



INSIGHTSIAS
SIMPLIFYING IAS EXAM PREPARATION

INSTA STATIC QUIZ

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INSIGHTSIAS
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PREPARATION

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1. Economy

- 1) In India, most freight traffic is presently handled by the
- Roadways
 - Railways
 - Inland waterways
 - Airways

Solution: a)

Network expansion in Railways has lagged behind capacity addition in the domestic roads sector. So, significant freight share has gone to the roadways, instead of more efficient Railways.

- 2) Consider the following statements regarding Dedicated Freight Corridor.
- Dedicated Freight Corridor Corporation of India Limited (DFCCIL) run by the Ministry of Railways undertakes the operation of the "Dedicated Freight Corridors" (DFC).
 - The Western DFC is lengthier than the Eastern DFC.
 - Western Dedicated Freight Corridor (WDFC) runs from Uttar Pradesh to Mumbai.

Which of the above statements is/are correct?

- 1, 2
- 1, 3
- 2, 3
- 1, 2, 3

Solution: b)

The Dedicated Freight Corridor Corporation of India Limited (DFCCIL) recently announced that Indian Railways will be running its freight trains on 40% of the dedicated freight corridor (DFC) by next year. The DFC project is one of the Indian Railways' largest infrastructure projects. The **1,504 kms long Western DFC** is from J N Port in Mumbai, Maharashtra to Dadri in the state of Uttar Pradesh and the **1,856 kms long Eastern DFC** is from Sahnewal near Ludhiana in Punjab to Dankuni in the state of West Bengal.

[Source](#)

- 3) Ministry of Mines is responsible for
- Survey and exploration of all minerals
 - Mining and metallurgy of non-ferrous metals
 - Administration and management of Geological Survey of India

Select the correct answer code:

- 1, 2
- 1, 3
- 2, 3
- 1, 2, 3

Solution: c)

Ministry of Mines is responsible for survey and exploration of all minerals, other than natural gas, petroleum and atomic minerals; for mining and metallurgy of non-ferrous metals like aluminium, copper, zinc, lead, gold, nickel etc. and for administration of the Mines and Minerals (Regulation and Development) Act, 1957 in respect of all mines and minerals other than coal, natural gas and petroleum.

A list of subjects allocated to the Ministry of Mines, Attached Office, Subordinate Office, Public Sector Undertakings and Research Institutions under the administrative control of Ministry of Mines are given below:-

(a) Legislation for regulation of mines and development of minerals within the territory of India, including mines and minerals underlying the ocean within the territorial waters or the continental shelf, or the exclusive economic zone and other maritime zones of India as may be specified, from time to time by or under any law made by Parliament.

(b) Regulation of mines and development of minerals other than Coal, Lignite and Sand for stowing and any other mineral declared as prescribed substances for the purpose of the Atomic Energy Act, 1962 (33 of 1962) under the control of the Union as declared by law, including questions concerning regulation and development of minerals in various States and the matters connected therewith or incidental thereto.

- All other metals and minerals not specifically allotted to any other Ministry/Department, such as Aluminium, Zinc, Copper, Gold, Diamonds, Lead and Nickel.
- Planning, development and Control of, and assistance to, all industries dealt with by the Ministry.
- Administration and Management of Geological Survey of India.
- Administration and Management of Indian Bureau of Mines
- Metallurgical Grade Silicon.

Source

- 4) The term "Sub Urbanisation" refers to
- a) Movement of population from urban areas to rural areas
 - b) Movement of people from central urban area to satellite communities
 - c) Population shift from rural areas into suburbs
 - d) Reduction of population in lower tier cities

Solution: b)

Suburbanization is a population shift from central urban areas into suburbs, resulting in the formation of (sub)urban sprawl. As a consequence of the movement of households and businesses out of the city centers, low-density, peripheral urban areas grow. (Sub-urbanization is inversely related to urbanization, which denotes a population shift from rural areas into urban centres.)

Many residents of metropolitan regions work within the central urban area, and choose to live in satellite communities called suburbs and commute to work via automobile or mass transit.

- 5) Open Acreage Licensing, often seen in news, is related to
- a) Hydrocarbon exploration
 - b) Railways
 - c) Mining of Iron ore
 - d) Land Acquisition

Solution: a)

What is Open Acreage Licensing Policy (OALP)?

The OALP, a critical part of the Hydrocarbon Exploration and Licensing Policy, provides uniform licences for exploration and production of all forms of hydrocarbons, enabling contractors to explore conventional as well as unconventional oil and gas resources.

Fields are offered under a *revenue-sharing model* and throw up marketing and pricing freedom for crude oil and natural gas produced.

- 6) There will be progressively lesser difference between Gross Domestic Product (GDP) and Net Domestic Product (NDP)
- a) If technological growth is slow in a nation and capital depreciation is high
 - b) If technological growth is high in a nation and capital depreciation is low
 - c) If technological growth is slow in a nation and capital depreciation is high
 - d) If technological growth is high in a nation and capital depreciation is high

Solution: b)

NDP is essentially the GDP discounted for the total value of the 'wear and tear' (depreciation) that happened in the assets while the goods and services were being produced. It means GDP minus depreciation is NDP. Depreciation is caused due to wear and tear of capital or due to poor technological growth that fails to cut down levels of depreciation.

Lower the depreciation, lesser will be the difference between GDP and NDP. This is achieved best in the case of option (b).

7) The market value of intermediary goods is deducted from the calculation of Gross Domestic Product (GDP) to

1. Avoid double counting of goods
2. Include the value of depreciation in the capital stock

Which of the above statements is/are correct?

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

Solution: a)

An intermediate good is a product utilized to produce a final good or finished product. These goods are sold between industries for resale or for the production of other goods.

Since GDP (gross domestic product) is a measurement of the market value of final goods, using intermediate goods in the calculation would result in goods being counted twice, and thus the figure would be inaccurate.

Depreciation is deducted separately. Moreover, it forms part of the calculation of NDP, not GDP.

8) "Rent Seeking activities" by business firms often involve

- a) Strategizing to cut down rental costs of factors of production
- b) Lobbying the government to change rules for making business profitable
- c) Speculating in financial markets to gain competitive advantage
- d) Seeking investment from multiple avenues to manage cash burden

Solution: b)

Trying to get the government to change the rules so as to make one's business more profitable rather than spending time and money not on the production of real goods and services is called as rent seeking.

It is like cutting a bigger slice of the cake rather than making the cake bigger trying to make more money without producing more for customers.

Rent-seeking and crony capitalism are closely related. These erode an economy's competitiveness, leads to concentration of wealth and inequity.

9) With reference to the 'Cash Management Bills', consider the following statements:

1. They are the long term bills
2. The bills are issued by the RBI on behalf of the government
3. They are eligible as SLR securities for Banks.

Which of the above statements is/are correct?

- a) 1 only
- b) 2, 3
- c) 1, 3
- d) 1, 2, 3

Solution: b)

Cash Management Bills (CMBs) are **short term bills issued by central government to meet its immediate cash needs**.

The bills are **issued by the RBI on behalf of the government**. Hence the **CMBs are short-term money market instruments that help the government to meet its temporary cash flow mismatches**.

CMBs are **eligible as SLR securities**. Investment in CMBs is also recognized as an eligible investment in Government securities by banks for SLR purpose under Section 24 of the Banking Regulation Act, 1949.

10) With reference to capital markets, consider the following statements:

1. Capital market deals in financial instruments and commodities that are long-term securities.
2. Secondary Market exclusively deals with the issue of new securities.

Which of the above statements is/are correct?

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

Solution: a)

Capital market **deals in financial instruments and commodities that are long-term securities**. They have a maturity of at least more than one year.

The most important type of capital market is the **primary market**. It is what we call the new issue market. It **exclusively deals with the issue of new securities**, i.e. securities that are issued to investors for the very first time.

After the primary market is **the secondary capital market. This is more commonly known as the stock market or the stock exchange**. Here the securities (shares, debentures, bonds, bills etc) are bought and sold by the investors.

The main point of difference between the primary and the secondary market is that in the primary market only new securities were issued, whereas in the secondary market the trading is for already existing securities. **There is no fresh issue in the secondary market.**

11) Why 'Indirect Tax' is considered as regressive taxation

- a) They are not charged the same for all income groups
- b) They are charged at higher rates than direct taxes
- c) They are charged at lower rates than direct taxes
- d) None of the above

Solution: d)

Indirect taxes make the distribution of income more unequal because of their regressive effects. The poor will get taxed a higher proportion of their income than the rich, making it a regressive tax.

Higher indirect taxes can cause cost-push inflation which can lead to a rise in inflation expectations.

12) Which of the following statements best describes 'Hard Currency'?

- a) It is a currency used during the balance of payment crisis.
- b) It is a currency having wide circulation in international market.
- c) It is a currency widely accepted around the world as a form of payment for goods and services.
- d) None of the above are correct.

Solution: c)

HARD CURRENCY refers to money that is issued by a nation that is seen as politically and economically stable. HARD CURRENCIES are widely accepted around the world as a form of payment for goods and services and may be preferred over the domestic CURRENCY.

13) A 'wilful default' would be deemed to have occurred in which of the following events.

1. Defaulting in meeting its repayment obligations to the lender even when it has the capacity to repay.
2. Not utilising the finance from the lender for the specific purposes for which finance was availed and diverting the funds for other purposes.
3. Disposed off the movable fixed assets or immovable property given for the purpose of securing a term loan without the knowledge of the bank.

Which of the above statements is/are correct?

- a) 1 only
- b) 1, 2
- c) 1, 3
- d) 1, 2, 3

Solution: d)

Simply, default means non-payment of a loan availed by a borrower. A willful defaulter is an entity or a person that has not paid the loan back despite the ability to repay it.

A 'wilful default' would be deemed to have occurred if any of the following events is noted:

- (a) The unit has **defaulted in meeting its payment / repayment obligations to the lender even when it has the capacity to repay.**
- (b) The unit has defaulted in meeting its payment / repayment obligations to the lender and has **not utilised the finance from the lender for the specific purposes for which finance was availed of but has diverted the funds for other purposes.**
- (c) The unit has defaulted in meeting its payment / repayment obligations to the lender and has **siphoned off the funds so that the funds have not been utilised for the specific purpose for which finance was availed of, nor are the funds available with the unit in the form of other assets.**
- (d) The unit has defaulted in meeting its payment / repayment obligations to the lender and has also **disposed off or removed the movable fixed assets or immovable property given for the purpose of securing a term loan without the knowledge of the bank / lender.**

14) Consider the following statements regarding Devaluation of currency.

1. Devaluation decreases the prices of imports purchased in the home country.
2. Devaluation can be employed to eliminate balance-of-payments deficits.
3. Devaluation will not be effective if the balance-of-payments disequilibrium is a result of basic

structural flaws in a country's economy.

Which of the above statements is/are correct?

- a) 1, 2
- b) 1, 3
- c) 2, 3
- d) 1, 2, 3

Solution: c)

Devaluation, reduction in the exchange value of a country's monetary unit in terms of gold, silver, or foreign monetary units. Devaluation is employed to eliminate persistent balance-of-payments deficits. For example, a devaluation of currency will decrease prices of the home country's exports that are purchased in the import country's currency. While making the exported goods cheaper for other countries, devaluation also increases the prices of imports purchased in the home country. Devaluation will not be effective if the balance-of-payments disequilibrium is a result of basic structural flaws in a country's economy.

15) Reserve Tranche is the economic term used in the context with

- a) World Bank
- b) World Trade Organisation
- c) Reserve Bank of India
- d) International Monetary Fund

Solution: d)

A reserve tranche is a portion of the required quota of currency each member country must provide to the International Monetary Fund (IMF) that can be utilized for its own purposes—without a service fee or economic reform conditions.

16) Which of the following were the goals of the planning system in India between 1950-1990?

1. Export promotion
2. Industrialization
3. Self-reliance
4. Equity

Select the correct answer code:

- a) 1, 2, 3, 4
- b) 2, 3, 4
- c) 1, 3, 4
- d) 1, 2, 4

Solution: a)

All the above are the goals of the planning system in India between 1950-1990.

17) Consider the following statements regarding Development banks.

1. Development banks are financial institutions that provide only short-term credit for capital-intensive investments.
2. Such banks often lend at low and stable rates of interest with considerable social benefits.
3. Development banks are often supported by governments in the form of tax incentives for private sector banks and financial institutions to invest in securities issued by development banks.
4. IDBI was set up as an apex body of all development finance institutions.

Which of the above statements is/are correct?

- a) 3, 4
- b) 1, 2, 3
- c) 2, 3, 4
- d) 1, 2, 3, 4

Solution: c)

Development banks are financial institutions that provide **long-term credit for capital-intensive investments spread over a long period** and yielding low rates of return, such as urban infrastructure, mining and heavy industry, and irrigation systems.

Development banks are also known as term-lending institutions or development finance institutions.

Features of development banks:

1. Such banks often lend at **low and stable rates of interest** to promote long-term investments with considerable social benefits.
2. Fund generation: To lend for long term, development banks require correspondingly long-term sources of finance, usually obtained by issuing **long-dated securities in capital market, subscribed by long-term savings institutions such as pension and life insurance funds and post office deposits**.
3. Support by the government: Considering the social benefits of such investments, and uncertainties associated with them, development banks are often supported by governments or international institutions.
4. Such support can be in the form of **tax incentives and administrative mandates for private sector banks and financial institutions to invest in securities issued by development banks**.

In 1955, the World Bank prompted the Industrial Credit and Investment Corporation of India (ICICI) — the parent of the largest private commercial bank in India today, ICICI Bank — as a collaborative effort between the government with majority equity holding and India's leading industrialists with nominal equity ownership to

finance modern and relatively large private corporate enterprises. In 1964, IDBI was set up as an apex body of all development finance institutions.

18) Consider the following statements regarding External debt of India.

1. The debtors can be the Union government, state governments, corporations or citizens of India.
2. Short-term borrowings dominate India's external debt.
3. The largest share of India's external debt is held in Indian rupees.

Which of the above statements is/are incorrect?

- a) 1, 2
- b) 1, 3
- c) 2, 3
- d) 3 only

Solution: c)

The external debt of India is the total debt the country owes to foreign creditors. The debtors can be the Union government, state governments, corporations or citizens of India. The debt includes money owed to private commercial banks, foreign governments, or international financial institutions such as the International Monetary Fund (IMF) and World Bank.

Long-term borrowings (more than a year to maturity) dominate India's external debt.

India's external debt is held in multiple currencies, **the largest of which is the United States dollar**. The rest of the debt is held in Indian rupees, special drawing rights, Japanese yen, Euros and other currencies.

19) Aggregate demand is an important economic indicator. It can be increased by

1. More investments
2. Higher Taxation
3. Increasing bank rate by RBI

Select the correct answer code:

- a) 1 only
- b) 1, 2
- c) 1, 3
- d) 2, 3

Solution: a)

Aggregate demand is the total demand for final goods and services in an economy at a given time.

Investment creates infrastructure, generates demand for raw material, labor, provides employment and adds to the productive capacity of the economy. It is one of the most potent factors in increasing Aggregate demand (AD).

The government has some ability to impact AD. It can give fiscal stimulus or increase taxes in order to influence how consumers spend or save. **An expansionary fiscal policy (higher spending, lower taxes) causes AD to increase, while a contractionary monetary policy (e.g. high bank rates) causes AD to decrease.**

20) 'Economic efficiency' as used by economists and policymakers is related to which of the following?

1. Equal allocation of goods and services to all consumers and corporations.
2. Resource efficient production

Select the correct answer code:

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

Solution: b)

Economic efficiency is when goods and services are distributed according to consumer preferences and needs of corporations. It is when the maximum number of goods and services are produced with a given amount of inputs.

21) Consider the following statements regarding Socialist society.

1. In a socialist society the government decides what goods are to be produced in accordance with the needs of society.
2. The desires of individual consumers are given much importance.
3. The goods produced are distributed among people on the basis of Purchasing Power.

Which of the above statements is/are incorrect?

- a) 2 only
- b) 1, 2
- c) 2, 3
- d) 1, 3

Solution: c)

In a capitalist society the goods produced are distributed among people not on the basis of what people need but on the basis of Purchasing Power—the ability to buy goods and services.

In a socialist society the government decides what goods are to be produced in accordance with the needs of society. It is assumed that the government knows what is good for the people of the country and so the desires of individual consumers are not given much importance. The government decides how goods are to be produced and how they should be distributed. In principle, distribution under socialism is supposed to be based on what people need and not on what they can afford to purchase.

22) The primary motive of the colonial government behind the policy of systematically deindustrialising India was

1. To make India a mere exporter of important raw materials for the modern industries in Britain.
2. To turn India into a sprawling market for the finished products.

Select the correct answer code:

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

Solution: c)

The primary motive of the colonial government behind this policy of systematically deindustrialising India was two-fold. The intention was, first, to reduce India to the status of a mere exporter of important raw materials for the upcoming modern industries in Britain and, second, to turn India into a sprawling market for the finished products of those industries so that their continued expansion could be ensured to the maximum advantage of their home country — Britain.

23) Total Factor Productivity (TFP) in an economy can improve by

1. Technology growth and efficiency
2. Increasing taxation on the private sector
3. Efficient human capital and physical capital.

Which of the above statements is/are correct?

- a) 1, 2
- b) 1, 3
- c) 2, 3
- d) 1, 2, 3

Solution: b)

If a nation has the same stock of land, labour and capital, and yet it achieves high rates of GDP growth consistently. If inputs are same, how does output increase over time?

Either the individual productivities of factors would have increased, or the total combined productivity of the economy has increased.

This can happen either by better technology, better infrastructure etc that improve the total factor productivity of the economy. Suppose, now a factory requires 10 hours to produce a good. With better techniques of production, the same can be achieved in 2 hours.

Technology growth and efficiency are regarded as two of the biggest sub-sections of Total Factor Productivity.

- 24) In the annual budget documents of the Government of India, 'Primary Deficit' refers to
- Difference between revenue deficit of the current year and grants for capital creation
 - Difference between revenue deficit of the present financial year and grants to states and local bodies
 - Difference between budgetary deficit and capital deficit of the present financial year
 - Difference between fiscal deficit of the current year and interest payments on the previous borrowings

Solution: d)

Primary Deficit: We must note that the borrowing requirement of the government includes interest obligations on accumulated debt. To obtain an estimate of borrowing on account of current expenditures exceeding revenues, we need to calculate what has been called the primary deficit. It is simply the fiscal deficit minus the interest payments

Gross primary deficit = Gross fiscal deficit – net interest liabilities

Net interest liabilities consist of interest payments minus interest receipts by the government on net domestic lending.

- 25) Consider the following statements regarding International Financial Service Centre (IFSC)

1. An IFSC caters to customers outside the jurisdiction of the domestic economy.
2. IFSC exclusively deals asset management and global portfolio diversification only.

Which of the above statements is/are correct?

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

Solution: a)

An IFSC is thus a jurisdiction that provides world class financial services to non-residents and residents, to the extent permissible under the current regulations, in a currency other than the domestic currency (Indian rupee) of the location where the IFSC is located.

Products and Services at IFSCs:

- Fund Raising for individuals, corporations and governments (sovereign and sub sovereign)
- Asset Management and Global Portfolio Diversification
- Personal Wealth Management (PWM) for high-net worth individuals (HNWIs).
- Global Tax Management and Cross- border Tax Liability Optimisation

2. Science and Technology

- 1) Why are Bacteriophages seen as a possible therapy against multi-drug-resistant strains of many bacteria?
1. These are ubiquitous viruses found wherever bacteria exist and can kill bacteria.
 2. They do not contain any RNA or DNA and thus cannot be infected by bacteria.

Select the correct answer code:

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

Solution: a)

A bacteriophage is a type of virus that infects bacteria. In fact, the word "bacteriophage" literally means "bacteria eater," because bacteriophages destroy their host cells. All bacteriophages are composed of a nucleic acid molecule that is surrounded by a protein structure. In other words, **they are comprised of a protein capsule around an RNA or DNA genome.**

- 2) Consider the following statements regarding CRISPR-Cas9.
1. CRISPR technology allows to easily alter DNA sequences and modify gene function.
 2. It can be used to correct sickle cell anemia, a genetic blood disorder.
 3. Gene editing system does not occur naturally in organisms.

Which of the above statements is/are correct?

- a) 1, 2
- b) 1, 3
- c) 1 only
- d) 1, 2, 3

Solution: a)

Indian scientists have developed a new variant of currently popular **gene editing tool, CRISPR-Cas9**, and have shown that this variant can increase precision in editing genome while avoiding unintended changes in DNA. The researchers have also shown that this type of gene editing can be **used to correct sickle cell anemia, a genetic blood disorder.**

By reprogramming and using a **naturally occurring gene editing system - CRISPR-Cas9 - found in bacteria**, scientists globally have been engaged in 'editing' genome of various organisms.

CRISPR-Cas9 stands for 'Clustered regularly interspaced short palindromic repeats and CRISPR-associated protein 9.' This protein can be programmed to go to a desired location in the genome and correct or edit defective strands (such as those involved in certain diseases) of DNA. The technology, when perfected, may be used to treat several genetic disorders.

- 3) DNA Profiling is used in which of the following areas?
1. Criminal investigations
 2. Parentage testing
 3. Genealogical research
 4. Study of animal and plant populations

Select the correct answer code:

- a) 1, 2, 3
- b) 1, 3, 4
- c) 2, 3, 4
- d) 1, 2, 3, 4

Solution: d)

DNA profiling (also called DNA fingerprinting) is the process of determining an individual's DNA characteristics.

DNA profiling is a forensic technique in **criminal investigations**, comparing criminal suspects' profiles to DNA evidence so as to assess the likelihood of their involvement in the crime. It is also used in **parentage testing**, to establish immigration eligibility, and in genealogical and medical research. DNA profiling has also been used in the **study of animal and plant populations** in the fields of zoology, botany, and agriculture.

- 4) Which of the following are considered as main drivers of antimicrobial resistance?
1. Misuse and overuse of antimicrobials
 2. Lack of access to clean water and hygiene for animals
 3. Poor infection and disease prevention in health-care facilities

Select the correct answer code:

- a) 1, 2
- b) 1, 3
- c) 2, 3
- d) 1, 2, 3

Solution: d)

AMR occurs naturally over time, usually through genetic changes. Antimicrobial resistant organisms are found in people, animals, food, plants and the environment (in water, soil and air). They can spread from person to person or between people and animals, including from food of animal origin. The main drivers of antimicrobial resistance include the **misuse and overuse of antimicrobials; lack of access to clean water, sanitation and hygiene (WASH) for both humans and animals; poor infection and disease prevention and control in health-care facilities and farms;** poor access to quality, affordable medicines, vaccines and diagnostics; lack of awareness and knowledge; and lack of enforcement of legislation.

- 5) Which of the characteristics of Graphene make it so special to the global electronics industry?
1. It is only one atom thick.
 2. It is a carbon material with high conductivity.
 3. It is the strongest material ever tested.
 4. It is highly opaque considering its darkness.

Select the correct answer code:

- a) 1, 2, 3
- b) 2, 4
- c) 1, 3, 4
- d) 1, 2, 3, 4

Solution: a)

Graphene is an allotrope (form) of carbon consisting of a **single layer of carbon atoms** arranged in a hexagonal lattice. **It is nearly transparent.**

It is the basic structural element of many other allotropes of carbon, such as graphite, charcoal, carbon nanotubes and fullerenes.

Its thin composition and **high conductivity** means it is used in applications ranging from miniaturised electronics to biomedical devices.

These properties also enable thinner wire connections; providing extensive benefits for computers, solar panels, batteries, sensors and other devices.

The one-atom-thick sheets of carbon conduct electrons better than silicon and have been made into fast, low-power transistors. Researchers have measured the intrinsic strength of graphene, and they've confirmed it to be the strongest material ever tested.

- 6) Ailments caused by Virus are
1. Severe acute respiratory syndrome (SARS)

2. Typhoid
3. Dysentery
4. Influenza

Select the correct answer code:

- a) 1, 2
- b) 2, 4
- c) 1, 4
- d) 1, 3

Solution: c)

Common ailments like cold, **influenza (flu)** and most coughs are caused by viruses. **SARS**, polio and chicken pox are also caused by viruses.

Diseases like dysentery and malaria are caused by protozoans whereas typhoid and tuberculosis (TB) are bacterial diseases.

7) Consider the following symptoms and the deficiency of the particular vitamin that is associated with the same:

1. Loss of vision in darkness: Vitamin D
2. Weak muscles and very little energy to work: Vitamin B1
3. Wounds take longer to heal: Vitamin C

Select the correct answer code:

- a) 1, 2
- b) 3 only
- c) 2, 3
- d) 1, 3

Solution: c)

Table 2.3 – Some diseases/disorders caused by deficiency of vitamins and minerals

Vitamin/Mineral	Deficiency disease/disorder	Symptoms
Vitamin A	Loss of vision	Poor vision, loss of vision in darkness (night), sometimes complete loss of vision
Vitamin B1	Beriberi	Weak muscles and very little energy to work
Vitamin C	Scurvy	Bleeding gums, wounds take longer time to heal
Vitamin D	Rickets	Bones become soft and bent
Calcium	Bone and tooth decay	Weak bones, tooth decay
Iodine	Goiter	Glands in the neck appear swollen, mental disability in children
Iron	Anaemia	Weakness

8) Consider the following statements regarding Total Polar Compounds (TPC).

1. TPC is used to measure the quality of cooking oil.
2. The level of TPC decreases every time oil is re-heated.

Which of the above statements is/are correct?

- a) 1 only
- b) 2 only

- c) Both 1 and 2
- d) Neither 1 nor 2

Solution: a)

What are Total Polar Compounds (TPC)?

In many countries, **TPC is used to measure the quality of cooking oil. The level of TPC increases every time oil is re-heated.**

Higher level of TPC in cooking oil leads to health issues like hypertension, atherosclerosis, Alzheimer's disease and liver disease. One of the studies also noticed high levels of glucose, creatinine and cholesterol with declined levels of protein and albumin in cooking oil.

According to FSSAI regulations, the maximum permissible limits for Total Polar Compounds (TPC) have been set at 25%, beyond which the cooking oil is unsafe for consumption.

9) Which of the following are some of most common rare diseases recorded in India?

- 1. Haemophilia
- 2. Thalassemia
- 3. Sickle-cell anaemia

Select the correct answer code:

- a) 1 only
- b) 2, 3
- c) 3 only
- d) 1, 2, 3

Solution: d)

A rare disease, also referred to as an orphan disease, is any disease that affects a small percentage of the population. While there is no universally accepted definition of rare diseases, countries typically arrive at their own descriptions, taking into consideration disease prevalence, its severity and the existence of alternative therapeutic options.

Characteristics:

- Rare diseases are characterised by a wide diversity of symptoms and signs that vary not only from disease to disease but also from patient to patient suffering from the same disease. Relatively common symptoms can hide underlying rare diseases, leading to misdiagnosis.
- The most common rare diseases recorded in India are **Haemophilia, Thalassemia, sickle-cell anaemia** and primary immuno deficiency in children, auto-immune diseases, Lysosomal storage disorders such as Pompe disease, Hirschsprung disease, Gaucher's disease, Cystic Fibrosis, Hemangiomas and certain forms of muscular dystrophies.

10) Which of the following causes a fatal blood disease, sometimes noted in the wool industry?

- a) Anthrax
- b) Clostridium
- c) Aspergillus
- d) Salmonella

Solution: a)

Anthrax causes a fatal blood disease called sorter's disease.

Aspergillus causes pulmonary and blood infections.

The well-known Typhoid fever is caused by Salmonella typhi.

Clostridium Botulinum toxin attacks the nervous system of the affected individual and causes trouble in respiration, swallowing, speaking, vision and causes overall physical weakness.

11) Consider the following statements regarding Nuclear Energy Agency (NEA).

1. It is an intergovernmental agency that is organized under the Organisation for Economic Co-operation and Development (OECD).

2. It assists member countries in maintaining and further developing safe, environmentally friendly and economical use of nuclear energy for peaceful purposes.

Which of the above statements is/are correct?

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

Solution: c)

The **Nuclear Energy Agency (NEA)** is an **intergovernmental** agency that facilitates co-operation among countries with advanced nuclear technology infrastructures to seek excellence in nuclear safety, technology, science, environment and law. The NEA is under the framework of the Organisation for Economic Cooperation and Development (**OECD**).

The NEA's Mission Statement, as reflected in its Strategic Plan, is:

"To assist its member countries in maintaining and further developing, through international co-operation, the scientific, technological and legal bases required for a safe, environmentally sound and economical use of nuclear energy for peaceful purposes. It strives to provide authoritative assessments and to forge common understandings on key issues as input to government decisions on nuclear energy policy and to broader OECD analyses in areas such as energy and the sustainable development of low-carbon economies."

12) Consider the following statements about Treaty on the Prohibition of Nuclear Weapons (TPNW).

1. It is the first legally binding international agreement to comprehensively prohibit nuclear weapons.

2. It was passed in 1974 after India conducted its first nuclear test.

3. The treaty prohibits the development, testing, production, stockpiling, transfer and use of nuclear weapons for all the UN member countries.

Which of the above statements is/are correct?

- a) 1 only
- b) 1, 2
- c) 1, 3
- d) 1, 2, 3

Solution: a)

The **Treaty on the Prohibition of Nuclear Weapons (TPNW)**, or the **Nuclear Weapon Ban Treaty**, is the **first legally binding international agreement to comprehensively prohibit nuclear weapons**, with the goal of leading towards their **total elimination**. It was adopted on 7 July 2017, opened for signature on 20 September 2017, and entered into force on 22 January 2021.

For those nations that are party to it, the treaty **prohibits the development, testing, production, stockpiling, stationing, transfer, use and threat of use of nuclear weapons, as well as assistance and encouragement to the prohibited activities**. For nuclear armed states joining the treaty, it provides for a time-bound framework for negotiations leading to the verified and irreversible elimination of its nuclear weapons programme.

13) Consider the following pairs regarding the Atomic Power Plants and its location

- | | |
|---------------------------------|-----------|
| 1. Kakrapar Atomic Power Plant: | Rajasthan |
| 2. Narora Atomic Power Station: | Gujarat |

3. Kudankulam Nuclear Power Plant:

Tamil Nadu

4. Kaiga Atomic Power Station:

Karnataka

Which of the above are correctly matched?

- a) 1, 2, 3
- b) 2, 3, 4
- c) 3, 4
- d) 1, 3, 4

Solution: c)

Kakrapar Atomic Power Plant is located in Gujarat.

Almost 25 years after the last unit was commissioned at Kakrapar Atomic Power Plant, the Nuclear Power Corporation of India Limited (NPCIL) has achieved criticality of a third unit of 700 MWe at the plant in Tapi district which is fully based on indigenous technology.

Narora Atomic Power Station (NAPS) is a *nuclear power plant* located in Narora, Bulandshahar District in *Uttar Pradesh*.

Kudankulam Nuclear Power Plant is the largest nuclear power station in India, situated in Koodankulam in the Tirunelveli district of Tamil Nadu.

Kaiga Generating Station is a nuclear power generating station situated at Kaiga, near the river Kali, in Uttara Kannada district of Karnataka.

14) Nuclear science is being utilized in which of the following areas of agriculture in India?

- 1. Development of high yielding crop seeds
- 2. Fertilizer and pesticide related studies
- 3. Radiation processing of food items

Select the correct answer code:

- a) 1, 2
- b) 1, 3
- c) 2, 3
- d) 1, 2, 3

Solution: d)

The nuclear agriculture programme of Bhabha Atomic Research Centre (BARC) covers development of high yielding crop seeds using nuclear techniques, fertilizer and pesticide related studies, radiation processing of food items and other areas.

15) Consider the following statements regarding International Atomic Energy Agency (IAEA).

- 1. IAEA is entrusted with the task of upholding the principles of the Nuclear Non-Proliferation Treaty of 1970.
- 2. IAEA works with its member states and multiple partners worldwide to promote the safe, secure and peaceful use of nuclear technologies.
- 3. Established under the UN treaty, the agency reports to both the UN General Assembly and the UN Security Council.

Which of the above statements is/are correct?

- a) 1, 2
- b) 1, 3
- c) 2 only
- d) 2, 3

Solution: a)

As the preeminent nuclear watchdog under the UN, the IAEA is entrusted with the task of upholding the principles of the Nuclear Non-Proliferation Treaty of 1970. Established as an autonomous organisation on July 29, 1957, at the height of the Cold War between the U.S. and the Soviet Union, the IAEA claims that it **“works with its member states and multiple partners worldwide to promote the safe, secure and peaceful use of nuclear technologies”**. Though **established independently of the UN through its own international treaty, the agency reports to both the UN General Assembly and the Security Council.**

- 16) Astronauts have to wear special protective space suits filled with air when they go to the moon or outer space. This is because of the
1. Lack of air pressure in these regions
 2. Very cold temperature in these regions
 3. Dangerous radiation in these regions

Select the correct answer code:

- a) 1, 2
- b) 1, 2, 3
- c) 2, 3
- d) 1 only

Solution: b)

On the moon there is **almost no air and hence no air pressure.**

If they did not wear these space suits, the counter pressure exerted by the body of the astronauts would make the blood vessels burst. The astronauts would bleed.

Astronauts must wear spacesuits whenever they leave a spacecraft and are exposed to the environment of space. In space, there is no air to breathe and no air pressure. **Space is extremely cold and filled with dangerous radiation.** Without protection, an astronaut would quickly die in space. Spacesuits are specially designed to protect astronauts from the cold, radiation and low pressure in space. They also provide air to breathe. Wearing a spacesuit allows an astronaut to survive and work in space.

- 17) Consider the following statements regarding Asteroid Impact Deflection Assessment (AIDA).
1. It is a joint research mission between NASA and SpaceX.
 2. It aims to study the viability of destroying an asteroid by crashing a spacecraft into its surface.

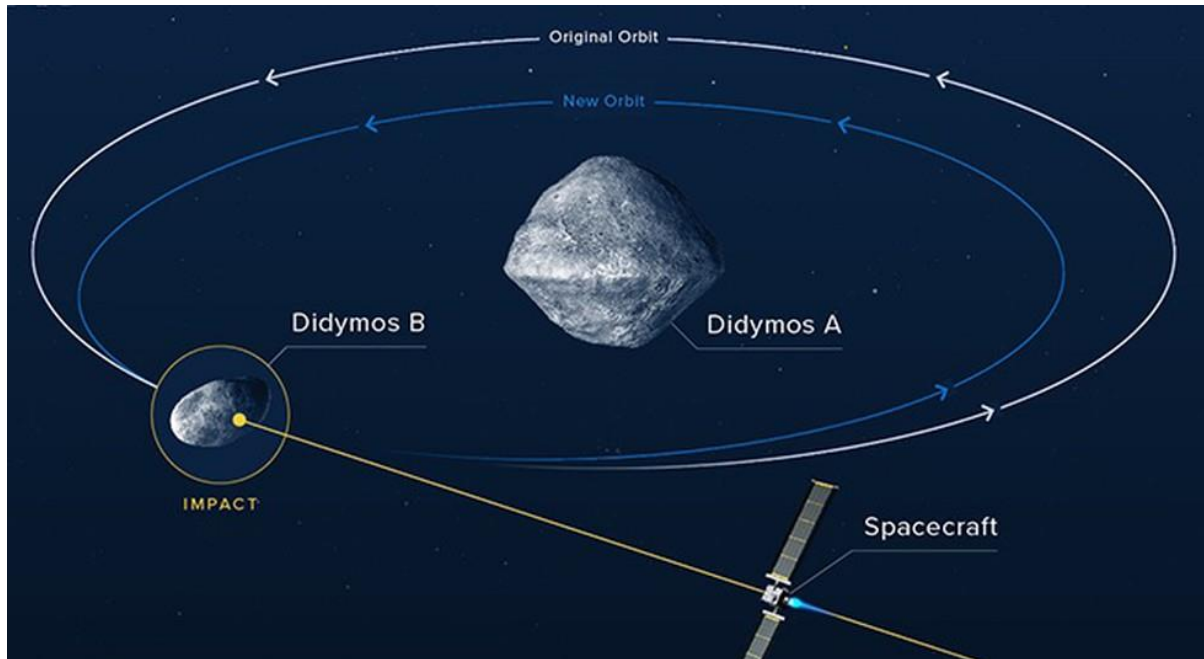
Which of the above statements is/are correct?

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

Solution: d)

Asteroid Impact Deflection Assessment (AIDA) is a joint research mission between NASA and the European Space Agency (ESA) teams.

- It aims to **study the viability of diverting an asteroid by crashing a spacecraft into its surface.**
- The project aims to deflect the orbit of one of the two Didymos asteroids between Earth and Mars, with an observer craft gauging the effect of the impact more effectively than ground-based observers could manage.



- 18) In order to stay over the same location on the Earth, a geostationary satellite must be directly above the
- Tropic of Cancer
 - Either North or South Pole
 - Equator
 - Tropic of Capricorn

Solution: c)

Most of the communication satellites today are placed in a geostationary orbit.

Geostationary satellites in orbits circle the Earth at the same rate as the Earth spins.

- The satellites are located near the equator since at this latitude there is a constant force of gravity from all directions. At other latitudes, the bulge at the centre of the Earth would pull the satellite down.

- 19) Consider the following statements regarding Gravitational waves (G-waves).

- G- Waves can pass through any intervening matter without being scattered significantly.
- They can be observed in the merger of two black holes.
- All movement of matter in space create G-waves that can be easily noticed by satellites.

Which of the above statements is/are correct?

- 1, 2
- 2, 3
- 3 only
- 2 only

Solution: a)

While light from distant stars may be blocked out by interstellar dust, gravitational waves will pass through essentially unimpeded. This feature allows G-Waves to carry information about astronomical phenomena never before observed by humans. With this detection we will be able to turn the Universe into our own laboratory.

Not all movements lead to massive or noticeable Gravitational waves.

- Two objects orbiting each other in a planar orbit such as a planet orbiting the Sun or a binary star system or the merging of two black holes will radiate Gravitational waves! But, if the objects are really small and their gravitational pull and the way they bend space-time curve is not significant, they won't create noticeable gravitational waves. It is extremely hard to track the G-waves of even big events like black hole formation.

20) Consider the following statements regarding Neutrinos.

1. They can be weaponized.
2. Human body cannot tolerate exposure to Neutrinos.
3. They are completely massless.

Which of the above statements is/are correct?

- a) 1, 2
- b) 2 only
- c) 1, 3
- d) None of the above

Solution: d)

Neutrinos are the information bearers of the universe — which are almost never lost in their path. India's effort in studying neutrinos at INO may help us unravel the deepest mystery of the universe — why there is more matter than antimatter in the universe.

- **Neutrinos are the least harmful of all elementary particles, as they almost never react with solid bodies.**
- Also, people tend to confuse the “neutrino” for the “neutron”. This has also led to the confusion that neutrinos can be weaponised, which is far from the truth. They are not used to trigger fission reactions, but are instead produced as a result of the reactions.
- **Neutrinos have mass** and as shown recently, they change their masses too.
- The neutrino is so named because it is **electrically neutral**.

21) What are ballistic missiles that you often hear in news?

- a) Missiles launched at a steep trajectory from the horizon
- b) Powered and unguided missiles
- c) Missiles that spend most of their flight out of the atmosphere
- d) Missiles with unpowered trajectory governed by gravity and air resistance

Solution: d)

A ballistic missile is a missile (rocket) that follows a ballistic trajectory with the objective of delivering one or more warheads to a predetermined target.

A ballistic missile is only guided during relatively brief periods of flight (there are unguided ballistic missiles as well, although these may well be considered rockets), and most of its trajectory is unpowered and **governed by gravity and air resistance if in the atmosphere**.

This contrasts to a cruise missile, which is aerodynamically guided in powered flight.

Long range intercontinental ballistic missiles (ICBM) are launched at a steep, sub-orbital flight trajectory and spend most of their flight out of the atmosphere. Shorter range ballistic missiles stay within the Earth's atmosphere.

22) Consider the following statements.

1. Dedicated SONARs can be fitted to ships and submarines for underwater communication.
2. SONARs fitted to aircrafts can act as beacons to trace their location in the event of their crash in the sea.

Which of the above statements is/are correct?

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

Solution: c)

SONAR is a technique that uses sound propagation (usually underwater, as in submarine navigation) to navigate, communicate with or detect objects on or under the surface of the water, such as other vessels.

Dedicated sonars can be fitted to ships and submarines for underwater communication. Sonars which act as beacons are fitted to aircraft to allow their location in the event of a crash in the sea. Sound waves travel differently through fish than through water because a fish's air-filled swim bladder has a different density than seawater. This density difference allows the detection of schools of fish by using reflected sound. Acoustic technology is especially well suited for underwater applications since sound travels farther and faster underwater than in air.

23) Consider the following statements regarding NAG missile.

1. This missile is designed to deliver nuclear-payloads.
2. The system uses infrared seeker to lock on the target.

Which of the above statements is/are correct?

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

Solution: b)

The NAG missile is a third-generation anti-tank guided missile, which has top attack capabilities that can effectively engage and destroy all known enemy tanks during day and night.

It uses an imaging infrared seeker in lock-on-before-launch mode.

It is launched from NAG missile carrier (NAMICA) which is capable of carrying up to 6 combat missiles.

Range: Minimum-500 metres and Maximum- 4 kilometres.

Developed by DRDO.

24) Consider the following statements regarding Akash missile system.

1. It has been indigenously developed.
2. It is a nuclear capable supersonic missile.
3. It can be launched from deep ocean waters and even from the edge of troposphere.

Which of the above statements is/are correct?

- a) 1, 2
- b) 2, 3
- c) 1, 3
- d) 1, 2, 3

Solution: a)

It was indigenously developed by Defence Research and Development Organisation (DRDO) under the Integrated Guided-Missile Development Programme (IGMDP).

It is powered by Ramjet-rocket propulsion system (RRPS) which renders thrust for the missile to intercept the target at supersonic speed without any retardation.

It is capable of neutralising aerial targets like cruise missiles, fighter jets, unmanned aerial vehicles (UAV) and air-to-surface missiles. It is a **surface to air missile**.

25) "Lakshya" and "Nishant" developed by the DRDO are

- a) Ballistic missile systems
- b) Combat engineering equipments
- c) Naval systems
- d) Unmanned Aerial Vehicles (UAVs)

Solution: d)

Lakshya is a high speed target drone system developed by DRDO.

The drone remotely piloted by a ground control station provides realistic towed aerial sub-targets for live fire training.

The Nishant UAV is primarily tasked with intelligence gathering over enemy territory and also for reconnaissance, training, surveillance, target designation, artillery fire correction, damage assessment, ELINT and SIGINT.

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3. Environment

1) Consider the following statements.

1. The energy pyramid of an ecosystem is always upright and narrows to the top.
2. The biomass in the upper trophic levels is generally very high as compared to the lower trophic levels.

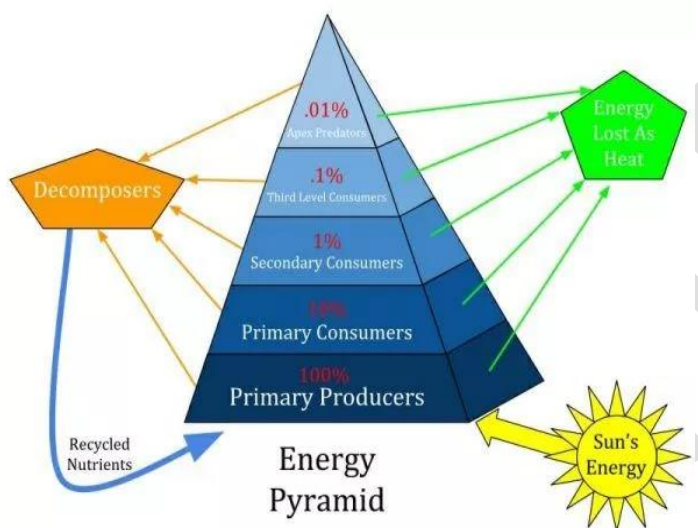
Which of the above statements is/are correct?

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

Solution: a)

Since each higher trophic level receives only a fraction of energy of the lower trophic levels, the **energy pyramid is narrow at the top**.

But, generally (barring some aquatic ecosystems) **lower trophic levels have higher biomass** as compared to the higher trophic levels.



2) Arrange the following ecosystems in the decreasing order of biomass productivity (g per metre square per year).

1. Coral reefs
2. Open ocean
3. Tropical rainforest
4. Deserts

Select the correct answer code:

- a) 1-3-2-4
- b) 3-1-2-4
- c) 3-1-4-2
- d) 1-3-4-2

Solution: b)

Producer	Biomass productivity (gC/m ² /yr)
Swamps and Marshes	2,500
Tropical rainforests	2,000
Coral reefs	2,000
Algal beds	2,000
River estuaries	1,800
Temperate forests	1,250
Cultivated lands	650
Tundras	140
Open ocean	125
Deserts	3

3) Consider the following statements.

1. In the aquatic environment, the sediment-characteristics often determine the type of benthic animals that can thrive there.
2. Like humans, plants also have mechanisms to maintain internal temperature.
3. Very small animals are rarely found in polar regions since thermoregulation is energetically expensive for these animals.

Which of the above statements is/are correct?

- a) 1, 2
- b) 1, 3
- c) 2, 3
- d) 1, 2, 3

Solution: b)

The mechanisms used by most mammals to regulate their body temperature are similar to the ones that we humans use. We maintain a constant body temperature of 37 degree C. In summer, when outside temperature is more than our body temperature, we sweat profusely.

The resulting evaporative cooling, similar to what happens with a desert cooler in operation, brings down the body temperature. In winter when the temperature is much lower than 37 degree C, we start to shiver, a kind of exercise which produces heat and raises the body temperature. **Plants, on the other hand, do not have such mechanisms to maintain internal temperatures.**

Thermoregulation is energetically expensive for many organisms. This is particularly true for small animals like shrews and humming birds. Heat loss or heat gain is a function of surface area. Since small animals have a larger surface area relative to their volume, they tend to lose body heat very fast when it is cold outside; then they have to expend much energy to generate body heat through metabolism. This is the main reason why very small animals are rarely found in polar regions.

4) Consider the following statements regarding Phosphorus and Phosphorus Cycle.

1. Phosphorus cycle is largely atmospheric and easily dissolves in water from air.
2. Phosphorus occurs as a mineral in phosphate rocks and enters the Phosphorus cycle from erosion and mining activities.
3. Phosphorus is responsible for excessive growth of rooted and free-floating microscopic plants in water bodies.

Which of the above statements is/are correct?

- a) 1, 2
- b) 2, 3
- c) 1, 3

d) 1, 2, 3

Solution: b)

Phosphorous cycle is mainly terrestrial. The main storage for phosphorus is in the earth's crust. On land phosphorus is usually found in the form of phosphates.

It occurs in large amounts as a mineral in phosphate rocks and enters the cycle from erosion and mining activities.

By the process of weathering and erosion phosphates enter rivers and streams that transport them to the ocean.

Being an important nutrient, **phosphorous promotes eutrophication in lakes.** Along with nitrogen related compounds it leads to undesirable situations like **algal bloom.**

5) Why do exotic species post a threat to an indigenous ecosystem such as in a Lake or an isolated island in the Andamans?

1. Such species compete with the local or native species for food.
2. They may be predators of local species.
3. Such species may cause diseases in native species.

Select the correct answer code:

- a) 1, 2
- b) 1, 3
- c) 1, 2, 3
- d) 2, 3

Solution: c)

Exotic species introduced to new environments often reset the ecological conditions in that new habitat, threatening the species that exist there; this is the reason that they are also termed invasive species.

Invasive species that are closely related to rare native species have the potential to hybridize with the native species; harmful effects of hybridization have led to a decline and even extinction of native species.

Invasive species can change the food web in an ecosystem by destroying or replacing native food sources. The invasive species may provide little to no food value for wildlife.

Lakes and islands are particularly vulnerable to extinction threats from introduced species.

6) Consider the following statements regarding Bioluminescent organisms.

1. Bioluminescent organisms are found only in the ocean environments.
2. The colour of the light emitted by the organism depends on their chemical properties.
3. In some organisms, Bioluminescence acts as defence mechanism, to protect itself from other organisms.

organisms.

Which of the above statements is/are correct?

- a) 1, 2
- b) 1, 3
- c) 2, 3
- d) 3 only

Solution: c)

“Bioluminescent organisms are usually found in the ocean environments, but they are also found on terrestrial environments. The colour of the light emitted by the organism depends on their chemical properties.”

In the case of fungi, the luminescence comes from the enzyme, luciferase. “The [green] light emits when luciferans is catalysed by the enzyme luciferase, in the presence of oxygen. During the chemical reaction, several unstable intermediate products are released as excess energy that makes them visible as light.

Bioluminescent mushrooms may glow for a number of reasons. The simplest explanation could be that bioluminescence attracts insects, which helps in dispersing spores. It may also be a mechanism for the organism to protect itself from frugivorous (or fruit-eating) animals.

7) Consider the following statements regarding Parasitism.

1. Parasitism occurs when two organisms interact, but while one benefits, the other experiences harm.
2. Tapeworm attaching itself to the intestine of a cow is an example of Parasitism.
3. The parasite always kill the host.

Which of the above statements is/are correct?

- a) 1, 2
- b) 1, 3
- c) 1 only
- d) 2, 3

Solution: a)

A **parasite is an organism that lives in or on another living organism, deriving nutrients from it.** In this relationship the parasite benefits, but the organism being fed upon, the host, is harmed. The host is usually weakened by the parasite as it siphons resources the host would normally use to maintain itself. The **parasite, however, is unlikely to kill the host.** This is because the parasite needs the host to complete its reproductive cycle by spreading to another host.

The reproductive cycles of parasites are often very complex, sometimes requiring more than one host species. A tapeworm is a parasite that causes disease in humans when contaminated, undercooked meat such as pork, fish, or beef is consumed. The tapeworm can live inside the intestine of the host for several years, benefiting from the food the host is bringing into its gut by eating. The parasite moves from species to species as it requires two hosts to complete its life cycle.

8) Which one of the following is the correct sequence of ecosystems in the order of decreasing productivity?

- a) Oceans, lakes, grasslands, mangroves
- b) Mangroves, oceans, grasslands, lakes
- c) Mangroves, grasslands, lakes, oceans
- d) Oceans, mangroves, lakes, grasslands

Solution: c)

Production/unit area depends on the number and diversity of producers.

Mangroves are one of the high productive regions in the world whereas ocean has least productivity.

9) Increased Snow cover on a water body can lead to

1. Sudden spurt in phytoplankton population which are not dependent on photosynthesis
2. Improved oxygen exchange and nutrient recycling in the lake
3. A condition of winterkill causing large scale death of fishes and organisms

Select the correct answer code:

- a) 1, 2
- b) 3 only
- c) 1, 3
- d) 2, 3

Solution: b)

Phytoplankton float on top surface of water bodies and require sunlight to thrive. Ice cover will reduce their breeding grounds and population.

The snow cover blocks exchange of nutrients and oxygen from the atmosphere, however the same may continue within the water stream. But it is worse than before.

Snow cover of ice on water body can effectively cut off light, plunging the waters into darkness.

Hence photosynthesis stops but respiration continues. Thus, in shallow lakes, oxygen gets depleted, and due to lack of oxygen there is large scale death of fishes and other organisms. This condition is known as winterkill.

10) The coastal ecosystems of mangroves, tidal marshes, and seagrass meadows provide numerous benefits and services along coasts like

1. Protection from storms and sea level rise
2. Regulation of coastal water quality
3. Provision of habitat for commercially important fisheries
4. Food security for many coastal communities
5. Sequester and store coastal blue carbon from the atmosphere

Select the correct answer code:

- a) 1, 2, 3
- b) 1, 3, 4, 5
- c) 1, 2, 3, 4
- d) 1, 2, 3, 4, 5

Solution: d)

The coastal ecosystems of mangroves, tidal marshes, and seagrass meadows provide numerous benefits and services that are essential for climate change adaptation along coasts globally, including protection from storms and sea level rise, prevention of shoreline erosion, regulation of coastal water quality, provision of habitat for commercially important fisheries and endangered marine species, and food security for many coastal communities. Additionally, these ecosystems sequester and store significant amounts of coastal blue carbon from the atmosphere and ocean and hence are now recognized for their role in mitigating climate change.

11) Consider the following statements.

1. Cold water corals, in general, have greater amount of zooxanthellae than warm water corals and does not build reef-like structures.
2. Cold-water corals differ from warm water corals because the former does not contain symbiotic algae for photosynthesis and grow more slowly.

Which of the above statements is/are correct?

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

Solution: b)

Corals that inhabit the colder deep waters of continental shelves and offshore canyons, ranging from 50 to over 1000m depths lack zooxanthellae and may build reef-like structures or occur solitarily.

Cold-water corals are different from their warm-water counterparts because they do not contain symbiotic algae for photosynthesis and grow more slowly. Cold-water corals obtain all their energy from organic matter and zooplankton, which they catch from the currents drifting past.

Cold-water corals can be found over a wide range of latitudes, from tropical to Polar Regions, and from the shallow to the deep seas.

12) Which of the following are recognised as the Ramsar sites in India?

1. Harike Lake
2. Wular Lake
3. Keoladeo National Park
4. Chilika Lake

Select the correct answer code:

- a) 1, 2, 3
- b) 2, 3, 4
- c) 1, 2, 3, 4
- d) 1, 2, 4

Solution: c)

Some of the Ramsar sites in India include

- Chilika Lake in Odisha
- Keoladeo National Park in Rajasthan
- Harike Lake in Punjab
- Loktak Lake in Manipur
- Wular Lake in Jammu and Kashmir

13) Consider the following statements regarding Peatlands.

1. Peatlands are wetlands where permanently waterlogged conditions prevent the complete decomposition of dead plant material.
2. Peatlands are highly space-effective carbon stocks and contain more carbon than the entire forest biomass of the world.
3. Peatlands are formed only under tropical climate conditions.

Which of the above statements is/are correct?

- a) 1, 2
- b) 1, 3
- c) 2, 3
- d) 1, 2, 3

Solution: a)

Peatlands are formed due to the accumulation of partially decomposed plant remains over thousands of years under conditions of water-logging.

Peatlands, which play a crucial role in regulating global climate by acting as carbon sinks, are facing degradation.

Peatlands (lands with peat at the surface) are highly space-effective carbon stocks: they cover only 3% of the land, but contain more carbon than the entire forest biomass of the world.

Peatlands contain 30 per cent of the world's soil carbon. When drained, these emit greenhouse gases, contributing up to one gigaton of emissions per year through oxidation.

Peatlands occur in different climate zones. While in tropical climate, they can occur in mangroves, in Arctic regions, peatlands are dominated by mosses. Some mangrove species are known to develop peatland soils under them.

Besides climate mitigation, peatlands are important for archaeology, as they maintain pollen, seeds and human remains for a long time in their acidic and water-logged conditions.

In many countries, pristine peatlands are important for recreation activities. These areas also support livelihood in the form of pastoralism.

The vegetation growing on pristine peatlands provide different kinds of fibres for construction activities and handicrafts.

14) Consider the following statements regarding Coral bleaching.

1. When corals are stressed by changes in temperature, light or nutrients, they expel the algae living in their tissue, causing them to turn white.
2. Increase in zooplankton levels triggers coral bleaching.
3. Cold water temperatures also cause coral bleaching.

Which of the above statements is/are correct?

- a) 1, 2
- b) 2, 3
- c) 1, 3
- d) 1, 2, 3

Solution: d)

What is coral bleaching?

According to the National Oceanic and Atmospheric Administration (NOAA), **when corals are stressed by changes in conditions such as temperature, light or nutrients, they expel the algae living in their tissue, causing them to turn white, hence bleached.**

Coral bleaching does not mean the corals are dead, but make them vulnerable, hence increasing their mortality. **Warm ocean temperatures** are one condition that could lead to coral bleaching. For instance, in 2005, the US lost half of its coral reefs in the Caribbean in one year due to a massive bleaching event. Even so, NOAA says that not all bleaching events are due to warmer temperatures. In January 2010, **cold water temperatures** in the Florida caused a coral bleaching event that resulted in some coral deaths.

List of triggers

- increased water temperature (marine heatwaves, most commonly due to global warming), or reduced water temperatures
- oxygen starvation caused by an increase in zooplankton levels as a result of overfishing
- increased solar irradiance (photosynthetically active radiation and ultraviolet light)
- increased sedimentation (due to silt runoff)
- bacterial infections
- changes in salinity
- herbicides
- extreme low tide and exposure
- cyanide fishing
- elevated sea levels due to global warming (Watson)¹
- mineral dust from African dust storms caused by drought
- pollutants such as oxybenzone, butylparaben, octyl methoxycinnamate, or enzacamene: four common sunscreen ingredients that are nonbiodegradable and can wash off of skin
- ocean acidification due to elevated levels of CO₂ caused by air pollution
- being exposed to Oil or other chemical spills

15) Consider the following statements regarding Wetlands.

1. In India, Wetlands are regulated under the *Environment (Protection) Rules*, 1986.

2. Wetlands International is an independent, not-for-profit, global organisation that works to sustain and restore wetlands and their resources for people and biodiversity.

Which of the above statements is/are correct?

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

Solution: b)

Wetlands are regulated under the Wetlands (Conservation and Management) Rules, 2017. The 2010 version of the Rules provided for a Central Wetland Regulatory Authority; the 2017 Rules replace it with state-level bodies and created a National Wetland Committee, which functions in an advisory role. The newer regulations removed some items from the definition of “wetlands” including backwaters, lagoon, creeks, and estuaries.

Wetlands International is a global organisation that works to sustain and restore wetlands and their resources for people and biodiversity. It is an independent, not-for-profit, global organisation, supported by government and NGO membership from around the world.

16) In which of the following trophic levels, you are likely to find the highest concentration of an organic toxin that has been found in ocean water and the aquatic animals inhabiting it?

- a) Aquatic plants
- b) Small fishes at lower trophic levels
- c) Human being who consumes sea food
- d) Large fishes at higher trophic levels

Solution: c)

Most of the organic toxins are water insoluble and non-biodegradable.

These high persistent toxins are, therefore, transferred from lower trophic level to higher trophic level through food chain.

17) Which of the following best describes an Indicator species?

- a) It is a species whose presence, absence or abundance reflects a specific environmental condition.
- b) It is a species non-native to the ecosystem under consideration and whose introduction causes or is likely to cause harm.
- c) It is a species that has a disproportionately large effect on the communities in which it occurs.
- d) It is a species which is introduced to reduce the level of pollution in an ecosystem.

Solution: a)

Indicator species, organism—often a microorganism or a plant—that serves as a measure of the environmental conditions that exist in a given locale.

Example – Lichens: Quality of air can be determined based on its presence.

18) Consider the following statements regarding Vegetative Propagation.

1. Plants raised by vegetative propagation can bear flowers and fruits earlier than those produced from seeds.
2. Vegetative propagation is not possible from the plants that have lost the capacity to produce seeds.
3. Plants produced through vegetative propagation are genetically similar enough to the parent plant.

Which of the above statements is/are correct?

- a) 1, 2
- b) 1, 3
- c) 2, 3
- d) 1, 2, 3

Solution: b)

There are many plants in which parts like the root, stem and leaves develop into new plants under appropriate conditions. This property of vegetative propagation is used in methods such as layering or grafting to grow many plants like sugarcane, roses, or grapes for agricultural purposes. **Plants raised by vegetative propagation can bear flowers and fruits earlier than those produced from seeds. Such methods also make possible the propagation of plants such as banana, orange, rose and jasmine that have lost the capacity to produce seeds.** Another advantage of vegetative propagation is that all plants produced are genetically similar enough to the parent plant to have all its characteristics.

19) An ecological pyramid is a diagrammatic presentation to describe trophic levels. How does the knowledge of ecological pyramid can help us in conservation of an ecosystem?

1. It helps us to identify bio-accumulation.
2. It helps us to identify bio-magnification.

3. It helps us to recognize an invasive species.

Select the correct answer code:

- a) 1, 3
- b) 1, 2
- c) 2, 3
- d) 1, 2, 3

Solution: b)

Ecological pyramid doesn't give evidence on introduction of new species.

20) Birds Following Army Ants is an example for which of the following types of symbiotic relationship between organisms?

- a) Mutualism
- b) Parasitism
- c) Commensalism
- d) Competition

Solution: c)

Commensalism is a type of symbiotic relationship between organisms in which one organism benefits without harming the other.

Many birds form a commensal relationship with some species of ants like the army ants. A great number of army ants trail on the forest floor, and while moving, stir up many insects lying in their path. The birds follow these army ants and eat up the insects that try to escape from them. The birds benefit by catching their prey easily, while the army ants are totally unaffected.

21) Acid rain is mainly a by-product of a variety of human activities that emit the oxides of

- a) Sulphur and nitrogen in the atmosphere
- b) Mercury and lead compounds in water bodies
- c) Radioactive compounds in effluent discharge
- d) Carbon emitted by peat lands

Solution: a)

Burning of fossil fuels (which contain sulphur and nitrogenous matter) such as coal and oil in power stations and furnaces or petrol and diesel in motor engines produce **sulphur dioxide and nitrogen oxides**.

SO₂ and NO₂ after oxidation and reaction with water are major contributors to acid rain, because polluted air usually contains particulate matter that catalyze the oxidation.

These lead to formation of acid rain that has deleterious effect on the overall ecology of the region.

22) Consider the following statements regarding ocean acidification.

1. It largely occurs due to the high absorption of nitrogenous based acidic compounds.
2. Introduction of sea grasses can reduce the impact of acidification.

Which of the above statements is/are incorrect?

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

Solution: a)

Ocean acidification refers to a reduction in the pH of the ocean over an extended period of time, caused **primarily by uptake of carbon dioxide (CO₂) from the atmosphere. Nitrogenous compounds contribute fraction to ocean acidification.**

Sea grass has ability to control ocean acidification.

23) E-waste contain potentially harmful materials such

1. Brominated flame retardants
2. Phosphors
3. Cadmium
4. Beryllium
5. Lead

Select the correct answer code:

- a) 1, 3, 4, 5
- b) 2, 3, 4, 5
- c) 1, 2, 3, 5
- d) 1, 2, 3, 4, 5

Solution: d)

Electronic scrap components, such as CPUs, contain potentially harmful materials such as lead, cadmium, beryllium, or brominated flame retardants.

CRTs have a relatively high concentration of lead and phosphors (not to be confused with phosphorus), both of which are necessary for the display.

Country's first e-waste clinic is being opened in Bhopal, Madhya Pradesh. It would enable segregation, processing and disposal of waste from both household and commercial units.

24) What are the sources that add nitrogen oxides into the atmosphere?

1. Bacteria living in soil
2. Reaction of Ultraviolet radiation with ozone
3. Lightning stroke

Select the correct answer code:

- a) 1, 2
- b) 1, 3
- c) 2, 3
- d) 1, 2, 3

Solution: b)

Nitrous oxide emissions occur naturally through many sources associated with the nitrogen cycle, which is the natural circulation of nitrogen among the atmosphere, plants, animals, and microorganisms that live in soil and water.

Nitrous oxide is actually removed from the atmosphere when it is absorbed by certain types of bacteria or destroyed by ultraviolet radiation or chemical reactions.

A natural source of nitrogen oxides occurs from a lightning stroke. The very high temperature in the vicinity of a lightning bolt causes the gases oxygen and nitrogen in the air to react to form nitric oxide. The nitric oxide very quickly reacts with more oxygen to form nitrogen dioxide.

25) Consider the following statements regarding Persistent Organic Pollutants (POPs).

1. Persistent Organic Pollutants (POPs) have the property of long-range environmental transport (LRET).
2. As we move up the food chain, concentrations of POPs tend to decrease so that animals at the top of the food chain tend to have the low concentrations of these chemicals.
3. Exposure to POPs can lead to cancer and diseases of immune system.

Which of the above statements is/are correct?

- a) 1, 2
- b) 1, 3
- c) 2, 3
- d) 1, 2, 3

Solution: b)

Exposure to POPs can lead to cancer, damage to central & peripheral nervous systems, diseases of immune system, reproductive disorders and interference with normal infant and child development.

Uniqueness of POPs:

POPs are lipophilic, which means that they accumulate in the fatty tissue of living animals and human beings. In fatty tissue, the concentrations can become magnified by up to 70 000 times higher than the background levels.

As you move up the food chain, concentrations of POPs tend to increase so that animals at the top of the food chain such as fish, predatory birds, mammals, and humans tend to have the greatest concentrations of these chemicals.

26) Consider the following statements about life forms.

1. Epiphytic: plants which derive nutrients from fungi that are attached to the roots of a vascular plant
2. Terrestrial: plants growing on land and climbers
3. Mycoheterotrophic: plants growing on another plants

Which of the above are correctly matched?

- a) 2 only
- b) 1, 2
- c) 2, 3
- d) 1, 2, 3

Solution: a)

Epiphytic (plants growing on other plants including those growing on rock boulders and often termed lithophyte),

Terrestrial (plants growing on land and climbers)

Mycoheterotrophic (plants which derive nutrients from mycorrhizal fungi that are attached to the roots of a vascular plant).

27) In terms of self-sustenance and endurance, which among the following is the most stable ecosystem?

- a) Forest
- b) Desert
- c) Ocean
- d) Mountains

Solution: c)

Ocean is a self-sustaining ecosystem and covers nearly 2/3rd of earth's area. It is the oldest ecosystem. It is least affected by natural calamities.

It is a highly diverse (from phytoplankton to sea grass to whales) and productive ecosystem and contains earliest evolutionary life forms. The evolutionary history has also been more stable than in terrestrial environments.

28) Tropics harbour more species than temperate or polar areas. What could be the possible reasons that tropics account for greater biological diversity than temperate regions.

1. Unlike temperate regions which were subjected to frequent glaciations in the past, tropical latitudes have remained relatively undisturbed for millions of years.

2. Tropical environments are less seasonal, relatively more constant and predictable unlike temperate regions.

3. There is more solar energy available in the tropics.

Select the correct answer code:

- a) 1, 2
- b) 1, 3
- c) 2, 3
- d) 1, 2, 3

Solution: d)

What is so special about tropics that might account for their greater biological diversity? Ecologists and evolutionary biologists have proposed various hypotheses; some important ones are

- (a) Speciation is generally a function of time, unlike temperate regions subjected to frequent glaciations in the past, tropical latitudes have remained relatively undisturbed for millions of years and thus, had a long evolutionary time for species diversification,
- (b) Tropical environments, unlike temperate ones, are less seasonal, relatively more constant and predictable. Such constant environments promote niche specialisation and lead to a greater species diversity and
- (c) There is more solar energy available in the tropics, which contributes to higher productivity; this in turn might contribute indirectly to greater diversity.

29) Consider the following statements regarding food chain in ecosystem:

- 1. In an aquatic ecosystem, more energy flows through grazing food chain than detritus food chain.
- 2. In a terrestrial ecosystem larger fraction of energy flow through detritus food chain than grazing food chain.
- 3. Only 10% of energy is lost in energy flow across different trophic levels.

Which of the above statements is/are correct?

- a) 1, 2
- b) 3 only
- c) 2, 3
- d) 1, 2, 3

Solution: a)

In an aquatic ecosystem, grazing food chain is the major conduit for energy flow. As against this, in a terrestrial ecosystem, a much larger fraction of energy flows through the detritus food chain than through the grazing food chain.

When energy is passed in an ecosystem from one trophic level to the next, only ten percent of the energy will be passed. Around 90% of energy will be lost.

30) Which of the following statements is incorrectly stated?

- a) Alpha diversity refers to diversity within a particular area or ecosystem.
- b) Food chain is more comprehensive than food web in displaying possible transfers of energy.
- c) Food chain implies a simple isolated relationship which seldom occurs in an ecosystem.
- d) None of the statements (a), (b), and (c) are incorrect.

Solution: b)

Alpha diversity

Alpha diversity describes the species diversity within a community at a small scale or local scale, generally the size of one ecosystem. When we casually speak of diversity in an area, more often than not it refers to alpha diversity.

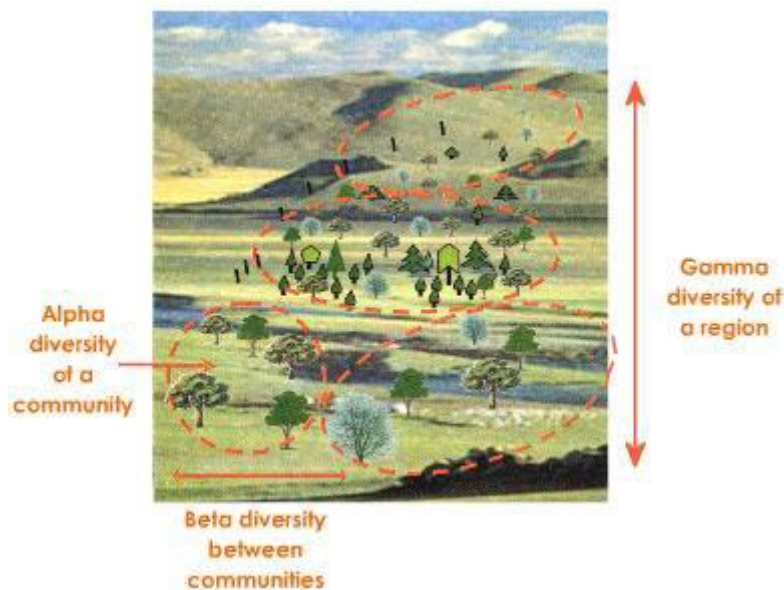
Beta diversity

Beta diversity describes the species diversity between two communities or ecosystems. It is at a larger scale, and looks to compare the species diversity between two separate entities that are often divided by a clear geographical barrier like a river or a mountain ridge.

Gamma diversity

Gamma diversity is studied at a very large scale—a biome—where species diversity is compared between many ecosystems. It could range over areas like the entire slope of a mountain, or the entire littoral zone of a sea shore.

Example: Let's take a mountain slope as our landscape. On this slope, there will be many different patches of forests and grasslands. Alpha diversity is the species diversity present within each forest or grassland patch of the slope. Beta diversity is represented by the species diversity between any two patches and their communities. Gamma diversity of the landscape is the species diversity along the entire range of the mountain slope.



Food web is more comprehensive than food chain.

31) To qualify as a biodiversity hotspot, which of the following conditions must be met

1. The biodiversity of the region is threatened.
2. Zones of High endemism
3. Areas where Ecological succession occur

Select the correct answer code:

- a) 1, 2
- b) 1, 3
- c) 2, 3
- d) 1, 2, 3

Solution: a)

To qualify as a biodiversity hotspot, a region must meet two strict criteria:

It must have at least 1,500 vascular plants as **endemics** — which is to say, it must have a high percentage of plant life found nowhere else on the planet. A hotspot, in other words, is irreplaceable.

It must have 30% or less of its original natural vegetation. In other words, **it must be threatened**.

32) Consider the following statements regarding Mediterranean Forests.

1. Mediterranean Forests are found in only those countries bordering Mediterranean Sea.
2. They have thick barks and wax coated leaves which help them reduce transpiration.
3. Mediterranean Forests are known as 'Orchards of the world' for their fruit cultivation.

Which of the above statements is/are correct?

- a) 1, 2
- b) 1, 3
- c) 2, 3
- d) 3 only

Solution: c)

Mediterranean forests are found in areas around Mediterranean Sea, Central Chile, South-West USA, Australia, Africa. They have **thick barks and wax coated leaves** which help them reduce transpiration. Due to these characteristics, Mediterranean trees adapt themselves to dry summers. Mediterranean Forests are known as '**Orchards of the world**' for their fruit cultivation. People have removed the natural vegetation here in order to cultivate what they want to. So, Citrus fruits such as oranges, figs, olives and grapes are commonly cultivated here.

33) Which of the following are Tropical Grasslands?

- 1. Savanna
- 2. Campos
- 3. Prairie
- 4. Llanos
- 5. Steppe

Select the correct answer code:

- a) 1, 2, 3
- b) 1, 2, 4
- c) 1, 2, 5
- d) 2, 3, 4, 5

Solution: b)

Grasslands are known by different names in different regions.

Tropical Grasslands are:

East Africa- Savanna

Brazil- Campos

Venezuela- Llanos

Temperate Grasslands are:

Argentina- Pampas

N. America- Prairie

S. Africa- Veld

C. Asia- Steppe

Australia- Down

34) Arrange the following ecosystems in decreasing order of net primary productivity

- 1. Tropical seasonal forest
- 2. Tropical rain forest
- 3. Temperate Grassland
- 4. Woodland and Shrubland

Select the correct answer code:

- a) 2-1-3-4
- b) 2-1-4-3
- c) 2-4-3-1
- d) 1-2-3-4

Solution: b)

Net primary productivity, or NPP, is gross primary productivity minus the rate of energy loss to metabolism and maintenance. In other words, it's the rate at which energy is stored as biomass by plants or other primary producers and made available to the consumers in the ecosystem.

Net primary productivity varies among ecosystems and depends on many factors. These include solar energy input, temperature and moisture levels, carbon dioxide levels, nutrient availability, and community interactions.

Tropical rain forests receive overall more rainfall than seasonal forests and grasslands. Also, a forest will certainly be more productive than grassland.

35) Consider the following statements regarding Alpha and beta diversity.

1. Alpha diversity is the diversity within an ecosystem which is generally described as the number of species.
2. Beta diversity is the geographic diversity which refers to the total diversity of a region.

Which of the above statements is/are correct?

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

Solution: a)

Alpha is the diversity within an ecosystem which is generally described as the number of species.

Beta diversity involves the comparison of different ecosystems in environmental gradients, for example, in a mountainous area within a coastal area. Beta diversity shows us the size of the change of species from one ecosystem to another.

Gamma diversity refers to the total diversity of a region, i.e. the geographic diversity. It is the sum of the alpha diversity of various ecosystems.

36) Photoperiodism is a phenomenon related to

1. Flowering in plants
2. Mode of photosynthesis in plants

Which of the above statements is/are correct?

- a) 1 only
- b) 2 only
- c) Both 1 and 2
- d) None of the above

Solution: a)

Photoperiodism is the physiological reaction of organisms to the length of day or night. It occurs in plants and animals.

- It has been observed that some plants require a periodic exposure to light to induce flowering. It is also seen that such plants are able to measure the duration of exposure to light.
- For example, some plants require the exposure to light for a period exceeding a well defined critical duration, while others must be exposed to light for a period less than this critical duration before the flowering is initiated in them.
- Together with temperature changes, photoperiod provokes changes in the colour of fur and feathers, migration, entry into hibernation, sexual behaviour etc. For e.g. the singing frequency of birds such as the canary depends on the photoperiod.

37) Consider the following about Seaweed.

1. Size of seaweeds range from that of a phytoplankton to a kelp forest.
2. They are rich in vitamins, minerals and fibre.
3. Multi-cellular algae cannot be characterized as seaweed.

Which of the above statements is/are correct?

- a) 1 only
- b) 2, 3
- c) 1, 2
- d) 1, 3

Solution: c)

A seaweed may belong to one of several groups of multi-cellular algae: the red algae, green algae, and brown algae.

- Many seaweeds contain anti-inflammatory and anti-microbial agents. Their known medicinal effects have been legion for thousands of years; the ancient Romans used them to treat wounds, burns, and rashes.
- Some seaweeds are microscopic, such as the phytoplankton that live suspended in the water column and provide the base for most marine food chains.
- Some are enormous, like the giant kelp that grow in abundant "forests" and tower like underwater redwoods from their roots at the bottom of the sea.
- Most are medium-sized, come in colors of red, green, brown, and black, and randomly wash up on beaches and shorelines just about everywhere.

38) Consider the following statements.

1. Phytoplanktons are the foundation of the aquatic food web as the primary producers and they help absorb atmospheric carbon dioxide.
2. Zoo plankton feed on phytoplankton and play a vital role in transfer of organic matter from primary producers to secondary consumers.

Which of the above statements is/are correct?

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

Solution: c)

Phytoplanktons are the foundation of the aquatic food web, the primary producers.

Zoo plankton feed on phytoplankton and play a vital role in food web of the food chain, nutrient recycling, and in transfer of organic matter from primary producers to secondary consumers like fishes.

Their role in the carbon cycle is quite different from that of trees and other land plants, which actually absorb CO₂ and serve as a storehouse, or "sink", of carbon.

39) Which of the following conditions is/are suitable for the growth of seaweed?

1. Turbid water
2. Freshwater inflows
3. Water temperature ranging from 25 °C to 30 °C

Select the correct answer code:

- a) 2 only
- b) 1, 3
- c) 3 only
- d) None of the above

Solution: c)

A water temperature ranging from 25 °C to 30 °C is best for growing seaweed. In shallow waters near the beach, the water temperature can become quite high especially during a sunny day. Such an area is not suitable for planting seaweed.

Fresh water kills seaweed. But Seaweed prefers clear saline water and plenty of sunlight, even turbid water (muddy) will not sustain good seaweed growth.

If the water current is too strong, it can damage your plants and even wash away your planted lines by pulling down the stakes.

They are the only group of higher plants adapted to life in the salt water. Major Sea grass meadows in India occur along the south east coast of Tamil Nadu, in the lagoons of a few Lakshadweep Island and Andaman and Nicobar Islands.

40) Consider the following statements regarding Seagrass.

1. They are found from the tropics to the Arctic and Antarctica.
2. They do not have roots and derive all the nutrition from petals.
3. They are called "lungs of the sea" as they generate substantial oxygen through photosynthesis.

Which of the above statements is/are correct?

- a) 1, 3
- b) 3 only
- c) 1, 2
- d) 1 only

Solution: b)

Seagrasses are found in shallow salty and brackish waters in many parts of the world, from the tropics to the Arctic Circle, **except the Antarctica.**

Even though seagrasses and seaweeds look superficially similar, they are very different organisms. **Seagrasses have leaves, roots and veins, and produce flowers and seeds. The roots and rhizomes (thicker horizontal stems) of seagrasses extend into the sediment of the seafloor and are used to store and absorb nutrients, as well as anchor the plants.**

They are one of the most productive ecosystems in the world. Seagrasses provide shelter and food to an incredibly diverse community of animals, from tiny invertebrates to large fish, crabs, turtles, marine mammals and birds.

Seagrasses are known as the "lungs of the sea" because one square meter of seagrass can generate 10 liters of oxygen every day through photosynthesis. Seagrass leaves also absorb nutrients and slow the flow of water, capturing sand, dirt and silt particles.

41) Which of the following are the Biodiversity Hotspots in India?

1. Western Ghats
2. Himalayas
3. Indo-Bhutan region
4. Sundaland

Select the correct answer code:

- a) 1, 2, 3
- b) 2, 3, 4
- c) 1, 2, 4
- d) 1, 2, 3, 4

Solution: c)

India has some of the world's most biodiverse regions. It hosts 4 biodiversity hotspots: the **Himalayas, the Western Ghats, the Indo-Burma region and the Sundaland (Includes group of Islands).**

42) Galathea National Park and the Campbell Bay National Park are part of

- a) Nanda Devi Biosphere Reserve
- b) Dibru-Saikhowa
- c) Great Nicobar Biosphere Reserve

d) Pachmarhi Biosphere Reserve

Solution: c)

Great Nicobar Biosphere Reserve (GNBR) comprising of the Galathea National Park and the Campbell Bay National Park.

43) Tadoba Andhari Tiger Reserve, recently seen in news is located in

- a) Andhra Pradesh
- b) Manipur
- c) Maharashtra
- d) Madhya Pradesh

Solution: c)

The **Tadoba Andhari Tiger Reserve** is a wildlife sanctuary in Chandrapur district of **Maharashtra**. It is Maharashtra's oldest and largest national park. The reserve includes the Tadoba National Park and the Andhari Wildlife Sanctuary.

44) The primary productivity of the tropical rain forest is lower when compared to that of the temperate forests. This is because of

- a) Intense leaching of soil in tropical rain forests
- b) Low microbial activity in tropical regions
- c) Dense vegetation Cover in tropical rain forests
- d) Practice of slash and burn agriculture in many tropical regions

Solution: a)

The soil is poor in nutrients and acidic due to **frequent leaching by heavy rains**.

Frequent rains wash away the top soil leaving only certain mineral and organic remains. So, if these forests are cleared, it will not yield tremendous vegetation growth as seen in tropical forests for a long time. However, rainforests are also notable for replenishing the soil quickly with dead organic matter (e.g. leaves that fall from trees).

45) Consider the following statements.

1. The park was created to protect its keystone species, the Nilgiri tahr.
2. The park is characterised by montane grasslands and shrublands interspersed with sholas in a high-altitude area of high rainfall, near-freezing temperatures and high winds.
3. The park is a part of Nilgiri Biosphere Reserve.

The above statements mainly refer to

- a) Mukurthi National Park
- b) Mudumalai National Park
- c) Eravikulam National Park
- d) Silent Valley National Park

Solution: a)

Mukurthi National Park (MNP) is a protected area located in the western corner of the Nilgiris Plateau west of Ootacamund hill station in the northwest corner of Tamil Nadu state in the Western Ghats mountain range of South India. The park was created to protect its keystone species, the Nilgiri tahr.

The park is characterised by montane grasslands and shrublands interspersed with sholas in a high-altitude area of high rainfall, near-freezing temperatures and high winds. It is home to an array of endangered wildlife, including royal Bengal tiger and Asian elephant, but its main mammal attraction is the **Nilgiri tahr**. The park was previously known as Nilgiri Tahr National Park.

The park is a **part of Nilgiri Biosphere Reserve**, India's first International Biosphere Reserve. As part of the Western Ghats, it is a UNESCO World Heritage Site since 1 July 2012.

46) Ecological Succession is generally characterized by

1. Increased productivity
2. Decreased niche development
3. Increased complexity of food webs

Select the correct answer code:

- a) 1, 2
- b) 1, 3
- c) 2, 3
- d) 1, 2, 3

Solution: b)

Ecological succession, the process by which the structure of a biological community evolves over time. The time scale can be decades (for example, after a wildfire), or even millions of years after a mass extinction. The community begins with relatively few pioneering plants and animals and develops through increasing complexity until it becomes stable or self-perpetuating as a climax community.

Two different types of succession—primary and secondary—have been distinguished.

- Primary succession occurs in essentially lifeless areas—regions in which the soil is incapable of sustaining life as a result of such factors as lava flows, newly formed sand dunes, or rocks left from a retreating glacier.
- Secondary succession occurs in areas where a community that previously existed has been removed; it is typified by smaller-scale disturbances that do not eliminate all life and nutrients from the environment.

Increased niche development is the characteristic feature of Ecological succession.

47) With reference to ecological succession, the term Seral stage refers to

- a) Intermediate stage in an ecological succession.
- b) Final stage in the ecological succession that is in near equilibrium with the environment.
- c) First stage of primary succession in an area.
- d) First stage of secondary succession in areas where natural biotic communities have been destroyed.

Solution: a)

A seral stage is an intermediate stage found in ecological succession in an ecosystem advancing towards its climax community. In many cases more than one seral stage evolves until climax conditions are attained.

48) What do you understand by Ecological footprint?

- a) The way in which ecological agents reveal their preferences through ecological activity
- b) A degree of impairment to an ecosystem, which when surpassed is too severe to allow recovery of that ecosystem
- c) An index of the area of a productive ecosystem required to produce the resources used and to assimilate the wastes produced by a defined population
- d) Non-monetary assessment of ecosystem integrity, health or resilience

Solution: c)

As per the Millennium Eco Assessment it is an **index of the area of productive land and aquatic ecosystems required to produce the resources used and to assimilate the wastes produced by a defined population at a specified material standard of living, wherever on Earth that land may be located.**

Ecological footprint analysis is widely used around the Earth in support of sustainability assessments.

It can be used to measure and manage the use of resources throughout the economy and explore the sustainability of individual lifestyles, goods and services, organizations, industry sectors, neighborhoods, cities, regions and nations.

49) Consider the following statements regarding dissolved oxygen in an aquatic ecosystem.

1. It increases with increase in temperature of a water-body.
2. Its concentration in fresh water is usually more than the concentration of oxygen in air.
3. Snow cover of ice on water reduces dissolved oxygen concentration.

Which of the above statements is/are correct?

- a) 1, 2
- b) 3 only
- c) 1, 3
- d) 1, 2, 3

Solution: b)

Dissolved oxygen (DO) is a measure of how much oxygen is dissolved in the water - the amount of oxygen available to living aquatic organisms. The amount of dissolved oxygen in a stream or lake can tell us a lot about its water quality.

Oxygen concentrations are much higher in air, which is about 21% oxygen, than in water, which is a tiny fraction of 1 percent oxygen.

Dissolved oxygen levels decrease with increasing temperature and atmospheric oxygen content is far higher than dissolved oxygen levels.

Ice and snow reduce the amount of sunlight reaching aquatic plants, thereby reducing photosynthesis and oxygen production.

50) Consider the following statements regarding Keoladeo National Park.

1. Keoladeo National Park is a famous avifauna sanctuary that hosts thousands of birds, especially during the winter season.
2. It is a natural wetland and also a UNESCO World Heritage Site.
3. It is located in the middle of Central Asian migratory flyway.

Which of the above statements is/are correct?

- a) 1, 2
- b) 1, 3
- c) 2, 3
- d) 1, 2, 3

Solution: b)

Keoladeo National Park formerly known as the Bharatpur Bird Sanctuary in Bharatpur, Rajasthan, is a famous **avifauna sanctuary that hosts thousands of birds, especially during the winter season. It is also a UNESCO World Heritage Site.**

It is a **man-made and man-managed wetland.**

Due to its strategic location in the **middle of Central Asian migratory flyway** and presence of water, large congregations of ducks, geese, coots, pelicans and waders arrive in the winter.

The park was the only known wintering site of the central population of the Siberian Crane, and also serves as a wintering area for other globally threatened species such as the Greater Spotted Eagle and Imperial Eagle.

51) Consider the following statements.

1. Climate change and unprecedented floods can facilitate the introduction of aquatic invasive alien species into new habitats.
2. Invasive alien species slowly begin to wipe out local diversity and the economy by altering the functions of the ecosystem.

Which of the above statements is/are correct?

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

Solution: c)

Climate change and unprecedented floods resulting from cloud bursts have facilitated the introduction of aquatic invasive alien species into new habitats in India. This phenomenon threatens ecosystems, habitats and native species. Recently, a study revealed the role of the 2018 floods in introducing the most dangerous fish species into Kerala's wetlands.

Researchers say that during heavy floods, invasive alien fishes which are illegally farmed in fragile systems, including domestic aquarium tanks, ponds, lakes and abandoned quarries, effortlessly escape from captivity and enter nearby wetlands. After a while, they **slowly begin to wipe out local diversity and the economy by altering the functions of the ecosystem.**

52) A greenhouse is made up of glass. What is the property of this glass?

- a) It is transparent to incoming short-wave solar radiation and opaque to outgoing long wave radiation.
- b) It is opaque to incoming short-wave solar radiation and transparent to outgoing long wave radiation.
- c) It is transparent to incoming long wave solar radiation and opaque to outgoing short wave radiation.
- d) It is opaque to incoming long wave solar radiation and transparent to outgoing short wave radiation.

Solution: a)

The glass allows in more radiation and prevents the long wave radiation going outside the glass house, causing the temperature inside the glasshouse structure warmer than outside.

When you enter a car or a bus, during summers, where windows are closed, you feel more heat than outside. Likewise during winter the vehicles with closed doors and windows remain warmer than the temperature outside.

53) Consider the following statements.

1. Global warming potential (GWP) is a measure of how much energy the emissions of 1 ton of any greenhouse gas (GHG) will absorb over a given period of time, relative to the emissions of 1 ton of carbon dioxide (CO₂).
2. The larger the GWP, the more that a given GHG warms the Earth compared to CO₂ over that time period.
3. The time period usually used for GWPs is 10 years.

Which of the above statements is/are correct?

- a) 1 only
- b) 1, 2
- c) 1, 3
- d) 2, 3

Solution: b)

The Global Warming Potential (GWP) was developed to allow comparisons of the global warming impacts of different greenhouse gases. Specifically, **it is a measure of how much energy the emissions of 1 ton of any greenhouse gas will absorb over a given period of time, relative to the emissions of 1 ton of carbon dioxide (CO₂).** The larger the GWP, the more that a given gas warms the Earth compared to CO₂ over that time period.

The time period usually used for GWPs is 100 years. GWPs provide a common unit of measure, which allows analysts to add up emissions estimates of different gases (e.g., to compile a national GHG inventory), and allows policymakers to compare emissions reduction opportunities across sectors and gases.

CO₂, by definition, has a GWP of 1 regardless of the time period used, because it is the gas being used as the reference.

54) Which of the following has/have been observed to destroy Ozone layer?

1. Polar Vortex
2. Higher than usual temperatures in the stratosphere.
3. Stratospheric clouds that react with chlorofluorocarbons (CFCs)

Select the correct answer code:

- a) 1 only
- b) 1, 3
- c) 1, 2, 3
- d) 2, 3

Solution: b)

The cause of the formation of the ozone hole is attributed to the unusual weather at the poles.

Polar vortex is a whirling cone of low pressure over the poles that is strongest in the winter months due to the increased temperature contrast between the polar regions and the mid-latitudes, such as the US and Europe.

The unique cocktail of the powerful vortex and low temperatures generates Stratospheric clouds that react with CFCs and destroy the Ozone layer in the process.

Ozone depletion also explains much of the observed **reduction in stratospheric and upper tropospheric temperatures.**

55) Consider the following statements.

1. The Arctic is warming far more quickly than Antarctic.
2. The accelerated Arctic warming changes the temperature contrast between mid and high latitudes.
3. Arctic warming can be beneficial for the whales.

Which of the above statements is/are correct?

- a) 1, 2
- b) 1, 3
- c) 2, 3
- d) 1, 2, 3

Solution: d)

The Arctic is warming far more quickly.

While both the Arctic and Antarctic are experiencing rising temperatures, thinning glaciers, disturbed ecosystems, and other alarming shifts as heat-trapping fossil fuel emissions build up, **changes are sweeping the northern region far faster.**

The High North is seeing unprecedented changes, including drastic ice losses on land and sea, galloping permafrost thaw, raging wildfires, unseasonal storms, earlier springs, and more.

The accelerated Arctic warming impacts weather down in the lower 48 and around the entire Northern Hemisphere by **changing the temperature contrast between mid and high latitudes.**

Arctic warming also stands to disrupt the marine food web, increase mortality for polar bears and seals, and threaten the livelihoods of the region's indigenous people. One bright note in the outlook: So far **whales seem to be benefitting from range expansion as sea ice recedes**.

56) Carbon Capture Utilization Storage (CCUS) is the process of

- a) Capturing waste carbon dioxide from large point sources and reusing it
- b) Redistributing captured carbon from storage in the atmosphere to mitigate de-calcification in marine sources
- c) Generating carbon certificates from carbon-intensive activities and issuing them based on the carbon footprint associated with each such activity
- d) Destroying atmospheric CO₂ by way of electrostatic precipitators and storing the residue in specialized storages

Solution: a)

Carbon capture utilization storage is the process of capturing waste carbon dioxide (CO₂) from large point sources, such as fossil fuel power plants, and either transporting it to a storage site where it will not enter the atmosphere, normally an underground geological formation, or reusing it.

In Carbon Capture and Storage (CCS), emissions are forced into underground rocks at great cost and no economic benefit while CCUS aims at using CO₂ emissions by exploiting the resource itself and creating new markets around it.

57) Which of the following are the Geoengineering techniques designed to tackle the effects of climate change?

1. Artificial trees that pull the CO₂ from the atmosphere using plastic polymers.
2. Adding large quantities of lime to the Ocean water to increase the amount of CO₂ absorption by the oceans.
3. Using unmanned ships to increase above-ocean cloud cover by spraying sea water into the air.
4. Floating thousands of tiny mirrors in space between Earth and the sun.

Select the correct answer code:

- a) 1, 2, 3
- b) 1, 3, 4
- c) 1, 2, 4
- d) 1, 2, 3, 4

Solution: d)

Geoengineering schemes are projects designed to tackle the effects of climate change directly, usually by removing CO₂ from the air or limiting the amount of sunlight reaching the planet's surface.

The first category of scheme – those designed to remove CO₂ from the air – include machines (sometimes called **"artificial trees") that pull the gas from the atmosphere using plastic polymers**. Other proposals seek to increase the amount of **CO₂ absorbed by the oceans** – for example by **adding large quantities of lime to the water**.

In the second category – schemes designed to **reduce the amount of sunlight reaching Earth** – proposals include firing sulphate aerosols into the stratosphere to reflect sunlight back to space; using unmanned ships to **increase above-ocean cloud cover by spraying sea water into the air**; painting the world's roofs white to increase reflectivity; and even **floating thousands of tiny mirrors in space between Earth and the sun**.

58) Which of the following clearly shows the importance of carbon dioxide in earth's atmosphere?

1. It is essential for the growth of plants.
2. It is the most abundant gas in the atmosphere after nitrogen and oxygen.
3. It absorbs the heat directly incoming from the Sun thus warming the planet.

Select the correct answer code:

- a) 1 only

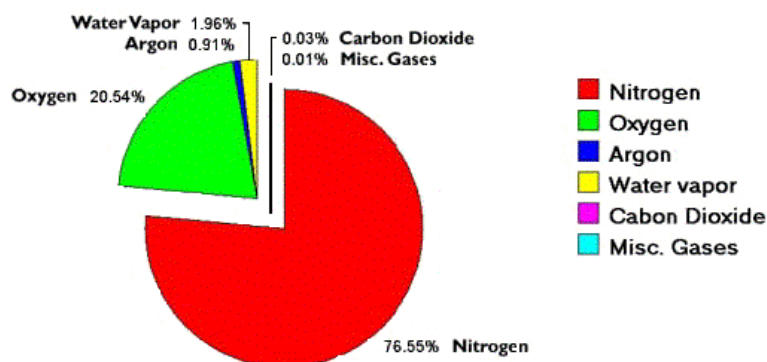
- b) 2, 3
- c) 1, 3
- d) 1, 2, 3

Solution: a)

Statement 1: Green plants use CO₂ gas to prepare their food through photosynthesis.

Statement 2: Argon is the next abundant gas.

The Gases That Comprise Earth's Atmosphere



Statement 3: Carbon dioxide in the atmosphere does not absorb the incoming visible radiations coming from the sun, but **Carbon dioxide blocks the out going infrared radiations radiated by earth. By absorbing infrared radiations, the atmosphere gets heated.** This is known as Green house Effect. The heated atmosphere keeps the earth warm. Thus carbon dioxide helps in keeping the earth warmer by blocking the infrared radiations.

59) Ocean acts as a large carbon sink on earth due to

- a) Its large geographical coverage
- b) Rich population of phytoplankton and seagrass
- c) Difference in the partial pressure of carbon dioxide between seawater and air
- d) All of the above

Solution: d)

Oceans are one of the largest carbon sinks on earth because of their large geographical coverage and presence of rich population of phytoplankton and seagrass, which act as carbon sink.

Carbon dioxide readily dissolves in water and the oceans provide a huge reservoir of carbon. Across the world's oceans there is a continual cycle of equilibration of dissolved carbon dioxide in water with carbon dioxide in the atmosphere.

The difference in partial pressure of the CO₂ between seawater and air facilitate gaseous exchange. This allows atmospheric CO₂ to dissolve in seawater.

The carbon dioxide which dissolves in our oceans occurs in three main forms. Aside from the normal carbon dioxide form, it is also found as bicarbonate and carbonate ions.

60) Consider the following statements.

1. Carbon neutrality refers to achieving net zero carbon dioxide emissions.
2. Carbon neutrality can be achieved only by eliminating carbon dioxide emissions altogether.
3. Renewable energy always produce zero carbon emissions.

Which of the above statements is/are correct?

- a) 1 only
- b) 1, 3
- c) 2, 3

d) 1, 3

Solution: a)

Carbon neutrality refers to achieving net zero carbon dioxide emissions by balancing carbon dioxide emissions with removal (often through carbon offsetting) or simply eliminating carbon dioxide emissions altogether (the transition to the "post-carbon economy").

Although **both renewable and non-renewable energy both produce carbon emissions in some form**, renewable energy has a lesser to almost zero carbon emissions.

61) Consider the following statements regarding National Board for Wildlife.

1. National Board for Wildlife is a Statutory Organization constituted under the Environment (Protection) Act, 1986.
2. It has the power to review all wildlife-related matters and approve projects in and around national parks and sanctuaries.
3. The NBWL is chaired by the Union Environment Ministry.

Which of the above statements is/are correct?

- a) 1, 3
- b) 2, 3
- c) 2 only
- d) 1, 2

Solution: c)

National Board for Wildlife:

- It is a "Statutory Organization" constituted under the **Wildlife Protection Act, 1972**.
- Its role is "advisory" in nature and advises the Central Government on framing policies and measures for conservation of wildlife in the country.
- Primary function of the Board is to promote the conservation and development of wildlife and forests.
- It has power to review all wildlife-related matters and approve projects in and around national parks and sanctuaries.
- No alteration of boundaries in national parks and wildlife sanctuaries can be done without approval of the NBWL.
- Composition: **The NBWL is chaired by the Prime Minister.**

62) Compensatory Afforestation Fund can be utilised for which of the following activities?

1. Wildlife Management
2. Forest Fire Prevention and Control Operations
3. Payment of salary and medical expenses of those working in forest areas
4. Monitoring of CAMPA works

Select the correct answer code:

- a) 1, 2, 3
- b) 1, 2
- c) 1, 2, 3, 4
- d) 1, 2, 4

Solution: d)

The Environment Minister emphasized that the CAMPA funds cannot be used for payment of salary, travelling allowances, medical expenses, etc.

"Important activities on which the fund will be utilised will be for the Compensatory Afforestation, Catchment Area Treatment, Wildlife Management, Assisted Natural Regeneration, Forest Fire Prevention and Control Operations, Soil and Moisture Conservation Works in the forest, Improvement of Wildlife Habitat, Management of Biological Diversity and Biological Resources, Research in Forestry and Monitoring of CAMPA works etc".

- 63) Central Ground Water Authority (CGWA) has been constituted under
- Environment (Protection) Act, 1986
 - Water (Prevention and Control of Pollution) Act, 1974
 - Public Liability Insurance Act, 1991
 - Hazardous waste Handling and management act, 1989

Solution: a)

Central Ground Water Authority (CGWA) has been constituted under Section 3(3) of the 'Environment (Protection) Act, 1986' for the purpose of regulation and control of ground water development and management in the Country.

- 64) Consider the following statements.

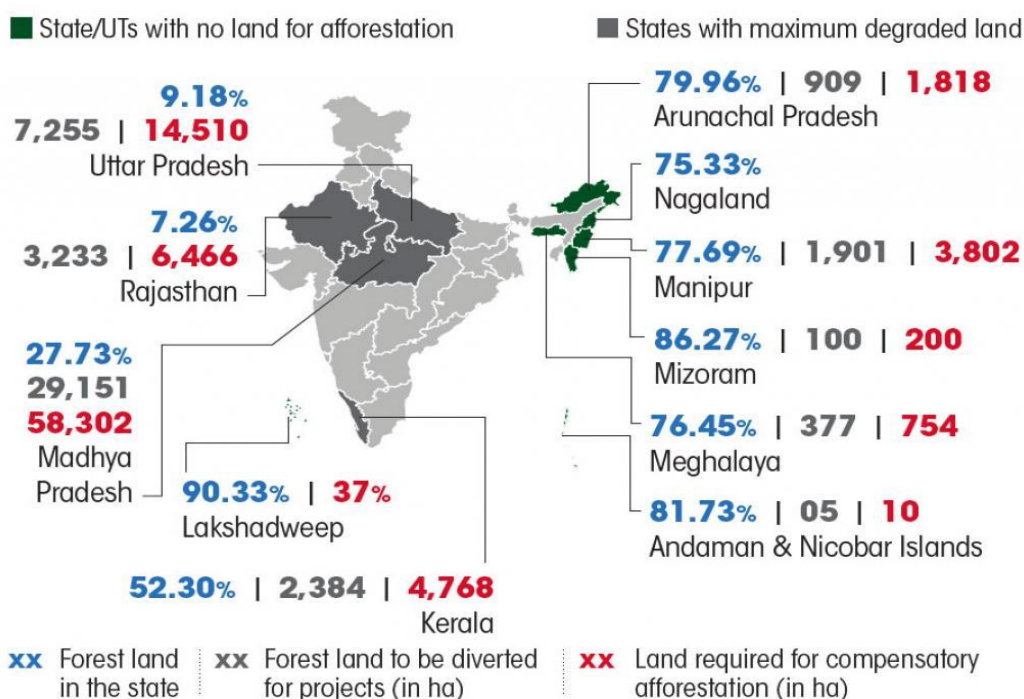
- States and Union Territories with more than 50 per cent of their land under forest cover can undertake compensatory afforestation in other states.
 - Lakshadweep, Arunachal Pradesh, Mizoram and Andaman & Nicobar Islands have more than 75 per cent of their land under forest cover.
 - According to the Forest (Conservation) Act, 1980, each time forest land is diverted, the project proponent has to pay the state for the ecosystem services lost due to diverting forest land.
- Which of the above statements is/are correct?

- 1, 2
- 1, 3
- 2, 3
- 3 only

Solution: c)

States and Union Territories with more than 75 per cent of their land under forest cover can undertake compensatory afforestation in other states. Lakshadweep, Mizoram, Andaman & Nicobar Islands, Arunachal Pradesh, Manipur, Meghalaya and Nagaland fall in this category.

Deforest here, afforest there



Source: Ministry of Environment, Forest and Climate Change

According to the Forest (Conservation) Act, 1980, each time forest land is diverted, the project proponent has to pay the state to undertake plantation and for the ecosystem services lost due to diverting forest land, called Net Present Value (NPV).

Madhya Pradesh, Uttar Pradesh, Kerala and Rajasthan — states with the most degraded land.

65) Consider the following statements.

1. Preservation of forest areas in India under the Forest Conservation Act, 1980 has been monitored by the Supreme Court.
2. Deemed forests refer to land tracts that appear to be a “forest”, but have not been notified so by the government or in historical records.
3. Deemed forests comprise about one fourth of India’s forest land.

Which of the above statements is/are correct?

- a) 1, 2
- b) 1, 3
- c) 2, 3
- d) 1, 2, 3

Solution: a)

Preservation of forest areas in India under the Forest Conservation Act, 1980 has been continuously monitored by the Supreme Court since the Godavarman case judgment in 1996.

While the concept of deemed forests has not been clearly defined in any law including the Forest Conservation Act of 1980.

Deemed forests, which comprise about 1% of India’s forest land, are a controversial subject as they refer to land tracts that appear to be a “forest”, but have not been notified so by the government or in historical records.

66) The terms “Absorptive Capacity” and “Carrying capacity” are used in the discourse of

- a) Evolutionary biology
- b) Geographical determinism
- c) Employment elasticity
- d) Sustainable Development

Solution: d)

The environment performs four vital functions (i) it supplies resources: resources here include both renewable and non-renewable resources. (ii) it assimilates waste (iii) it sustains life by providing genetic and bio diversity and (iv) it also provides aesthetic services like scenery etc. The environment is able to perform these functions without any interruption as long as the demand on these functions is within its **carrying capacity**. **This implies that the resource extraction is not above the rate of regeneration of the resource and the wastes generated are within the assimilating capacity of the environment.**

Absorptive capacity means the ability of the environment to absorb degradation.

67) Consider the following statements regarding “4 per 1000” initiative.

1. The “4 per 1000” initiative intends to increase soil organic matter and carbon sequestration through the implementation of agricultural practices such as agro-forestry and conservation agriculture.
2. It is the initiative of *Food and Agriculture Organization (FAO)*.

Which of the above statements is/are correct?

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

Solution: a)

The "4 per 1000" initiative intends to increase soil organic matter and carbon sequestration through the implementation of agricultural practices adapted to local environmental, social and economic conditions, such as agro-ecology, agro-forestry, conservation agriculture or landscape management.

The initiative commits stakeholders to transition towards productive and highly resilient agriculture, based on the appropriate management of lands and soils, creating jobs and incomes and consequently promoting sustainable development.

This initiative is part of the Global Climate Action Plan (GCAA) adopted by the UNFCCC at COP 22 as a follow-up to the COP 21 Lima-Paris Plan of Action and contributes to the goal of reaching a land-degradation neutral world.

68) Consider the following statements regarding International Union for Conservation of Nature (IUCN).

1. Its main aim is to mobilize the public in support of nature conservation.
2. It has observer and consultative status at the United Nations.
3. It was involved in establishing the World Wide Fund for Nature.

Which of the above statements is/are correct?

- a) 2, 3
- b) 1, 3
- c) 1, 2
- d) 2 only

Solution: a)

The International Union for Conservation of Nature (IUCN) is an international organization working in the field of nature conservation and sustainable use of natural resources. It is involved in data gathering and analysis, research, field projects, advocacy, and education. IUCN's mission is to "influence, encourage and assist societies throughout the world to conserve nature and to ensure that any use of natural resources is equitable and ecologically sustainable".

Over the past decades, IUCN has widened its focus beyond conservation ecology and now incorporates issues related to sustainable development in its projects. **IUCN does not itself aim to mobilize the public in support of nature conservation. It tries to influence the actions of governments, business and other stakeholders by providing information and advice, and through building partnerships.** The organization is best known to the wider public for compiling and publishing the IUCN Red List of Threatened Species, which assesses the conservation status of species worldwide.

IUCN has a membership of over 1400 governmental and non-governmental organizations. Its headquarters are in Gland, Switzerland.

IUCN has observer and consultative status at the United Nations and plays a role in the implementation of several international conventions on nature conservation and biodiversity. It was involved in establishing the World Wide Fund for Nature and the World Conservation Monitoring Centre.

IUCN was established in 1948. It was previously called the International Union for the Protection of Nature (1948–1956) and the World Conservation Union (1990–2008).

69) Consider the following statements regarding Global Tiger Initiative (GTI).

1. Global Tiger Initiative (GTI) is a global alliance of governments, international organizations, civil society, the conservation and scientific communities and the private sector, with the aim of working together to save wild tigers from extinction.
2. The initiative is led by all tiger range countries (TRCs).
3. The scope of GTI also includes Asiatic Lions.
4. World Bank is one of the founding partners of GTI.

Which of the above statements is/are correct?

- a) 1, 2, 3, 4
- b) 1, 2, 4
- c) 1, 3, 4
- d) 1, 4

Solution: b)

The Global Tiger Initiative (GTI) was launched in 2008 as a global alliance of governments, international organizations, civil society, the conservation and scientific communities and the private sector, with the aim of working together to save wild tigers from extinction. In 2013, the scope was broadened to include Snow Leopards.

The GTI's founding partners included the **World Bank**, the Global Environment Facility (GEF), the Smithsonian Institution, Save the Tiger Fund, and International Tiger Coalition (representing more than 40 non-government organizations). The **initiative is led by the 13 tiger range countries (TRCs).**

In November 2010, leaders of the tiger range countries (TRCs) assembled at an International Tiger Forum in St. Petersburg, Russia to adopt the **St. Petersburg Declaration on Tiger Conservation** and endorsed its implementation mechanism, called the **Global Tiger Recovery Program**. Their overarching goal was to **double the number of wild tigers** across their geographical area from about 3,200 to more than 7,000 by 2022.

70) Forest Carbon Partnership Facility (FCPF) and Forest Investment Program (FIP) are the initiatives by

- a) UN Environment
- b) World Bank
- c) United Nations Development Programme
- d) Food and Agriculture Organisation

Solution: b)

Forest Investment Programme (FIP) was established by the World Bank in 2009 for supporting sustainable forest management and reforestation activities, in line with REDD+ objectives.

Forest Carbon Partnership Facility (FCPF) is a World Bank programme and consists of a Readiness Fund and a Carbon Fund. The FCPF was created to assist developing countries to reduce emissions from deforestation and forest degradation, enhance and conserve forest carbon stocks, and sustainably manage forests (REDD+).

71) The higher the amount of biological oxygen demand (BOD) in a certain segment of water

1. The greater the amount of organic matter available for oxygen consuming bacteria.
2. Higher could be the level of pollution in the water

Select the correct answer code:

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

Solution: c)

Biochemical Oxygen Demand or Biological Oxygen Demand, is a measurement of the amount of dissolved oxygen (DO) that is used by aerobic microorganisms when decomposing organic matter in water.

Biochemical Oxygen Demand is an important water quality parameter because it provides an index to assess the effect discharged wastewater will have on the receiving environment. **The higher the BOD value, the greater the amount of organic matter or "food" (read nutrients) available for oxygen consuming bacteria.**

72) A substantial increase in atmospheric aerosols is likely to

1. Affect rainfall patterns
2. Cut down the destruction of stratospheric ozone significantly
3. Increase global warming by large proportions

Select the correct answer code:

- a) 1 only
- b) 1, 3
- c) 1, 2, 3
- d) 1, 2

Solution: a)

Aerosols are minute particles suspended in the atmosphere. When these particles are sufficiently large, we notice their presence as they scatter and absorb sunlight. Their scattering of sunlight can reduce visibility (haze) and redden sunrises and sunsets.

Aerosols interact both directly and indirectly with the Earth's radiation budget and climate. As a direct effect, the **aerosols scatter sunlight directly back into space**. As an indirect effect, aerosols in the lower atmosphere can modify the size of cloud particles, changing how the clouds reflect and absorb sunlight, thereby affecting the Earth's energy budget.

Aerosols also can act as sites for chemical reactions to take place (heterogeneous chemistry). The most significant of these reactions are those that lead to the **destruction of stratospheric ozone**. During winter in the polar regions, aerosols grow to form polar stratospheric clouds. The large surface areas of these cloud particles provide sites for chemical reactions to take place. These reactions lead to the formation of large amounts of reactive chlorine and, ultimately, to the destruction of ozone in the stratosphere.

73) Consider the following statements regarding Methane Emissions.

1. Wetlands contribute the maximum share for the global methane emissions.
2. Temperate regions and Arctic are the major contributors of Methane.
3. Methane is categorised as a Short-lived climate pollutant, that have relatively short lifetime in the atmosphere.

Which of the above statements is/are correct?

- a) 1, 2
- b) 1, 3
- c) 2, 3
- d) 1, 2, 3

Solution: b)

The amount of methane in Earth's atmosphere continues to rise. That is the conclusion of two new studies from the **Global Carbon Project**.

They found that global emissions of the potent greenhouse gas totalled 576 million metric tons per year for the 2008 to 2017 decade—a 9 percent increase compared to the previous decade.

Across the study years, **wetlands contributed 30 percent of global methane emissions**, with oil, gas, and coal activities accounting for 20 percent. Agriculture, including enteric fermentation and manure management, made up 24 percent of emissions, and landfills comprised 11 percent. **Sixty-four percent of emissions came from tropical regions** of South America, Asia, and Africa, with temperate regions accounting for 32 percent and the Arctic contributing 4 percent.

Short-lived climate pollutants are powerful climate forcers that remain in the atmosphere for a much shorter period of time than carbon dioxide (CO₂), yet their potential to warm the atmosphere can be many times greater. Certain short-lived climate pollutants are also dangerous air pollutants that have harmful effects for people, ecosystems and agricultural productivity.

The **short-lived climate pollutants: black carbon, methane, tropospheric ozone**, and hydrofluorocarbons are the most important contributors to the man-made global greenhouse effect after carbon dioxide, responsible for up to 45% of current global warming.

74) Consider the following statements regarding *Eutrophication*.

1. *Eutrophication* is when a body of water becomes overly enriched with minerals and nutrients which induce excessive growth of algae and in turn, increases water quality.

2. Increase of phytoplankton in a water body is the response to increased levels of nutrients.

Which of the above statements is/are correct?

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

Solution: b)

Eutrophication is when a body of water becomes overly enriched with minerals and nutrients which induce excessive growth of algae. This process may result in oxygen depletion of the water body. One example is an "algal bloom" or great increase of phytoplankton in a water body as a response to increased levels of nutrients. Eutrophication is often induced by the discharge of nitrate or phosphate-containing detergents, fertilizers, or sewage into an aquatic system.

75) During winter the vehicles with closed doors and windows remain warmer than the temperature outside.

This may be due to

- a) Greenhouse effect
- b) Heat Conduction by metallic frame of vehicle
- c) Ionizing radiation effect
- d) High pollution outside the vehicle

Solution: a)

A greenhouse is made up of glass. The glass which is transparent to incoming short wave solar radiation is opaque to outgoing long wave radiation. The glass, therefore, allows in more radiation and prevents the long wave radiation going outside the glass house, causing the temperature inside the glasshouse structure warmer than outside.

When you enter a car or a bus, during summers, where windows are closed, you feel more heat than outside. Likewise during winter the vehicles with closed doors and windows remain warmer than the temperature outside.

