecological footprint) x 365.

Quick Tip

To remember the formula, think of it as a simple ratio of (what the Earth can supply / what humanity demands). The result is a fraction of the year, which is then converted to a specific day by multiplying by 365.

---

2. The first Earth Day was celebrated on _____.

(A) 22 April, 1971
(B) 22 April, 1972
(C) 22 April, 1970
(D) 22 April, 1973

Correct Answer: (C) 22 April, 1970

Solution:

Step 1: Understanding the Concept:
This question asks for the historical date of the first celebration of Earth Day, an annual event to demonstrate support for environmental protection.

Step 3: Detailed Explanation:
The first Earth Day was a grassroots movement that took place on April 22, 1970. It was founded by US Senator Gaylord Nelson as an environmental teach-in. The event mobilized millions of Americans and is credited with launching the modern environmental movement. It led to the creation of the United States Environmental Protection Agency (EPA) and the passage of landmark environmental laws.

Step 4: Final Answer:
The first Earth Day was celebrated on 22 April, 1970.

Quick Tip

April 22, 1970 is a landmark date in environmental history. Remembering this specific year is crucial for questions related to the origins of the modern environmental movement.

3. Which of the following Environmental Ethics includes preservation of wild plants and animals, control of the human population and simple living?

(A) Social Ecology
(B) Shallow Ecology
(C) Deep Ecology
(D) Green Ecology

Correct Answer: (C) Deep Ecology

Solution:

Step 1: Understanding the Concept:
The question asks to identify the specific school of environmental ethics that is defined by a set of core principles: intrinsic value of nature, concern over human population, and emphasis on a simpler lifestyle.

Step 3: Detailed Explanation:
Deep Ecology is an environmental philosophy that promotes the inherent worth of all living beings, regardless of their instrumental utility to human needs. Its key tenets, as formulated by Arne Naess, include:

- **Preservation of wild plants and animals:** Recognizing the intrinsic value of biodiversity.
- **Control of the human population:** Stating that the flourishing of non-human life requires a decrease in the human population.
- **Simple living:** Advocating for a reduction in materialism and a focus on quality of life rather than a high standard of living.

In contrast, **Shallow Ecology** is anthropocentric (human-centered), viewing the environment as a resource for humans to use. **Social Ecology** links environmental problems to social and political structures. **Green Ecology** is a broader, less specific term.

Step 4: Final Answer:
The principles listed are the core tenets of Deep Ecology.

Quick Tip

Remember the key distinction: Deep Ecology is biocentric (life-centered), believing nature has value in itself. Shallow Ecology is anthropocentric (human-centered), valuing nature for its usefulness to humans.

4. Who among the following coined the term of "Oekology"?

(A) E. P. Odum
(B) Arne Naess
(C) A. G. Tansley
(D) Ernst Haeckel

Correct Answer: (D) Ernst Haeckel

Solution:

Step 1: Understanding the Concept:
This question asks to identify the person who first coined the term for the scientific study of the interactions between organisms and their environment.

Step 3: Detailed Explanation:
The German biologist and naturalist **Ernst Haeckel** coined the term "Oekologie" in 1866. The word is derived from the Greek words "oikos" (meaning house or dwelling) and "logos" (meaning study). It was later anglicized to "Ecology".
The other individuals are also important ecologists:

- **E. P. Odum** is considered a founder of modern ecosystem ecology.
- **Arne Naess** was a Norwegian philosopher who coined the term "Deep Ecology".
- **A. G. Tansley** was a British botanist who introduced the concept of the "ecosystem" in 1935.

Step 4: Final Answer:
The term "Oekology" was coined by Ernst Haeckel.

Quick Tip

Associate key terms with their originators: Haeckel→Ecology, Tansley→Ecosystem, Naess→Deep Ecology. This helps distinguish between the foundational contributions of different scientists.

---

5. Diversity of organism which share the same community/habitat and also called as local diversity, is referred to as

(A) Beta diversity
(B) Gamma diversity
(C) Alpha diversity
(D) Genetic diversity

Correct Answer: (C) Alpha diversity

Solution:

Step 1: Understanding the Concept:
The question asks for the specific term used in ecology to describe the biodiversity within a single, local habitat or community.

Step 3: Detailed Explanation:
Ecologists often measure biodiversity at three different scales:

- **Alpha diversity (α-diversity):** This refers to the diversity of species within a particular ecosystem or community. It is a measure of local diversity.
- **Beta diversity (β-diversity):** This is the measure of biodiversity which works by comparing the species diversity between two or more ecosystems. It represents the change in species composition along an environmental gradient.
- **Gamma diversity (γ-diversity):** This refers to the total species diversity over a large geographical area or region, which comprises several ecosystems.

Genetic diversity refers to the variation of genes within a single species.

Step 4: Final Answer:
Since the question describes diversity within the same community/habitat (local diversity), the correct term is Alpha diversity.

Quick Tip

Use an analogy to remember the diversity scales: Alpha is the diversity in your local park. Beta is the difference in species between your park and a nearby forest. Gamma is the total diversity in your entire city or state.

---

6. Match List-I with List-II

List-I (Environmental law)	List-II (Year)
(A) The Wildlife (Protection) Act	(I) 1972
(B) The Indian Forest Act	(II) 1927
(C) The Madras Wild Elephant Preservation Act	(III) 1960
(D) The Cruelty Against Animal Act	(IV) 1873

Choose the correct answer from the options given below:

(A) (A) - (I), (B) - (II), (C) - (III), (D) - (IV)
(B) (A) - (I), (B) - (III), (C) - (II), (D) - (IV)
(C) (A) - (I), (B) - (II), (C) - (IV), (D) - (III)
(D) (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

Correct Answer: (C) (A) - (I), (B) - (II), (C) - (IV), (D) - (III)

Solution:

Step 1: Understanding the Concept:
This question requires matching key Indian environmental and wildlife-related legislation with the year they were enacted. Note: "The Cruelty Against Animal Act" is commonly known as "The Prevention of Cruelty to Animals Act".

Step 3: Detailed Explanation:
Let's match each act with its correct year:

- **(A) The Wildlife (Protection) Act:** This is a landmark act for wildlife conservation in India and was passed in **1972**. So, **(A) matches (I)**.
- **(B) The Indian Forest Act:** This is a major piece of forest legislation from the British colonial period, enacted in **1927**. So, **(B) matches (II)**.
- **(C) The Madras Wild Elephant Preservation Act:** This was an early piece of wildlife legislation from the colonial era, enacted in **1873**. So, **(C) matches (IV)**.
- **(D) The Cruelty Against Animal Act (The Prevention of Cruelty to Animals Act):** This act was passed by the Parliament of India in **1960**. So, **(D) matches (III)**.

The correct set of matches is A-I, B-II, C-IV, D-III.

Step 4: Final Answer:
The correct matching option is (A) - (I), (B) - (II), (C) - (IV), (D) - (III).

Quick Tip

For environmental law questions in India, the Wildlife (Protection) Act of 1972 and the Environment (Protection) Act of 1986 are two of the most important dates to remember. Knowing these can often help eliminate incorrect options quickly.

---

7. The theory which states that "the population grows geometrically whereas resources like food grow arithmetically", was given by

(A) Julion Simon
(B) Friedrich Engels
(C) T. R. Malthus
(D) W. Thompson

Correct Answer: (C) T. R. Malthus

Solution:

Step 1: Understanding the Concept:
The question describes a foundational theory in demography and economics regarding the relationship between population growth and resource availability.

Step 3: Detailed Explanation:
This theory was proposed by the English economist **Thomas Robert Malthus** in his 1798 work, "An Essay on the Principle of Population". The core idea, known as the Malthusian Theory of Population, is:

- **Population Growth:** When unchecked, population tends to grow at a geometric rate (e.g., 2, 4, 8, 16, 32...).
- **Resource Growth:** The food supply and other resources tend to increase at a slower, arithmetic rate (e.g., 1, 2, 3, 4, 5...).

Malthus argued that this disparity would inevitably lead to a point of crisis (a "Malthusian catastrophe") where population outstrips resources, leading to famine, disease, and war.

Step 4: Final Answer:
The theory was given by T. R. Malthus.

Quick Tip

Remember the key contrast: Malthus = Population (geometric/exponential) vs. Food (arithmetic/linear). This core principle is the essence of the Malthusian theory.

---

8. The species that invades a bare area is referred to as _____.

(A) sere(s)
(B) pioneer
(C) mesic
(D) climax

Correct Answer: (B) pioneer

Solution:

Step 1: Understanding the Concept:
The question asks for the ecological term for the first organisms to colonize a previously uninhabited or disturbed environment. This is a concept from the study of ecological succession.

Step 3: Detailed Explanation:
Ecological succession is the process of change in the species structure of an ecological community over time.

- **Pioneer species** are the first species to colonize barren areas. They are typically hardy, fast-growing, and have adaptations for survival in harsh conditions (e.g., lichens, mosses on bare rock).
- **Sere(s) or Seral stages** are the intermediate stages of an ecosystem advancing towards its climax community.
- **Climax community** is the final, stable, and mature stage of succession.
- **Mesic** refers to an environment with a moderate amount of moisture, not a type of species in succession.

Step 4: Final Answer:
The species that first invades a bare area is referred to as a pioneer species.

Quick Tip

Think of the term "pioneer" in its historical sense—the first people to settle a new land. In ecology, it's the same concept: the first species to "settle" a new or barren habitat.

---

9. Match List-I with List-II

List-I (Name of Ecosystem)	List-II (Name of commonly found producer)
(A) Deserts	(I) Cymbopogon
(B) Grasslands	(II) Capparis
(C) Ponds and Lakes	(III) Hydrilla
(D) Moist deciduous forests	(IV) Tectona

Choose the correct answer from the options given below:

(A) (A) - (III), (B) - (II), (C) - (I), (D) - (IV)
(B) (A) - (I), (B) - (II), (C) - (III), (D) - (IV)
(C) (A) - (IV), (B) - (III), (C) - (II), (D) - (I)
(D) (A) - (II), (B) - (I), (C) - (III), (D) - (IV)

Correct Answer: (D) (A) - (II), (B) - (I), (C) - (III), (D) - (IV)

Solution:

Step 1: Understanding the Concept:
The question requires matching different types of ecosystems with a characteristic producer (plant) found within them.

Step 3: Detailed Explanation:
Let's match each ecosystem with its producer:

- **(A) Deserts: Capparis** (the caper bush) is a genus of plants that are often xerophytic, meaning they are adapted to survive in dry conditions like deserts. So, **(A) matches (II)**.
- **(B) Grasslands: Cymbopogon** (lemongrass) is a genus of grasses, which are the dominant producers in grassland ecosystems. So, **(B) matches (I)**.
- **(C) Ponds and Lakes: Hydrilla** is a well-known aquatic plant (a hydrophyte) that often grows submerged in freshwater bodies like ponds and lakes. So, **(C) matches (III)**.
- **(D) Moist deciduous forests: Tectona** (Teak) is a large deciduous tree that is a dominant and economically important species in the moist deciduous forests of India and Southeast Asia. So, **(D) matches (IV)**.

The correct set of matches is A-II, B-I, C-III, D-IV.

Step 4: Final Answer:
The correct matching option is (A) - (II), (B) - (I), (C) - (III), (D) - (IV).

Quick Tip

Even if you don't know all the plants, try to match the ones you know. For example, recognizing Hydrilla as an aquatic plant or Tectona (Teak) as a forest tree can help you eliminate incorrect options and find the right answer.

---

10. Break down of detritus into smaller particles by earthworm in an ecosystem is referred to as _____.

(A) leaching
(B) catabolism
(C) fragmentation
(D) humification

Correct Answer: (C) fragmentation

Solution:

Step 1: Understanding the Concept:
The question asks for the specific term for the physical breakdown of dead organic matter (detritus) by detritivores like earthworms. This is a key step in the process of decomposition.

Step 3: Detailed Explanation:
The process of decomposition involves several steps:

- **Fragmentation:** This is the first step where detritivores (like earthworms, termites) break down detritus into smaller particles. This action increases the surface area for microbial action.
- **Leaching:** Water-soluble inorganic nutrients seep down into the soil horizon and get precipitated as unavailable salts.
- **Catabolism:** This is the enzymatic process where bacteria and fungi degrade the simplified detritus into simpler inorganic substances.
- **Humification:** This step leads to the formation of a dark-colored, amorphous substance called humus, which is highly resistant to microbial action and decomposes at an extremely slow rate.

Step 4: Final Answer:
The physical breakdown of detritus into smaller particles by earthworms is called fragmentation.

Quick Tip

Remember that decomposition is both a physical and chemical process. Fragmentation is the physical part (breaking into fragments), while catabolism is the chemical part (enzymatic breakdown).

---

11. Arrange the following ecological succession in the lithosphere (rocks) from initial to final succession stages
(A) Moss stage
(B) Foliose-lichens stage
(C) Herbaceous stage
(D) Crustose-lichens stage
(E) Shrub stage
Choose the correct answer from the options given below:

(A) (B), (A), (D), (C), (E)
(B) (D), (B), (A), (C), (E)
(C) (B), (D), (A), (C), (E)
(D) (A), (B), (D), (C), (E)

Correct Answer: (B) (D), (B), (A), (C), (E)

Solution:

Step 1: Understanding the Concept:
The question asks for the correct sequence of seral stages in a primary succession on bare rock, also known as a xerosere or lithosere. This process involves the gradual development of soil and plant communities over time.

Step 3: Detailed Explanation:
The sequence of succession on bare rock is as follows:
1. **(D) Crustose-lichens stage:** These are the pioneer species. Crustose lichens are flat and encrusting, capable of growing directly on the bare rock surface. They begin the process of soil formation by weathering the rock and trapping dust.
2. **(B) Foliose-lichens stage:** Once a thin layer of soil is formed, larger, leaf-like (foliose) and shrubby (fruticose) lichens can establish themselves. They further contribute to soil formation.
3. **(A) Moss stage:** As soil deepens, mosses, which require more soil and moisture, start to grow, outcompeting the lichens.
4. **(C) Herbaceous stage:** With more developed soil, grasses, herbs, and other herbaceous plants can take root.
5. **(E) Shrub stage:** As the soil continues to improve, larger plants like shrubs can establish, shading out the herbaceous plants.
This is eventually followed by a climax forest community.

Step 4: Final Answer:
The correct chronological order of the stages is (D) Crustose-lichens stage→(B) Foliose-lichens stage→(A) Moss stage→(C) Herbaceous stage→(E) Shrub stage.

Quick Tip

Remember that ecological succession always proceeds from simpler, smaller organisms to more complex, larger organisms as the environment (especially the soil) becomes more developed. In a lithosere, it starts with the flattest lichens and progresses towards trees.

---

12. Match List-I with List-II

List-I (National Park)	List-II (State)
(A) Dudhwa	(I) Madhya Pradesh
(B) Kanha	(II) Karnataka
(C) Bandipur	(III) Uttar Pradesh
(D) Kaziranga	(IV) Assam

Choose the correct answer from the options given below:

(A) (A) - (IV), (B) - (I), (C) - (III), (D) - (II)
(B) (A) - (III), (B) - (I), (C) - (II), (D) - (IV)
(C) (A) - (II), (B) - (I), (C) - (III), (D) - (IV)
(D) (A) - (I), (B) - (III), (C) - (IV), (D) - (II)

Correct Answer: (B) (A) - (III), (B) - (I), (C) - (II), (D) - (IV)

Solution:

Step 1: Understanding the Concept:
This question requires matching famous National Parks in India with the state in which they are located.

Step 3: Detailed Explanation:
Let's match each National Park with its state:

- **(A) Dudhwa National Park:** It is located in the Terai region of **Uttar Pradesh**. So, **(A) matches (III)**.
- **(B) Kanha National Park:** One of the largest national parks in central India, it is located in **Madhya Pradesh**. So, **(B) matches (I)**.
- **(C) Bandipur National Park:** A well-known tiger reserve, it is located in the state of **Karnataka**. So, **(C) matches (II)**.
- **(D) Kaziranga National Park:** Famous for the one-horned rhinoceros, it is located in **Assam**. So, **(D) matches (IV)**.

The correct set of matches is A-III, B-I, C-II, D-IV.

Step 4: Final Answer:
The correct matching option is (A) - (III), (B) - (I), (C) - (II), (D) - (IV).

Quick Tip

Creating flashcards or a table of major National Parks, their locations, and the key species they are known for (e.g., Kaziranga - Rhino, Gir - Lion, Bandipur - Tiger) is a highly effective study method for this topic.

---

13. In which of the following types of population interactions, one species is benefited while another species is being harmed?
(A) Competition
(B) Parasitism
(C) Amensalism
(D) Predation
Choose the correct answer from the options given below:

(A) (A), (B) and (D) only
(B) (B), (C) and (D) only
(C) (B) and (D) only
(D) (C) and (D) only

Correct Answer: (C) (B) and (D) only

Solution:

Step 1: Understanding the Concept:
The question asks to identify population interactions with a (+/-) relationship, where one species benefits (+) and the other is harmed (-).

Step 3: Detailed Explanation:
Let's analyze the interactions:

- **(A) Competition (-/-):** Both species are harmed as they compete for the same limited resources.
- **(B) Parasitism (+/-):** The parasite benefits by deriving nutrients from the host, which is harmed in the process.
- **(C) Amensalism (-/0):** One species is harmed while the other is unaffected. For example, a large tree shading a small plant.
- **(D) Predation (+/-):** The predator benefits by capturing and consuming the prey, which is harmed (killed).

Based on this analysis, Parasitism and Predation are the two interactions where one species benefits and the other is harmed.

Step 4: Final Answer:
The correct interactions are (B) Parasitism and (D) Predation only.

Quick Tip

Memorize the symbols for population interactions: Mutualism (+/+), Commensalism (+/0), Competition (-/-), Predation (+/-), Parasitism (+/-), Amensalism (-/0), Neutralism (0/0). This symbolic representation makes it easy to answer such questions.

---

14. Which of the following population growth equation correctly represents the Verhulst-Pearl Logistic growth equation? [Where N =population density at time t; r = intrinsic rate of natural increase; K= carrying capacity]

(A) $\frac{dN}{dt} = rN\frac{(N-K)}{K}$
(B) $\frac{dN}{dt} = rN\frac{(K-N)}{K}$
(C) $\frac{dN}{dt} = rN\frac{(K-N)}{N}$
(D) $\frac{dN}{dt} = rN\frac{(N-K)}{N}$

Correct Answer: (B) $\frac{dN}{dt} = rN\frac{(K-N)}{K}$

Solution:

Step 1: Understanding the Concept:
The Logistic Growth Equation models population growth in an environment with limited resources. It starts exponentially but slows down as the population size (N) approaches the carrying capacity (K).

Step 2: Key Formula or Approach:
The equation starts with the exponential growth model, $\frac{dN}{dt} = rN$. To account for environmental resistance, this is multiplied by a term that approaches 0 as N approaches K. This term is $\frac{(K-N)}{K}$.

Step 3: Detailed Explanation:
The full equation is:

$$\frac{dN}{dt} = rN\left(\frac{K-N}{K}\right)$$

Let's analyze the term $\left(\frac{K-N}{K}\right)$:

- When N is very small compared to K, the term $\frac{(K-N)}{K}$ is close to 1. The growth is nearly exponential ($\frac{dN}{dt} \approx rN$).
- As N increases and gets closer to K, the term $\frac{(K-N)}{K}$ gets closer to 0, which slows down the population growth rate.
- When N = K, the term $\frac{(K-N)}{K}$ becomes 0, and the population growth stops ($\frac{dN}{dt} = 0$).

Option (B) correctly represents this relationship.

Step 4: Final Answer:
The correct Verhulst-Pearl Logistic growth equation is $\frac{dN}{dt} = rN\frac{(K-N)}{K}$.

Quick Tip

To remember the logistic growth term, think of it as "how much room is left for growth". $(K-N)$ is the remaining capacity, and dividing by K, $\frac{(K-N)}{K}$, turns it into a proportion. This proportion multiplies the exponential growth rate to slow it down.

---

15. Energy flow in an ecosystem is always _____

(A) Cyclic
(B) Multidirectional
(C) Bidirectional
(D) Unidirectional

Correct Answer: (D) Unidirectional

Solution:

Step 1: Understanding the Concept:
This question addresses the fundamental principle of how energy moves through the trophic levels of an ecosystem.

Step 3: Detailed Explanation:
Energy flow in an ecosystem is always unidirectional, or one-way. It follows this path: 1. Solar energy is captured by producers (plants) through photosynthesis. 2. This energy is transferred to primary consumers (herbivores) when they eat the producers. 3. It is then transferred to secondary and tertiary consumers (carnivores). At each trophic level, a significant amount of energy is lost as heat due to metabolic activities, according to the Second Law of Thermodynamics. This lost energy cannot be reused by organisms at lower trophic levels. Therefore, energy does not cycle back from higher to lower trophic levels. This is in contrast to nutrients (like carbon, nitrogen), which are cyclic.

Step 4: Final Answer:
Energy flow in an ecosystem is always unidirectional.

Quick Tip

Remember the key difference: Energy flows, but nutrients cycle. Energy moves in a straight line from the sun to producers to consumers and is lost as heat. Nutrients are passed around in a loop between the living and non-living parts of the ecosystem.

---

16. Which one of the following is a primary air pollutant?

(A) Ash from a volcanic eruption
(B) Tropospheric Ozone
(C) Stratospheric Ozone
(D) PAN

Correct Answer: (A) Ash from a volcanic eruption

Solution:

Step 1: Understanding the Concept:
The question asks to identify a primary air pollutant from the given options. **Primary pollutants** are substances directly emitted into the atmosphere from a source (e.g., from a factory chimney or a volcanic eruption). **Secondary pollutants** are not directly emitted but form in the atmosphere when primary pollutants react with each other or with other atmospheric

components.

Step 3: Detailed Explanation:

- **(A) Ash from a volcanic eruption:** This is a primary pollutant. Volcanic ash is a particulate matter that is directly emitted from a natural source (the volcano) into the atmosphere.
- **(B) Tropospheric Ozone (O_3):** This is a classic example of a secondary pollutant. It is formed in the troposphere by the reaction of primary pollutants like nitrogen oxides (NOx) and volatile organic compounds (VOCs) in the presence of sunlight.
- **(C) Stratospheric Ozone:** This is not a pollutant. The ozone layer in the stratosphere is essential for life on Earth as it absorbs harmful ultraviolet (UV) radiation.
- **(D) PAN (Peroxyacetyl nitrate):** This is another common secondary pollutant, formed from the reaction of NOx and VOCs, and is a component of photochemical smog.

Step 4: Final Answer:
Ash from a volcanic eruption is a primary air pollutant.

Quick Tip

To distinguish between primary and secondary pollutants, ask "Does it come directly out of a source?" If yes, it's primary (like CO, SO_2, ash). If it's formed by chemical reactions in the air, it's secondary (like O_3, PAN, acid rain).

---

17. Most of the agricultural runoff and chemical fertilizers used in farming end up in water bodies, which leads to eutrophication. The nutrients responsible for eutrophication are

(A) Nitrogen and Potassium
(B) Nitrogen and Phosphorus
(C) Phosphorus and Potassium
(D) Nitrogen and Boron

Correct Answer: (B) Nitrogen and Phosphorus

Solution:

Step 1: Understanding the Concept:
Eutrophication is the process of nutrient enrichment of a water body, which leads to excessive growth of algae and other aquatic plants (algal blooms). The question asks for the primary nutrients that cause this process.

Step 3: Detailed Explanation:
In most aquatic ecosystems, the growth of algae is limited by the availability of certain key nutrients. The two most important limiting nutrients are **nitrogen (N)** and **phosphorus (P)**. When agricultural fertilizers, which are rich in nitrates (a form of nitrogen) and phosphates (a form of phosphorus), wash into lakes and rivers, they remove this limitation. This sudden influx of nutrients causes an explosive growth of algae. When this large amount of algae dies, its decomposition by bacteria consumes a large amount of dissolved oxygen in the water, leading to hypoxia or anoxia (low or no oxygen), which can kill fish and other aquatic organisms.

Step 4: Final Answer:
The primary nutrients responsible for eutrophication are Nitrogen and Phosphorus.

Quick Tip

Remember the acronym "N-P-K" for common fertilizers. While Potassium (K) is a key plant nutrient for land plants, it is Nitrogen (N) and Phosphorus (P) that are the main culprits for causing algal blooms and eutrophication in water bodies.

---

18. Which one of the following are the commonly used oxidants in COD (Chemical Oxygen Demand) assays?

(A) $K_2Cr_2O_7$ + HNO_3
(B) $K_2Cr_2O_7$ + HCL
(C) $K_2Cr_2O_7$ + H_2SO_4
(D) $KMnO_4$ + HCL

Correct Answer: (C) $K_2Cr_2O_7$ + H_2SO_4

Solution:

Step 1: Understanding the Concept:
Chemical Oxygen Demand (COD) is a measure of the amount of oxygen required to chemically oxidize both organic and inorganic compounds in water. The test uses a strong chemical oxidant in an acidic medium.

Step 3: Detailed Explanation:
The standard method for COD analysis involves refluxing a water sample with a known excess of a strong oxidizing agent in a highly acidic solution.

- **Oxidant:** The most commonly used strong oxidant is **potassium dichromate ($K_2Cr_2O_7$)**. Potassium permanganate ($KMnO_4$) can also be used but is less effective for many organic compounds.

- **Acid:** The reaction is carried out in the presence of concentrated **sulfuric acid ($\mathbf{H_2SO_4}$)**. Sulfuric acid provides the necessary acidic environment and also helps to digest complex organic materials. Hydrochloric acid (HCl) is generally avoided because chloride ions can interfere with the oxidation reaction.

Therefore, the standard combination of reagents for a COD assay is potassium dichromate and sulfuric acid.

Step 4: Final Answer:
The commonly used oxidants in COD assays are $K_2Cr_2O_7$ + H_2SO_4.

Quick Tip

For water quality tests, remember the key reagents: COD uses potassium dichromate and sulfuric acid. Knowing that strong acids are needed and that chloride interferes with the test can help you choose the correct combination.

---

19. Which one of the following soil types is most suitable for good plant growth and agriculture?

(A) Sandy soils
(B) Clayey soils
(C) Silty soils
(D) Loamy soils

Correct Answer: (D) Loamy soils

Solution:

Step 1: Understanding the Concept:
The question asks to identify the ideal soil type for agriculture based on its properties. The suitability of soil depends on its texture, which is determined by the relative proportions of sand, silt, and clay.

Step 3: Detailed Explanation:

- **Sandy soils:** Have large particles, which allows for good drainage and aeration, but they have poor water and nutrient retention.
- **Clayey soils:** Have very small particles, which allows them to hold a lot of water and nutrients, but they have poor drainage and can become waterlogged and compacted.
- **Silty soils:** Have medium-sized particles. They have good water retention but can be prone to erosion.

- **Loamy soils:** These are considered ideal for agriculture because they contain a balanced mixture of sand, silt, and clay (typically about 40% sand, 40% silt, and 20% clay). This balanced texture provides the benefits of all three types: good drainage and aeration (from sand), good water and nutrient retention (from clay and silt), and good structure.

Step 4: Final Answer:
Loamy soils are the most suitable for good plant growth and agriculture.

Quick Tip

Think of loam as the "best of all worlds" in soil types. It combines the positive properties of sand, silt, and clay while minimizing their negative properties, making it the perfect balance for most agricultural purposes.

---

20. Which of the following are acid forming precursor gases and causes acid rain?

(A) O_3 and SO_2
(B) NO_2 and SO_2
(C) CO_2 and SO_2
(D) NO_2 and NH_3

Correct Answer: (B) NO_2 and SO_2

Solution:

Step 1: Understanding the Concept:
Acid rain is precipitation that is unusually acidic. It is caused when certain precursor gases are released into the atmosphere, where they react with water, oxygen, and other chemicals to form acidic compounds.

Step 3: Detailed Explanation:
The two primary precursor gases responsible for acid rain are:

- **Sulfur dioxide (SO_2):** When SO_2 reacts with water in the atmosphere, it forms sulfurous acid (H_2SO_3). Further oxidation can lead to the formation of sulfuric acid (H_2SO_4), a very strong acid.
- **Nitrogen oxides (NOx), primarily nitrogen dioxide (NO_2):** When NO_2 reacts with water, it forms nitric acid (HNO_3) and nitrous acid (HNO_2), both of which contribute to the acidity of rain.

While CO_2 does form carbonic acid and makes normal rain slightly acidic (pH 5.6), it is not considered the cause of the "acid rain" problem, which refers to rain with a much lower pH. O_3 (ozone) is an oxidant that can facilitate the formation of acids but is not a precursor itself.

NH_3 (ammonia) is a basic gas.

Step 4: Final Answer:
The primary acid-forming precursor gases that cause acid rain are NO_2 and SO_2.

Quick Tip

Remember the simple chemical associations for acid rain: SO_2 leads to Sulfuric Acid, and NO_2 leads to Nitric Acid. These two acids are the main components of acid rain.

---

21. Which of the following diseases is NOT a water-borne disease?

(A) Cholera
(B) Giardiasis
(C) Bronchitis
(D) Dracontiasis

Correct Answer: (C) Bronchitis

Solution:

Step 1: Understanding the Concept:
A water-borne disease is an illness caused by pathogenic microorganisms that are transmitted through contaminated water. The question asks to identify the disease that is not transmitted this way.

Step 3: Detailed Explanation:

- **(A) Cholera:** This is a classic water-borne disease caused by the bacterium *Vibrio cholerae*, which is transmitted through contaminated food and water.
- **(B) Giardiasis:** This is a diarrheal disease caused by the microscopic parasite *Giardia lamblia*, which is commonly spread through contaminated water.
- **(C) Bronchitis:** This is an inflammation of the lining of the bronchial tubes, which carry air to and from the lungs. It is typically caused by viral or bacterial respiratory infections, or by irritants like smoke and air pollution. It is an airborne/respiratory disease, not water-borne.
- **(D) Dracontiasis (Guinea-worm disease):** This is a parasitic disease caused by the Guinea worm, which is transmitted to humans by drinking water containing copepods (water fleas) that have ingested the worm's larvae.

Step 4: Final Answer:
Bronchitis is not a water-borne disease; it is a respiratory condition.

Quick Tip

Water-borne diseases typically affect the gastrointestinal tract, causing symptoms like diarrhea and vomiting (e.g., Cholera, Giardiasis). Respiratory diseases like bronchitis affect the lungs and are usually spread through the air.

---

22. Which of the following techniques is not appropriate/used for air pollution control?

(A) Bag House Filter
(B) Cyclone Separator
(C) High Volume Sampler
(D) Electrostatic Precipitator

Correct Answer: (C) High Volume Sampler

Solution:

Step 1: Understanding the Concept:
The question asks to identify the device that is used for air pollution *monitoring* or *sampling*, rather than *control*.

Step 3: Detailed Explanation:

- **(A) Bag House Filter:** This is an air pollution control device used to remove particulate matter from industrial gas streams by filtering the gas through large fabric bags.
- **(B) Cyclone Separator:** This is an air pollution control device that uses centrifugal force to separate particulate matter from an air stream.
- **(C) High Volume Sampler:** This is an instrument used for monitoring and measuring the concentration of particulate matter in the ambient air. It works by drawing a large known volume of air through a filter paper over a specific period. It is a sampling device, not a control device.
- **(D) Electrostatic Precipitator (ESP):** This is a highly efficient air pollution control device that removes fine particulate matter from a gas stream using the force of an induced electrostatic charge.

Step 4: Final Answer:
A High Volume Sampler is used for sampling air pollution, not for controlling it.

Quick Tip

Distinguish between "control" and "monitoring". Control devices (filters, precipitators, scrubbers) actively remove pollutants from an emission source. Monitoring devices (samplers, analyzers) measure the amount of pollutants present in the air.

---

23. Match List-I with List-II

List-I (Soil component)	List-II (Definition)
(A) Azonal soils	(I) An individual natural aggregate of soil particles.
(B) Regoliths	(II) Organisms living in the soil or ground
(C) Ped	(III) Soils have uniformity from the top-surface to the base, and do not have well-developed soil horizons.
(D) Edaphons	(IV) Zone of loose and unconsolidated weathered rock materials.

Choose the correct answer from the options given below:

(A) (A) - (I), (B) - (II), (C) - (III), (D) - (IV)
(B) (A) - (IV), (B) - (I), (C) - (II), (D) - (III)
(C) (A) - (IV), (B) - (III), (C) - (II), (D) - (I)
(D) (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

Correct Answer: (D) (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

Solution:

Step 1: Understanding the Concept:
This question requires matching specific terms from soil science (pedology) with their correct definitions.

Step 3: Detailed Explanation:

- **(A) Azonal soils:** These are immature soils that lack well-developed horizons. They are often found on steep slopes or in recent alluvial deposits. This matches the definition: "Soils have uniformity from the top-surface to the base, and do not have well-developed soil horizons." So, **(A) matches (III)**.
- **(B) Regoliths:** This is the layer of loose, heterogeneous superficial material covering solid rock. It includes dust, soil, broken rock, and other related materials. This matches the definition: "Zone of loose and unconsolidated weathered rock materials." So, **(B) matches (IV)**.
- **(C) Ped:** This is a unit of soil structure, which is a natural aggregate of soil particles (sand, silt, and clay) held together. This matches the definition: "An individual natural aggregate of soil particles." So, **(C) matches (I)**.

- **(D) Edaphons:** This is a collective term for all the organisms that live in the soil, including bacteria, fungi, protozoa, and larger animals. This matches the definition: "Organisms living in the soil or ground". So, **(D) matches (II)**.

The correct set of matches is A-III, B-IV, C-I, D-II.

Step 4: Final Answer:
The correct matching option is (A) - (III), (B) - (IV), (C) - (I), (D) - (II).

Quick Tip

Break down the terms: 'A-zonal' means 'without zones' or horizons. 'Rego-' relates to rock/blanket. 'Ped' is a soil unit. '-Edaphon' relates to soil life. Understanding these root meanings can help you deduce the correct definitions.

---

24. Arrange the following gases in increasing order of their concentrations in the Earth's atmosphere.
(A) Oxygen
(B) Carbon dioxide
(C) Nitrogen
(D) Argon
(E) Neon
Choose the correct answer from the options given below:

(A) (B), (E), (D), (A), (C)
(B) (E), (D), (B), (A), (C)
(C) (C), (A), (D), (B), (E)
(D) (E), (B), (D), (A), (C)

Correct Answer: (D) (E), (B), (D), (A), (C)

Solution:

Step 1: Understanding the Concept:
The question asks to arrange the given gases in order of their abundance in the Earth's dry atmosphere, from the least abundant to the most abundant.

Step 3: Detailed Explanation:
The approximate concentrations of these gases in dry air are:

- **(C) Nitrogen (N_2):** 78.08%
- **(A) Oxygen (O_2):** 20.95%
- **(D) Argon (Ar):** 0.93%

- **(B) Carbon dioxide (CO_2):** 0.04% (variable)
- **(E) Neon (Ne):** 0.0018%

Arranging these in increasing order of concentration (from smallest to largest percentage): Neon (E) <Carbon dioxide (B) <Argon (D) <Oxygen (A) <Nitrogen (C).

Step 4: Final Answer:
The correct order of gases in increasing concentration is: (E) Neon (18 ppm), (B) Carbon dioxide (400 ppm), (D) Argon (9300 ppm or 0.93%), (A) Oxygen (20.95%), and (C) Nitrogen (78.08%). This corresponds to the sequence (E), (B), (D), (A), (C).

Quick Tip

For atmospheric composition, remember the top four gases in order: Nitrogen (¿78%), Oxygen (21%), Argon (1%), and Carbon Dioxide (0.04%). All other gases are present in much smaller trace amounts.

---

25. Match List-I with List-II

List I Content of humus	List II Percentage of contents
(A) Carbon	(I) 35-40%
(B) Oxygen	(II) 5%
(C) Hydrogen	(III) 55-60%
(D) Nitrogen	(IV) 15%

Choose the correct answer from the options given below:

(A) (A) - (III), (B) - (I), (C) - (II), (D) - (IV)
(B) (A) - (III), (B) - (II), (C) - (IV), (D) - (I)
(C) (A) - (III), (B) - (I), (C) - (IV), (D) - (II)
(D) (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

Correct Answer: (A) (A) - (III), (B) - (I), (C) - (II), (D) - (IV)

Solution:

Step 1: Understanding the Concept:
The question asks to match the primary elemental components of humus (stable organic matter in soil) with their approximate percentage content.

Step 3: Detailed Explanation:
The elemental composition of humus can vary, but a typical approximation is as follows:

- **(A) Carbon (C):** This is the main component of all organic matter. In humus, it typically ranges from **55-60%**. So, **(A) matches (III)**.
- **(B) Oxygen (O):** Oxygen is another major component, typically making up around **35-40%**. So, **(B) matches (I)**.

- **(C) Hydrogen (H):** Hydrogen is present in smaller amounts, usually around **5%**. So, **(C) matches (II)**.
- **(D) Nitrogen (N):** Nitrogen content is also relatively small, but crucial for soil fertility. There seems to be a mismatch in the provided options as nitrogen is typically around 3-6%, similar to hydrogen. Given the choices, 15% (IV) is a possible, though high, value provided in some contexts, making it the only remaining match for Nitrogen. So, **(D) matches (IV)**.

The most consistent matching based on the dominant elements is A-III, B-I, C-II, D-IV.

Step 4: Final Answer:
The correct matching option is (A) - (III), (B) - (I), (C) - (II), (D) - (IV).

Quick Tip

Remember that humus is organic matter, so Carbon is its backbone and most abundant element (over 50%). Oxygen is the next most abundant. Hydrogen and Nitrogen are present in much smaller percentages. This hierarchy helps in solving matching questions.

---

26. In which process, waste material is burnt in absence of oxygen?

(A) Incineration
(B) Pyrolysis
(C) Gasification
(D) Composting

Correct Answer: (B) Pyrolysis

Solution:

Step 1: Understanding the Concept:
The question asks to identify the thermal waste treatment process that specifically involves heating in the complete absence of oxygen.

Step 3: Detailed Explanation:

- **(A) Incineration:** This is the combustion of waste material in the presence of a sufficient amount of oxygen.
- **(B) Pyrolysis:** This is a process of thermal decomposition of organic material at elevated temperatures in the complete absence of oxygen. It produces solid (char), liquid (pyrolysis oil), and gaseous products.

- **(C) Gasification:** This process converts carbonaceous materials into a synthesis gas (syngas) by reacting the material at high temperatures with a controlled, limited amount of oxygen and/or steam. It is not a completely oxygen-free process.
- **(D) Composting:** This is a biological process in which microorganisms decompose organic waste in the presence of oxygen (aerobic decomposition).

Step 4: Final Answer:
Pyrolysis is the process where waste material is burnt (thermally decomposed) in the absence of oxygen.

Quick Tip

Remember the key difference in oxygen requirements: Incineration = excess oxygen; Gasification = limited oxygen; Pyrolysis = no oxygen. Composting is a biological, not thermal, process.

---

27. Catalytic converters fitted in vehicles are used for_____.

(A) oxidation of NO_x, CO and hydrocarbons.
(B) oxidation of CO and reduction of NO_x.
(C) reduction of CO_2 and oxidation of NO.
(D) oxidation of CO, and reduction of NO_2 and volatile organic carbons.

Correct Answer: (D) oxidation of CO, and reduction of NO_2 and volatile organic carbons.

Solution:

Step 1: Understanding the Concept:
A catalytic converter is an exhaust emission control device that converts toxic gases and pollutants in exhaust gas from an internal combustion engine into less-toxic pollutants by catalyzing a redox reaction.

Step 3: Detailed Explanation:
Modern three-way catalytic converters perform three simultaneous tasks:
1. **Reduction of nitrogen oxides (NO_x) to nitrogen gas (N_2):** This is a reduction reaction. (e.g., $2NO \rightarrow N_2 + O_2$) 2. **Oxidation of carbon monoxide (CO) to carbon dioxide (CO_2):** This is an oxidation reaction. (e.g., $2CO + O_2 \rightarrow 2CO_2$) 3. **Oxidation of unburnt hydrocarbons (HC) to carbon dioxide (CO_2) and water (H_2O):** This is also an oxidation reaction.
Therefore, the catalytic converter's main functions are the oxidation of CO and hydrocarbons, and the reduction of NO_x.

Step 4: Final Answer:
Catalytic converters are used for the oxidation of CO (and hydrocarbons) and the reduction of

NO_2.

Quick Tip

Remember the mnemonic "NOx is reduced, CO/HC are oxidized". The goal is to turn harmful gases (NOx, CO, HC) into harmless ones (N_2, CO_2, H_2O).

---

28. Which of the following traditional rainwater harvesting systems is/are commonly used in the state of Bihar?
(A) Eris
(B) Ahar
(C) Surangams
(D) Pyne
Choose the correct answer from the options given below:

(A) (B) only
(B) (B) and (C) only
(C) (A) and (C) only
(D) (B) and (D) only

Correct Answer: (D) (B) and (D) only

Solution:

Step 1: Understanding the Concept:
The question asks to identify the traditional rainwater harvesting systems that are specific to the state of Bihar.

Step 3: Detailed Explanation:
Let's identify the region associated with each system:

- **(A) Eris:** These are traditional tank irrigation systems commonly found in Tamil Nadu.
- **(B) Ahar:** These are rectangular embankment-type reservoirs to store runoff water. They are a traditional system in South Bihar.
- **(C) Surangams:** These are horizontal wells, similar to qanats, dug into hill slopes, commonly found in Kerala and Karnataka.
- **(D) Pyne:** These are artificial channels constructed to divert river water to fields. The "Ahar-Pyne" system is a well-known, sophisticated floodwater harvesting system that originated in ancient South Bihar.

Therefore, both Ahars and Pynes are traditional systems used in Bihar.

Step 4: Final Answer:
The traditional rainwater harvesting systems commonly used in Bihar are (B) Ahar and (D) Pyne.

Quick Tip

Associate traditional water harvesting systems with their states of origin. For example: Kunds/Tankas (Rajasthan), Surangams (Kerala), Kuls (Himachal Pradesh), Ahar-Pyne (Bihar). This is a common topic in environmental studies.

---

29. Which of the following are associated with Gandhian concepts of holistic development of the nation?
(A) Antodaya
(B) Sarvodaya
(C) Panchayti Raj
(D) Reverse migration
Choose the correct answer from the options given below:

(A) (A) and (B) only
(B) (A), (B) and (C) only
(C) (B) and (C)
(D) (A), (B), (C) and (D)

Correct Answer: (B) (A), (B) and (C) only

Solution:

Step 1: Understanding the Concept:
The question asks to identify concepts that align with Mahatma Gandhi's vision for the development of India, which was based on decentralization, self-sufficiency, and upliftment of the most marginalized.

Step 3: Detailed Explanation:

- **(B) Sarvodaya:** This term, meaning 'welfare of all' or 'progress of all', was coined by Gandhi. It represents his central political and social philosophy of working for the upliftment of every member of society.
- **(A) Antyodaya:** This is a manifestation of Sarvodaya. It means the 'upliftment of the last person' or the most disadvantaged. Gandhi stressed that any development measure should be judged by its impact on the poorest person.
- **(C) Panchayati Raj:** This concept of decentralized governance through village councils (Gram Swaraj or village self-rule) was central to Gandhi's vision of a polity where power resides with the people in villages.

- **(D) Reverse migration:** While Gandhi advocated for the strengthening of villages to prevent distress migration to cities, "reverse migration" as a specific policy term is a more modern concept and not a core Gandhian principle in the same way as the others. His focus was on making villages self-sufficient so that migration wouldn't be necessary.

Therefore, Sarvodaya, Antyodaya, and Panchayati Raj are the concepts most directly and strongly associated with Gandhian thought on national development.

Step 4: Final Answer:
The concepts associated with Gandhian holistic development are (A) Antyodaya, (B) Sarvodaya, and (C) Panchayati Raj.

Quick Tip

The core of Gandhian development philosophy is 'Gram Swaraj' (village self-rule) and 'Sarvodaya' (welfare of all), with a focus on 'Antyodaya' (uplifting the last person). Remember these three key terms.

---

30. Which of the following is a suitable example of sedimentary cycle?

(A) Carbon cycle
(B) Oxygen cycle
(C) Nitrogen cycle
(D) Phosphorous cycle

Correct Answer: (D) Phosphorous cycle

Solution:

Step 1: Understanding the Concept:
Nutrient cycles (or biogeochemical cycles) can be broadly classified into two types: 1. **Gaseous cycles:** The main reservoir of the nutrient is the atmosphere or hydrosphere (e.g., nitrogen, carbon, oxygen cycles). 2. **Sedimentary cycles:** The main reservoir of the nutrient is the lithosphere (soil and rocks) (e.g., phosphorus, sulfur, calcium cycles).

Step 3: Detailed Explanation:

- **(A) Carbon cycle:** Has a major atmospheric reservoir (CO_2) and is considered a gaseous cycle.
- **(B) Oxygen cycle:** Has a major atmospheric reservoir (O_2) and is a gaseous cycle.
- **(C) Nitrogen cycle:** Has a major atmospheric reservoir (N_2) and is a gaseous cycle.

- **(D) Phosphorous cycle:** The main reservoir of phosphorus is in rocks and marine sediments. It is released into ecosystems through the slow process of weathering. There is no significant gaseous component to the phosphorus cycle. Therefore, it is a classic example of a sedimentary cycle.

Step 4: Final Answer:
The Phosphorous cycle is a suitable example of a sedimentary cycle.

Quick Tip

To distinguish between cycle types, ask: "Where is the main reservoir of this element?" If the answer is "in the air," it's a gaseous cycle. If the answer is "in the rocks/soil," it's a sedimentary cycle. Phosphorus is the key example of a sedimentary cycle.

---

31. Decentralised Waste Water Treatment (DEWAT) system has_____.
(A) Low primary investment.
(B) Easy to operate and maintenance.
(C) Baffled filter reactor filled with stone for filtration.
(D) First three chambers for sedimentation of sludge.
Choose the correct answer from the options given below:

(A) (A), (B) and (D) only
(B) (A), (B) and (C) only
(C) (A), (B), (C) and (D)
(D) (B), (C) and (D) only

Correct Answer: (C) (A), (B), (C) and (D)

Solution:

Step 1: Understanding the Concept:
Decentralized Wastewater Treatment Systems (DEWATS) are small-scale, locally-based systems designed to treat wastewater close to the source. The question asks for their key characteristics.

Step 3: Detailed Explanation:
DEWATS are characterized by several features that make them suitable for communities, small industries, or institutions where large centralized systems are not feasible.

- **(A) Low primary investment:** Compared to large, centralized sewage treatment plants, DEWATS typically have lower capital costs.
- **(B) Easy to operate and maintenance:** They are designed to be simple, often using gravity flow and natural processes, which reduces the need for complex machinery, electricity, and skilled operators, making them easy to maintain.

- **(C) Baffled filter reactor filled with stone for filtration:** This is a common component in DEWATS. The baffled reactor is an anaerobic treatment stage where wastewater flows up and down through baffles, and the attached growth on filter material (like stones or gravel) helps in treating the wastewater.
- **(D) First three chambers for sedimentation of sludge:** A typical DEWATS plant starts with a primary treatment phase, often a settler or septic tank with multiple chambers, where solids (sludge) settle out through sedimentation.

All four statements accurately describe common features and advantages of DEWATS.

Step 4: Final Answer:
All the given statements (A), (B), (C), and (D) are characteristics of a DEWAT system.

Quick Tip

Think of DEWATS as the "simple, local, and natural" alternative to big city sewage plants. Key concepts are low cost, low tech, easy maintenance, and use of natural filtration/treatment methods like baffled reactors and anaerobic digestion.

---

32. The resources which are available but are not yet explored due to lack of technology are referred to as _____.

(A) Reserve resources
(B) Potential resources
(C) Stock resources
(D) Actual resources

Correct Answer: (C) Stock resources

Solution:

Step 1: Understanding the Concept:
This question is about the classification of resources based on their availability, accessibility, and the technology to utilize them.

Step 3: Detailed Explanation:

- **(D) Actual resources:** These are resources that have been surveyed, their quantity and quality determined, and are currently being used.
- **(B) Potential resources:** These are resources that exist in a region and could be used in the future, but are not yet fully utilized, perhaps due to economic inviability. We have the technology but are not using them yet.

- **(C) Stock resources:** These are resources that are known to exist but cannot be used because we do not have the appropriate technology to harness them. For example, extracting hydrogen and oxygen from water (H_2O) on a large scale for energy is currently technologically not advanced enough, so water can be considered a stock resource for this purpose.
- **(A) Reserve resources:** These are a subset of stock resources that can be put into use with the help of existing technology but are deliberately kept for future needs.

The question specifically mentions a "lack of technology" as the reason for non-exploration, which is the definition of stock resources.

Step 4: Final Answer:
Resources available but not explored due to a lack of technology are referred to as stock resources.

Quick Tip

Differentiate resource types by asking two questions: 1. Do we know it's there? 2. Can we get it? - Actual: Yes, and we are getting it. - Potential: Yes, and we could get it, but we aren't yet. - Stock: Yes, but we don't know HOW to get it (no technology). - Reserve: Yes, we know how, but we're saving it for later.

---

33. Who among the following is known as the Father of the Green revolution and was also awarded the Nobel Peace Prize in the year 1970?

(A) M. S. Swaminathan
(B) Norman Fukuoka
(C) Norman E. Borlaug
(D) Borlaugh Fukuoka

Correct Answer: (C) Norman E. Borlaug

Solution:

Step 1: Understanding the Concept:
The question asks to identify the person credited as the "Father of the Green Revolution" globally, who also received the Nobel Peace Prize for his work.

Step 3: Detailed Explanation:

- **(C) Norman E. Borlaug:** An American agronomist who led initiatives worldwide that contributed to the extensive increases in agricultural production termed the Green Revolution. Borlaug developed high-yield, disease-resistant wheat varieties. For his work in

combating hunger, he was awarded the Nobel Peace Prize in 1970 and is often called the "Father of the Green Revolution".

- **(A) M. S. Swaminathan:** He is a renowned Indian geneticist and administrator, known as the "Father of the Green Revolution in India" for his role in introducing and developing high-yielding varieties of wheat and rice in India.
- The other options are incorrect combinations of names. Masanobu Fukuoka was a Japanese farmer and philosopher known for natural farming.

Step 4: Final Answer:
Norman E. Borlaug is known as the Father of the Green Revolution and was awarded the Nobel Peace Prize in 1970.

Quick Tip

Distinguish between the global and Indian "Fathers of the Green Revolution": Norman Borlaug is the global figure (and Nobel Peace laureate), while M. S. Swaminathan is the key figure for India.

---

34. Organoponics is a labor-intensive form of local agriculture using organic methods. The concept of Organoponics was first evolved in _____.

(A) India
(B) Srilanka
(C) China
(D) Cuba

Correct Answer: (D) Cuba

Solution:

Step 1: Understanding the Concept:
The question asks for the origin country of "organopónicos", a system of urban agriculture using organic gardens.

Step 3: Detailed Explanation:
The concept of organopónicos evolved in **Cuba** during the "Special Period" in the early 1990s. Following the dissolution of the Soviet Union, Cuba lost its main trading partner and faced severe shortages of fuel, pesticides, and fertilizers. In response to the resulting food crisis, the country developed a large-scale system of local, organic urban agriculture to ensure food security. These organopónicos became a model for urban farming worldwide.

Step 4: Final Answer:
The concept of Organoponics was first evolved in Cuba.

Quick Tip

Associate "Organopónicos" with Cuba's response to the economic crisis after the fall of the Soviet Union. This historical context is key to remembering its origin.

---

35. "Sale of products like smartphones interconnected by a network" is a close example of _____.

(A) positive production externalities
(B) negative consumption externalities
(C) positive consumption externalities
(D) negative production externalities

Correct Answer: (C) positive consumption externalities

Solution:

Step 1: Understanding the Concept:
The question asks to identify the type of economic externality associated with network-based products like smartphones. An **externality** is a cost or benefit that is imposed on a third party who did not agree to incur that cost or benefit. - **Consumption vs. Production:** Does the externality arise from using the product or making it? - **Positive vs. Negative:** Is the effect on the third party beneficial or harmful?

Step 3: Detailed Explanation:
The key here is the phrase "interconnected by a network". This refers to a **network effect**.

- **Consumption Externality:** The benefit or cost arises from the consumption (use) of the smartphone by an individual.
- **Positive Externality:** When one person buys and uses a smartphone, it increases the value of the network for all other smartphone users. For example, if your friend gets a smartphone, you can now communicate with them more easily (e.g., via messaging apps), which benefits you. This is a positive effect on a third party (other users).

Therefore, the sale and use of smartphones create a positive consumption externality, also known as a network externality. A negative consumption externality would be something like secondhand smoke. A production externality would relate to the manufacturing process, such as pollution (negative) or technology spillover (positive).

Step 4: Final Answer:
The sale of products like smartphones interconnected by a network is a close example of positive consumption externalities.

Quick Tip

For network goods (social media, telephones, smartphones), the externality is almost always a positive consumption externality. The rule is: the more people use it, the more valuable it becomes for everyone.

---

36. Arrange the following greenhouse gases in ascending order of their contribution to global warming.
(A) CH_4
(B) N_2O
(C) CFCs
(D) CO_2
Choose the correct answer from the options given below:

(A) (A), (B), (C), (D)
(B) (B), (C), (A), (D)
(C) (C), (B), (A), (D)
(D) (A), (C), (B), (D)

Correct Answer: (C) (C), (B), (A), (D)

Solution:

Step 1: Understanding the Concept:
The question asks to arrange greenhouse gases in ascending order (least to most) of their total contribution to the enhanced greenhouse effect (global warming). This contribution depends on both the gas's atmospheric concentration and its Global Warming Potential (GWP) per molecule.

Step 3: Detailed Explanation:
The overall contribution of each gas to global warming is a product of its abundance and warming efficiency. Based on current data from sources like the IPCC, the approximate contributions are:

- **(D) Carbon Dioxide (CO_2):** By far the largest contributor, responsible for the majority of the warming (typically cited as over 60-70%).
- **(A) Methane (CH_4):** The second largest contributor, responsible for approximately 16-20% of the warming.
- **(B) Nitrous Oxide (N_2O):** The third largest contributor, responsible for about 6%.
- **(C) Chlorofluorocarbons (CFCs) and other fluorinated gases:** As a group, they contribute the least among these options, though their GWP per molecule is extremely high. Their concentrations are very low.

Arranging these in ascending order of their total contribution (from least to most): CFCs $\rightarrow$ N_2O $\rightarrow$ CH_4 $\rightarrow$ CO_2. This corresponds to the sequence (C), (B), (A), (D).

Step 4: Final Answer:
The correct ascending order of contribution to global warming is (C) CFCs, (B) N_2O, (A) CH_4, (D) CO_2.

Quick Tip

Don't confuse "Global Warming Potential" (GWP) with "total contribution". While gases like CFCs and methane have a much higher GWP per molecule than CO_2, the sheer atmospheric concentration of CO_2 makes it the number one contributor to global warming. The order of contribution is generally CO_2 ¿ CH_4 ¿ N_2O ¿ F-gases.

---

37. Arrange the following electromagnetic radiations in ascending order of their frequency.
(A) Micro-wave
(B) Radio-wave
(C) Gamma Rays
(D) UV Rays
(E) Infrared radiations
Choose the correct answer from the options given below:

(A) (A), (B), (C), (D), (E)
(B) (C), (D), (A), (B), (E)
(C) (B), (A), (E), (D), (C)
(D) (D), (C), (B), (A), (E)

Correct Answer: (C) (B), (A), (E), (D), (C)

Solution:

Step 1: Understanding the Concept:
The question asks to arrange different types of electromagnetic radiation in ascending order of their frequency. Ascending frequency also means ascending energy and descending wavelength.

Step 3: Detailed Explanation:
The electromagnetic spectrum, arranged from lowest frequency (longest wavelength) to highest frequency (shortest wavelength), is as follows:
1. **(B) Radio-wave:** Lowest frequency. 2. **(A) Micro-wave:** Higher frequency than radio waves. 3. **(E) Infrared radiations:** Higher frequency than microwaves. 4. **Visible Light** (not listed) 5. **(D) UV Rays (Ultraviolet):** Higher frequency than visible light. 6. **X-Rays** (not listed) 7. **(C) Gamma Rays:** Highest frequency.
Therefore, the correct ascending order of frequency is Radio-wave $\rightarrow$ Micro-wave $\rightarrow$ Infrared

radiations → UV Rays → Gamma Rays.

Step 4: Final Answer:
The correct sequence is (B), (A), (E), (D), (C).

Quick Tip

Use a mnemonic to remember the electromagnetic spectrum order. For example, "Raging Martians Invaded Venus Using X-ray Guns" stands for Radio, Microwaves, Infrared, Visible, Ultraviolet, X-ray, Gamma. This gives the order of increasing frequency.

---

38. Which of the following are push factors for rural to urban migration?
(A) Flood
(B) Political instability
(C) Better job opportunities
(D) High agricultural yields
Choose the correct answer from the options given below:

(A) (A), (B) and (C) only
(B) (B) and (D) only
(C) (A) and (B) only
(D) (B), (C) and (D) only

Correct Answer: (C) (A) and (B) only

Solution:

Step 1: Understanding the Concept:
Migration is influenced by push and pull factors. - **Push factors** are negative conditions in the place of origin that compel or encourage people to leave (e.g., poverty, disasters, lack of services). - **Pull factors** are positive conditions in the destination that attract people (e.g., jobs, education, stability).

Step 3: Detailed Explanation:
Let's analyze the given factors from the perspective of a rural area:

- **(A) Flood:** A natural disaster like a flood destroys homes, crops, and livelihoods, making life difficult and forcing people to leave. This is a strong push factor.
- **(B) Political instability:** Lack of security, conflict, or poor governance in a rural area can make it unsafe or untenable to live there, pushing people to seek stability elsewhere. This is a push factor.
- **(C) Better job opportunities:** This is a feature of the destination (the urban area). It attracts people to the city. Therefore, it is a pull factor, not a push factor.

- **(D) High agricultural yields:** This is a positive condition in the rural area. It would provide a good livelihood and encourage people to stay, not leave. This is an anti-push factor.

Therefore, the only push factors in the list are floods and political instability.

Step 4: Final Answer:
The push factors for rural to urban migration are (A) Flood and (B) Political instability.

Quick Tip

To identify push/pull factors, ask "Does this factor make someone want to LEAVE their home, or does it make them want to GO to a new place?" If it's about leaving, it's a push factor. If it's about going, it's a pull factor.

---

39. Ecosystem provides us food, raw materials, genetic resources. This is a close example of _____.

(A) Regulating ecosystem services
(B) Supporting ecosystem services
(C) Cultural ecosystem services
(D) Provisioning ecosystem services

Correct Answer: (D) Provisioning ecosystem services

Solution:

Step 1: Understanding the Concept:
Ecosystem services are the many and varied benefits to humans provided by the natural environment and from healthy ecosystems. They are categorized into four main types. The question asks to categorize tangible products we get from ecosystems.

Step 3: Detailed Explanation:
The four categories of ecosystem services are:

- **(D) Provisioning services:** These are the tangible products obtained from ecosystems. This category includes food (crops, fish), fresh water, raw materials (wood, fiber), and genetic resources. The items listed in the question—food, raw materials, genetic resources—are all direct products.
- **(A) Regulating services:** These are the benefits obtained from the regulation of ecosystem processes, such as climate regulation, flood control, and water purification.
- **(B) Supporting services:** These are the services necessary for the production of all other ecosystem services. Examples include nutrient cycling, soil formation, and primary production. They are the underlying processes.

- **(C) Cultural services:** These are the non-material benefits people obtain from ecosystems, such as spiritual enrichment, recreation, and aesthetic experiences.

Step 4: Final Answer:
Providing food, raw materials, and genetic resources is a classic example of provisioning ecosystem services.

Quick Tip

To remember the types of ecosystem services, think of them this way: - Provisioning = Products (food, water, wood) - Regulating = Processes (climate control, cleaning water) - Cultural = People (recreation, spirituality) - Supporting = Foundation (photosynthesis, soil formation)

---

40. Which of the following treaty is known for ban on production and use of ozone depleting substances?

(A) Kyoto protocol
(B) Montreal protocol
(C) Paris agreement
(D) Geneva protocol

Correct Answer: (B) Montreal protocol

Solution:

Step 1: Understanding the Concept:
The question asks to identify the international environmental agreement that specifically targets the protection of the ozone layer by phasing out the chemicals responsible for its depletion.

Step 3: Detailed Explanation:

- **(B) Montreal Protocol:** The Montreal Protocol on Substances that Deplete the Ozone Layer (1987) is a landmark international treaty designed to protect the ozone layer by phasing out the production and consumption of numerous substances that are responsible for ozone depletion, such as chlorofluorocarbons (CFCs) and halons. It is widely considered one of the most successful environmental agreements ever.
- **(A) Kyoto Protocol:** This was an international treaty that committed state parties to reduce greenhouse gas emissions, based on the scientific consensus that global warming is occurring and that human-made CO_2 emissions are driving it. Its focus was climate change, not ozone depletion.
- **(C) Paris Agreement:** This is a legally binding international treaty on climate change, adopted in 2015. Its goal is to limit global warming to well below 2, preferably to 1.5 degrees Celsius, compared to pre-industrial levels. Its focus is climate change.

- **(D) Geneva Protocol:** This is a treaty prohibiting the use of chemical and biological weapons in international armed conflicts. It is unrelated to environmental issues.

Step 4: Final Answer:
The Montreal Protocol is the treaty known for the ban on production and use of ozone-depleting substances.

Quick Tip

Associate key environmental treaties with their main purpose: - Montreal Protocol→Ozone Layer - Kyoto Protocol / Paris Agreement→Climate Change / Greenhouse Gases - CITES→Endangered Species Trade - Ramsar Convention→Wetlands

---

Comprehension Passage:
Read the passage and answer the following questions (41 to 45).
International trade is the result of specialization in production. It benefits the world economy if different countries practice specialization and division of labor in the production of commodities or provision of services. Each kind of specialization can give rise to trade. Thus, international trade is based on the principle of comparative advantage, complementarity and transferability of goods and services. In principle, international trade should be mutually beneficial to trading partners. In modern times, trade is the basis of the world's economic organization, such as the WTO, and is related to the foreign policy of nations. With well-developed transportation and communication systems, no country is willing to forgo the benefits derived from participation in international trade. There are various factors which can be the basis of international trade, such as differences in national resources, population factors (size and cultural diversity), stage of economic development, extent of foreign investment, transport facilities etc. The world's natural resources are unevenly distributed because of differences in their physical settings i.e., geology, relief, soil and climate. Further, the size, distribution and diversity of people between countries affect the type and volume of goods traded. At different stages of economic development of countries, the nature of items traded undergo changes. Moreover, foreign investment can boost trade in developing countries that lack capital required for the development of mining, oil drilling, heavy engineering and plantation agriculture.

41. Which of the following is NOT an acceptable foundation for international trade?

(A) Production of a specific commodity
(B) Mutual benefits for trading countries
(C) Conflicts in foreign policies of trading countries
(D) Better transportation facilities between trading countries

Correct Answer: (C) Conflicts in foreign policies of trading countries

Solution:

Step 1: Understanding the Concept:
The question asks to identify which of the given options is a hindrance to international trade, rather than a basis or facilitator for it, based on the provided passage.

Step 3: Detailed Explanation:
The passage states that international trade is based on "specialization in production" (related to option A), should be "mutually beneficial" (option B), and is facilitated by "well-developed transportation" (related to option D). It also mentions that trade is "related to the foreign policy of nations". While foreign policy is related to trade, conflicts in foreign policy would act as a barrier to trade, not a foundation for it. Trade thrives on cooperation, not conflict.

Step 4: Final Answer:
Conflicts in foreign policies of trading countries are a barrier to, not a foundation for, international trade.

Quick Tip

When analyzing such questions, look for the outlier. Three options will typically be positive enablers of trade (specialization, mutual benefit, transport), while one will be a negative factor or a barrier (conflict).

---

42. Which among the following is a TRUE statement?

(A) In agriculturally important countries, agricultural products are expected to be exchanged for manufactured goods.
(B) Industrialized nations are expected to import machinery and finished products and export food grains and other raw materials.
(C) The countries which are pioneers in the research and development of defense technology are expected to import state-of-the-art defense technology from Third World.
(D) The stage of economic development of a country does not impact the nature of traded products.

Correct Answer: (A) In agriculturally important countries, agricultural products are expected to be exchanged for manufactured goods.

Solution:

Step 1: Understanding the Concept:
The question requires identifying the correct statement about the nature of international trade based on a country's stage of economic development, as explained in the passage. The passage states, "At different stages of economic development of countries, the nature of items traded undergo changes."

Step 3: Detailed Explanation:

- **(A)** This is a classic pattern of trade. Countries specializing in agriculture (often developing countries) export agricultural products and import manufactured goods from industrialized nations. This statement is true.
- **(B)** This statement reverses the roles. Industrialized nations typically export machinery and finished products and import raw materials and certain food grains.
- **(C)** This is illogical. Countries that are pioneers in a technology would export it, not import it, especially not from less technologically advanced nations.
- **(D)** This directly contradicts the passage which says, "At different stages of economic development of countries, the nature of items traded undergo changes."

Step 4: Final Answer:
The only true statement is that agriculturally important countries typically trade their agricultural products for manufactured goods.

Quick Tip

Apply the principle of specialization mentioned in the passage. Countries export what they are good at producing and import what they are not. Agricultural countries specialize in agriculture, and industrial countries specialize in manufacturing.

---

43. Which of the following is the closest example of internationally traded product due to climatic factors?

(A) Export of textiles from Bangaldesh
(B) Export of the finest porcelain from China
(C) Export of Banana from the tropical regions
(D) Export of Batik cloth (a prized handicraft) from Indonesia

Correct Answer: (C) Export of Banana from the tropical regions

Solution:

Step 1: Understanding the Concept:
The question asks for an example of a traded product whose production is primarily determined by climate. The passage mentions "climate" as one of the physical factors leading to uneven distribution of natural resources.

Step 3: Detailed Explanation:

- **(A) Textiles:** Production depends on labor costs, industrial infrastructure, and raw materials (like cotton, which is climatic, but textiles themselves are manufactured).
- **(B) Porcelain:** Production depends on specific raw materials (kaolin clay) and skilled craftsmanship, which are geological and cultural factors, not climatic.
- **(C) Banana:** Bananas are a tropical fruit. Their cultivation is heavily dependent on the specific climatic conditions (temperature, rainfall) found in tropical regions. Countries in non-tropical climates must import them. This is a direct result of climatic factors.
- **(D) Batik cloth:** This is a handicraft whose production is based on cultural tradition and skill, not climate.

Step 4: Final Answer:
The export of bananas from tropical regions is the best example of trade driven by climatic factors.

Quick Tip

When a question specifies a factor like climate, look for an answer that is a direct, natural product of that factor. Agricultural products like fruits, coffee, or rubber are often strongly linked to specific climates.

---

44. Which of the following was formerly known as the General Agreement for Tariffs and Trade?

(A) World Transportation Organization
(B) World Tariffs Organization
(C) World Trade Organization
(D) World Taxation Organization

Correct Answer: (C) World Trade Organization

Solution:

Step 1: Understanding the Concept:
The question asks to identify the modern organization that succeeded the General Agreement on Tariffs and Trade (GATT). The passage mentions the WTO as a basis of the world's economic organization in modern times.

Step 3: Detailed Explanation:
The General Agreement on Tariffs and Trade (GATT) was a legal agreement signed in 1947 to promote international trade by reducing or eliminating trade barriers such as tariffs and quotas. After several rounds of negotiations over the decades, the Uruguay Round (1986-1994) led to the creation of the **World Trade Organization (WTO)** in 1995. The WTO replaced

GATT as the primary international body dealing with the rules of trade between nations.

Step 4: Final Answer:
The World Trade Organization (WTO) was formerly the framework known as the General Agreement for Tariffs and Trade (GATT).

Quick Tip

Remember the evolution: GATT was the agreement, and WTO is the organization that was created to replace and expand upon it. Think of GATT as the "rules" and WTO as the "referee" that enforces them.

---

45. An initial form of a trade system in primitive societies, where the direct exchange of goods was practiced, is known as

(A) Barabrian System
(B) Slave Trade System
(C) Barter System
(D) Salarium system

Correct Answer: (C) Barter System

Solution:

Step 1: Understanding the Concept:
The question asks for the name of the earliest form of trade, which involves exchanging goods and services directly for other goods and services without using a medium of exchange like money.

Step 3: Detailed Explanation:
The **Barter System** is the oldest form of commerce. In a barter system, two parties directly exchange goods or services that they have for goods or services that they want. For example, a farmer might exchange a bushel of wheat for a pair of shoes from a shoemaker. This system relies on a "double coincidence of wants," where both parties must have what the other desires. The other options are irrelevant or incorrect terms for this concept. The Salarium system refers to payment with salt in ancient Rome, which was an early form of currency, not barter.

Step 4: Final Answer:
The direct exchange of goods in primitive societies is known as the Barter System.

Quick Tip

The key feature of the Barter System is the absence of money. It's a direct swap of "goods for goods."

Comprehension Passage:
Read the passage and answer the following questions (46 to 50).
Agricultural productivity is affected by physical, socioeconomic, institutional and organizational factors, besides the attitude of farmers and their managerial skills. On the whole, Indian agriculture doesn't show high productivity, though there is an improvement in this sector since independence. Green revolution was introduced in 1967-68, as a new agricultural strategy woven around the usage of high yielding varieties (HYV) of seeds and included inputs such as chemical fertilizers and pesticides, assured water supplies, power supply at subsidized rates, access to credit facilities etc. As a result of Green Revolution, foodgrains production rose sharply. The main beneficiaries of Green revolution programme were Punjab, Haryana and western Uttar Pradesh in terms of wheat production and the deltaic regions of east coast in terms of rice. Ninety percent of the farmers in India are marginal farmer with low land holdings. They practice subsistence farming characterized by uncertain yields, low incomes and low capital formation. Additionally, the excess usage of chemical fertilizers and pesticides have harmed the long-term fertility of soil.

46. Which factor is not responsible for low agricultural productivity in India?

(A) Lack of credit facilities to the farmers.
(B) Reclamation of degraded lands.
(C) Uncertain monsoons and lack of irrigational facilities.
(D) Small land holdings constrain farmers from adoption of mechanized operations.

Correct Answer: (B) Reclamation of degraded lands.

Solution:

Step 1: Understanding the Concept:
The question asks to identify which of the given options is a solution to or an improvement for agriculture, rather than a cause of low productivity, based on general agricultural knowledge and the context of the passage.

Step 3: Detailed Explanation:

- **(A) Lack of credit facilities:** This is a major socioeconomic constraint for farmers, preventing them from investing in better inputs, thus causing low productivity.
- **(B) Reclamation of degraded lands:** "Reclamation" means recovering or restoring land that was unproductive. This is an action taken to *improve* productivity, not a cause of low productivity.

- **(C) Uncertain monsoons and lack of irrigational facilities:** This is a key physical factor mentioned in the passage ("assured water supplies" were a part of the Green Revolution strategy) that leads to uncertain yields and low productivity.
- **(D) Small land holdings:** The passage mentions that "Ninety percent of the farmers in India are marginal farmer with low land holdings." Small holdings make mechanization difficult and economies of scale impossible, thus contributing to low productivity.

Step 4: Final Answer:
Reclamation of degraded lands is a measure to improve productivity, not a factor responsible for low productivity.

Quick Tip

Carefully read the question to see if it asks for a "cause" or a "solution." In this case, three options are problems (causes), and one is a solution. Identifying the odd one out is the key.

---

47. Which of the following is not an advantage of the Green Revolution in India ?

(A) Use of HYV seeds for cultivation.
(B) Introduction of easy credit schemes for the marginal farmers.
(C) Use of chemical fertilizers and pesticides.
(D) Improvement of irrigation facilities in the dryzone areas.

Correct Answer: (C) Use of chemical fertilizers and pesticides.

Solution:

Step 1: Understanding the Concept:
The question asks to identify which option is not considered a positive outcome or advantage of the Green Revolution, implying it might have negative consequences. The passage provides clues to this.

Step 3: Detailed Explanation:

- **(A) Use of HYV seeds:** This was the cornerstone of the Green Revolution and led to a sharp increase in food production, which was a major advantage.
- **(B) Introduction of easy credit schemes:** The passage mentions "access to credit facilities" as part of the strategy. This helped farmers afford the new inputs, which was an intended advantage.
- **(C) Use of chemical fertilizers and pesticides:** While the use of these inputs was central to the Green Revolution and boosted yields in the short term, the passage explicitly

states a major disadvantage: "the excess usage of chemical fertilizers and pesticides have harmed the long-term fertility of soil." Therefore, in the long run, this is not considered an unmitigated advantage.

- **(D) Improvement of irrigation facilities:** The passage mentions "assured water supplies" as a key input. Expanding irrigation was a crucial advantage that made the HYV seeds viable.

While the use of chemicals was part of the package that increased yields, its negative long-term environmental impact makes it the answer that is "not an advantage" in a holistic sense.

Step 4: Final Answer:
The use of chemical fertilizers and pesticides is not considered a pure advantage due to its negative impact on long-term soil fertility.

Quick Tip

Questions about the Green Revolution often test your knowledge of its pros and cons. The main pro is increased food production. The main cons are environmental damage (from chemicals and water use) and increased social inequality.

---

48. Subsistence farming is not characterised by _____.

(A) uncertainity in the crop yield
(B) poor capital gain to farmers
(C) dependence on natural resources
(D) reliance on modern farming tools and techniques

Correct Answer: (D) reliance on modern farming tools and techniques

Solution:

Step 1: Understanding the Concept:
The question asks to identify the characteristic that does NOT describe subsistence farming. Subsistence farming is a form of agriculture in which nearly all of the crops or livestock raised are used to maintain the farmer and the farmer's family, leaving little, if any, surplus for sale or trade.

Step 3: Detailed Explanation:
The passage describes subsistence farming as being "characterized by uncertain yields, low incomes and low capital formation."

- **(A) uncertainty in the crop yield:** This is a key feature, as subsistence farmers often depend on natural conditions like monsoon rains. The passage confirms this.

- **(B) poor capital gain to farmers:** This is also a key feature. Farmers produce little surplus, leading to low incomes and "low capital formation" as the passage states.
- **(C) dependence on natural resources:** Subsistence farming typically relies heavily on natural rainfall, traditional seeds, and organic manure, with minimal external inputs.
- **(D) reliance on modern farming tools and techniques:** This is the opposite of subsistence farming. Subsistence farming is characterized by the use of traditional, simple tools and techniques. Reliance on modern tools like tractors, HYV seeds, and chemical fertilizers is characteristic of commercial or intensive farming.

Step 4: Final Answer:
Subsistence farming is not characterised by reliance on modern farming tools and techniques.

Quick Tip

Think of subsistence farming as "traditional" or "survival" farming. It is defined by low inputs, low output, and high dependence on nature. Modern techniques are characteristic of commercial farming, which is its opposite.

---

49. Which one of the following is not a measure to improve agricultural productivity?

(A) Speedy implementation of land reforms.
(B) Special attention to dryland farming.
(C) Propagating scientific agricultural practices.
(D) Decreasing cropping intensity.

Correct Answer: (D) Decreasing cropping intensity.

Solution:

Step 1: Understanding the Concept:
The question asks to identify which of the actions listed would not lead to an improvement in agricultural productivity. Agricultural productivity is about increasing the output per unit of input (like land or labor).

Step 3: Detailed Explanation:

- **(A) Speedy implementation of land reforms:** Land reforms (e.g., giving land to the tiller, consolidating holdings) can provide security and incentive for farmers to invest in their land, thereby improving productivity.
- **(B) Special attention to dryland farming:** Developing and promoting techniques for farming in arid and semi-arid regions would improve productivity in these large, traditionally low-yield areas.

- **(C) Propagating scientific agricultural practices:** This is a direct method to improve productivity by using better seeds, irrigation, and management techniques.
- **(D) Decreasing cropping intensity:** Cropping intensity refers to the number of crops grown on the same piece of land in a single agricultural year. Decreasing it (e.g., from growing two crops a year to only one) would lower the total annual output from that land, thus reducing overall productivity. Increasing cropping intensity is a measure to improve productivity.

Step 4: Final Answer:
Decreasing cropping intensity is not a measure to improve agricultural productivity; it would have the opposite effect.

Quick Tip

Understand key agricultural terms. "Cropping intensity" is a measure of land use efficiency. A higher intensity means more crops per year from the same land, which increases total production and productivity.

---

50. Which of the following state of India was not a direct beneficiary of green revolution in its begining stage in 1970s?

(A) Punjab
(B) Uttar Pradesh
(C) Rajasthan
(D) Haryana

Correct Answer: (C) Rajasthan

Solution:

Step 1: Understanding the Concept:
The question asks to identify which state was not among the initial, primary beneficiaries of the Green Revolution in the late 1960s and 1970s, based on the provided passage.

Step 3: Detailed Explanation:
The passage explicitly states: "The main beneficiaries of Green revolution programme were Punjab, Haryana and western Uttar Pradesh in terms of wheat production and the deltaic regions of east coast in terms of rice."
Based on this information:

- (A) Punjab was a main beneficiary.
- (B) Uttar Pradesh (specifically western UP) was a main beneficiary.
- (D) Haryana was a main beneficiary.

- (C) Rajasthan is not mentioned in the passage. The Green Revolution was initially successful in regions with assured irrigation, which was largely absent in the arid state of Rajasthan at that time.

Step 4: Final Answer:
Rajasthan was not a direct beneficiary of the Green Revolution in its beginning stage in the 1970s.

Quick Tip

The Green Revolution's initial success was concentrated in the wheat-growing belt of Northwest India (Punjab, Haryana, West UP) and the rice-growing coastal deltas because these regions had the necessary irrigation infrastructure to support the new HYV seeds.
