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Table of Contents

1. POLITY2

2. GEOGRAPHY16

3. ENVIRONMENT28

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1. Polity

1) Consider the following statements regarding Regulating Act of 1773.

1. It was the first step taken by the British Government to control and regulate the affairs of the East India Company in India.
2. It provided for the establishment of a Supreme Court at Bombay presidency.
3. It designated the Governor of Bengal as the 'Governor-General of India' and vested in him major executive powers.

Which of the above statements is/are correct?

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

Solution: a)

This act is of great constitutional importance as (a) it was the **first step taken by the British Government to control and regulate the affairs of the East India Company in India**; (b) it recognised, for the first time, the political and administrative functions of the Company; and (c) it laid the foundations of central administration in India.

It designated the Governor of Bengal as the 'Governor-General of Bengal' and created an Executive Council of four members to assist him. The first such Governor-General was Lord Warren Hastings.

It provided for the establishment of a Supreme Court at Calcutta.

2) Consider the following statements regarding Charter Act of 1833.

1. It ended the activities of the East India Company as a commercial body, which became a purely administrative body.
2. It provided for reservation of Indians in the covenanted civil services.

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 Charter Act of 1833 attempted to introduce a system of open competition for selection of civil servants, and stated that the Indians should not be debarred from holding any place, office and employment under the Company. However, this provision was negated after opposition from the Court of Directors.

It ended the activities of the East India Company as a commercial body, which became a purely administrative body. It provided that the company's territories in India were held by it 'in trust for His Majesty, His heirs and successors'.

3) A law member was added to Governor-General's Council, under which of the following Acts?

- a) Pitt's India, 1784
- b) Charter Act, 1813
- c) Charter Act, 1833
- d) Charter Act, 1853

Solution: c)

Provision was made under the **Charter Act, 1833 for the addition of a law member to the Governor-General's Council. Lord Macaulay was the first Law Member appointed under the Act.** The Governor-General was also advised to appoint a Law Commission to codify all the laws.

4) Consider the following statements.

1. The idea of a constituent assembly for India was first put forward by Jawaharlal Nehru
2. The Constituent assembly was constituted in 1943 after the approval of the Cripps Proposals.

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)

MN Roy had put forth the idea of a Constituent assembly of India in 1934. Later the INC demanded it.

During the Second World War, this assertion for an independent Constituent Assembly formed only of Indians gained momentum and this was **convened in December 1946.**

Between December 1946 and November 1949, the Constituent Assembly drafted a constitution for independent India.

5) Consider the following statements regarding 'Objectives resolution'.

1. The resolution laid down the fundamentals and philosophy of the constitutional structure.
2. This Resolution was unanimously adopted by the Constituent Assembly.
3. It missed out on the safeguards for minorities, backward and tribal areas.

Which of the above statements is/are correct?

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

Solution: b)

- In December, 1946, **Jawaharlal Nehru moved the historic 'Objectives Resolution' in the Assembly. It laid down the fundamentals and philosophy of the constitutional structure.**
- It included the major values and ideals of sovereignty, republic, fundamental rights, directive principles, non-interference etc.
- It sought to secure to ideals mentioned in the Preamble.
- **It provided for adequate safeguards for minorities, backward and tribal areas,** and depressed and other backward classes.
- **This Resolution was unanimously adopted by the Assembly** on January 22, 1947. It influenced the eventual shaping of the constitution through all its subsequent stages. Its modified version forms the Preamble of the present Constitution.

6) Consider the following statements.

1. Article 341 of the Constitution provides certain privileges and concessions to the members of Scheduled Castes.
2. President alone is vested with the power to include or exclude any entry in the Scheduled Castes (SC) list.
3. Reservation is provided for Scheduled Castes both in the Lok Sabha and Rajya Sabha.

Which of the above statements is/are incorrect?

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

Solution: c)

Article 341 of the Constitution provides certain privileges and concessions to the members of Scheduled Castes.

Under the provision of Article 341, first list of SCs in relation to a states/UT is to be issued by a notified Order of the President after consulting concerned state Government.

But the clause (2) of Article 341 envisages that, any subsequent inclusion in or exclusion from the list of Scheduled Castes can be effected through an Act of Parliament.

Parliament alone is vested with the power to include or exclude any entry in the SC list under Article 341 of the Constitution.

Statement 3: Reservation is there only in the Lok Sabha.

7) Consider the following statements.

1. Article 256 of the Constitution obligates the State government to ensure implementation of the laws made by Parliament.
2. The refusal to enforce the laws made by Parliament even after the Centre issues directions would empower the President to impose President's Rule in those States under Articles 356 and 365.
3. *S.R. Bommai v. Union of India* is a significant case on Indian federalism.

Which of the above statements is/are correct?

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

Solution: d)

Article 256 of the Constitution obligates the State government to ensure implementation of the laws made by Parliament. If the State government fails to do so, the Government of India is empowered to give "such directions to a State as may appear... to be necessary". **The refusal to enforce the law even after the Centre issues directions would empower the President to impose President's Rule in those States under Articles 356 and 365.** The Supreme Court of India has also confirmed this reading of the law in *S.R. Bommai v. Union of India* — arguably the most significant case on Indian federalism.

8) Consider the following statements regarding the functions of the Law Commission of India.

1. Take all such measures as may be necessary to harness law and the legal process in the service of the poor.
2. Suggest such legislations as might be necessary to implement the Directive Principles and to attain the objectives set out in the Preamble of the Constitution.
3. Identify laws which are no longer needed or relevant and can be immediately repealed.
4. Consider the requests for providing research to any foreign countries as may be referred to it by the Government through Ministry of Law and Justice.

Which of the above statements is/are correct?

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

Solution: d)

The Law Commission of India shall, inter-alia, :-

- identify laws which are no longer needed or relevant and can be immediately repealed;

- examine the existing laws in the light of Directive Principles of State Policy and suggest ways of improvement and reform and also suggest such legislations as might be necessary to implement the Directive Principles and to attain the objectives set out in the Preamble of the Constitution;
- consider and convey to the Government its views on any subject relating to law and judicial administration that may be specifically referred to it by the Government through Ministry of Law and Justice (Department of Legal Affairs);
- Consider the requests for providing research to any foreign countries as may be referred to it by the Government through Ministry of Law and Justice (Department of Legal Affairs);
- take all such measures as may be necessary to harness law and the legal process in the service of the poor;
- revise the Central Acts of general importance so as to simplify them and remove anomalies, ambiguities and inequities;

9) Consider the following statements regarding the power of the Speaker of the Lok Sabha with respect to the suspension of a member of the house.

1. In order to ensure that proceedings are conducted in the proper manner, the Speaker of the Lok Sabha is empowered to force a Member to withdraw from the House for the remaining part of the day, or to place him/her under suspension.

2. The Speaker has the authority for the revocation of suspension.

3. Similar function in Rajya Sabha is carried out by the Deputy Chairman of the Rajya Sabha.

Which of the above statements is/are incorrect?

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

Solution: b)

In order to ensure that proceedings are conducted in the proper manner, the Speaker is empowered to force a Member to withdraw from the House (for the remaining part of the day), or to place him/her under suspension.

While the Speaker is empowered to place a Member under suspension, the **authority for revocation of this order is not vested in her. It is for the House**, if it so desires, to resolve on a motion to revoke the suspension.

Like the Speaker in Lok Sabha, the Chairman of the Rajya Sabha is empowered under Rule Number 255 of its Rule Book to “direct any Member whose conduct is in his opinion grossly disorderly to withdraw immediately” from the House.

“...Any Member so ordered to withdraw shall do so forthwith and shall absent himself during the remainder of the day’s meeting.”

The Chairman may “name a Member who disregards the authority of the Chair or abuses the rules of the Council by persistently and wilfully obstructing” business. In such a situation, the House may adopt a motion suspending the Member from the service of the House for a period not exceeding the remainder of the session.

The House may, however, by another motion, terminate the suspension.

Unlike the Speaker, however, the Rajya Sabha Chairman does not have the power to suspend a Member.

10) Consider the following statements regarding Inter-State Council.

1. The Inter-State Council is a permanent constitutional body set up by a presidential order.

2. It was formed based on the recommendation of Sarkaria Commission.

3. It is headed by Union Home Minister.

Which of the above statements is/are correct?

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

Solution: a)

The Inter-State Council is a non-permanent constitutional body set up by a presidential order on the basis of provisions in Article 263 of the Constitution of India. The body was formed by a presidential order dated 28 May 1990 on **recommendation of Sarkaria Commission**. The Council is formed to discuss or investigate policies, subjects of common interest, and disputes among states.

Prime Minister of India is the Chairman of Inter-State Council.

11) Which of these acts, for the first time, provided for the association of Indians with the executive Councils of the Viceroy and introduced the system of communal representation?

- a) Indian Councils Act of 1909
- b) Government of India Act of 1919
- c) Government of India Act 1935
- d) Councils Act 1891

Solution: a)

- This Act is also known as Morley-Minto Reforms.
- **The Indian Councils Act 1909 empowered the Governor General to nominate one Indian member to the Executive Council** leading to the appointment of Satyendra Prasanna Sinha as the first Indian member. The Government of India Act 1919 increased the number of Indians in the council to three.
- It **introduced a system of communal representation for Muslims** by accepting the concept of 'separate electorate'. Under this, the Muslim members were to be elected only by Muslim voters. Thus, the Act 'legalised communalism' and Lord Minto came to be known as the Father of Communal Electorate.

12) Consider the following statements.

1. The Government of India (GoI) Act of 1935 provided for a three-fold enumeration, viz., federal, provincial and concurrent subjects for legislation.
2. In the GoI Act 1935, residuary powers were given to the Central legislature.

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 Government of India (GoI) Act of 1935 provided for a three-fold enumeration, viz., federal, provincial and concurrent.

The present Constitution follows the scheme of this act but with one difference, that is, under this act, the **residuary powers were given neither to the federal legislature nor to the provincial legislature but to the governor-general of India**. In this respect, India follows the Canadian precedent.

13) Consider the following statements regarding Government of India Act of 1919.

1. It introduced, for the first time, bicameralism and direct elections in the country.
2. It relaxed the central control over the provinces by demarcating and separating the central and provincial subjects.
3. It separated, for the first time, provincial budgets from the Central budget and authorised the provincial legislatures to enact their budgets.

Which of the above statement is/are correct?

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

d) 1, 2

Solution: a)

Features of Government of India Act of 1919

- **It introduced, for the first time, bicameralism and direct elections in the country.** Thus, the Indian Legislative Council was replaced by a bicameral legislature consisting of an Upper House (Council of State) and a Lower House (Legislative Assembly).
- **It relaxed the central control over the provinces by demarcating and separating the central and provincial subjects.**
- **It separated, for the first time, provincial budgets from the Central budget** and authorized the provincial legislatures to enact their budgets.

14) Consider the following statements regarding Constituent assembly.

1. The assembly had representation from both British India and princely states.
2. The system of proportional representation was adopted in the election of assembly.
3. The Assembly included important ministers of the British Cabinet as ex-officio members.

Which of the above statements is/are correct?

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

Solution: b)

- The total strength of the Constituent Assembly was to be 389. Of these, 296 seats were to be allotted to British India and 93 seats to the Princely States. Out of 296 seats allotted to the British India, 292 members were to be drawn from the eleven governors' provinces and four from the four chief commissioners' provinces, one from each.
- Each province and princely state (or group of states in case of small states) were to be allotted seats in proportion to their respective population. Roughly, one seat was to be allotted for every million population.
- Seats allocated to each British province were to be decided among the three principal communities— Muslims, Sikhs and general, in proportion to their population.
- The representatives of each community were to be elected by members of that community in the provincial legislative assembly and voting was to be by the method of proportional representation by means of single transferable vote.
- There was no communal representation.
- It included all important personalities of India at that time, with the exception of Mahatma Gandhi and M A Jinnah.

15) Consider the following statements.

1. With the commencement of the Constitution, all the acts passed during the British Era was repealed.
2. All the parts of the constitution was enforced on August 1947.

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: c)

- With the commencement of the Constitution, the Indian Independence Act of 1947 and the Government of India Act of 1935, with all enactments amending or supplementing the latter Act, were repealed. **The Abolition of Privy Council Jurisdiction Act (1949) was however continued.**

- Some provisions of the Constitution pertaining to citizenship, elections, provisional parliament, temporary and transitional provisions, and short title contained in Articles 5, 6, 7, 8, 9, 60, 324, 366, 367, 379, 380, 388, 391, 392 and 393 came into force on November 26, 1949 itself. The remaining provisions (the major part) of the Constitution came into force on January 26, 1950.

16) Consider the following statements regarding the key features of Indian Federalism?

1. The existence and authority of each tier of government is constitutionally guaranteed.
2. Division of powers between State and Centre cannot be arbitrarily manipulated by the Central government alone.

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)

Each tier has its own jurisdiction in specific matters of legislation, taxation and administration; for e.g. in India states legislate in matters of police, and Centre legislates in areas of national security as a whole.

Tiers may be dependent upon each other; however not completely, else it erodes autonomy.

The fundamental provisions of the constitution cannot be unilaterally changed by one level of government. Such changes require the consent of both the levels of government.

17) Which of these is against the ethos of Indian democracy and constitution?

- a) Proportional Representation
- b) Separation of powers between different government agencies
- c) Religious intolerance
- d) Scientific interpretation of Indian traditions

Solution: c)

Proportional Representation is being followed in Rajya Sabha and Presidential elections.

Even though powers are not strictly separated between legislature and executive, there is some separation of powers in the functioning of regulatory bodies like RBI, SEBI and the departments.

Religious intolerance is not only against freedom of expression but also tends to threaten secularism.

The constitution encourages building of scientific temper under fundamental duties.

18) The major features of parliamentary government in India is/are?

1. Separation of powers between the legislative and executive organs.
2. Membership of the ministers in the legislature
3. Collective responsibility of the executive to the legislature

Select the correct answer code:

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

Solution: b)

The parliamentary system is based on the principle of cooperation and co-ordination between the legislative and executive organs while the presidential system is based on the doctrine of separation of powers between the two organs.

Other major features are: (a) Presence of nominal and real executives; (b) Majority party rule, (c) Collective responsibility of the executive to the legislature, (d) Membership of the ministers in the legislature, (e) Leadership of the prime minister or the chief minister, (f) Dissolution of the lower House (Lok Sabha or Assembly).

19) The Parliament cannot amend these provisions which form the 'basic structure' of the Constitution, that include:

1. Freedom and dignity of the individual
2. Principle of equality
3. Effective access to justice
4. Principle of reasonableness

Select the correct answer code:

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

Solution: d)

Even though the basic structure doctrine was given by the SC, it is yet to define or clarify as to what constitutes the 'basic structure' of the Constitution. It is not mentioned anywhere in the constitution, and our understanding of the basic structure comes from the various judgements of the court.

The following have emerged as 'basic features' of the Constitution:

- Supremacy of the Constitution; Sovereign, democratic and republican nature of the Indian polity; Secular character of the Constitution
- Separation of powers between the legislature, the executive and the judiciary; Federal character of the Constitution; Unity and integrity of the nation; Welfare state (socio-economic justice)
- Judicial review; Freedom and dignity of the individual; Parliamentary system; Rule of law; Harmony and balance between Fundamental Rights and Directive Principles; Principle of equality
- Free and fair elections; Independence of Judiciary; Limited power of Parliament to amend the Constitution; Effective access to justice; Principle of reasonableness; Powers of the Supreme Court under Articles 32, 136, 141 and 142

20) If one can relate the Indian constitution to the following, the closest could be?

- a) Socio-economic register
- b) Academic work
- c) Rulebook
- d) Dictionary

Solution: c)

The Indian Constitution lays down the basic rules or laws that have to be followed by everyone. These laws are for both the government and the people.

21) The Indian model of Secularism would stand violated if

1. The state supports or facilitates religious activities.
2. The state participates in religious reforms

Select the correct answer code:

- a) 1 only
- b) 2 only

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

Solution: d)

Facilitating Haz pilgrims or managing Shrine management boards at temples and mosques does not constitute violation of Indian model of secularism.

The banning of untouchability or the intrusion of state in triple talaq matter clearly shows that the state has and will keep intervening in religious matter as and when needed. Indian model of secularism does not demand strict separation of religion and state.

- 22) The notion of 'Freedom', in a society, implies
1. Absence of external constraints
 2. Conditions in which people can develop their talents
 3. All decisions are made collectively

Select the correct answer code:

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

Solution: b)

Both the **aspects of freedom — the absence of external constraints as well as the existence of conditions in which people can develop their talents** — are important. A free society would be one which enables all its members to develop their potential with the minimum of social constraints.

In order to be free, an individual should be able to make decisions individually, with a support of collective decision-making in which no one individual dominates the others.

- 23) Consider the following statements.
1. The Preamble to the Indian Constitution is based on the Objective Resolution.
 2. The 44th constitutional amendment added three new words—socialist, secular and integrity to preamble.
 3. Preamble is a source of power to legislature.

Which of the above statements is/are correct?

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

Solution: a)

The Preamble to the Indian Constitution is based on the 'Objective Resolution', drafted and moved by Pandit Nehru, and adopted by the Constituent Assembly.

Preamble has been amended by the **42nd Constitutional Amendment Act (1976)**, which added three new words—socialist, secular and integrity.

The Preamble is neither a source of power to legislature nor a prohibition upon the powers of legislature.

- 24) Consider the following statements
1. In the Berubari Union case, the Supreme Court opined that Preamble is part of the Constitution.

2. In the Kesavananda Bharati case, the Supreme Court rejected the earlier opinion and held that Preamble is not part of the Constitution.

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: c)

In the Berubari Union case (1960), the Supreme Court said that the Preamble shows the general purposes behind the several provisions in the Constitution, and is thus a key to the minds of the makers of the Constitution. Further, where the terms used in any article are ambiguous or capable of more than one meaning, some assistance at interpretation may be taken from the objectives enshrined in the Preamble. **Despite this recognition of the significance of the Preamble, the Supreme Court specifically opined that Preamble is not a part of the Constitution.**

In the Kesavananda Bharati case¹⁷ (1973), the Supreme Court rejected the earlier opinion and held that **Preamble is a part of the Constitution.** It observed that the Preamble is of extreme importance and the Constitution should be read and interpreted in the light of the grand and noble vision expressed in the Preamble.

25) Consider the following statements

- 1. The Preamble has been amended only once till date.
- 2. It is justiciable and its provisions are enforceable in courts of law

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 Preamble has been amended only once so far, in 1976, by the 42nd Constitutional Amendment Act, which has added three new words—Socialist, Secular and Integrity—to the Preamble. This amendment was held to be valid.

The Preamble is neither a source of power to legislature nor a prohibition upon the powers of legislature. **It is non-justiciable, that is**, its provisions are not enforceable in courts of law.

26) Which of the following is/are the demerits of the Parliamentary System?

- 1. Government by Amateurs
- 2. Not conducive to administrative efficiency
- 3. Separation of Powers

Select the correct answer code:

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

Solution: b)

Government by Amateurs: the parliamentary system is **not conducive to administrative efficiency** as the ministers are not experts in their fields. The Prime Minister has a limited choice in the selection of ministers; his choice is restricted to the members of Parliament alone and does not extend to external talent.

In the parliamentary system, the legislature and the executive are together and inseparable. The cabinet acts as the leader of legislature as well as the executive.

27) Which of the following is/are the features of Parliamentary Form of Government?

1. Majority party rule
2. Dissolution of the lower House
3. Collective responsibility of the executive to the legislature
4. Membership of the ministers in the legislature

Select the correct answer code:

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

Solution: d)

The Constitution establishes the parliamentary system not only at the Centre but also in the states. The features of parliamentary government in India are:

- (a) Presence of nominal and real executives;
- (b) Majority party rule,
- (c) Collective responsibility of the executive to the legislature,
- (d) Membership of the ministers in the legislature,
- (e) Leadership of the prime minister or the chief minister,
- (f) Dissolution of the lower House (Lok Sabha or Assembly).

28) Which of the following elements is/are the basic structure of Indian Constitution?

1. Harmony between Union and State
2. Freedom and dignity of the individual
3. Free and fair elections

Which of the statements given above is/are correct?

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

Solution: d)

From the various judgements, the following have emerged as 'basic features' of the Constitution or elements / components / ingredients of the 'basic structure' of the constitution:

1. Supremacy of the Constitution
2. Sovereign, democratic and republican nature of the Indian polity
3. Secular character of the Constitution
4. Separation of powers between the legislature, the executive and the judiciary
5. Federal character of the Constitution
6. Unity and integrity of the nation
7. Welfare state (socio-economic justice)
8. Judicial review
9. Freedom and dignity of the individual
10. Parliamentary system
11. Rule of law
12. Harmony and balance between Fundamental Rights and Directive Principles
13. Principle of equality
14. Free and fair elections
15. Independence of Judiciary
16. Limited power of Parliament to amend the Constitution

17. Effective access to justice
18. Principle of reasonableness
19. Powers of the Supreme Court under Articles 32.

Harmony between Union and State is not a part of basic structure of constitution.

29) Consider the following statements

1. The majority of the provisions in the Constitution need to be amended by a special majority of the Parliament and ratification by at least half of the state legislatures.
2. Amendment of certain provisions of the Constitution by a simple majority is not deemed as constitutional amendment under Article 368.

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)

Amendment of certain provisions of the Constitution by a simple majority of Parliament, that is, a majority of the members of each House present and voting (similar to the ordinary legislative process). Notably, **these amendments are not deemed to be amendments of the Constitution for the purposes of Article 368.**

The majority of the provisions in the Constitution need to be amended by a special majority of the Parliament, that is, a majority (that is, more than 50 per cent) of the total membership of each House and a majority of two-thirds of the members of each House present and voting.

30) Which of the following directive principles of state policy was/were included by 42nd Amendment Act of 1976?

1. To promote equal justice and to provide free legal aid to the poor
2. To take steps to secure the participation of workers in the management of industries
3. To protect monuments, places and objects of historic interest which are declared to be of national importance

Select the correct answer code:

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

Solution: d)

The 42nd Amendment Act of 1976 added four new Directive Principles to the original list. They require the State:

1. To secure opportunities for healthy development of children (Article 39).
2. **To promote equal justice and to provide free legal aid to the poor (Article 39 A).**
3. **To take steps to secure the participation of workers in the management of industries (Article 43 A).**
4. To protect and improve the environment and to safeguard forests and wild life (Article 48 A)

31) Collective Responsibility of the council of ministers to the Parliament is the bedrock principle of parliamentary government. It implies that

- a) The Lok sabha can remove the council of ministers from office by passing a vote of no confidence
- b) All important decisions of the council of Ministers have to be approved by the Parliament
- c) The council of Ministers is appointed and dismissed by the Parliament
- d) None of the above

Solution: a)

The ministers are collectively responsible to the Parliament in general and to the Lok Sabha in particular (Article 75). They act as a team, and swim and sink together. The principle of collective responsibility implies **that the Lok Sabha (not Parliament) can remove the ministry (i.e., council of ministers headed by the prime minister) from office by passing a vote of no confidence.**

32) Consider the following statements.

1. Parliamentary democracy in most countries is often known as the Cabinet form of government.
2. Since it is not practical for all ministers to meet regularly and discuss everything, the decisions are taken in Cabinet meetings.

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)

Cabinet Ministers are usually top-level leaders of the ruling party or parties who are in charge of the major ministries. Usually the Cabinet Ministers meet to take decisions in the name of the Council of Ministers. Cabinet is thus the inner ring of the Council of Ministers. **Since it is not practical for all ministers to meet regularly and discuss everything, the decisions are taken in Cabinet meetings. That is why parliamentary democracy in most countries is often known as the Cabinet form of government.**

33) The Indian model of government is also called as the “Westminster” model of government because

- a) Indian constitution was modelled very closely on the lines of the British constitution
- b) Indian constitution was made with the assistance of the British
- c) India follows parliamentary form of government
- d) The members of the parliamentary house are elected through adult franchise

Solution: c)

Westminster is a place in London where the British Parliament is located. It is often used as a symbol of the British Parliament.

The Parliament is the legislative organ of the Union government. It occupies a pre-eminent and central position in the Indian democratic political system due to adoption of the parliamentary form of government, also known as ‘Westminster’ model of government.

34) Which of the following is/are the features of Federalism?

1. Different tiers of government govern the same citizens, but each tier has its own jurisdiction.
2. The existence and authority of each tier of government generally is constitutionally guaranteed.
3. Each tier of government must draw all its financial resources independent of the other tier.

Select the correct answer code:

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

Solution: b)

Each tier has its own jurisdiction in specific matters of legislation, taxation and administration; for e.g. in India states legislate in matters of police, and Centre legislates in areas of national security as a whole.

Existence of each tier of government is constitutionally guaranteed.

35) A federal government means a government in which

- a) there is division of powers between the Central and state governments; and also between the federal and state judiciaries
- b) all the powers are vested in the national government and the regional governments derive their authority from the national government.
- c) a large number of powers are vested in the national government and the regional governments, with some independent powers, derive their authority from the national government
- d) powers are divided between the national government and the regional governments by the Constitution and both operate in their respective jurisdictions independently

Solution: d)

A federal government is one in which powers are divided between the national government and the regional governments by the Constitution itself and both operate in their respective jurisdictions independently. In a federal model, the national government is known as the Federal government or the Central government or the Union government and the regional government is known as the state government or the provincial government.



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2. Geography

- 1) India's seed vault, to protect important genetic material in case of a major man-made or natural disaster, is located in
- Kangchenjunga
 - Karakoram Pass
 - Ladakh
 - Nanda Devi

Solution: c)

At Chang La in the Himalayas, at a height of 17,300 feet, India has its seed storage facility. The vault is a joint venture of the National Bureau of Plant Genetic Resources (which comes under the Indian Council of Agricultural Research) and the Defence Institute of High-Altitude Research (under Defence Research and Development Organisation).

- 2) State Disaster Response Fund (SDRF) has been constituted by each state under the provisions of Disaster Management act 2005. Disaster(s) covered under SDRF include:
- Hailstorm
 - Frost damage
 - Flash floods
 - Pest attack
 - Avalanche

Select the correct answer code:

- 1, 3, 4, 5
- 1, 2, 3, 5
- 1, 2, 3, 4, 5
- 1, 2, 3, 4

Solution: c)

Disaster (s) covered under SDRF: Cyclone, drought, earthquake, fire, flood, tsunami, hailstorm, landslide, avalanche, cloudburst, pest attack, frost and cold waves.

Source

- 3) Consider the following statements regarding State Disaster Response Fund (SDRF).

- The Central Government contributes 50% to SDRF and the remaining 50% is provided from the State Government.
- A State Government may use the funds available under the SDRF for providing immediate relief to the victims of natural disasters that they consider to be 'disasters' within the local context in the State.

Which of the above statements is/are correct?

- 1 only
- 2 only
- Both 1 and 2
- Neither 1 nor 2

Solution: b)

SDRF has been constituted by each state under the provisions of Disaster Management act 2005.

It was constituted based on the recommendations of the 13th Finance Commission.

Funding: The Central Government contributes 75% of SDRF allocation for general category States/UTs and 90% for special category States/UTs.

Heads: The state executive committee headed by the Chief Secretary is authorized to decide on all matters relating to the financing of the relief expenditure from the SDRF.

Local Disaster: A State Government may use up to 10 percent of the funds available under the SDRF for **providing immediate relief to the victims of natural disasters that they consider to be 'disasters' within the local context in the State** and which are not included in the notified list of disasters of the Ministry of Home Affairs subject to the condition that the State Government has listed the State specific natural disasters and notified clear and transparent norms and guidelines for such disasters with the approval of the State Authority, i.e., the State Executive Authority (SEC).

- 4) Consider the following statements regarding the role and functions of National Disaster Response Force (NDRF)?
1. It imparts basic and operational level training to State Response Forces like Police and Home guards.
 2. It is responsible for organizing Public Awareness Campaigns about disaster management.
 3. It is the statutorily sanctioned force for guarding sensitive international borders during a disaster.

Which of the above statements is/are correct?

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

Solution: a)

Functions of National Disaster Response Force (NDRF):

- Specialized response during disasters.
- Proactive deployment during impending disaster situations.
- Acquire and continually upgrade its own training and skills.
- Liaison, Reconnaissance, Rehearsals and Mock Drills.
- **Impart basic and operational level training to State Response Forces** (Police, Civil Defence and Home Guards).
- Community Capacity Building Programme.
- **Organize Public Awareness Campaigns.**

- 5) Blizzards come under which type of natural disaster
- a) Biological
 - b) Terrestrial
 - c) Aquatic
 - d) Atmospheric

Solution: d)

Table 7.2 : Classification of Natural Disasters

<i>Atmospheric</i>	<i>Terrestrial</i>	<i>Aquatic</i>	<i>Biological</i>
Blizzards Thunderstorms Lightning Tornadoes Tropical Cyclone Drought Hailstorm Frost, Heat Wave or <i>Loo</i> , Cold Waves, etc.	Earthquakes Volcanic Eruptions Landslides Avalanches Subsidence Soil Erosion	Floods Tidal Waves Ocean Currents Storm Surge Tsunami	Plants and Animals as colonisers (Locusts, etc.). Insects infestation— fungal, bacterial and viral diseases such as bird flu, dengue, etc.

6) Which of the following forces affect the velocity and direction of Wind?

1. Pressure gradient force
2. Frictional force
3. Gravitational force
4. Coriolis force

Select the correct answer code:

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

Solution: d)

Forces Affecting the Velocity and Direction of Wind:

- The **air** is set in motion due to the differences in atmospheric pressure. The air in motion is called **wind**. **The wind blows from high pressure to low pressure**. The wind at the surface experiences friction. In addition, rotation of the earth also affects the wind movement. The force exerted by the **rotation of the earth** is known as the **Coriolis force**.
- Thus, the horizontal winds near the earth surface respond to the combined effect of three forces - the **pressure gradient force, the frictional force and the Coriolis force**. In addition, the **gravitational force** acts downward.

7) Consider the following statements.

1. The percentage of moisture present in the atmosphere as compared to its full capacity at a given temperature is known as absolute humidity.
2. The ability of the air to hold water vapour depends entirely on its temperature.
3. The absolute humidity differs from place to place on the surface of the earth.

Which of the above statements is/are correct?

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

Solution: c)

- **Water vapor** present in the air is known as **humidity**. It is expressed quantitatively in different ways. The actual amount of the water vapour present in the atmosphere is known as the **absolute humidity**.
- It is the weight of water vapour per unit volume of air and is expressed in terms of grams per cubic metre. **The ability of the air to hold water vapour depends entirely on its temperature. The absolute humidity differs from place to place on the surface of the earth.**

- The percentage of moisture present in the atmosphere as compared to its full capacity at a given temperature is known as the **relative humidity**.

8) Consider the following statements.

1. Relative humidity is greater over the continents and least over the oceans.
2. High relative humidity of the air occurs when the air temperature approaches the dew

point value.

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 percentage of moisture present in the atmosphere as compared to its full capacity at a given temperature is known as the relative humidity.** With the change of air temperature, the capacity to retain moisture increases or decreases and the relative humidity is also affected. **It is greater over the oceans and least over the continents.** The air containing moisture to its full capacity at a given temperature is said to be saturated. It means that the air at the given temperature is incapable of holding any additional amount of moisture at that stage. **The temperature at which saturation occurs in a given sample of air is known as dew point.**
- As air temperature increases, air can hold more water molecules, and its relative humidity decreases. When temperatures drop, relative humidity increases. **High relative humidity of the air occurs when the air temperature approaches the dew point value.** Temperature therefore directly relates to the amount of moisture the atmosphere can hold.

9) Consider the following statements regarding Chagos Islands/ Chagos Archipelago.

1. It is the southernmost archipelago of the Chagos-Laccadive Ridge
2. It is located south of Mauritius in Indian Ocean.

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: b)

The **Chagos Archipelago** or **Chagos Islands** are a group of seven atolls comprising more than 60 individual tropical islands in the Indian Ocean about 500 kilometres (310 mi) **south of the Maldives archipelago.**

This chain of islands is the **southernmost archipelago of the Chagos-Laccadive Ridge**, a long submarine mountain range in the Indian Ocean.



10) Consider the following statements regarding Land Breeze.

1. In the Land Breeze, the wind blows from the sea to the land.
2. It usually takes place during day time.

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)

Land and Sea Breezes

- The land and sea absorb and transfer heat differently. During the day the land heats up faster and becomes warmer than the sea. Therefore, over the land the air rises giving rise to a low-pressure area, whereas the sea is relatively cool and the pressure over sea is relatively high. Thus, pressure gradient from sea to land is created and the wind blows from the sea to the land as the sea breeze. **In the night** the reversal of condition takes place. The land loses heat faster and is cooler than the sea. **The pressure gradient is from the land to the sea and hence land breeze results.**

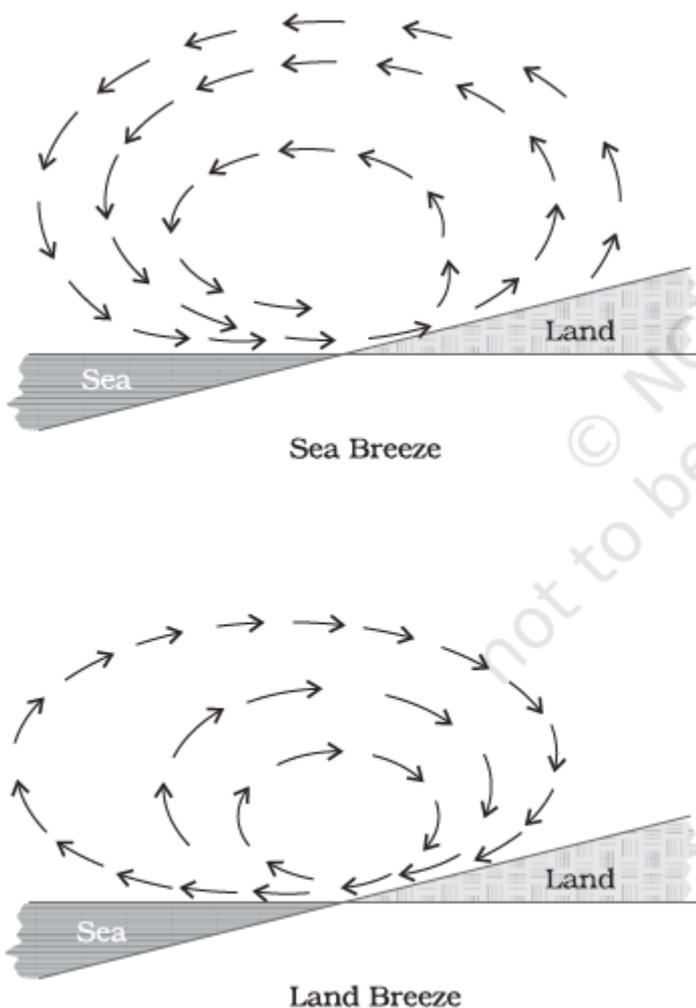


Figure 10.7 : Land and sea breezes

11) Consider the following statements regarding Heat Budget.

1. Roughly 70 percent of heat received from sun is reflected back to space even before reaching the earth's surface.
2. The reflected amount of radiation by the Earth is called the albedo of the earth.

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 **earth as a whole does not accumulate or lose heat**. It maintains its temperature. This can happen only if the amount of heat received in the form of insolation equals the amount lost by the earth through terrestrial radiation. Consider that the insolation received at the top of the atmosphere is 100 per cent. While passing through the atmosphere some amount of energy is reflected, scattered and absorbed. Only the remaining part reaches the earth surface. **Roughly 35 units are reflected back to space even before reaching the earth's surface**. Of these, 27 units are reflected back from the top of the clouds and 2 units from the snow and ice-covered areas of the earth. **The reflected amount of radiation is called the albedo of the earth**.

The remaining 65 units are absorbed, 14 units within the atmosphere and 51 units by the earth's surface.

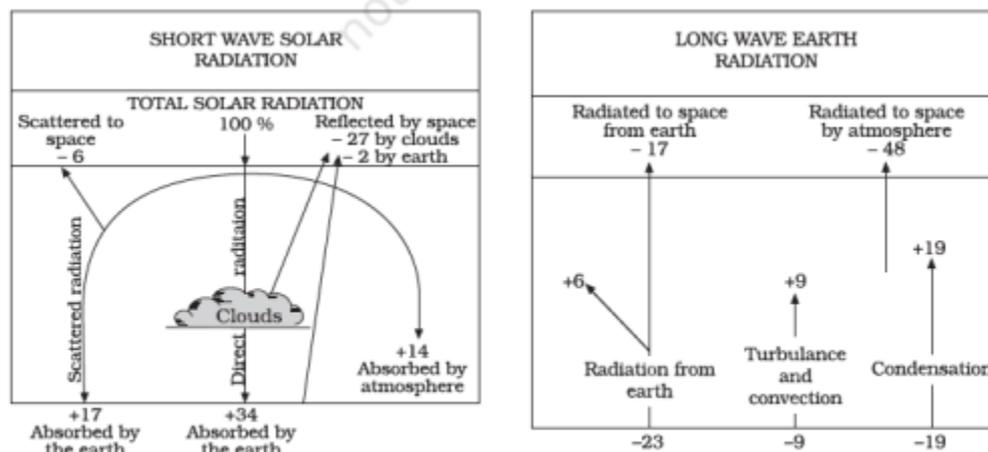


Figure 9.2 : Heat budget of the earth

12) Consider the following statements regarding first stage of Demographic transition.

1. The first stage has high fertility and high mortality.
2. Most of the people are engaged in agriculture.
3. The population growth is high.

Which of the above statements is/are correct?

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

Solution: c)

Demographic transition theory can be used to describe and **predict the future population of any area**. The theory tells us that population of any region changes from high births and high deaths to low births and low deaths as society progresses from rural agrarian and illiterate to urban industrial and literate society. These changes occur in stages which are collectively known as the **demographic cycle**.

The **first stage has high fertility and high mortality** because people reproduce more to compensate for the deaths due to epidemics and variable food supply. The **population growth is slow and most of the people are engaged in agriculture** where large families are an asset. Life expectancy is low, people are mostly illiterate and have low levels of technology. Two hundred years ago all the countries of the world were in this stage. **Fertility remains high in the beginning of second stage but it declines with time. This is accompanied by reduced mortality rate.** Improvements in sanitation and health conditions lead to decline in mortality. Because of this gap the net addition to population is high.

In the **last stage, both fertility and mortality decline considerably**. The population is either stable or grows slowly.

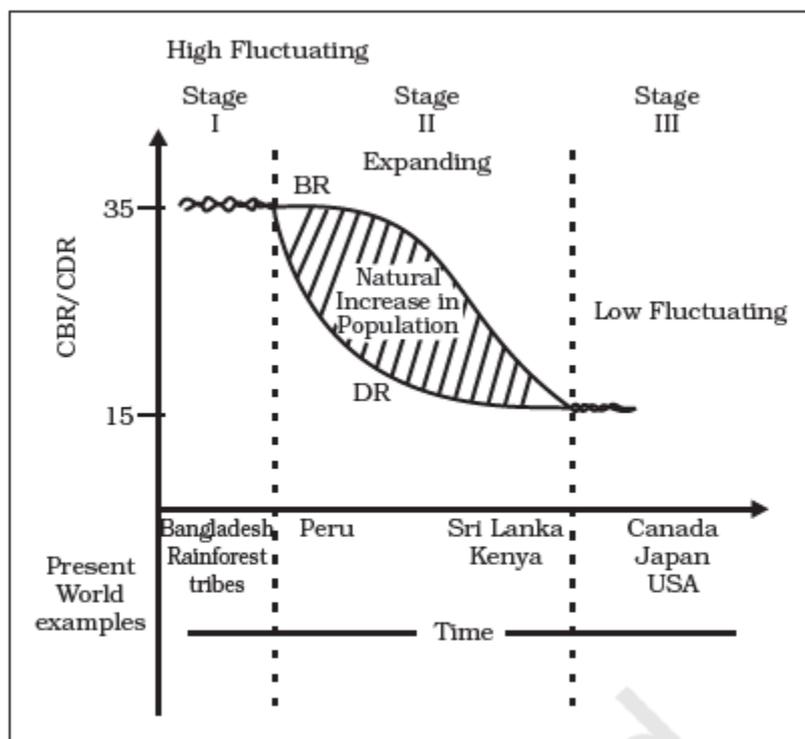


Fig. 2.3: Demographic Transition Theory

13) Which of the following factors can be considered as the Basis of International Trade?

1. Stage of economic development
2. Population
3. Extent of foreign investment
4. Difference in national resources

Select the correct answer code:

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

Solution: d)

Basis of International Trade

(i) **Difference in national resources:** The world's national resources are unevenly distributed because of differences in their physical make up i.e. geology, relief soil and climate.

(ii) **Population factors:** The size, distribution and diversity of people between countries affect the type and volume of goods traded.

(iii) **Stage of economic development:** At different stages of economic development of countries, the nature of items traded undergo changes.

(iv) **Extent of foreign investment:** Foreign investment can boost trade in developing countries which lack in capital required for the development of mining, oil drilling, heavy engineering, lumbering and plantation agriculture.

(v) **Transport:** In olden times, lack of adequate and efficient means of transport restricted trade to local areas. Only high value items, e.g. gems, silk and spices were traded over long distances. With expansions of rail, ocean and air transport, better means of refrigeration and preservation, trade has experienced spatial expansion.

14) Which of the following countries does not share its border with Saudi Arabia?

- a) Iraq
- b) Syria

- c) Qatar
d) Jordan

Solution: b)



- 15) Consider the following pairs regarding names of Shifting cultivation and their region
1. Jhuming - North eastern states of India
 2. Milpa - Central America and Mexico
 3. Ladang - Indonesia and Malaysia

Which of the above pairs is/are correctly matched?

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

Solution: d)

The vegetation is usually cleared by fire, and the ashes add to the fertility of the soil. Shifting cultivation is thus, also called slash and burn agriculture. The cultivated patches are very small and cultivation is done with very primitive tools such as sticks and hoes. After sometime (3 to 5 years) the soil loses its fertility and the farmer shifts to another parts and clears other patch of the forest for cultivation. The farmer may return to the earlier patch after sometime. One of the major problems of shifting cultivation is that the cycle of jhum becomes less and less due to loss of fertility in different parcels.

It is prevalent in tropical region in different names, e.g. **Jhuming in North eastern states of India, Milpa in central America and Mexico and Ladang in Indonesia and Malaysia.**

- 16) Consider the following statements regarding Population Ageing.

1. Population ageing is the process by which the share of the older population becomes proportionally larger.

2. It is very common in least developed countries.

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)

Population ageing is the process by which the **share of the older population becomes proportionally larger**. This is a phenomenon of the twentieth century. In most of the **developed countries** of the world, **population in higher age groups has increased due to increased life expectancy**. With a reduction in birth rates, the proportion of children in the population has declined.

17) Consider the following statements.

1. Quaternary activities involve research and development and is seen as an advanced form of services involving specialized knowledge and technical skills.
2. Quinary activities are performed by highest level of decision makers or policy makers.

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)

Quaternary activities involve some of the following: the collection, production and dissemination of information or even the production of information. Quaternary activities centre around **research, development** and may be **seen as an advanced form of services involving specialized knowledge and technical skills**.

The highest level of decision makers or policy makers perform quinary activities. Quinary activities are services that focus on the creation, re-arrangement and interpretation of new and existing ideas; data interpretation and the use and evaluation of new technologies. Often referred to as 'gold collar' professions, they represent another subdivision of the tertiary sector representing special and highly paid skills of senior business executives, government officials, research scientists, financial and legal consultants, etc.

18) Consider the following pairs regarding Age-Sex Pyramid with their characteristics:

1. Expanding Populations - narrow base and a tapered top
2. Constant Population - bell shaped and tapered towards the top
3. Declining Populations - triangular shaped pyramid

Which of the above pairs is/are correctly matched?

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

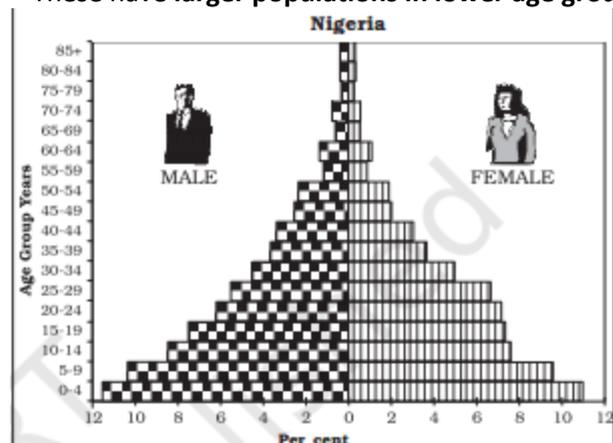
Solution: b)

Age-Sex Pyramid

- The age-sex structure of a population refers to the number of females and males in different age groups. A population pyramid is used to show the age-sex structure of the population.
- The shape of the population pyramid reflects the characteristics of the population. The left side shows the percentage of males while the right side shows the percentage of women in each age group.

Expanding Populations

- The age-sex pyramid is a **triangular shaped pyramid** with a wide base and is typical of less developed countries.
- These have **larger populations in lower age groups** due to high birth rates.



Source: Demographic Year Book, 2009-10

Fig. 3.1: Expanding Population

Constant Population

- The pyramid is **bell shaped and tapered towards the top**. This shows birth and death rates are almost equal leading to a near constant population.

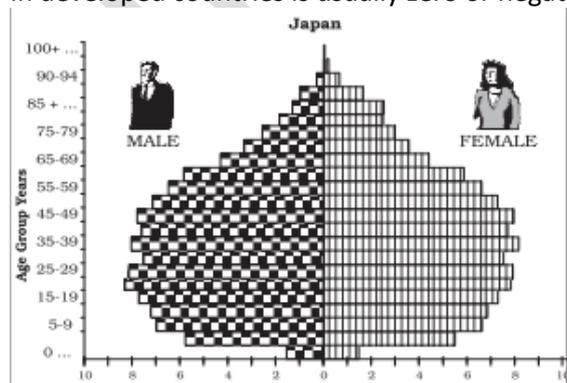


Source: Demographic Year Book, 2009-10

Fig. 3.2: Constant Population

Declining Populations

- The pyramid has a **narrow base and a tapered top** showing **low birth and death rates**. The population growth in developed countries is usually zero or negative.



Source: Demographic Year Book, 2009-10

Fig. 3.3: Declining Population

19) Consider the following statements regarding the alluvial plains.

1. Bhangar is a narrow belt parallel to the Shiwalik foothills where the streams and rivers coming from the mountains disappear.
2. In Tarai belt, most of the streams and rivers re-emerge and create marshy and swampy conditions.

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)

From the north to the south, Northern Plains can be divided into three major zones: the **Bhabar**, the **Tarai** and the **alluvial** plains. The alluvial plains can be further divided into the **Khadar** and the **Bhangar**.

Bhabar is a narrow belt ranging between 8-10 km parallel to the Shiwalik foothills at the break-up of the slope. As a result of this, the streams and rivers coming from the mountains deposit heavy materials of rocks and boulders, and at times, disappear in this zone.

South of the Bhabar is the **Tarai** belt, with an approximate width of 10-20 km where **most of the streams and rivers re-emerge** without having any properly demarcated channel, thereby, **creating marshy and swampy conditions** known as the **Tarai**.

This has a luxurious growth of natural vegetation and houses a varied wildlife. The south of Tarai is a belt consisting of **old and new alluvial deposits** known as the **Bhangar** and **Khadar** respectively.

20) Consider the following statements regarding Dooars or Duars.

1. Duars are the alluvial floodplains in northeastern India that lie south of the foothills of the Himalayas and north of the Brahmaputra River basin.
2. Duars affect the development of tea gardens.

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 Dooars or Duars are the alluvial floodplains in eastern-northeastern India that lie south of the outer foothills of the Himalayas and north of the Brahmaputra River basin.

‘Duar formations’ are important, which have also been **used for the development of tea gardens**.

3. Environment

1) Consider the following statements.

1. Ecotone is a zone of junction between two or more diverse ecosystems.
2. Ecotone is always larger than a biome.
3. A well-developed ecotone may contain some unique organisms which might be absent in the adjacent ecosystems.

Which of the above statements is/are correct?

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

Solution: c)

Ecotone is a zone of junction between two or more diverse ecosystems. For e.g. the mangrove forests represent an ecotone between marine and terrestrial ecosystem. **It may be very narrow or quite wide, but not larger than a biome which is a much larger entity. Well-developed ecotones contain some organisms which are entirely different from that of the adjoining communities.**

2) Consider the following statements.

1. Chemosynthetic bacteria obtain their energy from the oxidation of inorganic molecules.
2. Chemosynthetic bacteria do not need sunlight for their survival.

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: d)

The energy required for the life within the biosphere usually comes from the sun. **But Chemosynthetic bacteria are organisms that use inorganic molecules as a source of energy and convert them into organic substances. They do not need sunlight for their survival.**

Chemosynthetic bacteria, unlike plants, **obtain their energy from the oxidation of inorganic molecules**, rather than photosynthesis. Chemosynthetic bacteria use inorganic molecules, such as ammonia, molecular hydrogen, sulfur, hydrogen sulfide and ferrous iron to produce the organic compounds needed for their subsistence.

Most chemosynthetic bacteria live in environments where sunlight is unable to penetrate and which are considered inhospitable to most known organisms.

3) Consider the following statements.

1. In the composition of living organisms, carbon constitutes the maximum share in the dry weight of organisms.
2. In the total quantity of global carbon, maximum percentage of carbon is found in the atmosphere.

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)

When you study the composition of living organisms, **carbon constitutes 49 per cent of dry weight of organisms and is next only to water**. If we look at the total quantity of global carbon, we find that **71 per cent carbon is found dissolved in oceans**. This oceanic reservoir regulates the amount of carbon dioxide in the atmosphere.

4) Consider the following statements.

1. The energy pyramid of an ecosystem is not always upright and narrow to the top.
2. Generally the lower trophic levels have higher biomass as compared to the higher trophic levels.

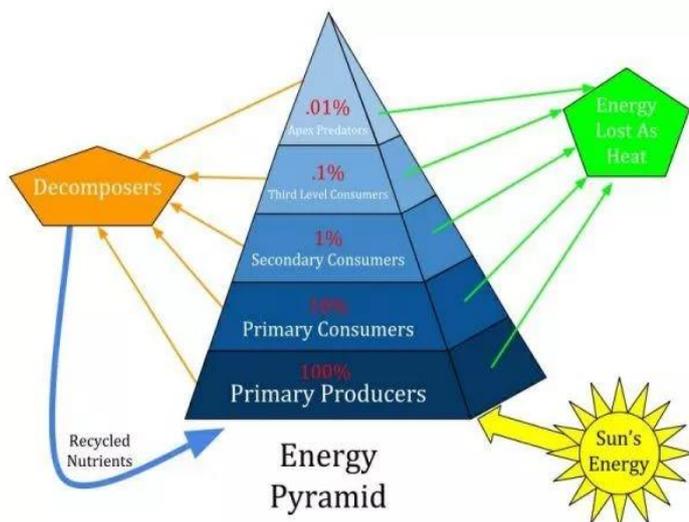
Which of the above statements is/are correct?

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

Solution: b)

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.



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

1. Tropical Rainforests
2. Open ocean
3. Coral reefs
4. Swamps and marshes

Select the correct answer code:

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

6) Which of the following are the main constituents of Biogas?

1. Methane
2. Hydrogen
3. Carbon Dioxide
4. Nitrogen

Select the correct answer code:

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

Solution: b)

Biogas comprises primarily methane (CH₄) and carbon dioxide (CO₂) and may have small amounts of Nitrogen, Hydrogen, hydrogen sulphide and oxygen.

7) Consider the following statements.

1. The grazing food chain is found in both Terrestrial and aquatic ecosystems.
2. The initial energy source for detritus food chain is dead organic matter.
3. The grazing and detritus food chains are not interlinked.

Which of the above statements is/are correct?

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

Solution: a)

• A sequence of organisms that feed on one another, form a food chain. In nature, two main types of food chains have been found: Grazing food chain and Detritus food chain.

• **The grazing food chain** starts with producers or autotrophs as base, which is consumed by heterotrophs. It is found in both Terrestrial and aquatic ecosystems.

• The **Detritus food chain** starts from dead organic 'matter of decaying animals and plant bodies' to the microorganisms and then to detritus feeding organism called detritivores or decomposer and to other predators.

• **The two food chains are linked** as the initial energy source for detritus food chain is the waste materials and dead organic matter from the grazing food chain.

8) Consider the following statements.

1. Bio magnification means the increase of contaminated substances or toxic chemicals that take place in the food chains.
2. Pollutants need to have long life, and soluble in fat to make bio magnification possible.

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)

- Bio magnification stands for Biological Magnification, which means the **increase of contaminated substances or toxic chemicals that take place in the food chains**. These substances often arise from intoxicated or contaminated environments.
- The contaminants include heavy metals namely mercury, arsenic, pesticides such as DDT, and polychlorinated biphenyls (PCBs) compounds which are then taken up by organisms because of the food they consume or the intoxication of their environment.
- **Pollutant needs to satisfy characteristics like long life, biologically active, soluble in fat etc. to make bio magnification possible.**

9) Consider the following statements.

1. Most mammals regulate their body temperature similarly like humans do.
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 only
- b) 1, 2
- c) 1, 3
- d) 1, 2, 3

Solution: c)

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.

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

1. Phosphorous cycle is mainly terrestrial and on land phosphorus is usually found in the form of phosphates.
2. Phosphorous occurs in large amounts as a mineral in phosphate rocks and enters the phosphorus cycle from erosion and mining activities.
3. Phosphorus is mainly responsible for degradation of free-floating microscopic plants in water bodies.

Which of the above statements is/are correct?

- a) 1 only

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

Solution: d)

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.**

11) Consider the following statements regarding Temperate Deciduous Biome

1. They are found in areas with warm moist summers and cool winters.
2. Soils of temperate forests are podzolic and fairly deep.
3. The trees shed their leaves in the summer season.

Which of the above statements is/are correct?

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

Solution: b)

Temperate deciduous or temperate broad-leaf forests are a variety of temperate forest 'dominated' by trees that lose their leaves each year. They are found in areas with warm moist summers and cool winters. Soils of temperate forests are podzolic and fairly deep.

The trees shed their leaves in the cold season. This is an adaptation for protecting themselves against the winter snow and frost.

12) Consider the following statements.

1. Fungai gain their biomass by producing food by themselves like autotrophs do.
2. Lichens located in tundra climates are an example of a primary producer.

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)

Fungi and such other oxidize biomass and thus called decomposers and are not primary producers. **They gain their biomass from oxidizing organic materials and not producing food by themselves like autotrophs do.** However, fungi in other forms, when forming symbiotic relation with algae can become primary producers. For e.g. lichens located in tundra climates are an exceptional example of a primary producer that, by mutualistic symbiosis, combine photosynthesis by algae (or additionally nitrogen fixation by cyanobacteria) with the protection of a decomposer fungus.

13) Consider the following statements.

1. Sea weeds are potential indicators of pollution in aquatic ecosystem, particularly heavy metal pollution due to their ability to bind and accumulate metals strongly.

2. Products like agar-agar and iodine can be extracted from seaweeds.

3. Rotting seaweed releases highly toxic gas.

Which of the above statements is/are correct?

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

Solution: d)

Sea weeds are macroscopic algae, which mean they have no differentiation of true tissues such as roots, stems and leaves.

- They grow in, shallow coastal waters wherever sizable sub-strata is available.
- Seaweeds are important as food for humans, feed for animals, and fertilizer for plants.
- Seaweeds are used as a drug for goiter treatment, intestinal and stomach disorders.
- **Products like agar-agar and alginates, iodine which are of commercial value, are extracted from seaweeds.**
- By the biodegradation of seaweeds methane like economically important gases can be produced in large quantities.
- They are potential **indicators of pollution in coastal ecosystem, particularly heavy metal pollution due to their ability to bind and accumulate metals strongly.**
- **Rotting seaweed is a potent source of hydrogen sulfide, a highly toxic gas.**

14) Consider the following statements regarding Phytoplankton.

1. Phytoplankton obtain the energy through the process of photosynthesis.

2. *Phytoplankton depend on B Vitamins for survival.*

3. They are not found in freshwater eco-systems.

Which of the above statements is/are correct?

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

Solution: c)

Phytoplankton are photosynthesizing microscopic biotic organisms that inhabit the upper sunlit layer of almost all oceans and bodies of fresh water on Earth. They are agents for "primary production", the creation of organic compounds from carbon dioxide dissolved in the water, a process that sustains the aquatic food web.

Phytoplankton are crucially dependent on minerals. These are primarily macronutrients such as nitrate, phosphate or silicic acid, whose availability is governed by the balance between the so-called biological pump and upwelling of deep, nutrient-rich waters.

Phytoplankton depend on B Vitamins for survival.

They are found in all water systems, including marine or brackish or fresh.

15) Which of these factors are responsible for the land degradation in India?

- 1. Improper irrigation use in farms
- 2. Monoculture crops
- 3. Intensive extraction of ground water
- 4. Forest fires

Select the correct answer code:

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

d) 1, 2, 3, 4

Solution: d)

Intensive irrigation of farms depletes groundwater; causes hardening of soil due to higher salinity and water logging leading to soil degradation.

Practice of monoculture does not allow the soil to rotate and conserve crucial minerals as the same minerals and nutrients are depleted in each crop cycle.

Forest fires lead to loss of vegetation, top soil cover, crucial biodiversity like microorganisms and animals thereby degrading the natural balance of the ecosystem, and leads to soil degradation.

16) Which of the following are the ecosystem services provided by Wetlands?

1. Water purification
2. Aquifer recharge
3. Microclimate regulation
4. Aesthetic enhancement of landscapes
5. Shoreline Erosion Control

Select the correct answer code:

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

Solution: d)

The wetlands, vital parts of the hydrological cycle, are highly productive ecosystems which support rich biodiversity and provide a wide range of ecosystem services such as water storage, **water purification**, flood mitigation, erosion control, **aquifer recharge**, **microclimate regulation**, **aesthetic enhancement of landscapes** while simultaneously supporting many significant recreational, social and cultural activities, being part of our rich cultural heritage;

17) Which of the following lakes is not designated as Ramsar wetland sites in India?

- a) Harike Lake
- b) Pulicat Lake
- c) Loktak Lake
- d) Rudrasagar Lake

Solution: b)

Pulicat lake is not designated as Ramsar wetland.

The 46 Ramsar sites in India include the Chilika Lake in Odisha, Harike Lake in Punjab, Loktak Lake in Manipur and Wular Lake in Jammu and Kashmir.

18) Seaweeds are potential natural fertilizers because

1. They are rich in soil nutrients and amino acids.
2. They are not susceptible to coastal pollution as they are found in deep waters.

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)

Seaweeds contains all soil nutrients (0.3% N, 0.1% P, 1.0% K, plus a full range of trace elements) **and amino acids**. Its jelly like alginate content helps to bind soil crumbs together.

However, caution should be observed when collecting seaweed, particularly from areas that **are liable to pollution**, such as downriver (including estuaries) of industrial activities as **seaweed is susceptible to contamination**.

19) Bleaching, or the paling of coral colour occurs due to

1. Fall in the concentration of photosynthetic pigments within the zooxanthellae.
2. Extreme low tides
3. Inflow of Inorganic Nutrients
4. Decline in the densities of zooxanthellae

Select the correct answer code:

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

Solution: d)

Zooxanthellae is what gives colour to corals and provide them food.

- Bleaching, or the paling of coral colour occurs; when (i) the **densities of zooxanthellae decline** and (ii) the **concentration of photosynthetic pigments within the zooxanthellae fall**.
- There are many causes of coral bleaching.
- Major Temperature changes, **extreme low tides**, tectonic uplift etc. can potentially induce bleaching.
- Moreover, Sedimentation, Fresh Water Dilution, **inflow of Inorganic Nutrients** (e.g. ammonia and nitrate) etc. too cause the same.

20) 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 incorrect?

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

Solution: a)

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.

21) Consider the following statements regarding Nitrogen pollution.

1. Since Nitrates cannot penetrate deep into the soil, they pollute only surface water and not groundwater.
2. Nitrous oxide is a greenhouse gas.

3. Agriculture remains the largest contributor to nitrogen emissions.

Which of the above statements is/are correct?

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

Solution: c)

Nitrates not only affect surface water but also pollute groundwater sources.

Nitrous oxide (N₂O) gas should not be confused with nitric oxide (NO) or nitrogen dioxide (NO₂). Neither nitric oxide nor nitrogen dioxide are greenhouse gases. **Nitrous oxide is a greenhouse gas.**

Nitrogen particles make up the largest fraction of PM_{2.5}, the class of pollutants closely linked to cardiovascular and respiratory illness

Though **agriculture remains the largest contributor to nitrogen emissions**, the non-agricultural emissions of nitrogen oxides and nitrous oxide are growing rapidly, with sewage and fossil-fuel burning — for power, transport and industry — leading the trend.

22) Consider the following statements regarding Fluorinated gases.

- 1. They are emitted through semiconductor manufacturing processes.
- 2. They have the least global warming potential of all gases.

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)

These are some of the most **potent and longest lasting type of greenhouse gases** emitted by human activities. They are emitted through a variety of industrial processes such as aluminum and semiconductor manufacturing and Substitution for Ozone-Depleting Substances.

They have **very high global warming potentials (GWPs)** relative to other greenhouse gases.

23) Which of the following are the sources that add nitrogen oxides into the atmosphere?

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

Select the correct answer code:

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

Solution: b)

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.

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

- 24) Which among the following greenhouse gases has the shortest atmospheric lifetime?
- Nitrous oxide
 - Sulfur hexafluoride
 - Nitrogen trifluoride
 - Methane

Solution: d)

Atmospheric lifetime and GWP relative to CO₂ at different time horizon for various greenhouse gases

Gas name	Chemical formula	Lifetime (years) ^[27]	Radiative Efficiency (Wm ⁻² ppb ⁻¹ , molar basis) ^[27]	Global warming potential (GWP) for given time horizon		
				20-yr ^[27]	100-yr ^[27]	500-yr ^[47]
Carbon dioxide	CO ₂	(A)	1.37 × 10 ⁻⁵	1	1	1
Methane	CH ₄	12	3.63 × 10 ⁻⁴	84	28	7.6
Nitrous oxide	N ₂ O	121	3 × 10 ⁻³	264	265	153
CFC-12	CCl ₂ F ₂	100	0.32	10 800	10 200	5 200
HCFC-22	CHClF ₂	12	0.21	5 280	1 760	549
Tetrafluoromethane	CF ₄	50 000	0.09	4 880	6 630	11 200
Hexafluoroethane	C ₂ F ₆	10 000	0.25	8 210	11 100	18 200
Sulfur hexafluoride	SF ₆	3 200	0.57	17 500	23 500	32 600
Nitrogen trifluoride	NF ₃	500	0.20	12 800	16 100	20 700

(A) No single lifetime for atmospheric CO₂ can be given.

- 25) Which of the following are biodegradable materials?
- Tissue paper
 - Cotton cloth
 - Glass objects
 - Synthetic fibres

Select the correct answer code:

- 1, 2
- 2, 4
- 1, 2, 3
- 1, 3, 4

Solution: a)

The waste materials which cannot be broken down into non-poisonous or harmless substances in nature are called **non-biodegradable waste**. Examples are plastics, polythene bags, ball-point pen refills, **synthetic fibres**, and **glass objects**, metal articles like aluminium cans, iron nails, silver foil and radioactive wastes.

Cotton cloth, paper, woollen clothes, wood etc. are bio-degradable. Some of the common examples of bio-degradable material are as follows: Paper bags; cardboard Boxes; Paper cups and plates; Jute products; **Cotton products**; **Tissue paper**; Plates and trays made up of Leaves.

- 26) An energy pyramid shows
- Absolute amounts of energy stored in each trophic level
 - Rate of energy flow through trophic levels
 - The pattern of energy pyramid reflects the laws of thermodynamics

Select the correct answer code:

- 1, 2

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

Solution: c)

Energy pyramids represent energy flow through trophic levels. An energy pyramid usually **shows rates of energy flow through trophic levels, not absolute amounts of energy stored.**

Energy pyramids are always upright (biomass pyramids can be inverted), that is, narrower at each successive level (unless organisms enter the ecosystem from elsewhere). **This pattern reflects the laws of thermodynamics**, which tell us that new energy can't be created, and that some must be converted to a not-useful form (heat) in each transfer.

27) An ecotype is a population that

1. Play a specific functional 'Keystone' role in an ecosystem
2. Carries genes to successfully adapt to local environmental conditions

Select the correct answer code:

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

Solution: b)

Statement 1 describes Keystone species.

An **ecotype is a population that is adapted to local environmental conditions.** The implication is that those individuals which were best adapted to the prevailing conditions left the most offspring. Moreover, those more successful individuals carry genes that are partly responsible for their success in that environment. Thus, **the adaptations of these ecotypes are based on the interactions of their own special sets of genes with their own environment.**

28) Consider the following statements regarding Eutrophication.

1. It leads to increase in the primary productivity of the water body.
2. It can occur only in the water bodies.

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: b)

Eutrophication, or hypertrophication, 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. It leads to **increase in the primary productivity of the water body** or 'bloom' of phytoplankton.

Eutrophication can also occur outside water bodies. For example, soils can be eutrophic when they have high levels of nitrogen, phosphorous or other nutrients.

29) Tigers can be found in which of the following types of habitats?

1. Mangrove swamps
2. Grasslands
3. Evergreen forests

4. Sub-tropical forests

Select the correct answer code:

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

Solution: c)

Tigers are found in a variety of habitats, including tropical and sub-tropical forests, evergreen forests, mangrove swamps and grasslands.

30) Consider the following Environmental conventions.

1. Basel Convention : Persistent Organic Pollutants.
2. Rotterdam Convention : Prior Informed Consent Procedure for certain hazardous Chemicals and Pesticides in international trade.
3. Stockholm Convention : Control of Transboundary Movements of Hazardous Wastes and their Disposal.

Which of the above pairs is/are correctly matched?

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

Solution: b)

The Basel, Rotterdam and Stockholm (BRS) Conventions are **multilateral environmental agreements**, which share the common objective of **protecting human health and the environment from hazardous chemicals and wastes**.

(B) Basel Convention:

- The **Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal** was created to protect people and the environment from the negative effects of the inappropriate management of hazardous wastes worldwide. It is the most comprehensive global treaty dealing with hazardous waste materials throughout their lifecycles, from production and transport to final use and disposal.

(R) Rotterdam Convention:

- The **Rotterdam Convention on the Prior Informed Consent Procedure for certain hazardous Chemicals and Pesticides in international trade** provides Parties with a first line of defence against hazardous chemicals. It promotes international efforts to protect human health and the environment as well as enabling countries to decide if they want to import hazardous chemicals and pesticides listed in the Convention.

(S) Stockholm Convention:

- The **Stockholm Convention on Persistent Organic Pollutants** is a global treaty to protect human health and the environment from highly dangerous, long-lasting chemicals by restricting and ultimately eliminating their production, use, trade, release and storage.

31) Which of the following is the most appropriate analogy regarding the relationship between a “Protected area” and the “Biosphere”?

- a) Earth and the moon
- b) Troposphere and Stratosphere
- c) A tree in a forest
- d) None of the above

Solution: c)

Biosphere is that part of the earth in which living organisms exist or which supports life. Please note we are not talking about the “biosphere reserve”.

Protected areas, just like any large ecosystem, are a significant part of our biosphere that is established to protect our flora, fauna and their habitats. So, the most appropriate analogy is option C where a tree is one among many species (both plant and animals) in a forest.

32) Consider the following statements regarding Shola Forests.

1. They are tropical montane forests found in high altitudes.
2. They have high concentration of lichen, mosses, ferns and orchids.
3. They have spread over the states of Karnataka, Tamil Nadu and Kerala.

Which of the above statements is/are correct?

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

Solution: d)

- The Shola vegetation are **tropical montane forests** found in the Western Ghats separated by rolling grasslands **in high altitudes**.
- These patches of shola forest are found mainly in the valleys and are usually separated from one another by undulating montane grassland.
- Shola forests are found in the higher elevation hill regions of the Nilgiris, Anaimalai, Munnar, Palni hills, Meghamalai, Agasthyamalai to the south and the Malnad and associated ranges in parts of Wayanad, Coorg, Baba Budangiri and Kudremukh up the north, in the states of **Karnataka, Kerala and Tamil Nadu**.
- They have high concentration of **lichen, mosses, ferns and orchids**.

33) The primary productivity of the tropical rain forest is lower compared to the temperate forests because of

1. Intense leaching of soil in tropical rain forests
2. Low microbial activity in tropical regions

Select the correct answer code:

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

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. leafs that fall from trees).

34) Which of the following regions on earth qualify as biodiversity hotspots?

1. The biodiversity of the region is threatened.
2. Areas where multiple ecological niches occur

Select the correct answer code:

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

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**.

35) Consider the following statements.

1. Some animal species change eating habits as they age.
2. The jaw structure of many animal species indicates their diet.

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: d)

Diet varies with species. Sea turtles may be carnivorous (meat eating), herbivorous (plant eating), or omnivorous (eating both meat and plants). **The jaw structure of many species indicates their diet.**

For instance, Green sea turtles have finely serrated jaws adapted for a mostly vegetarian diet of sea grasses and algae. As adults, these are the only predominantly herbivorous sea turtles; although some occasionally also dine on jellyfish and sponges.

Some species change eating habits as they age. For example, green sea turtles are mainly carnivorous from hatching until juvenile size; they then progressively shift to an herbivorous diet.

36) Which of the following plant micronutrients is associated with chlorophyll formation in plants?

1. Iron
2. Copper
3. Magnesium

Select the correct answer code:

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

Solution: d)

Magnesium forms a part of the chlorophyll molecule - essential in photosynthesis.

Iron is taken up in ferrous and ferric forms by plants. It acts as a catalyst in the production of chlorophyll.

Cu^{+2} (**copper**) can be absorbed through leaves. It becomes very toxic if too much applied. It is also a catalyst in chlorophyll formation.

37) Consider the following statements.

1. Coniferous trees are most desirable as pulpwood.
2. Shorter the cellulose fiber in the pulp of a tree, the more desirable it is for making paper.

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 timber resources used to make wood pulp are referred to as pulpwood. While in theory, any tree can be used for pulp-making, **coniferous trees are preferred because the cellulose fibers in the pulp of these species are longer, and therefore make stronger paper.**

Some of the most commonly used softwood trees for paper making include spruce, pine, fir, larch and hemlock, and hardwoods such as eucalyptus, aspen and birch.

38) Phytoplankton are generally found in upper layers of ocean water because of

1. Abundant sunlight in the upper layer of ocean water
2. Absence of nutrients in deep ocean water

Select the correct answer code:

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

Solution: a)

Phytoplankton in the open ocean need both sunlight and nutrients (such as nitrate and phosphate) to be able to photosynthesize.

- Abundant Sunlight is available in the uppermost layers.
- During photosynthesis, the nutrients are quickly used up by phytoplankton so they are not available for long periods in the upper layers under normal circumstances.

This is indeed the case in tropical waters, and as a result they are very unproductive.

- To escape this problem the seawater needs to be mixed regularly to bring the **nutrient rich deep waters up to the sunlight zone where the phytoplankton can grow.**

39) Consider the following statements regarding plant pathogens.

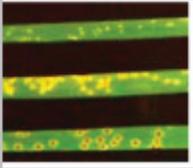
1. Bacteria as well as virus can cause diseases in plants.
2. Pathogen transmission cannot happen by the medium of water.
3. Pathogens can affect plants only after transmitting itself from the root to the shoots.

Which of the above statements is/are correct?

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

Solution: b)

Table 2.2: Some Common Plant Diseases caused by Microorganisms

Plant Diseases	Micro-organism	Mode of Transmission	Figures
Citrus canker	Bacteria	Air	
Rust of wheat	Fungi	Air, seeds	
Yellow vein mosaic of <i>bhindi</i> (Okra)	Virus	Insect	

Pathogens can transmit themselves through all three modes – air, water and soil.

40) Photoperiodism is a phenomenon related to

- Mode of photosynthesis in plants
- Flowering in plants
- Both a and b
- Neither a nor b

Solution: b)

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.

41) Consider the following statements.

- The highest number and high endemism of orchid species are found in Western Ghats.
- Trade of wild orchid is banned globally.
- Botanical Survey of India conducts census of orchids in India.

Which of the above statements is/are correct?

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

Solution: c)

- Botanical Survey of India conducts census of orchids in India.
- A State-wise distribution of orchid species point out that the Himalayas, North-East parts of the country and Western Ghats are the hot-spots of the beautiful plant species.
- While **north-east India rank at the top in species concentration, the Western Ghats have high endemism of orchids.**
- Entire orchid family is listed under appendix II of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) and hence **any trade of wild orchid is banned globally.**

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

Solution: b)

- **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.

43) Consider the following statements about Tamil yeoman.

1. Tamil yeoman is the butterfly species *endemic to Western Ghats* which has been declared *the state butterfly of Tamil Nadu.*
2. Tamil Nadu became the first state in the country to *declare a state butterfly.*

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: b)

Tamil yeoman (Cirrochroa thais) butterfly species endemic to Western Ghats is the state butterfly of Tamil Nadu.

Maharashtra was the first to declare Blue Mormon as its state butterfly, followed by Uttarakhand (Common peacock), Karnataka (Southern bird wings) and Kerala (Malabar banded peacock).

44) Which of the following rivers flows through Kaziranga National Park?

1. Brahmaputra
2. Diphlu
3. Dharla

4. Mora Dhansiri

5. Rangpo

Select the correct answer code:

a) 1, 2, 3

b) 1, 3, 4, 5

c) 1, 2, 4

d) 1, 2, 3, 4, 5

Solution: c)

Kaziranga is crisscrossed by four main rivers — **Brahmaputra, Diphlu, Mora Diphlu and Mora Dhansiri** and has numerous small water bodies.

45) Consider the following statements.

1. India is a temporary home to several migratory animals and birds like Amur Falcons, Bar-headed Geese, and Humpbacked Whales.

2. The Indian sub-continent is also part of Central Asian Flyway (CAF) that covers areas between the Arctic and Indian Oceans.

3. India had legally binding MoUs with the Convention on Migratory Species (CMS) on the conservation and management of Siberian Cranes and Marine Turtles.

Which of the above statements is/are correct?

a) 1, 2

b) 1, 3

c) 2, 3

d) 1, 2, 3

Solution: a)

India has signed a **non-legally binding MOU** with CMS on the conservation and management of Siberian Cranes (1998), Marine Turtles (2007), Dugongs (2008) and Raptors (2016).

India is a temporary home to several migratory animals and birds. The important among these include Amur Falcons, Bar-headed geese, Black-necked cranes, Marine turtles, Dugongs, Humpbacked Whales, etc. **The Indian sub-continent is also part of the major bird flyway network, i.e, the Central Asian Flyway (CAF) that covers areas between the Arctic and Indian Oceans.**

46) Which of the following are the Ozone depleting substances?

1. Hydrobromofluorocarbons (HBFCs)

2. Halons

3. Carbon tetrachloride

4. Methyl chloroform

5. Methyl bromide

Select the correct answer code:

a) All except 3

b) All except 4

c) All except 5

d) All of the above

Solution: d)

Ozone depleting substances include:

- chlorofluorocarbons (CFCs)
- hydrochlorofluorocarbons (HCFCs)
- hydrobromofluorocarbons (HBFCs)
- halons

- methyl bromide
- carbon tetrachloride
- methyl chloroform.

- 47) Which of the following correctly assesses the impact of climate change on agriculture and food security?
1. Crop yield may be reduced in most tropical and sub-tropical regions due to decreased water availability.
 2. Insect or pest incidence may increase leading to greater crop losses.

Which of the above is/are correct?

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

Solution: c)

According to IPCC report, climate change would hit the poorest countries severely in terms of reducing the agricultural products.

- Crop yield would be reduced due to decreased water availability, and new or changed insect/pest incidence. This is because higher temperature is conducive for the growth of pests.
- Agriculture will be adversely affected not only by an increase or decrease in the overall amounts of rainfall but also by shifts in the timing of the rainfall.

- 48) The chemical oxygen demand (COD) test is commonly used to measure which of the following?

- a) Amount of oxygen used in an oxygenation process
- b) Computing oxygen levels in forest ecosystems
- c) Oxygen required to decompose organic constituents present in the wastewater
- d) None of the above

Solution: c)

The amount of oxygen that is required for the chemical oxidation of the organic and inorganic chemicals present in the wastewater by utilising oxidising agents like Potassium permanganate, Potassium dichromate etc. is called as chemical oxygen demand (COD). COD is the oxygen demand that is consumed by both inorganic and organic matter present in the wastewater sample.

- 49) Which of the following pollutants are directly emitted from motor vehicles?

1. Particulate matter
2. Un-burnt hydrocarbons
3. Ozone
4. Carbon monoxide
5. Methane

Select the correct code:

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

Solution: a)

The following pollutants are emitted from motor vehicles:

- Particulate matter (PM).**
- Un-burnt hydrocarbons.
- Nitrogen oxides (NO_x).**
- Carbon monoxide (CO).**

Carbon dioxide (CO₂).
Sulphur dioxide (SO₂).
 Methane

While ozone is not emitted directly from automobiles, the unstable compound is formed in the atmosphere through a complex set of chemical reactions involving hydrocarbons, oxides of nitrogen, and sunlight.

50) Which of the following will reduce Global Warming in the short-term?

- Melting of permafrost In the Arctic region
- Increased rice cultivation
- Greater promotion of cattle breeding in developing countries
- Major and sustained volcanic explosions

Solution: d)

Permafrost contains carbon that was trapped since ages, and its release after melting accelerates global warming.

Rice fields are wetlands that release methane which is a GHG accelerating global warming.

Cattle breeding also release methane.

Suspended particles from volcanic ash, when spread in the atmosphere, reduce solar insolation and help in cooling the earth.

51) Which of the following adds/add nitrogen to the soil?

- Burning of coal by man
- Death of vegetation
- Excretion of urea by animals

Select the correct answer code.

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

Solution: c)

- **Burning of coal by man is the main source of atmospheric carbon dioxide. It has nothing to do with adding nitrogen to the soil.**
- Nitrogenous waste products of living organisms such as urea and dead remain of organisms are converted back into inorganic ammonia by the bacteria.

52) Which of these ecosystems would sequester most carbon for a given unit of area?

- Mature tropical forests
- Saltmarsh
- Grassland
- Bare soil

Solution: b)

Saltmarshes are one of the key coastal 'blue carbon' habitats, recognised for their ability to store carbon within above- and below-ground biomass and sediments.

Saltmarshes sequester carbon at a rate two to four times greater than that recorded for mature tropical forests.

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

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

Solution: c)

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.

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

- a) Rich population of phytoplankton and seagrass
- b) Its large geographical coverage
- 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.

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

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

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**.

56) Consider the following statements regarding Permafrost.

1. Permafrost store about double the amount of carbon present in the atmosphere.
2. In the solid state of Permafrost, microbial decomposition of organic materials is stalled and as the Earth warms microbes become active and the greenhouse gases drift upwards.

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)

In this solid state, the normal microbial decomposition of organic materials is stalled, and the carbon dioxide and methane that's normally produced stays in the ground.

This means that in the permanently frozen regions of Siberia, Canada, Greenland and Alaska store about **double the amount of carbon that's up in the atmosphere**.

But as the Earth warms, and the soils starts to get hotter, the microbes become active and the greenhouse gases drift upwards once again.

57) Mosses is a bioindicator. What do you understand by this statement?

1. It reflects changes to ecosystems such as pollution.
2. It cannot be cloned or genetically engineered.
3. It does not contain mRNA.

Select the correct answer code:

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

Solution: a)

Mosses are a common flowerless plant found in all cities especially in damp (humid) or shady locations. It generally absorbs water and nutrients from their immediate environments.

So, according to scientists, delicate mosses found on rocks and trees in cities around the world can be used as **low-cost bio indicator to monitor urban pollution and to measure the impact of atmospheric change**.

As a bio indicator, mosses respond to pollution or drought- stress by changing its shape, density or disappearing. This characteristic will allow scientists to calculate atmospheric alterations and air pollution.

58) With reference to the evolution of living organisms on earth, which of the following is the correct sequence of evolution?

- a) Spiders-Snakes-Corals-Horses
- b) Snakes-Spiders-Corals-Horses
- c) Corals-Spiders-Snakes-Horses
- d) Horses-Spiders-Snakes-Corals

Solution: c)

Living organisms were first evolved on seas and then moved to lands. Simple organisms like blue green algae, bacteria were first evolved, then it lead to corals, spiders and complex animals like snakes, horses etc.,

59) Which of the following statements best describes biotic potential?

- a) It refers to the potential biomass of a population measured as dry weight per unit area.
- b) It refers to the maximum reproductive capacity of an organism under optimum environmental conditions.
- c) It refers to the possible functional roles a species can play in an ecosystem.
- d) It refers to the minimum population of a species required to sustain a food web.

Solution: b)

Biotic potential, the maximum reproductive capacity of an organism under optimum environmental conditions.

60) When ocean temperatures get too hot, corals often experience 'bleaching' events. What does this mean?

- a) Plants and animals living in the vicinity of corals die
- b) Corals move towards cooler waters
- c) Corals submerge themselves completely under water, starving themselves of sunlight and air to breathe
- d) The symbiotic nature of the relationship between a certain plant and animal breaks down

Solution: d)

Often mistaken for a form of vegetation, corals "are in fact an animal that lives in symbiosis with an algae, a plant,"

Corals and algae "provide services for each other," with the algae providing "up to 90% of the coral animal's food" through photosynthesis

"When ocean temperatures get too hot, this symbiosis, this relationship, breaks down". "The algae is lost from the coral and causes the coral to look white," effectively "starving" it.

When coral bleaches, it is not dead. Corals can survive a bleaching event, but they are under more stress and are subject to mortality.

61) Consider the following statements.

1. States and Union Territories with more than 50 per cent of their land under forest cover can undertake compensatory afforestation in other states.
2. 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?

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

Solution: b)

States and Union Territories with more than 75 per cent of their land under forest cover can undertake compensatory afforestation in other states.

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).

62) Consider the following statements regarding Compensatory Afforestation Fund and Compensatory Afforestation Fund Management and Planning Authority (CAMPA) Act, 2016.

1. The law establishes the National Compensatory Afforestation Fund under the Public Account of India, and a State Compensatory Afforestation Fund under the Public Account of each state.
2. The law says that land selected for afforestation should preferably be contiguous to the forest being diverted so that it is easier for forest officials to manage it.

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)

CAMPA Act:

- To compensate the loss of forest area and to maintain the sustainability, the Government of India came up with a well-defined Act, known as CAMPA (Compensatory Afforestation Fund Management and Planning Authority).
- **The law establishes the National Compensatory Afforestation Fund under the Public Account of India, and a State Compensatory Afforestation Fund under the Public Account of each state.**
- These Funds will receive payments for: (i) compensatory afforestation, (ii) net present value of forest (NPV), and (iii) other project specific payments.
- The National Fund will receive 10% of these funds, and the State Funds will receive the remaining 90%.
- **According to the Act's provision, a company diverting forest land must provide alternative land to take up compensatory afforestation.**
- For afforestation, the company should pay to plant new trees in the alternative land provided to the state.
- **The law says that land selected for afforestation should preferably be contiguous to the forest being diverted so that it is easier for forest officials to manage it.** But if no suitable non-forest land is found, degraded forests can be chosen for afforestation.

63) Central Ground Water Authority (CGWA) has been constituted under

- a) Environment (Protection) Act, 1986
- b) Hazardous waste Handling and management act, 1989
- c) Public Liability Insurance Act, 1991
- d) Water (Prevention and Control of Pollution) Act, 1974

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.

1. Wildlife Protection Act (WPA) empowers the Central government to declare any wild animal, including those in Schedule I & II of the WPA, to be vermin for specified area and period.
2. Wildlife Protection Act authorizes Chief Wildlife Warden to permit hunting of certain wild animals only if they cannot be captured or translocated.

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)

Wildlife laws divide species into 'schedules' ranked from I to V. Schedule I members are the best protected, in theory, with severe punishments meted out to those who hunt them.

Wild boars, nilgai and rhesus monkeys are Schedule II and III members — also protected, but can be hunted under specific conditions. Crows and fruit bat fall in Schedule 5, the vermin category.

Section 62 of Act empowers Centre to declare wild animals other than Schedule I & II to be vermin for specified area and period.

Section 11(1) a of the Wildlife Protection Act (WPA) authorizes chief wildlife warden to permit hunting of any problem wild animal only if it cannot be captured, tranquillized or translocated.

65) 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.**

66) The Global Environment Facility (GEF) provides funding to assist developing countries in meeting the objectives of international environmental conventions. The GEF serves as a "financial mechanism" to which of these conventions?

1. Stockholm Convention on Persistent Organic Pollutants (POPs)
2. Minamata Convention on Mercury
3. Convention on Biological Diversity (CBD)
4. UN Convention to Combat Desertification (UNCCD)

Select the correct answer code:

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

Solution: d)

The GEF provides funding to assist developing countries in meeting the objectives of international environmental conventions. **The GEF serves as a "financial mechanism" to five conventions:** Convention on Biological Diversity (CBD), United Nations Framework Convention on Climate Change (UNFCCC), Stockholm Convention on Persistent Organic Pollutants (POPs), UN Convention to Combat Desertification (UNCCD), and Minamata Convention on Mercury.

67) Consider the following statements regarding Green Climate Fund (GCF).

1. The Green Climate Fund (GCF) is a fund established within the framework of the UNFCCC.
2. The Fund's investments can be in the form of grants only.
3. GCF has established a direct access modality so that national and sub-national organisations can receive funding directly, rather than only via international intermediaries.

Which of the above statements is/are correct?

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

Solution: c)

The Green Climate Fund (GCF) is a global fund created to support the efforts of developing countries to respond to the challenge of climate change. GCF helps developing countries limit or reduce their greenhouse gas (GHG) **emissions and adapt to climate change. It seeks to promote a paradigm shift to low-emission and climate-resilient development**, taking into account the needs of nations that are particularly vulnerable to climate change impacts.

It was set up by the countries who are parties to the United Nations Framework Convention on Climate Change (UNFCCC) in 2010, as part of the Convention's financial mechanism.

GCF's activities are aligned with the priorities of developing countries through the principle of country ownership, and the Fund has established a direct access modality so that national and sub-national organisations can receive funding directly, rather than only via international intermediaries.

The Fund's investments can be in the **form of grants, loans, equity or guarantees**.

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 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.

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) The Intergovernmental Panel on Climate Change (IPCC) is the leading international body for the assessment of climate change. Consider the following statements regarding Intergovernmental Panel on Climate Change.
1. Its membership is open to all member countries of the United Nations (UN).
 2. It was established by the United Nations Framework Convention on Climate Change (UNFCCC).
 3. Scientists from all over the world contribute to the work of the IPCC on a voluntary basis.

Which of the above statements is/are correct?

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

Solution: b)

As an intergovernmental body, **membership of the IPCC is open to all member countries of the United Nations (UN) and WMO.**

It was **established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO)** in 1988 to provide the world with a clear scientific view on the current state of knowledge in climate change and its potential environmental and socio-economic impacts.

Thousands of scientists from all over the world contribute to the work of the IPCC on a voluntary basis as authors, contributors and reviewers.

- 70) Consider the following about Conservation International (CI).
1. It is an inter-governmental environmental organization based in Hague.
 2. Its work focuses on science, policy, and partnership with businesses and communities with regard to climate change and environment.

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)

Conservation International (CI) is an **American non-profit environmental organization** headquartered in Crystal City, Arlington, Virginia.

CI's work focuses on science, policy and partnership with businesses, governments and communities.

- 71) Consider the following statements
1. Humification leads to accumulation of a dark colored amorphous substance called humus.
 2. Humus is highly resistant to microbial action and undergoes decomposition at an extremely slow rate.
 3. The humus is further degraded by some microbes and release of inorganic nutrients occurs by the process known as catabolism.

Which of the above statements is/are correct?

- a) 1 only
- b) 1, 2

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

Solution: b)

Detritivores (e.g., earthworm) break down detritus into smaller particles. This process is called **fragmentation**.

- By the process of **leaching**, **water soluble inorganic nutrients** go down into the soil horizon and get precipitated as unavailable salts.
- **Bacterial and fungal enzymes** degrade detritus into simpler inorganic substances. This process is called as **catabolism**. It is important to note that all the above steps in decomposition operate simultaneously on the detritus.
- **Humification and mineralization** occur during decomposition in the soil. **Humification leads to accumulation of a dark colored amorphous substance called humus** that is highly resistant to microbial action and undergoes decomposition at an extremely slow rate. Being colloidal in nature it serves as a reservoir of nutrients. **The humus is further degraded by some microbes and release of inorganic nutrients occurs by the process known as mineralization.**

72) Consider the following statements regarding Ecological Succession.

1. The gradual and fairly predictable change in the species composition of a given area is called ecological succession.
2. The entire sequence of communities that successively change in a given area are called sere(s).
3. Primary succession begins in areas where natural biotic communities have been destroyed.

Which of the above statements is/are correct?

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

Solution: c)

ECOLOGICAL SUCCESSION

- An important characteristic of all communities is that their composition and structure constantly change in response to the changing environmental conditions. This change is orderly and sequential, parallel with the changes in the physical environment. These changes lead finally to a community that is in near equilibrium with the environment and that is called a **climax community**. **The gradual and fairly predictable change in the species composition of a given area is called ecological succession**. During succession some species colonies an area and their population become more numerous whereas populations of other species decline and even disappear.
- **The entire sequence of communities that successively change in a given area are called sere(s)**. The individual transitional communities are termed **seral stages** or **seral communities**.
- **Succession** is hence a process that starts in an area where no living organisms are there – these could be areas where no living organisms ever existed, say bare rock; or in areas that somehow, lost all the living organisms that existed there. The former is called **primary succession**, while the latter is termed **secondary succession**.
- **Secondary succession** begins in areas where natural biotic communities have been destroyed such as in abandoned farm lands, burned or cut forests, lands that have been flooded. Since some soil or sediment is present, succession is faster than primary succession.

73) Consider the following statements regarding Ecotone.

1. A well-developed ecotone contains some organisms which are entirely different from that of the adjoining communities.
2. Mangrove forests represent an ecotone.
3. The organisms which occur primarily or most abundantly in this zone are known as edge species.

Which of the above statements is/are correct?

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

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

Solution: d)

Ecotone

• Ecotone is a zone of junction between **two or more diverse ecosystems**. For e.g. the **mangrove forests** represent an ecotone between marine and terrestrial ecosystem. Other examples are – grassland, estuary and river bank.

Characteristics of Ecotone

- It may be very narrow or quite wide.
- It has the conditions intermediate to the adjacent ecosystems. Hence it is a **zone of tension**.
- A well-developed ecotone contains some organisms which are entirely different from that of the adjoining communities.
- Sometimes the number of species and the population density of some of the species is much greater in this zone than either community. This is called edge effect.
- **The organisms which occur primarily or most abundantly in this zone are known as edge species.** In the terrestrial ecosystems edge effect is especially applicable to birds.
- For example, the density of birds is greater in the mixed habitat of the ecotone between the forest and the desert.

74) In order for biomagnification to occur, the pollutant must be

1. Short-lived
2. Mobile
3. Soluble in fats
4. Biologically inactive

Select the correct answer code:

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

Solution: d)

- In order for **biomagnification** to occur, the **pollutant must be: long-lived, mobile, soluble in fats, biologically active**. If a pollutant is short-lived, it will be broken down before it can become dangerous. If it is not mobile, it will stay in one place and is unlikely to be taken up by organisms. If the pollutant is soluble in water, it will be excreted by the organism. Pollutants that dissolve in fats, however, may be retained for a long time.
- If a pollutant is not active biologically, it may biomagnify, but we really don't worry about it much, since it probably won't cause any problems Examples: DDT

75) Consider the following statements regarding life form in aquatic ecosystem.

1. Neuston: These are unattached organisms which live at the air water interface.
2. Nekton: These are organisms which remain attached to stems and leaves of rooted plants
4. Benthos: The benthic organisms are those found living in the bottom of the water mass.

Which of the above statements is/are correct?

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

Solution: a)

The organisms (both flora and fauna) in the aquatic ecosystem are unevenly distributed but can be classified on the basis of their life form or location into five groups

i) Neuston:

- These are unattached organisms which live at the air water interface such as floating plants, etc.

ii) Periphyton:

- These are organisms which remain attached to stems and leaves of rooted plants or substances emerging above the bottom mud such as sessile algae and their associated group of animals.

iii) Plankton:

- This group includes both microscopic plants like algae (phytoplankton) and animals like crustaceans and protozoans (zooplankton) found in all aquatic ecosystems, except certain swift moving waters.

iv) Nekton:

- This group contains animals which are swimmers.
- The nektons are relatively large and powerful as they have to overcome the water currents.
- The animal's range in size from the swimming insects (about 2 mm long) to the largest animals, the blue whale.

v) Benthos:

- The benthic organisms are those found living in the bottom of the water mass.
- Practically every aquatic ecosystem contains well developed benthos.

76) Consider the following statements regarding Photochemical smog.

1. Photochemical smog is a term used to describe air pollution that is a result of the interaction of sunlight with certain chemicals in the atmosphere.
2. One of the primary components of photochemical smog is stratospheric ozone.

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 Formation of Smog

- **Photochemical smog** (smog) is a term used to describe **air pollution that is a result of the interaction of sunlight with certain chemicals in the atmosphere.**
- One of the primary components of photochemical smog is ozone.
- While **ozone in the stratosphere** protects earth from harmful UV radiation, ozone on the ground is hazardous to human health.
- **Ground-level ozone** is formed when **vehicle emissions containing nitrogen oxides** (primarily from vehicle exhaust) **and volatile organic compounds** (from paints, solvents, printing inks, petroleum products, vehicles, etc.) interact in the **presence of sunlight.**

77) Consider the following statements regarding biomass production.

1. Gross primary productivity of an ecosystem is the rate of production of organic matter during photosynthesis.
2. Net primary productivity is the available biomass for the consumption to heterotrophs.
3. Secondary productivity is gross primary productivity minus respiratory losses.

Which of the above statements is/are correct?

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

Solution: b)

The rate of biomass production is called productivity. It can be divided into **gross primary productivity (GPP)** and **net primary productivity (NPP)**. **Gross primary productivity of an ecosystem is the rate of production of organic matter during photosynthesis.** A considerable amount of GPP is utilized by plants in respiration. **Gross primary productivity minus respiration losses (R), is the net primary productivity (NPP).**

GPP – R = NPP

Net primary productivity is the available biomass for the consumption to heterotrophs (herbivores and decomposers).

Secondary productivity is defined as the rate of formation of new organic matter by consumers.

78) Consider the following statements regarding Wildlife Crime Control Bureau.

1. It is a statutory multi-disciplinary body established under Prevention of Cruelty to Animals Act, 1960.
2. It is mandated to establish a centralized wildlife crime data bank.
3. It is also mandated to collect and collate intelligence related to organized wildlife crime activities.

Which of the above statements is/are correct?

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

Solution: c)

Wildlife Crime Control Bureau is a **statutory** multi-disciplinary body established by the Government of India under the **Ministry of Environment and Forests**, to combat organized wildlife crime in the country. Under Section 38 (Z) of the **Wild Life (Protection) Act, 1972**, it is mandated to **collect and collate intelligence related to organized wildlife crime activities** and to disseminate the same to State and other enforcement agencies for immediate action so as to apprehend the criminals; to **establish a centralized wildlife crime data bank**; coordinate actions by various agencies in connection with the enforcement of the provisions of the Act;

79) Consider the following statements regarding population interactions.

1. In competition, only one species benefits and the other is harmed.
2. The interaction where one species is benefitted and the other is neither benefitted nor harmed is called commensalism.
3. Example of commensalism is the interaction between sea anemone that has stinging tentacles and the clown fish.

Which of the above statements is/are correct?

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

Solution: b)

Table 13.1 : Population Interactions

Species A	Species B	Name of Interaction
+	+	Mutualism
-	-	Competition
+	-	Predation
+	-	Parasitism
+	0	Commensalism
-	0	Amensalism

Both the species benefit in **mutualism** and both lose in competition in their interactions with each other. In both **parasitism** and **predation** only one species benefit (parasite and predator, respectively) and the interaction is detrimental to the other species (host and prey, respectively).

The interaction where one species is benefitted and the other is neither benefitted nor harmed is called **commensalism**. In **amensalism** on the other hand one species is harmed whereas the other is unaffected. Predation, parasitism and commensalism share a common characteristic— the interacting species live closely together.

Example of commensalism is the interaction between sea anemone that has stinging tentacles and the clown fish that lives among them. The fish gets protection from predators which stay away from the stinging tentacles. The anemone does not appear to derive any benefit by hosting the clown fish.

80) Consider the following statements regarding Cheetah.

1. Cheetah is the world's fastest land mammal.
2. The Asiatic cheetah is classified as critically endangered by the IUCN Red List.
3. Cheetah was declared extinct in India.

Which of the above statements is/are correct?

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

Solution: d)

- The **cheetah**, *Acinonyx jubatus*, is one of the oldest of the big cat species, with ancestors that can be traced back more than five million years to the Miocene era.
- The cheetah is also the **world's fastest land mammal**.
- The **country's last spotted feline died in Chhattisgarh in 1947**. Later, the **cheetah — was declared extinct in India in 1952**.

The **Asiatic cheetah** is classified as a "**critically endangered**" species by the **IUCN Red List**, and is believed to **survive only in Iran**.