ForumIAS

Prelims Marathon

1st Week August, 2025

HISTORY
ECONOMICS
POLITY
SCIENCE AND TECHNOLOGY
GEOGRAPHY AND ENVIRONMENT

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Public finance in India

1. With reference to the government's revenue receipts, consider the following statements:
1. Tax revenue includes all income earned by the government through direct and indirect taxes.
2. Dividends from Public Sector Undertakings (PSUs) and interest on loans are classified as non-tax revenue.
3. Grants received by the central government are always internal in nature.

Which of the statements given above is/are correct?

A. 1 and 2 only
B. 2 and 3 only
C. 1 and 3 only
D. 1, 2 and 3

Answer: A. 1 and 2 only

Explanation:

- Tax revenue includes all direct and indirect taxes collected by the government.
- Profits/dividends from PSUs and interest from loans are part of **non-tax revenue**.
- Grants received by the **Central Government** are **external**, not internal. Internal grants are relevant for **state governments**.

Source: Indian Economy (NCERT)

2. Which of the following are classified as **Non-Tax Revenue Receipts** of the Government of India?
1. Fees and fines collected by government departments
2. Interest received on loans given to state governments
3. Income from stamp printing and coin minting
4. Income tax collected from individuals

Select the correct answer using the code below:

A. 1, 2 and 3 only
B. 1 and 4 only
C. 2, 3 and 4 only
D. 1, 2, 3 and 4

Answer: A. 1, 2 and 3 only

Explanation:

- Fees and fines are part of non-tax revenue.
- **I**nterest from internal lending is a non-tax revenue.
- Income from fiscal services like coin minting and stamp printing is non-tax revenue.
- Income tax is a **direct tax** and thus part of **tax revenue**, not non-tax revenue.

Source: Indian Economy (NCERT)

3. With reference to **Revenue Expenditure** in government budgeting, consider the following statements:
1. Revenue expenditure is of a consumptive nature and does not result in the creation of productive assets.
2. Salaries, pensions, subsidies, and interest payments are all components of revenue expenditure.
3. Capital grants given to state governments are included under revenue expenditure.

Which of the statements given above is/are correct?

A. 1 and 2 only
B. 2 and 3 only
C. 1 and 3 only
D. 1, 2 and 3

Answer: A. 1 and 2 only
Explanation:

- Revenue expenditure is consumptive and does not create productive assets.
- Items like salaries, pensions, subsidies, and interest payments are typical examples of revenue expenditure.
- **Capital grants**, by definition, are considered **capital expenditure**, not revenue expenditure. Only **non-capital grants** are part of revenue expenditure.

Source: Indian Economy (NCERT)

4. With reference to **Capital Receipts** in the Union Government's financial accounts, consider the following statements:

1. Capital receipts include all non-revenue receipts that may be used for investment or development purposes.
2. Borrowings from institutions like the World Bank and IMF are classified as capital receipts.
3. Interest received on loans given by the government is a capital receipt.

Which of the statements given above is/are correct?
A. 1 and 2 only
B. 2 and 3 only
C. 1 and 3 only
D. 1, 2 and 3

Answer: A. 1 and 2 only
Explanation:

- Capital receipts are non-revenue receipts meant for investment/development but may be diverted to meet revenue needs.
- External borrowings from institutions like the **World Bank**, **IMF**, etc., are part of capital receipts.
- **Interest received** on loans is part of **revenue receipts**, not capital receipts. Only the **loan principal recovery** is a capital receipt.

Source: Indian Economy (NCERT)

5. Consider the following statements:

1. A **Surplus Budget** occurs when the government's estimated revenue exceeds its estimated expenditure in a financial year.
2. **Zero-Based Budgeting** requires all expenditures to be re-justified each time a budget is prepared, regardless of previous allocations.
3. **Sunset Budgeting** is a budgeting technique where every budget is automatically dissolved at the end of the financial year.

Which of the statements given above is/are correct?
A. 1 and 2 only
B. 2 and 3 only
C. 1 and 3 only
D. 1, 2 and 3

Answer: A. 1 and 2 only
Explanation:

- Surplus budget refers to revenues exceeding expenditures.
- Zero-Based Budgeting involves re-evaluating all expenses from scratch each time.

- Sunset Budgeting refers to schemes **ending after a prescribed time**, not **entire budgets** dissolving annually.

Source: Indian Economy (NCERT)

6. Consider the following statements:
1. Expansionary fiscal policy is used to stimulate economic activity during periods of recession by increasing government spending or reducing taxes.
2. Contractionary fiscal policy is aimed at curbing inflation by withdrawing money from the market through increased taxation or reduced government expenditure.
3. Both expansionary and contractionary fiscal policies are implemented by the Reserve Bank of India.

Which of the statements given above is/are correct?
A. 1 and 2 only
B. 2 and 3 only
C. 1 and 3 only
D. 1, 2 and 3

Answer: A. 1 and 2 only
Explanation:
- Expansionary fiscal policy boosts demand during a downturn through higher spending or lower taxes.
- Contractionary policy addresses inflation through spending cuts or tax hikes.
- Fiscal policies are implemented by the **government**, not the **RBI**. The RBI implements **monetary policy**.

Source: Indian Economy (NCERT)

7. Which of the following statements correctly describes *Deficit Financing* in the context of India's fiscal policy?
1. It involves borrowing from the Reserve Bank of India.
2. It is undertaken only when the government has surplus revenue.
3. It may involve issuance of treasury bills and use of cash balances.

Select the correct answer using the code given below:
A. 1 and 2 only
B. 1 and 3 only
C. 2 and 3 only
D. 1, 2 and 3

Answer: B. 1 and 3 only
Explanation:
- Borrowing from the RBI is a key component of deficit financing.
- Deficit financing is done when there is a **shortfall**, not surplus.
- Treasury bills and accumulated cash balances are tools of deficit financing.

Source: Indian Economy (NCERT)

8. Which of the following best describes the implications of a **high Revenue Deficit**?
A. It indicates the government is investing in infrastructure and asset creation.
B. It implies the government is dis-saving and using past savings to meet current expenses.
C. It shows surplus in the revenue account of the budget.
D. It reflects an increase in tax revenues exceeding non-tax revenues.

Answer: B.
Explanation:

- A **high revenue deficit** means the government is spending more than its revenue income on **day-to-day operations**, not asset creation.
- It often leads to **dis-saving** and increased borrowing **for consumption**, not investment.

Source: Indian Economy (NCERT)

9. Which of the following components are included in the calculation of **Gross Fiscal Deficit (GFD)**?
1. Total government expenditure
2. Revenue receipts
3. Capital receipts that do not create debt (e.g., loan recovery, PSU disinvestment)

Select the correct answer using the code given below:
A. 1 and 2 only
B. 1 and 3 only
C. 2 and 3 only
D. 1, 2 and 3

Answer: D. 1, 2 and 3
Explanation:
- GFD = **Total Expenditure** – (**Revenue Receipts + Non-debt creating Capital Receipts**)
- Hence, all three components are relevant to the formula.

Source: Indian Economy (NCERT)

10. With reference to types of fiscal deficit, consider the following statements:
1. A **structural deficit** occurs due to temporary economic downturns such as recessions.
2. A **cyclical deficit** emerges even when the economy is at full employment.

Which of the statements given above is/are **correct**?
A. 1 only
B. 2 only
C. Both 1 and 2
D. Neither 1 nor 2

Answer: D
Explanation:
- Structural deficit is **independent** of economic cycles; it persists even during **upswings**.
- Cyclical deficit occurs when the economy is **not at full potential**, e.g., during a **recession**.

Source: Indian Economy (NCERT)

Environment and Ecology

Q. With reference to Habitat and Environment, consider the following statements:
1. A habitat always contains life, whereas the environment does not necessarily have life.
2. All habitats are environments, but all environments are not habitats.

Which of the statements given above is/are correct?
(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Correct Answer: (c)
Explanation:

- **Statement 1:** Correct. A habitat is a specific place where a particular species lives, so it always contains life. The environment includes all external factors (biotic and abiotic), and may or may not contain life.
- **Statement 2:** Correct. Every habitat is part of an environment, but an environment can include non-living components or areas without life, so not all environments are habitats.

Source- Shankar IAS

Q. Which of the following best describes an ecosystem?
(a) An ecosystem is a functional unit where living organisms interact only among themselves without involving the physical environment.
(b) An ecosystem can be of any size, includes specific and limited species, and involves interaction between biotic and abiotic components through nutrient cycles and energy flows.
(c) An ecosystem consists only of living organisms and does not depend on abiotic factors like soil or climate.
(d) An ecosystem is a large geographical area that has no interdependence between species and physical components.

Correct Answer: (b)
Explanation: Option (b) accurately describes an ecosystem as a functional unit where living organisms (biotic components) interact with each other and with non-living elements (abiotic components) like soil, water, and climate.
Source- Shankar IAS

Q. Which of the following characteristic features is correctly paired with its vegetation type?
(a) Sloping branches and needle-like leaves — Taiga vegetation
(b) Deep roots — Tundra vegetation
(c) Waxy stem and thick leaves — Tropical vegetation
(d) Canopy — Desert vegetation

Correct Answer: (a)
Explanation:
(a) Correct – Taiga trees have sloping branches and needle-like leaves to handle snow and reduce water loss.
(b) Wrong – Deep roots are found in desert plants, not tundra.
(c) Wrong – Waxy stems and thick leaves are desert plant features, not tropical.
(d) Wrong – Canopy is typical of tropical forests, deserts lack dense canopy.
Source- Shankar IAS

Q. Which of the following best describes natural selection as proposed by Darwin and Wallace?
(a) It is the process by which organisms acquire new genes through mutation alone.
(b) It is the evolutionary force that selects beneficial genetic variations, enabling better adaptation to the environment.
(c) It refers to sudden large-scale changes in species caused by geographic isolation.
(d) It means all members of a species survive equally regardless of genetic traits.

Correct Answer: (b)
Explanation: Natural selection is the mechanism by which individuals with advantageous genetic traits are more likely to survive, reproduce, and pass those traits to their offspring. It acts on existing genetic variations and favors adaptations that improve an organism's fitness in its environment

Source- Shankar IAS

Q. Consider the following statements about Ecotone:

1. An ecotone is a transition zone between two different biomes or ecosystems.
2. Mangrove forests represent an ecotone between marine and terrestrial ecosystems.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Correct Answer: (c)
Explanation: An ecotone is indeed a transitional area where two distinct ecosystems or biomes meet and integrate. Mangrove forests are classic examples of ecotones as they lie between marine (saltwater) and terrestrial (land) ecosystems, exhibiting characteristics of both.
Source- Shankar IAS

Q. Consider the following statements about Edge Effect and Edge Species:

1. Edge effect refers to changes in population or community structures at the boundary of two habitats (ecotone).
2. Edge effect is more prominent in aquatic ecosystems than terrestrial ecosystems.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Correct Answer: (a)
Explanation: Edge effect occurs at the boundary of two habitats (ecotones) where species diversity and population density often increase. It is more prominent in terrestrial ecosystems than in aquatic ones. Hence, only statement 1 is correct.
Source- Shankar IAS

Q. Which term best describes both the physical space an organism occupies and its functional role in the community?

(a) Habitat
(b) Ecological niche
(c) Ecotone
(d) Home range

Correct Answer: (b)
Explanation:

- Ecological niche refers to the organism's role and space in its community.
- Habitat is simply where an organism lives.
- Ecotone is a transition zone between ecosystems.
- Home range is the area an animal uses regularly, often larger than its habitat.

Source- Shankar IAS

Q. Consider the following statements about ecological succession:

1. Ecological succession is the gradual replacement of one community by another over time.
2. The pioneer community is the first to colonize a new area during succession.
3. The climax community is unstable and short-lived.

Which of the statements given above is/are correct?

(a) 1 and 2 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) All 1, 2 and 3

Correct Answer: (a)
Explanation: Statements 1 and 2 are correct. Ecological succession is a gradual, directional process where one biological community replaces another. The pioneer community consists of the first organisms to colonize a new or disturbed area. Statement 3 is incorrect because the climax community is stable, mature, and long-lasting, representing the final stage of succession
Source- Shankar IAS

Q. Lichens, which can initiate ecological succession on bare rock, are a symbiotic association of:

(a) fungi and mosses
(b) algae and fungi
(c) algae and bacteria
(d) bacteria and fungi

Correct Answer: (b)
Explanation: Lichens are a classic example of mutualism, where algae (which perform photosynthesis) and fungi (which provide structure and absorb moisture/nutrients) live together. They are pioneer species that help break down bare rock into soil, initiating primary succession.
Source- Shankar IAS

Q. "Saprotrophs" are best classified under which of the following groups?

(a) Secondary consumers
(b) Decomposers
(c) Producers
(d) Consumers

Correct Answer: (b) Decomposers
Explanation: Saprotrophs like fungi and bacteria break down dead organic matter, making nutrients available for reuse in the ecosystem.
Source- Shankar IAS

Function of Ecosystem

1. With reference to the **Pyramid of Numbers in ecosystems**, consider the following statements:

1. The Pyramid of Numbers in a forest ecosystem is typically inverted due to a small number of large producers.
2. The Pyramid of Numbers always accurately represents the biomass and energy flow at each trophic level.

Which of the statements given above is/are correct?

A. 1 only

B. 2 only
C. Both 1 and 2
D. Neither 1 nor 2

Answer: A. 1 only
Explanation:

- In a forest ecosystem, a few large trees (producers) support a greater number of herbivores (e.g., birds), followed by more parasites and hyperparasites, forming an inverted pyramid of numbers.
- The pyramid of numbers does not account for the biomass or size of organisms at each trophic level, and thus does not always accurately represent the energy or mass flow within an ecosystem.

Source: Environment (NCERT)

2. Consider the following statements:
Assertion (A): In a forest ecosystem, the pyramid of numbers is generally inverted.
Reason (R): A few large-sized trees support a greater number of herbivores, parasites, and hyperparasites at successive trophic levels.
For the Assertion (A) and Reason (R) below, choose the correct alternative from the following.
a) Both A and R are true, and R is the correct explanation of A
b) Both A and R are true, but R is not the correct explanation of A
c) A is true, but R is false
d) A is false, but R is true

Answer: a) Both A and R are true, and R is the correct explanation of A
Explanation:

- In **forest ecosystems**, the **pyramid of numbers is inverted** because **a small number of large-sized producers (trees)** support a **greater number of herbivores (like birds), parasites, and hyperparasites** at higher trophic levels.
- Thus, **both the assertion and reason are correct**, and the **reason appropriately explains** why the pyramid is inverted in forest ecosystems.

Source: Environment (NCERT)

3. Consider the following statements regarding the **Pyramid of Biomass**:
1. The pyramid of biomass in terrestrial ecosystems is generally upright, with maximum biomass at the producer level.
2. In most of the aquatic ecosystems, the pyramid of biomass is inverted.
3. The pyramid of biomass is measured by counting the number of individuals at each trophic level.

How many of the statements above statements is/are **correct**?
a) 1 only
b) 2 only
c) 3 only
d) None

Answer: b) 1 and 2 only
Explanation:

- In terrestrial ecosystems, producers like trees and grasses have maximum biomass, making the pyramid upright.
- In aquatic ecosystems, fast-reproducing phytoplankton have less standing biomass than primary consumers (like zooplankton), leading to an inverted pyramid.

- Pyramid of biomass is based on **dry weight (biomass)**, not the **number of individuals** — that's the pyramid of numbers.

Source: Environment (NCERT)

3. Consider the following statements:
Statement I: The pyramid of energy is always upright, regardless of the ecosystem type.
Statement II: This is because at each trophic level, a portion of energy is lost as heat and only a small fraction is passed on to the next level.
Which one of the following is correct?
a) Both Statement I and Statement II are correct and Statement II is the correct explanation of Statement I
b) Both Statement I and Statement II are correct but Statement II is not the correct explanation of Statement I
c) Statement I is correct but Statement II is incorrect
d) Statement I is incorrect but Statement II is correct

Answer: a) Both Statement I and Statement II are correct and Statement II is the correct explanation of Statement I
Explanation:

- The energy pyramid is always upright in all ecosystems (terrestrial or aquatic) because energy flow follows the laws of thermodynamics.
- Due to losses at each trophic level (mainly as heat through respiration), only a small fraction of energy is transferred upward.
- Since Statement II correctly **explains** Statement I based on energy flow dynamics, **option (a)** is correct.

Source: Environment (NCERT)

4. With reference to **Bioaccumulation and Biomagnification,** consider the following statements:
1. Bioaccumulation refers to the increase in concentration of a pollutant from the environment to the first organism in a food chain.
2. Biomagnification refers to the increase in concentration of a pollutant as it moves up successive trophic levels in a food chain.

Which of the statements given above is/are correct?
A. 1 only
B. 2 only
C. Both 1 and 2
D. Neither 1 nor 2

Answer: C. Both 1 and 2
Explanation:

- Bioaccumulation is the process by which pollutants from the environment accumulate in the first organism of a food chain.
- Biomagnification is the process where the concentration of pollutants increases at each successive trophic level in a food chain (e.g., DDT in birds of prey).

Source: Environment (NCERT)

5. With reference to **types of biotic interactions among species**, consider the following statements:
1. In mutualism, both interacting species derive benefit from the relationship.
2. In amensalism, one species is harmed while the other remains unaffected.
3. Competition results in mutual benefit to both the interacting species.

4. In commensalism, one species benefits and the other remains unaffected.

Which of the statements given above are correct?

A. 1, 2 and 4 only
B. 1, 3 and 4 only
C. 2, 3 and 4 only
D. 1, 2, 3 and 4

Answer: A. 1, 2 and 4 only

Explanation:

- Mutualism involves mutual benefit (+/+) to both species.
- Amensalism is a (–/0) interaction where one species is harmed, and the other is unaffected.
- Competition is a (–/–) interaction; both species are harmed due to resource scarcity.
- Commensalism is a (+/0) interaction where one species benefits, and the other is unaffected.

Source: Environment (NCERT)

6. **Which of the following best describes Amensalism?**

a) One species benefits while the other remains unaffected
b) Both species are harmed due to the interaction
c) One species is harmed while the other remains unaffected
d) Both species benefit from the interaction

Answer: c) One species is harmed while the other remains unaffected

Explanation:

- **Amensalism** is a **(–/0)** interaction where **one species is harmed** and the **other is neither harmed nor benefited**.
- *Example:* A large tree shading a smaller plant, thus stunting its growth; the tree remains unaffected.

Source: Environment (NCERT)

7. Ecological succession is typically characterised by:

1. Increased biological productivity
2. Increased niche specialization
3. Simpler food webs
4. Shift of nutrients from reservoirs to organisms

Select the correct answer using the code below:

(a) 1 and 2 only
(b) 1, 2 and 4 only
(c) 2 and 3 only
(d) 1, 2, 3 and 4

Answer: (b) 1, 2 and 4 only

Explanation:

- The following characteristics are observed during ecological succession:
    - **Productivity rises as more plants grow,** increasing biomass and energy flow in the system.
    - **Organisms begin to occupy more specific ecological roles**, reducing competition and enhancing ecosystem stability.
    - **Succession leads to more complex food webs** with multiple trophic levels and interactions, not simpler ones.

- **Nutrients that were earlier in the soil, rocks, or atmosphere are increasingly cycled** through living organisms (biotic components) as the ecosystem matures.

Source: Environment (NCERT)

8. With reference to the **Carbon Cycle in nature**, consider the following statements:
1. The carbon cycle includes both short-term exchanges through processes like photosynthesis and respiration.
2. Carbon stored in deep ocean sediments and fossil fuels is permanently locked and cannot re-enter the atmosphere.

Which of the statements given above is/are correct?
A. 1 only
B. 2 only
C. Both 1 and 2
D. Neither 1 nor 2

Answer: A. 1 only
Explanation:
- The carbon cycle includes both short-term exchanges through processes like photosynthesis and respiration, and long-term storage in sediments and fossil fuels.
- Carbon stored in sediments and fossil fuels can return to the atmosphere — through erosion, geological uplift, and combustion (burning of fossil fuels), releasing CO_2 back into the atmosphere.

Source: Environment (NCERT)

9. With reference to the **Nitrogen Cycle,** consider the following statements:
1. Atmospheric nitrogen must be converted to usable forms like ammonia or nitrate before plants can absorb it.
2. Denitrifying bacteria help in converting nitrates and nitrites back into elemental nitrogen.
3. Human-induced nitrogen fixation has become a major source of nitrogen pollution.

Which of the statements given above are correct?
A. 1 and 2 only
B. 2 and 3 only
C. 1 and 3 only
D. 1, 2 and 3

Answer: D. 1, 2 and 3
Explanation:
- Plants cannot absorb elemental nitrogen (N_2) directly; it must first be converted into ammonia, nitrates, or nitrites through processes like biological or atmospheric nitrogen fixation.
- Denitrifying bacteria such as Pseudomonas convert nitrates and nitrites into elemental nitrogen (N_2), which escapes into the atmosphere, completing the nitrogen cycle.
- Human activity, especially industrial nitrogen fixation (e.g. fertilizers), has exceeded natural fixation and caused environmental issues like eutrophication, acid rain, and harmful algal blooms.

Source: Environment (NCERT)

10. With reference to **sedimentary and biogeochemical cycles in ecosystems**, consider the following statements:
1. In a sedimentary cycle, elements like phosphorus and calcium do not pass through the atmosphere rather move through erosion.
2. Unlike energy, nutrients are recycled continuously through ecosystems and are not permanently lost.

Which of the statements given above is/are correct?
A. 1 only
B. 2 only
C. Both 1 and 2
D. Neither 1 nor 2

Answer: C. Both 1 and 2
Explanation:

- Sedimentary cycles (e.g., phosphorus, calcium) **do not involve the atmosphere** and primarily occur through **geological processes** like erosion, sedimentation, volcanic activity, and biological processes such as excreta of marine birds.
- Unlike energy (which is lost as heat), **nutrients are recycled indefinitely** within the ecosystem through the **biogeochemical cycles**.

Source: Environment (NCERT)

Terrestrial ecosystem

1. With reference to the Tundra biome, consider the following statements:
1. The alpine tundra exhibits greater diurnal temperature variation than the arctic tundra.
2. Tundra vegetation is characterized by shallow root systems and short stature due to permafrost and low soil fertility.
3. Large-bodied mammals in the tundra are an example of Gloger's Rule.
4. In the southern hemisphere, tundra regions are more extensive than in the northern hemisphere due to larger landmass near the South Pole.

Which of the above statements is/are correct?
(a) 1 and 2 only
(b) 2 and 3 only
(c) 1, 2 and 3 only
(d) 1, 2 and 4 only

Answer: (a) 1 and 2 only
Explanation:

- Alpine tundra, being at high altitudes at various latitudes, experiences strong day-night temperature swings, unlike the more consistently cold Arctic tundra.
- Permafrost prevents deep root penetration, and low nutrients support only low-growing vegetation.
- The large body size and small appendages (ears/tail) are in line with **Bergmann's and Allen's Rules**, not Gloger's Rule, which relates to pigmentation.
- Tundra is **less extensive** in the Southern Hemisphere because of the dominance of oceans around Antarctica.

Source: Environment(N.C.E.R.T)

2. With reference to forest ecosystems, consider the following statements:
1. Boreal forest soils are acidic and nutrient-rich due to slow decomposition and accumulation of organic litter.
2. Temperate evergreen forests are commonly found in regions with warm, wet summers and dry, cold winters.
3. Boreal forests exhibit lower biological productivity and community stability.

Which of the statements given above is/are correct?
(a) 1 and 2 only
(b) 2 only
(c) 3 only
(d) 2 and 3 only

Answer: (c) 3 only
Explanation:

- Boreal soils are **acidic and nutrient-poor**, not nutrient-rich. This is due to leaching and slow decomposition of coniferous litter.
- Temperate evergreen forests occur in **Mediterranean-type climates** with **warm, dry summers** and **cool, moist winters**, not the reverse.
- Boreal forests have low productivity and stability due to harsh climates and poor soil quality.

Source: Environment(N.C.E.R.T)

3. Consider the following statements:
Statement-I: Tropical rainforests exhibit poor soil fertility, yet support rich biodiversity and dense vegetation.
Statement-II: Rapid nutrient cycling in the litter layer compensates for the naturally nutrient-poor red latosol soils.
Which one of the following is correct in respect of the above statements?
(a) Both Statement-I and Statement-II are correct and Statement-II is the correct explanation for Statement-I
(b) Both Statement-I and Statement-II are correct, but Statement-II is not the correct explanation for Statement-I
(c) Statement-I is correct, but Statement-II is incorrect
(d) Statement-I is incorrect, but Statement-II is correct

Answer: (a) Both Statement-I and Statement-II are correct and Statement-II is the correct explanation for Statement-I
Explanation:

- Despite poor soil fertility (due to leaching and red latosols), tropical rainforests support dense and diverse life forms.
- Rapid decomposition and nutrient recycling in the litter layer enable high productivity and compensate for soil poverty.

Source: Environment(N.C.E.R.T)

4. Consider the following statements:
Statement-I: Tropical seasonal forests are adapted to pronounced dry and wet periods, and are typically found in regions like Southeast Asia and Central America.
Statement-II: Subtropical rainforests experience sharp temperature differences between summer and winter and are dominated by deciduous species.
Which one of the following is correct in respect of the above statements?
(a) Both Statement-I and Statement-II are correct and Statement-II is the correct explanation for Statement-I
(b) Both Statement-I and Statement-II are correct, but Statement-II is not the correct explanation for Statement-I
(c) Statement-I is correct, but Statement-II is incorrect
(d) Statement-I is incorrect, but Statement-II is correct
Answer: (c) Statement-I is correct, but Statement-II is incorrect

Explanation:

- Tropical seasonal (monsoon) forests are indeed characterized by distinct dry and wet seasons and occur in regions such as Southeast Asia, Central/South America, and parts of India.
- Subtropical rainforests have **less temperature variation** between seasons and are dominated by **evergreen broad-leaved** species, not deciduous. They also support epiphytes and tropical-type fauna.

Source: Environment(N.C.E.R.T)

5. Consider the following statements:

1. Tropical Wet Evergreen forests are characterized by a multi-tiered structure with distinct layers of shrubs, short trees, and tall evergreen trees.
2. Tropical Wet Evergreen forests are found only in the Western Ghats and northeastern India.
3. Tropical Semi-Evergreen forests contain species from both wet evergreen and moist deciduous forest types.
4. Ferns and orchids are commonly found growing epiphytically in Tropical Wet Evergreen forests.

How many of the above statements are correct?

(a) Only two
(b) Only three
(c) All four
(d) Only one

Answer: (b) Only three

Explanation:

- Wet evergreen forests have a clear vertical stratification (tiered pattern).
- They are **not only** found in the Western Ghats and NE India, but also in **Andaman and Nicobar Islands.**
- Semi-evergreen forests are defined by a mix of **wet evergreen and moist deciduous** species.
- Ferns and orchids are common epiphytes in wet evergreen forests.

Source: Environment(N.C.E.R.T)

6. Match the following forest types with their commonly associated tree species:

Forest Type	**Common Trees**
1. Tropical Moist Deciduous	A. Sal, Teak, Mango, Bamboo, Rosewood
2. Littoral and Swamp Forest	B. Mangrove species with aerial roots, Sundari tree
3. Tropical Dry Deciduous	C. Sal, Acacia varieties, Bamboo

How many of the above pairs are correctly matched?

(a) Only one
(b) Only two
(c) All three
(d) None

Answer: (c) All three

Explanation:

- Moist deciduous forests are dominated by sal, teak, mango, bamboo, and rosewood.

- Littoral and swamp forests are characterized by mangrove species like Sundari and trees with aerial (pneumatophore) roots.
- Dry deciduous forests commonly have sal, acacia species, and bamboo.

Source: Environment(N.C.E.R.T)

7. Which one of the following Indian forest types is being described below?
This forest type is found in the eastern Himalayan region and in parts of the Nilgiri Hills and Kerala. It features a three-layered structure with coniferous trees at the top, deciduous trees like oak in the middle, and rhododendron and champa in the lower layer. It occurs in areas receiving a minimum of 2000 mm annual rainfall.
(a) Tropical Wet Evergreen Forest
(b) Montane Wet Temperate Forest
(c) Tropical Semi-Evergreen Forest
(d) Subtropical Broadleaf Forest

Answer: (b) Montane Wet Temperate Forest
Explanation:
Montane wet temperate forests are primarily found in two distinct regions of India:

- **Northern Region**: These forests occur east of Nepal, extending into Arunachal Pradesh, where they receive a minimum of **2000 mm of annual rainfall**.
- The forest exhibits a clear **three-tier structure**: The **upper canopy** comprises mostly **coniferous species**, the **middle layer** features **deciduous trees** such as **oak** and the **lower layer** is dominated by **rhododendron** and **champa**, along with a rich variety of **ground flora**.
- **Southern Region**: These forests are found in the **Nilgiri Hills** and the **higher elevations of Kerala**.
- Compared to the North, the **southern montane forests are relatively less dense** but still support rhododendrons and diverse undergrowth.

Source: Environment(N.C.E.R.T)

8. Consider the following statements:
1. Moist Alpine Scrub forests are typically found at elevations lower than those of Dry Alpine Scrub forests.
2. Himalayan Dry Temperate Forests are dominated solely by coniferous species without the presence of broad-leaved species.

Which of the statements given above is/are correct?
(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Answer: (a) 1 only
Explanation:

- Moist Alpine Scrub forests occur all along the Himalayas and on higher hills near the Myanmar border. They are found at lower elevations than dry alpine scrub and include rhododendron, birch, mosses, and ferns.
- Himalayan Dry Temperate Forests are **not solely** coniferous; they also include broad-leaved trees like **oak, maple, and ash** along with conifers.

Source: Environment(N.C.E.R.T)

9. Match the following **grassland types in India** with their respective regions:

Grassland Type	Region
1. Semi-arid Zone	A. Ganga alluvial plains of Northern India
2. Dry Sub-humid Zone	B. Peninsular India (excluding Nilgiri Hills)
3. Moist Sub-humid Zone	C. Northern Gujarat, Rajasthan, Western Uttar Pradesh, Delhi, Punjab
4. Humid Montane Regions	D. Assam, Manipur, West Bengal, Himachal Pradesh, J&K, etc.

How many of the above pairs are correctly matched?
(a) Only one
(b) Only two
(c) Only three
(d) All four

Answer: (d) All four
Explanation:

- Semi-arid zone covers North Gujarat, Rajasthan (except Aravallis), W. UP, Delhi, and Punjab.
- Dry sub-humid zone covers **all of peninsular India** except the Nilgiris.
- Moist sub-humid zone includes the **Ganga alluvial plains** with level, low-lying topography.
- Humid montane grasslands found in NE states and Himalayan foothills, shaped by shifting cultivation and grazing.

Source: Environment(N.C.E.R.T)

10. Consider the following statements regarding the **Desert Ecosystem:**
1. Some desert plants perform photosynthesis through their stems due to absence or reduction of leaves.
2. Desert animals conserve water by producing dilute urine and being active primarily during the day.
3. In deserts, perennial plants like creosote bush and cactus are common, while annuals complete their life cycle only during the short rainy season.

Which of the statements given above are correct?
(a) 1 and 2 only
(b) 1 and 3 only
(c) 2 and 3 only
(d) All three

Answer: (b) 1 and 3 only
Explanation:

- Many desert plants reduce water loss by minimizing leaves and conducting photosynthesis through **chlorophyll-rich stems**.
- Desert animals **conserve water by excreting concentrated urine**, not dilute. They are mostly **nocturnal**, not active during the day.
- Creosote bush and cactus are perennial desert plants, while **annuals bloom and reproduce during brief rainy seasons** only.

Source: Environment(N.C.E.R.T)

Aquatic Ecosystem

1. Consider the following statements **regarding aquatic organisms**:

1. Neuston includes both organisms that live on top of the air-water interface and those just beneath it.
2. Nekton comprises mostly microscopic organisms whose movement is governed by water currents.
3. Benthos are organisms that live at the bottom of water bodies and are found in almost all aquatic ecosystems.

How many of the above statements are correct?

A. Only one
B. Only two
C. All three
D. None

Answer: B. Only two

Explanation:

- Neuston includes organisms that live at or near the air-water interface. Some live on top (like water striders), while others live just beneath (like beetles and back-swimmers).
- **T**his describes **plankton**, not nekton. Nekton are strong swimmers, ranging from insects to whales, and are capable of overcoming water currents.
- Benthos refers to organisms that live at the bottom of aquatic ecosystems. They are indeed found in almost all such ecosystems.

Source: Environment (N.C.E.R.T)

2. **Which of the following statements regarding factors limiting productivity in aquatic ecosystems is/are correct?**

1. The photic zone is the upper layer of water where light penetrates and photosynthesis occurs.
2. Dissolved oxygen levels in water decrease with an increase in temperature.
3. Winterkill occurs due to oxygen depletion under ice-covered water bodies where photosynthesis stops.

Select the correct answer using the code given below:

(a) 1 and 2 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1, 2 and 3

Answer: (d) 1, 2 and 3

Explanation:

- The **photic zone** is the **lighted upper layer** of aquatic ecosystems where **photosynthesis** takes place.
- **Temperature rise reduces oxygen solubility**, and also increases decomposer activity, leading to **lower dissolved oxygen** in water.
- **Winterkill** happens when **snow and ice block sunlight**, stopping **photosynthesis**, but **respiration continues**, depleting oxygen and leading to **fish deaths**.

Source: Environment (N.C.E.R.T)

3. **Which of the following statements about oligotrophic and eutrophic lakes is/are correct?**

1. Oligotrophic lakes are deeper, have better water quality, and support more plant and animal species than eutrophic lakes.
2. Eutrophic lakes are characterized by high nutrient flux but low oxygen levels in the bottom layer.

Select the correct answer using the code given below:

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Answer: (c) Both 1 and 2
Explanation:

- Oligotrophic lakes are **deeper**, have **good water quality**, and contain **many** plant and animal species.
- Eutrophic lakes show **high nutrient flux** (due to eutrophication) but **lack oxygen** in the hypolimnion (bottom layer).

Source: Environment (N.C.E.R.T)

4. Consider the following statements:
Statement I: Eutrophication leads to decreased biodiversity and transformation of aquatic ecosystems into terrestrial ones over time.
Statement II: This occurs because algal blooms restrict sunlight, deplete oxygen, and create detritus layers that shallow the water body and allow terrestrial plant colonization.
Codes:
(a) Both Statement I and Statement II are correct, and Statement II is the correct explanation of Statement I
(b) Both Statement I and Statement II are correct, but Statement II is not the correct explanation of Statement I
(c) Statement I is correct, but Statement II is incorrect
(d) Statement I is incorrect, but Statement II is correct

Answer: (a) Both Statement I and Statement II are correct, and Statement II is the correct explanation of Statement I
Explanation:

- Eutrophication causes biodiversity loss and gradual conversion of aquatic habitats into marshlands or terrestrial ecosystems.
- Algal blooms block sunlight, reduce oxygen through decomposition, and promote detritus accumulation, ultimately allowing land plants to take over.

Source: Environment (N.C.E.R.T)

5. **Consider the following statements regarding Red Tide:**
1. Red Tide occurs due to a natural oceanic cycle and is not influenced by human-induced nutrient pollution.
2. Red Tide refers to harmful algal blooms that can discolor water and release toxins harmful to marine and human life.

Which of the above statements is/are correct?
(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Answer: (b) 2 only
Explanation:

- Red tides **can** be influenced by **human-induced factors**, especially **nutrient runoff** from agriculture, sewage, and industry.

- Red tide is a type of **harmful algal bloom** that discolours water and can produce **toxins** affecting marine life and humans.

Source: Environment (N.C.E.R.T)

6. Consider the following statements regarding wetlands as per the Ramsar Convention:

1. Coral reefs and oases are included under the natural category of wetlands.
2. Rice paddies and fishponds are excluded from Ramsar's definition of wetlands as they are artificial.
3. Wetlands are required to hold water throughout the year to be recognised under the Ramsar Convention.

Which of the statements given above is/are correct?

(a) 1 only
(b) 1 and 3 only
(c) 2 and 3 only
(d) 1, 2 and 3

Answer: (a) 1 only
Explanation:

- The Ramsar Convention **includes coral reefs, oases, estuaries, deltas, mangroves, and coastal areas** under the **natural wetlands** category.
- **Rice paddies and fishponds**, though **human-made**, are explicitly **included in Ramsar's definition** of wetlands.
- A wetland **need not hold water year-round**. Even **seasonal or intermittent presence of water** (e.g., during growing seasons) qualifies under Ramsar's broad definition.

Source: Environment (N.C.E.R.T)

7. The following description best refers to which Ramsar site in India?

It is one of South India's largest brackish water wetlands, located on the Coromandel Coast. Characterised by salt marshes, mudflats, and shallow waters, it supports endangered species like the black-headed ibis and greater flamingo. It serves as a migratory stopover along the East Asian–Australasian Flyway and plays a role in flood control and groundwater recharge.

(a) Point Calimere Wildlife Sanctuary
(b) Kazhuveli Sanctuary
(c) Vembanad Kol Wetland
(d) Pichavaram Mangroves

Answer: (b) Kazhuveli Sanctuary
Explanation:

- **Kazhuveli Sanctuary** matches all elements of the description:
  - **Brackish water wetland**
  - **Located on the Coromandel Coast**
  - **Supports endangered waterbirds**
  - **Migratory stopover (East Asian–Australasian Flyway)**
  - **Provides ecosystem services like flood control and groundwater recharge**

Source: Environment (N.C.E.R.T)

8. **Consider the following statements regarding Estuary Ecosystems:**

1. Estuaries are classified solely based on salinity and are unaffected by geomorphological or hydrological factors.

2. Estuaries act as transition zones between riverine and marine ecosystems and serve as natural sediment traps, aiding delta formation.
3. Despite tidal influence, estuaries exhibit minimal wave action making them ideal nurseries for many aquatic species.

How many of the above statements is/are correct?

(a) Only one
(b) Only two
(c) All three
(d) None

Answer: (b) Only two

Explanation:

- Estuaries are **not classified solely on salinity**. They are categorised by **geomorphological features** (like coastal topography) and **water circulation patterns** as well (e.g., fjords, bar-built estuaries, tectonic estuaries, etc.).
- Estuaries **serve as transition zones** and **act as sediment traps**, promoting **delta formation** where river sediments settle as freshwater meets seawater.
- Estuaries typically have **very little wave action** due to their semi-enclosed nature, making them **safe, calm environments ideal for juvenile aquatic species** — hence often referred to as **natural nurseries**.

Source: Environment (N.C.E.R.T)

8. Consider the following statements:

Statement I: Mangrove forests are highly adapted to saline and waterlogged conditions, using specialized structures like pneumatophores and prop roots for respiration and support.

Statement II: These adaptations allow mangroves to thrive in high-altitude inland freshwater wetlands and alpine lakes, far from coastal tidal influence.

Which one of the following is correct?

(a) Both Statement I and Statement II are correct, and Statement II is the correct explanation of Statement I
(b) Both Statement I and Statement II are correct, but Statement II is not the correct explanation of Statement I
(c) Statement I is correct, but Statement II is incorrect
(d) Statement I is incorrect, but Statement II is correct

Answer: (c) Statement I is correct, but Statement II is incorrect

Explanation:

- Mangroves are **highly adapted** to **saline**, **tidal**, and **anaerobic** (oxygen-poor) soil conditions through structures like **pneumatophores**, **prop roots**, and **salt-secreting leaves**.
- Mangroves are **littoral tropical and subtropical coastal plants**, and they **do not grow in inland freshwater or alpine lakes**. Their habitat is limited to **tidal estuaries, creeks, and deltaic mudflats**.

Source: Environment (N.C.E.R.T)

9. Consider the following statements regarding Blue Economy 2.0:

1. Blue Economy 2.0 focuses only on the development of maritime trade and port infrastructure, excluding ecological restoration.
2. The initiative promotes sustainable aquaculture, coastal ecosystem restoration, and a multi-sectoral approach integrating technology and climate resilience.

Which of the above statements is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Answer: (b) 2 only
Explanation:

- Blue Economy 2.0 is **not limited** to trade or port infrastructure. It **includes ecological restoration**, particularly of **mangroves and coral reefs**, along with climate-proofing measures.
- It emphasizes **sustainable aquaculture**, **restoration of coastal ecosystems**, and a **tech-integrated, multi-sectoral strategy** aligned with broader national goals like **Vision 2025** and **Deep Ocean Mission**.

Source: Environment (N.C.E.R.T)

10. **Consider the following statements regarding Environmental Flow (e-Flow):**
1. Environmental flow refers only to the quantity of water required to support aquatic ecosystems.
2. E-flow helps maintain the ecological integrity of river systems and supports livelihoods dependent on them.

Which of the above statements is/are correct?
(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Answer: (b) 2 only
Explanation:

- Environmental flow refers not just to **quantity**, but also includes the **timing and quality** of water flow necessary to sustain **freshwater ecosystems** and **human livelihoods**.
- E-flow plays a crucial role in **maintaining ecological balance**, supporting **biodiversity**, and **ensuring sustainable livelihoods**, especially where water resources are **heavily used or contested**.

Source: Environment (N.C.E.R.T)

ENVIRONMENTAL POLLUTION

1. Which of the following pairs of air pollutants and their sources are correctly matched?
1. Carbon Monoxide (CO) – Incomplete combustion of petrol and diesel
2. Carbon Dioxide (CO_2) – Burning of fossil fuels like coal and oil
3. Chlorofluorocarbons (CFCs) – Emissions from air conditioning and refrigeration units

Select the correct answer using the code given below:
(a) 1 and 2 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1, 2 and 3

Answer: (d) 1, 2 and 3
Explanation:

- **CO** is produced by the **incomplete combustion** of carbon-based fuels like **petrol, diesel, and wood**.

- **CO_2** is emitted primarily from **burning coal, oil, and natural gas** – key human activities causing greenhouse emissions.
- **CFCs** are released from **air conditioners and refrigerators**, especially older models – they damage the ozone layer.

Source: Environment (N.C.E.R.T)

2. **Consider the following statements regarding Sulphur Dioxide (SO_2) emissions:**

1. Ships and locomotives using fossil fuels are the primary sources of SO_2 emissions globally.
2. Extraction and processing of metal ores release significant amounts of SO_2.
3. Fossil fuel-based power plants are the largest contributors to SO_2 emissions, as per the Environmental Protection Agency (EPA).

Which of the above statements is/are correct?

(a) 1 and 2 only
(b) 2 and 3 only
(c) 3 only
(d) 1, 2 and 3

Answer: (b) 2 and 3 only

Explanation:

- While ships and locomotives do emit SO_2, they are **not** the *primary* global source.
- Smelting and metal extraction processes emit SO_2, though they are not the largest source.
- According to the **EPA**, **fossil fuel-based power plants** (especially coal-fired) are the **largest** source of SO_2 emissions.

Source: Environment (N.C.E.R.T)

3. **Which of the following substances are commonly used in cloud seeding to induce artificial rainfall for air pollution mitigation?**

(a) Silver iodide and potassium iodide
(b) Silver nitrate and potassium iodide
(c) Silver iodide and potassium nitrate
(d) Silver nitrate and potassium chloride

Answer: (a) Silver iodide and potassium iodide

Explanation:

- **Cloud seeding** is a weather modification technique used to stimulate rainfall by introducing certain substances into clouds to encourage the formation of raindrops.
- The **most commonly used chemicals** are **Silver Iodide (AgI)** and **Potassium Iodide (KI)** because their crystalline structure closely resembles that of natural ice. This allows them to act as **nuclei** around which moisture condenses, forming raindrops.
- This method is also used for **reducing air pollution** by washing out suspended particulate matter from the atmosphere.
- **Other chemicals** like dry ice (solid CO_2) or liquid propane may also be used, but **silver iodide and potassium iodide remain the most widely preferred** due to their high efficiency in ice crystal formation.

Source: Environment (N.C.E.R.T)

4. Consider the following statements regarding Biochar:

1. Biochar is produced by heating agricultural and organic waste at high temperatures in the presence of oxygen.
2. Biochar application in agriculture can help reduce nitrous oxide emissions and improve water retention in nutrient-poor soils.
3. In the construction sector, biochar can serve as a carbon sink by being integrated into building materials.

Which of the above statements is/are correct?

(a) 2 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1, 2 and 3

Answer: (b) 2 and 3 only

Explanation:

- Biochar is produced by **heating crop residue or organic waste at 400–600°C** in a **low-oxygen (pyrolysis) environment**, *not in the presence of oxygen*.
- Applying biochar in agriculture improves **water retention**, especially in **semi-arid and nutrient-poor soils**, and **reduces nitrous oxide (N_2O) emissions** by **30–50%**.
- Biochar can be **integrated into building materials** to create a **low-carbon construction alternative**, thus serving as a **long-term carbon sink**.

Source: Environment (N.C.E.R.T)

5. Hydrofluorocarbons (HFCs) are used in which of the following applications?

1. As propellants in aerosol products
2. As blowing agents in foam manufacturing
3. As fire suppression agents
4. As refrigerants and lubricants in cooling systems

How many of the above applications involve the use of HFCs?

(a) Only one
(b) Only two
(c) Only three
(d) All four

Answer: (d) All four

Explanation:

- **Aerosols** –HFCs are used as propellants in aerosol sprays like deodorants, medical inhalers, etc.
- **Foam agents** –HFCs act as blowing agents in the production of insulating foams.
- **Fire retardants** – Some HFCs are used in fire suppression systems (e.g., HFC-227ea).
- **Lubricants** –HFCs are used in refrigeration and air-conditioning systems, where they function alongside specific lubricants to ensure compressor efficiency.

Source: Environment (N.C.E.R.T)

6. Consider the following statements regarding Mercury Pollution:

1. Mercury emitted into the atmosphere can travel long distances across continents before settling back to the earth.
2. Methylmercury is primarily formed in the human body through digestion of elemental mercury.
3. Artisanal and small-scale gold mining is the largest source of anthropogenic mercury emissions globally.
4. Natural re-emission of mercury from land and water surfaces contributes to the current levels of atmospheric mercury.

How many of the above statements are correct?

(a) Only one
(b) Only two
(c) Only three
(d) All four

Answer: (c) Only three
Explanation:

- Mercury can **travel thousands of miles** in the atmosphere before being deposited via rainfall or as dry particles.
- **Methylmercury** is formed in the **environment**, especially in **aquatic systems** by the action of **microorganisms**, *not* in the human body.
- According to the **UNEP Global Mercury Assessment 2018**, **artisanal and small-scale gold mining (ASGM)** contributes the **largest share (37.7%)** of human-caused emissions.
- Mercury previously deposited can be **re-emitted** from land, water, and other surfaces, adding to current atmospheric levels.

Source: Environment (N.C.E.R.T)

7. Consider the following statements regarding plastic pellets (nurdles):

1. Nurdles are microplastic raw materials used in plastic manufacturing processes such as moulding and extrusion.
2. Nurdle pollution primarily results from public littering along coastlines.

Which of the above statements is/are correct?
(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Answer: (a) 1 only
Explanation:

- Nurdles are pre-formed plastic pellets, commonly made of polyethylene, polypropylene, and other plastics. They serve as raw materials in plastic manufacturing, including moulding and extrusion processes.
- Nurdle pollution is not caused by citizen littering but results from leaks during production, transport, storage, or recycling of plastic pellets.

Source: Environment (N.C.E.R.T)

8. Which of the following are classified as secondary air pollutants?

1. Tropospheric Ozone (O_3)
2. Sulfur dioxide (SO_2)
3. Ammonium Sulphate
4. Photochemical Smog
5. Carbon monoxide (CO)

Select the correct answer using the code given below:
(a) 1, 2 and 3 only
(b) 1, 3 and 4 only
(c) 2, 4 and 5 only
(d) 1, 2, 3 and 5 only

Answer: (b) 1, 3 and 4 only
Explanation:

- **Tropospheric Ozone (O_3)** –*Secondary pollutant*, formed by reactions involving NOx and VOCs in the presence of sunlight.
- **Sulfur Dioxide (SO_2)** –*Primary pollutant*, emitted directly from sources like coal combustion.
- **Ammonium Sulphate** – *Secondary pollutant*, formed from SO_2 and NH_3 reacting in the atmosphere.
- **Photochemical Smog** – *Secondary pollutant*, formed through sunlight-driven reactions involving NOx and VOCs.
- **Carbon Monoxide (CO)** – *Primary pollutant*, emitted directly from incomplete combustion.

Source: Environment (N.C.E.R.T)

9. **According to the WHO Air Quality Guidelines and general understanding of air pollutants, consider the following statements:**
1. The 24-hour mean concentration of PM2.5 should not exceed 15 µg/m^3, and the annual mean should not exceed 5 µg/m^3.
2. The highest levels of ozone pollution are generally observed during cloudy and rainy weather conditions.
3. Excessive ozone in the air can act as a trigger for asthma attacks.

Which of the above statements are correct?
(a) 1 and 3 only
(b) 2 and 3 only
(c) 1 and 2 only
(d) 1, 2 and 3

Answer: (a) 1 and 3 only
Explanation:

- As per the **WHO Air Quality Guidelines 2021:**
  - **The annual mean PM2.5 limit is 5 µg/m^3**
  - **The 24-hour mean should not exceed 15 µg/m^3**
- Ozone pollution peaks during hot, sunny days, especially in summer. It is formed by **photochemical reactions** involving sunlight, not during cloudy or rainy weather.
- **Ozone is a known respiratory irritant** and can worsen asthma or trigger asthmatic episodes, especially in sensitive individuals**.**

Source: Environment (N.C.E.R.T)

10. Consider the following statements regarding Flue Gas Desulphurisation (FGD):
1. FGD is a pollution control technology used to remove sulfur dioxide from flue gases emitted primarily by coal-based thermal power plants.
2. Flue gas contains only carbon dioxide and water vapour and is considered non-polluting.
3. Sulphur dioxide in flue gas contributes to both particulate matter pollution and respiratory illnesses.

Which of the above statements is/are correct?
(a) 1 and 2 only
(b) 1 and 3 only
(c) 2 and 3 only
(d) 1, 2 and 3

Answer: (b) 1 and 3 only
Explanation:

- **FGD** is indeed used to remove **sulfur dioxide (SO_2)** from flue gases, especially in **coal-based thermal power plants (TPPs)** and **waste incineration units**.
- Flue gas contains not just **CO_2 and water vapour**, but also **CO, SO_2, NOx**, **particulate matter**, and **trace pollutants**, many of which are harmful. So it is *not* non-polluting.
- **SO_2** in the atmosphere forms **sulphate aerosols**, which worsen **PM pollution** and cause **respiratory illnesses**.

Source: Environment (N.C.E.R.T)

Environmental Pollution - 2

1. Consider the following statements regarding **Indoor Air Pollution**:

1. In rural areas, burning of traditional fuels like firewood, charcoal, and cow dung is a major source of indoor air pollution.
2. Radon is a naturally occurring gas from soil, which is primarily emitted from carpets and wooden furniture.
3. Formaldehyde is mainly released from carpets, particle boards, and insulation foam.

How many of the statements given above are correct?

(a) Only one
(b) Only two
(c) All three
(d) None

Answer: (b) Only two

Explanation:

- **R**ural indoor pollution is mostly due to biofuels like firewood, charcoal, and cow dung burned in enclosed kitchens.
- Radon is **not** emitted from carpets or furniture — it is a naturally occurring gas released from soil and can accumulate indoors due to poor ventilation.
- Formaldehyde mainly comes from carpets, particle boards, and insulation foam.

Source: Environment (N.C.E.R.T)

2. **Consider the following statements regarding *fly ash*, a byproduct from coal-based thermal power plants:**

1. It can be utilised in the manufacturing of building materials such as bricks.
2. It can partially replace Portland cement in concrete production.
3. It consists only of silicon dioxide and calcium oxide and is free from toxic substances.

Which of the statements given above is/are correct?

(a) 1 and 2 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1, 2 and 3

Answer: (a) 1 and 2 only

Explanation:

- Fly ash is commonly used in making bricks, blocks, and tiles due to its pozzolanic properties.
- It can replace a portion of Portland cement in concrete, improving workability and durability.

- Fly ash is not made up of only silicon dioxide (SiO_2) and calcium oxide (CaO); it also contains other oxides and can have toxic elements like arsenic, lead, and mercury, depending on the coal source and combustion process.

Source: Environment (N.C.E.R.T)

3. With reference to the **National Ambient Air Quality Standards (NAAQS)** in India, consider the following statements:

1. They are established by the Central Pollution Control Board (CPCB) under the Air (Prevention and Control of Pollution) Act.
2. $PM_{2.5}$ and PM_{10} are among the pollutants covered under NAAQS.
3. The National Air Monitoring Programme (NAMP) monitors only sulphur dioxide, nitrogen dioxide, and carbon monoxide levels.

How many of the statements given above are correct?

(a) Only one
(b) Only two
(c) All three
(d) None

Answer: (b) Only two

Explanation:

- The CPCB is empowered under the Air (Prevention and Control of Pollution) Act to set air quality standards, including NAAQS.
- NAAQS covers particulate matter with a size less than 2.5 microns ($PM_{2.5}$) and less than 10 microns (PM_{10}), along with other pollutants like SO_2, NO_2, CO, lead, arsenic, etc.
- The NAMP monitors a **range** of pollutants, including SO_2, NO_2, SPM, RSPM, and more — not just SO_2, NO_2, and CO.

Source: Environment (N.C.E.R.T)

4. Consider the following statements regarding the **Air Quality Index (AQI)** in India:

1. $PM_{2.5}$, PM_{10}, nitrogen dioxide, ozone, and carbon monoxide are among the pollutants measured under AQI.
2. The 'Poor' category in India's AQI corresponds to an index value range of 201300.

Which of the statements given above is/are **correct**?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Answer: (c) Both 1 and 2

Explanation:

- AQI in India measures multiple pollutants, including $PM_{2.5}$, PM_{10}, NO_2, O_3, CO, and others like SO_2, NH_3, Pb, and benzene.
- The 'Poor' category covers AQI values from **201 to 300**, indicating breathing discomfort on prolonged exposure.

Source: Environment (N.C.E.R.T)

5. With reference to the *"BhuNeer"* portal, recently launched by the Government of India, consider the following statements:

1. It has been developed by the Central Ground Water Authority in collaboration with the National Informatics Centre.
2. It replaces the earlier NOCAP system for groundwater regulation.
3. It issues No Objection Certificates (NOCs) integrated with QR codes.

Which of the statements given above is/are **correct**?
(a) 1 and 2 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1, 2 and 3

Answer: (d) 1, 2 and 3
Explanation:

- The "BhuNeer" portal, launched during India Water Week 2024, is developed by CGWA and NIC to regulate and manage groundwater resources.
- It replaces the NOCAP system, offers PAN-based single ID, and issues QRcoded NOCs to enhance transparency and efficiency.

Source: Environment (N.C.E.R.T)

6. Consider the following statements regarding the **World Air Quality Report 2024**:
1. The report is published annually by the Swiss organisation IQAir.
2. In 2024, India ranked as the third most polluted country in the world.
3. Byrnihat was the most polluted city in the world in 2024.

Which of the statements given above is/are **correct**?
(a) 1 and 2 only
(b) 2 and 3 only
(c) 3 only
(d) 1 and 3 only

Answer: (d) 1 and 3 only
Explanation:

- The World Air Quality Report is published every year by **IQAir**, a Swiss organisation.
- In 2024, India ranked **fifth**, not third. (It was third in 2023.)
- Byrnihat (on the Assam-Meghalaya border) was recorded as the most polluted city globally in 2024.

Source: Environment (N.C.E.R.T)

7. The *Keeling Curve* is related to which of the following?
(a) Concentration of carbon dioxide in Earth's atmosphere
(b) Concentration of lead and nitrates in groundwater
(c) Increase in tropospheric ozone concentration
(d) Variation in global mean sea level

Answer: (a) Concentration of carbon dioxide in Earth's atmosphere
Explanation:

- The **Keeling Curve** is a graph showing the concentration of **CO_2 in Earth's atmosphere** since 1958, based on continuous measurements taken at the **Mauna Loa Observatory** in Hawaii by Dr. Charles David Keeling.
- It is considered a reliable measure of CO_2 in the middle troposphere and has been instrumental in raising awareness about **global warming** and climate change.

- The curve shows both a long-term upward trend (due to fossil fuel burning) and seasonal fluctuations (due to plant growth and decay cycles).

8. Consider the following statements regarding **Hydroxymethanesulphonate (HMS)**:
1. HMS is a secondary aerosol formed through reactions between formaldehyde and sulfur dioxide in the presence of liquid water within aerosol particles.
2. HMS formation is favoured in warm, humid tropical climates where high temperatures accelerate ammonium volatilisation.
3. Increased $PM_{2.5}$ levels associated with HMS can affect both air quality and climate processes.

How many of the statements given above are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

Answer: (b) Only two
Explanation:
- HMS forms via reactions between **formaldehyde and SO_2** in liquid water within aerosols, even when water is supercooled.
- HMS formation is **not** favoured in warm tropical climates — it is more likely in **cold conditions** where ammonium volatilisation is reduced, stabilising sulfite ions.
- HMS contributes to **$PM_{2.5}$ pollution**, impacting **air quality**, influencing **cloud formation**, and affecting **climate radiative properties**.

9. Which of the following statements regarding **water quality indicators** are **correct**?
1. Dissolved Oxygen (DO) content below 4.0 mg/L is considered highly polluted and unsuitable for aquatic life.
2. Biochemical Oxygen Demand (BOD) measures the amount of oxygen required to oxidise both biodegradable and nonbiodegradable matter in water.
3. Chemical Oxygen Demand (COD) is considered a better measure than BOD for total pollution load, as it accounts for both biodegradable and nonbiodegradable organic matter.
4. Higher BOD values indicate higher dissolved oxygen content in water.

Select the answer using the code given below:
(a) 1 and 3 only
(b) 1, 2 and 3 only
(c) 2, 3 and 4 only
(d) 1 and 4 only

Answer: (a) 1 and 3 only
Explanation:
- DO below 4.0 mg/L is considered highly polluted and harmful for aquatic life.
- BOD measures oxygen needed to decompose **biodegradable** matter only, not nonbiodegradable matter.
- COD includes oxygen demand for both biodegradable and nonbiodegradable organic matter, making it a more comprehensive pollution measure.
- Higher BOD means **lower** DO content, as more oxygen is consumed by decomposition.

Source: Environment (N.C.E.R.T)

10. Which of the following are forms of dissolved nitrogen found in groundwater?

1. Nitrate (NO_3^-)
2. Ammonium (NH_4^+)
3. Ammonia (NH_3)
4. Nitrite (NO_2^-)
5. Nitrogen dioxide (NO_2)

Select the correct answer using the code given below:

(a) 1, 2 and 3 only
(b) 1, 2, 3 and 4 only
(c) 1, 3, 4 and 5 only
(d) 1, 2, 3, 4 and 5
(e) 2, 3 and 5 only

Answer: (b) 1, 2, 3 and 4

Explanation:

- Forms of dissolved nitrogen in groundwater include **nitrate (NO_3^-), ammonium (NH_4^+), ammonia (NH_3), nitrite (NO_2^-), nitrogen gas (N_2), nitrous oxide (N_2O), and organic nitrogen.**
- **Nitrogen dioxide (NO_2)** is a gaseous air pollutant, **not** typically a dissolved nitrogen form in groundwater.

Source: Environment (N.C.E.R.T)