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1. Polity

1) Which of the following is/are extra constitutional devices for securing cooperation and coordination between the states in India?

1. The Governor's Conference
2. Inter-state council
3. Zonal Council

Select the correct answer code:

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

Solution: b)

Zonal Councils are statutory bodies established under the States Reorganisation Act 1956 and not constitutional bodies. They are only deliberative and advisory bodies.

Governor's conference is extra constitutional device for securing cooperation and coordination between the states in India.

The **Constitution of India in Article 263, provided that an Inter-State Council (ISC)** may be established "if at any time it appears to the President that the public interests would be served by the establishment of a Council".

2) Consider the following statements.

1. The recommendation for election is made by the Government and the notification for election is issued by the Election Commission.
2. Elected members of the lower house of the parliament have the right to vote in the elections of both the Lok Sabha and Rajya Sabha.

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)

Under Section 14 of the Representation of the People Act, the **EC sends its recommendation** to the government which requests the **President to clear the notification** of the poll dates.

The EC's recommendation contains the details of all the Parliamentary constituencies, their respective dates of polling and the dates when the notification has to be issued.

Section 14 of the RP Act reads: "... the President shall, by one or more notifications published in the Gazette of India on such date or dates as may be recommended by the Election Commission call upon all Parliamentary constituencies to elect members in accordance with the provisions of this Act ...".

A member of the Rajya Sabha is elected by the Legislative Assembly of States and Union territories by means of single transferable vote through proportional representation.

3) The term 'Lack of Internal democracy' is sometimes heard in the context of Indian political parties. The term implies that

1. Concentration of power in one or few leaders at the top and participatory decision-making is largely absent

2. There are no provincial or local branches of the party and workers are drawn from the Central pool only
3. There is no constitutional document for the party.

Which of the above statements is/are correct?

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

Solution: a)

All over the world there is a tendency in political parties towards the **concentration of power in one or few leaders at the top**. Parties do not keep membership registers, do not hold organisational meetings, and do not conduct internal elections regularly.

Ordinary members of the party do not get sufficient information on what happens inside the party.

They do not have the means or the connections needed to influence the decisions. As a result the leaders assume greater power to make decisions in the name of the party.

Since one or few leaders exercise paramount power in the party, those who disagree with the leadership find it difficult to continue in the party. More than loyalty to party principles and policies, personal loyalty to the leader becomes more important.

4) The term "Socialist" in the Preamble of the Constitution implies

1. The government strives to maintain a more equitable distribution of wealth in society.
2. Government should regulate and facilitate the equitable ownership of factors of production to achieve desired socio-economic objectives.

Which of the above statements is/are correct?

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

Solution: c)

The Indian brand of socialism is a 'democratic socialism' and not a 'communistic socialism' (also known as 'state socialism') which involves the nationalisation of all means of production and distribution and the abolition of private property.

Democratic socialism, on the other hand, holds faith in a 'mixed economy' where both public and private sectors co-exist side by side.

As the Supreme Court says, 'Democratic socialism aims to end poverty, ignorance, disease and inequality of opportunity. Indian socialism is a blend of Marxism and Gandhism, leaning heavily towards Gandhian socialism'.

5) Consider the following statements

1. All fundamental rights are directly enforceable.
2. Law can be made by both parliament and state legislature to enforce fundamental rights

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)

Most of fundamental rights are directly enforceable (self-executory) while a few of them can be enforced on the basis of a law made for giving effect to them.

Such a law can be made only by the Parliament and not by state legislatures so that uniformity throughout the country is maintained. (Article 35)

- 6) Protection against arrest and detention in certain cases is a fundamental right under the broader
- Right to Freedom
 - Right against Exploitation
 - Right to Equality
 - Right to constitutional remedies

Solution: a)

The Constitution of India contains the **right to freedom**, given in articles 19 to 22, and with the view of guaranteeing individual rights that were considered vital by the framers of the constitution.

Right to Freedom consists of

- protection of six rights regarding freedom of: (i) speech and expression, (ii) assembly, (iii) association, (iv) movement, (v) residence, and (vi) profession (Article 19).
- Protection in respect of conviction for offences** (Article 20).
- Protection of life and personal liberty (Article 21).
- Right to elementary education (Article 21A).
- Protection against arrest and detention in certain cases (Article 22).

- 7) Constitutional articles that have a bearing on education include

- Article 30
- Article 51A
- Article 243

Select the correct answer code:

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

Solution: d)

Article 30 is about the right of minorities to establish and administer educational institutions.

Article 51A is set of fundamental duties:

Amendment of article 51A- In article 51A of the Constitution, after clause (J), the following clause shall be added, namely:-

"(k) who is a parent or guardian to provide opportunities for education to his child or, as the case may be, ward between the age of six and fourteen years."

Article 243G talks about the powers/authority/responsibility of Panchayats, which also covers school education.

- 8) The Directive Principles listed in Part IV of the Constitution contains which of the following?

- The goals and objectives that we as a society should adopt
- Certain rights that individuals should enjoy apart from the Fundamental Rights
- Certain policies that the government should adopt to further citizen welfare.

Select the correct answer code:

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

Solution: d)

The Directive Principles lists mainly three things:

- the goals and objectives that we as a society should adopt;
- certain rights that individuals should enjoy apart from the Fundamental Rights; and
- certain policies that the government should adopt.

9) What is the difference in the electoral college of the Vice-President and the President of India?

1. Both the houses of parliament take part in the election of President, unlike the Vice-President who is elected by the Rajya Sabha alone.
2. State legislative assemblies do not take part in the election of the Vice-President, unlike that of the President.

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 **Vice-President**, like the president, is elected not directly by the people but by the method of indirect election. He is elected by the **members of an electoral college consisting of the members of both Houses of Parliament**.

His Electoral College is different from the Electoral College for the election of the President in the following two respects: It consists of both elected and nominated members of the Parliament (in the case of president, only elected members).

It does not include the members of the state legislative assemblies (in the case of President, the elected members of the state legislative assemblies are included).

10) Who acts as the ex-officio chairman of the Indian Parliamentary Group?

- a) President of India
- b) Prime Minister
- c) Speaker, Lok Sabha
- d) Leader of Opposition, Lok Sabha

Solution: c)

The Indian Parliamentary Group is an autonomous body, membership of which is open to all current or former members of the Indian Parliament. Speaker of Lok Sabha is its ex-officio President.

11) Consider the following statements regarding Parliamentary Committees.

1. Parliamentary committees draw their authority from the Constitution of India.
2. Parliamentary committees enables parliamentarians to understand the executive processes closely.
3. Parliament is bound by the recommendations of Parliamentary committees.

Which of the above statements is/are correct?

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

Solution: a)

Executive accountability to the legislature is enforced through questions in Parliament also, which are answered by ministers. However, department standing committees go one step further and hear from senior officials of

the government in a closed setting, allowing for more detailed discussions. This mechanism also enables parliamentarians to understand the executive processes closely.

Parliamentary committees draw their authority from Article 105 (on privileges of Parliament members) and Article 118 (on Parliament's authority to make rules for regulating its procedure and conduct of business). Committee reports are usually exhaustive and provide authentic information on matters related to governance. Bills that are referred to committees are returned to the House with significant value addition. **Parliament is not bound by the recommendations of committees.**

12) Under the framework of Judicial review, the Supreme Court and High Court have the power to declare any law unconstitutional under which of the following circumstances?

1. If it is ultra vires
2. If it violates any of the Fundamental rights
3. If it is repugnant to a central law on same subject
4. If it has been enacted without legislative jurisdiction

Select the correct answer code:

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

Solution: d)

If a law made by Parliament or the state legislatures violates any provision of the Constitution, the Supreme Court has the power to declare such a law invalid or ultra vires.

Article 254 is a classic example of how both unitary and federal features exist in the Indian constitution. The Article provides that in case of a conflict between a central and a state law on the same subject, the provisions of the central law will prevail over the conflicting provisions of the same law.

13) Which of the following are matters on which a constitutional amendment is possible only with the ratification of the legislature of not less than one-half of the states?

1. Election of the President
2. Abolition of legislative council in a state
3. Lists in the Seventh Schedule
4. Representation of states in Parliament.

Select the correct answer code:

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

Solution: b)

Those provisions of the Constitution which are related to the federal structure of the polity can be amended by a special majority of the Parliament and also with the consent of half of the state legislatures by a simple majority.

The following provisions can be amended in this way:

1. **Election of the President** and its manner.
2. Extent of the executive power of the Union and the states.
3. Supreme Court and high courts.
4. Distribution of legislative powers between the Union and the states.
5. Any of the **lists in the Seventh Schedule**.
6. **Representation of states in Parliament**.
7. Power of Parliament to amend the Constitution and its procedure (Article 368 itself).

14) Article 156 in The Constitution of India provides that Governor shall hold office for a term of five years from the date on which he enters upon his office. Which of the following can be deducted from this?

1. No Governor can be removed from office till completion of his term.
2. No Governor can continue in office beyond five years.

Select the correct answer code:

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

Solution: d)

Article 156 in The Constitution Of India 1949

Term of office of Governor

- (1) The Governor shall hold office during the pleasure of the President
- (2) The Governor may, by writing under his hand addressed to the President, resign his office
- (3) Subject to the foregoing provisions of this article, a Governor shall hold for a term of five years from the date on which he enters upon his office
- (4) **Provided that a Governor shall, notwithstanding the expiration of his term, continue to hold office until his successor enters upon his office**

15) If in an election to a State legislative Assembly the candidate who is declared elected loses his deposit, then it means that

- a) Polling was very poor.
- b) The Election was for a multi member constituency
- c) The elected candidates's victory over his nearest rival was very marginal.
- d) Very large no of candidates contested in the election.

Solution: d)

Any candidate who fails to secure more than one-sixth (16.5%) of the total valid votes cast would forfeit his or her deposit. **When a large number of candidates contest the election, due to distribution of votes, the winning candidate may get less than one-sixth of valid votes.**

16) Consider the following statements.

1. Article 100 of the constitution says that all questions in a sitting of the House shall be determined by a majority of votes of the members present and voting.
2. The constitution recognises voice vote to determine majority in a 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)

Article 100 of the constitution says that all questions in a sitting of the House shall be determined by a majority of votes of the members present and voting. This Article clearly says that majority will be determined by means of voting. **The constitution does not mention voice vote.** Nevertheless, this is done in the ordinary situations, but when a member demands a vote, the chair has to allow it. The majority cannot be precisely determined by a voice vote. That is why the Rules of the House provide for actual voting.

17) What is not explicitly stated in the Constitution of India but followed as a convention?

- a) The Finance Minister is to be a Member of the Lower House
- b) The Prime Minister has to resign if he loses the majority in the Lower House
- c) All sections of India are to be represented in the Councils of Ministers
- d) If both the President and the Vice-President demit office simultaneously before the end of the tenure, Speaker of the Lower House of the Parliament will officiate as the President

Solution: b)

PM resigns, if he loses the majority in the house is a convention and not mentioned in the constitution.

The Constitution does not contain any specific procedure for the selection and appointment of the Prime Minister. Article 75 says only that the Prime Minister shall be appointed by the president. However, this does not imply that the president is free to appoint any one as the Prime Minister. In accordance with the conventions of the parliamentary system of government, the President has to appoint the leader of the majority party in the Lok Sabha as the Prime Minister.

18) Consider the following Statements:

- 1. Unlike the Rajya Sabha Chairman, the Speaker of Lok Sabha cannot suspend a member without adopting a motion for suspension.
- 2. While the Rajya Sabha Chairman is empowered to place a member under suspension, the authority for revocation of this order is not vested in him.

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)

The Speaker may invoke Rule 374A in case of "grave disorder occasioned by a member coming into the well of the House or abusing the Rules of the House, persistently and wilfully obstructing its business by shouting slogans or otherwise...". The member concerned, "on being named by the Speaker, stands automatically suspended from the service of the House for five consecutive sittings or the remainder of the session, whichever is less". This clause was incorporated in the Rule Book on December 5, 2001. Obviously, the intention was to skirt around the necessity of moving and adopting a motion for 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.

The Chairman of the Rajya Sabha 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, the Rajya Sabha Chairman does not have the power to suspend a member.**

19) Consider the following statements regarding Adjournment Motion.

- 1. Adjournment Motion draw the attention to a definite matter of urgent public importance.
- 2. It involves an element of censure against the government.
- 3. Rajya Sabha is not permitted to make use of Adjournment motion.

Which of the above statements is/are correct?

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

Solution: c)

Adjournment Motion It is introduced in the Parliament to draw attention of the House to a definite matter of urgent public importance, and needs the support of 50 members to be admitted. As it interrupts the normal business of the House, it is regarded as an extraordinary device. It involves an element of censure against the government and hence Rajya Sabha is not permitted to make use of this device. The discussion on an adjournment motion should last for not less than two hours and thirty minutes.

20) Consider the following statements:

1. Reservation in promotion in public posts is a fundamental right.
2. Article 335 recognizes that special measures need to be adopted for considering the claims of SCs and STs in order to bring them to a level-playing field.

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 Supreme Court has ruled that the states are not bound to provide reservation in appointments and promotions and that there is no fundamental right to reservation in promotions.

Articles 16 (4) and 16 (4-A) of the Constitution does not confer individuals with a fundamental right to claim reservation in promotion. It only empowers the State to make a reservation in matters of appointment and promotion in favour of the Scheduled Castes and the Scheduled Tribes, only if in the opinion of the State they are not adequately represented in the services of the State.

Article 335 recognizes that special measures need to be adopted for considering the claims of SCs and STs in order to bring them to a level-playing field.

21) Consider the following statements.

1. Legislative Assembly of Puducherry was created through an Act of Parliament.
2. Puducherry legislature consists of some MLAs nominated by the Lieutenant Governor of Puducherry.
3. The Lieutenant Governor can sometimes act in his discretion in the matter of law making, even though the Council of Ministers has the task of aiding and advising him.

Which of the above statements is/are correct?

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

Solution: b)

The **Government of Union Territories Act, 1963** provides for a **Legislative Assembly of Puducherry**.

The same Act says that **the UT will be administered by the President of India through an Administrator (LG).**

Section 44 of the Act, says **the Council of Ministers headed by a Chief Minister** will “aid and advise the Administrator in the exercise of his functions in relation to matters with respect to which the Legislative Assembly of the Union Territory has power to make laws”.

• The same clause also allows **the LG to “act in his discretion” in the matter of lawmaking**, even though the Council of Ministers has the task of aiding and advising him.

What happens when there is a difference of opinion?

• In case of a difference of opinion between the LG and his Ministers on any matter, the Administrator is bound to refer it to the President for a decision and act according to the decision given by the President.

However, the Administrator can also claim that **the matter is urgent, and take immediate action as he deems necessary.**

22) Consider the following statements.

1. The 73rd Constitutional Amendment Act provides for reservation of one-third seats for women in Panchayats at all the three levels.
2. The reservation of thirty-three percent of seats for women in parliament and state Legislature does not require constitutional Amendment.
3. Political parties contesting elections can allocate thirty three percent of seats they contest to women candidates without any constitutional Amendment.

Which of the above statements is/are correct?

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

Solution: c)

The 73rd Constitutional Amendment Act provides for reservation of one-third seats for women in Panchayats at all the three levels.

Reservation of thirty -three percent of seats for women in parliament and state Legislature require constitutional Amendment.

23) Consider the following statements regarding Part IV of the Constitution.

1. They are enforceable by the Courts.
2. The principles laid down in this part are to influence the making of laws by the State.

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 Directive Principles of State Policy are enumerated in Part IV of the Constitution from Articles 36 to 51.

The phrase 'Directive Principles of State Policy' denotes the ideals that the State should keep in mind while formulating policies and enacting laws. These are the constitutional instructions or recommendations to the State in legislative, executive and administrative matters.

The Directive Principles are **non-justiciable in nature, that is, they are not legally enforceable by the courts for their violation.**

24) Consider the following statements.

1. In practice, the Chief Minister remains in office so long as he continues to be the leader of the majority in the State Legislative Assembly.
2. The Governor has full discretionary powers in summoning a session of the State Legislative Assembly.
3. The original Constitution prescribed that the total number of Ministers, including the Chief Minister, in the Council of Ministers in a State shall not exceed 15% of the total number of members of the Legislative Assembly of that State.

Which of the above statements is/are correct?

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

Solution: a)

Theoretically, the Chief Minister holds office during the pleasure of the Governor. **However, in actual practice the Chief Minister remains in office so long as he continues to be the leader of the majority in the State Legislative Assembly.**

The **2016 Supreme Court judgment in the Nabam Rebia v Deputy Speaker** held that the governor's power to summon, prorogue and dissolve the House **should be only on the advice of the council of ministers.** And not at his own.

• The judgment, however, also held that **if the governor has reasons to believe the council of ministers has lost the confidence of the House, he can ask the chief minister to prove the majority.**

Article 164 (1A) of the Constitution prescribed that the total number of Ministers, including the Chief Minister, in the Council of Ministers in a State **shall not exceed 15% of the total number of members of the Legislative Assembly of that State.**

• This provision was introduced through **the 91st Constitution (Amendment) Act, 2003.**

Exceptions: Provided that the number of Ministers, including the Chief Minister in a State shall not be less than twelve.

25) Consider the following statements regarding State Election Commission.

1. The State Election Commissioner is appointed by the President.
2. The State Election Commissioner has the status of a Judge of a High Court.
3. The State Election Commissioners work independently of the Election Commission of India and each has its own sphere of operation.

Which of the above statements is/are correct?

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

Solution: c)

The Constitution of India vests in the State Election Commission, consisting of a State Election Commissioner, the superintendence, direction and control of the preparation of electoral rolls for, and the conduct of all elections to the Panchayats and the Municipalities **(Articles 243K, 243ZA).**

The State Election Commissioner is **appointed by the Governor.**

The State Election Commissioners work independently of the Election Commission of India and each has its own sphere of operation.

Powers and removal of state election commissioner:

The State Election Commissioner has **the status, salary and allowance of a Judge of a High Court and cannot be removed from office except in like manner and on the like grounds as a Judge of a High Court.**

26) Consider the following statements regarding No-confidence motion.

1. It can be moved only in the Lok Sabha or state assembly as the case may be.
2. It is moved against the entire Council of Ministers and not individual ministers or private members.

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)

What are the conditions related to no-confidence motion?

- It can be moved only in the Lok Sabha or state assembly as the case may be. **It cannot be moved in the Rajya Sabha or state legislative council.**
- The no-confidence motion is **moved against the entire Council of Ministers and not individual ministers or private members.**

27) Consider the following statements.

1. The orders of the Delimitation Commission have the force of law and they cannot be challenged before any court.
2. The orders of the Delimitation Commission are laid before the Lok Sabha and the respective State Legislative Assemblies, and modifications are not permitted.
3. The number of Lok Sabha seats and State Assembly seats remained frozen on the basis of the 2001 Census.

Which of the above statements is/are correct?

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

Solution: a)

Delimitation is undertaken by a highly powerful commission. They are formally known as Delimitation Commission or Boundary Commission.

These bodies are so powerful that **its orders have the force of law and they cannot be challenged before any court.**

The commissions' orders are enforced as per the date specified by the President of India. Copies of these orders are **laid before the Lok Sabha or the concerned Legislative Assembly. No modifications are permitted.**

While the current boundaries were drawn on the basis of the 2001 Census, **the number of Lok Sabha seats and State Assembly seats remained frozen on the basis of the 1971 Census.**

28) Consider the following statements regarding Pardoning power of President and Governor.

1. The Constitution gives equal powers to President and Governor to grant Pardon.
2. The power of pardon shall be exercised by the President on the advice of Council of Ministers.
3. The constitution does not provide any mechanism to question the legality of decisions of President or governors exercising mercy jurisdiction.

Which of the above statements is/are correct?

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

Solution: b)

The pardoning power of President is wider than the governor and it differs in the following two ways:

- The power of the President to grant pardon extends in cases where the punishment or sentence is by a Court Martial but **Article 161** does not provide any such power to the Governor.

- The President can grant pardon in all cases where the sentence given is sentence of death but pardoning power of Governor does not extend to death sentence cases.

Exercise of these powers:

1. This power of pardon shall be exercised by the President on the advice of Council of Ministers.
2. The constitution does not provide for any mechanism to question the legality of decisions of President or governors exercising mercy jurisdiction.
3. But the SC in **Epuru Sudhakar case** has given a small window for judicial review of the pardon powers of President and governors for the purpose of ruling out any arbitrariness.

29) Consider the following statements.

1. The Preamble is part of the Constitution of India.
2. The Preamble has the same legal effect as any other part.
3. The Preamble reflects the principles of the Universal Declaration of Human Rights (1948).

Which of the above statements is/are correct?

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

Solution: c)

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.

It is a part of the Constitution as declared by the Supreme Court. It does not have a legal effect independently since it cannot be enforced in a court of law.

The Universal Declaration of Human Rights (1948) consists of the following:

- Articles 1–2 established the basic concepts of **dignity, liberty, and equality**.
- Articles 18–21 sanctioned the so-called "constitutional liberties" and spiritual, **public, and political freedoms**, such as **freedom of thought, opinion, religion and conscience**, word, and peaceful association of the individual.

The **Preamble of the constitution mentions about liberty, equality, fraternity, justice** - social, economic, political and many such things which overlap with the 1948 declaration as seen in Articles 1-2, 18-21, etc.

30) Consider the following statements.

1. The National Anthem was first sung at the 1929 Lahore session of the Indian National Congress.
2. 'Jana Gana Mana' was adopted as the country's National Anthem by the Constituent Assembly of India on 16th August 1947 soon after Independence.
3. Reverence to the National Anthem is a Fundamental duty as per Article 51A (a) of the Constitution.

Which of the above statements is/are correct?

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

Solution: c)

On December 27, 1911, the National Anthem was first sung at the **Calcutta session of the Congress**.

- 'Jana Gana Mana' was adopted as the country's National Anthem by the Constituent Assembly of India on **January 24, 1950, the last day of its last session**.

Reverence to the National Anthem is a **Fundamental duty** as per **Article 51A (a)** of the Constitution.

[Source](#)

2. Geography

1) Consider the following statements.

1. Much of the Earth's mantle consists of magma.
2. Magma is a mixture of minerals and also contains small amounts of dissolved gases.
3. The high pressure under Earth's crust keep magma in a solid state.

Which of the above statements is/are correct?

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

Solution: a)

Magma is extremely hot liquid and semi-liquid rock located under Earth's surface. Earth has a layered structure that consists of the inner core, outer core, mantle, and crust. **Much of the planet's mantle consists of magma.** This magma can push through holes or cracks in the crust, causing a volcanic eruption. When magma flows or erupts onto Earth's surface, it is called lava.

Like solid rock, **magma is a mixture of minerals. It also contains small amounts of dissolved gases** such as water vapor, carbon dioxide, and sulfur. **The high temperatures and pressure under Earth's crust keep magma in its fluid state.**

2) The climate and weather of a region largely depends on

1. Distance from equator
2. Height above Mean Sea Level (MSL)
3. Distance from International Date Line
4. Proximity with major water bodies

Select the correct answer code:

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

Solution: c)

- Places farther from equator are likely to have lesser rainfall and a colder climate.
- Altitude affects the temperature of a place. Places at higher Mean Sea Level (MSL) are more likely to be colder than those at lower MSL.
- **Distance from International Date Line indirectly refers to the longitude of a place, which has no bearing on a place's weather or climate.**
- Places close to large lakes or sea are more likely to have moderate weather due to the blowing of land and sea breezes.

3) Consider the following statements regarding Chota Nagpur Plateau.

1. The Chota Nagpur Plateau is a plateau in eastern India, which covers much of Jharkhand state as well as adjacent parts of Odisha, West Bengal and Chhattisgarh.
2. The Indo-Gangetic plain lies to the north and east of the plateau.
3. The plateau has been formed by continental uplift from forces acting deep inside the earth.
4. The Krishna River flows through Chota Nagpur Plateau.

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: a)

The Chota Nagpur Plateau is a plateau in eastern India, which covers much of Jharkhand state as well as adjacent parts of Odisha, West Bengal and Chhattisgarh. The Indo-Gangetic plain lies to the north and east of the plateau, and the basin of the Mahanadi River lies to the south.

The Chota Nagpur Plateau is a continental plateau—an extensive area of land thrust above the general land. The plateau has been formed by continental uplift from forces acting deep inside the earth.

The Damodar River flows through Chota Nagpur Plateau.

4) Consider the following statements regarding Peninsular Rivers.

1. The Peninsular rivers have shorter and shallower courses as compared to their Himalayan counterparts.
2. A large number of the Peninsular rivers are seasonal.
3. Peninsular rivers carry much larger silt as compared to Himalayan rivers which carry fresh water.

Which of the above statements is/are correct?

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

Solution: a)

The Peninsular rivers have shorter and shallower courses as compared to their Himalayan counterparts. Most of them come from Western Ghats, however, some of them originate in the central highlands and flow towards the west. Rest of them all flow to the east in the Bay of Bengal.

A large number of the Peninsular rivers are seasonal, as their flow is dependent on rainfall. During the dry season, even the large rivers have reduced flow of water in their channels.

Moreover, **due to flowing on hard terrain and short courses, they carry much lesser silt as compared to Himalayan rivers.**

5) Which of the following factors Influence the formation of South-West Monsoon?

1. **Shift of the position of Inter Tropical Convergence Zone (ITCZ)** in summer.
2. **Presence of the high-pressure area**, east of Madagascar, approximately at 20°S over the Indian Ocean.
3. **Movement of the westerly jet stream** to the north of the Himalayas and the presence of the tropical easterly jet stream over the Indian peninsula during summer.

Select the correct answer code:

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

Solution: d)

Factors Influencing South-West Monsoon Formation

- **The differential heating and cooling of land and water** creates a low pressure on the landmass of India while the seas around experience comparatively high pressure.
- **The shift of the position of Inter Tropical Convergence Zone (ITCZ) in summer**, over the Ganga plain (this is the equatorial trough normally positioned about 5°N of the equator. It is also known as the monsoon-trough during the monsoon season).

- The **presence of the high-pressure area, east of Madagascar, approximately at 20°S over the Indian Ocean**. The intensity and position of this high-pressure area affect the Indian Monsoon.
- The Tibetan plateau gets intensely heated during summer, which results in strong vertical air currents and the formation of low pressure over the plateau at about 9 km above sea level.
- The **movement of the westerly jet stream to the north of the Himalayas and the presence of the tropical easterly jet stream over the Indian peninsula during summer**.

6) The thinnest layer of our planet is

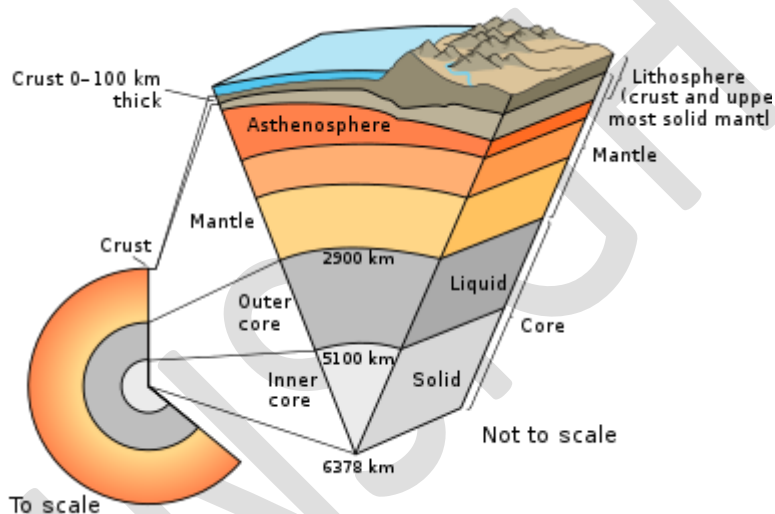
- Mantle
- Crust
- Outer Core
- Inner Core

Solution: b)

Earth has 4 layers:

- The outer crust that we live on
- The plastic-like mantle
- The liquid outer core
- The solid inner core

The crust is by far the thinnest of the layers of earth. The thickness varies depending on where you are on earth, with oceanic crust being 5-10 km and continental mountain ranges being up to 30-45 km thick. **Thin oceanic crust is denser than the thicker continental crust.**



7) In the course of its evolution, the early atmosphere on earth largely contained

1. Water vapour
2. Nitrogen
3. Carbon dioxide
4. Methane
5. Ammonia
6. Very little of free oxygen

Select the correct answer code:

- 1, 2, 3, 4, 5
- 1, 3, 4, 5, 6
- 1, 2, 4, 5, 6
- 1, 2, 3, 4, 5, 6

Solution: d)

During the cooling of the earth, gases and water vapour were released from the interior solid earth. This started the evolution of the present atmosphere. The early atmosphere largely contained **water vapour, nitrogen, carbon dioxide, methane, ammonia and very little of free oxygen.**

8) Consider the following statements.

1. More fish come closer to the shore during the Low tide.
2. High tides help in navigation as they raise the water level close to the shores.

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)

High tides help in navigation. They raise the water level close to the shores. This helps the ships to arrive at the harbour more easily. **The high tides also help in fishing. Many more fish come closer to the shore during the high tide.** This enables fishermen to get a plentiful catch. The rise and fall of water due to tides is being used to generate electricity in some places.

9) Consider the following statements regarding Indian plate.

1. The Indian plate is tectonically separated from the Peninsular India plate.
2. It forms a convergent plate boundary with the Himalayas.
3. The plate extends to Pakistan and Myanmar as well.

Which of the above statements is/are correct?

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

Solution: c)

The Indian plate includes Peninsular India and the Australian continental portions. The subduction zone along the Himalayas forms the northern plate boundary in the form of continent—continent convergence. In the east, it extends through Rakinyoma Mountains of Myanmar towards the island arc along the Java Trench. The eastern margin is a spreading site lying to the east of Australia in the form of an oceanic ridge in SW Pacific. The Western margin follows Kirthar Mountain of Pakistan.

10) Consider the following statements.

1. Braided channels occur in rivers with near flat slopes.
2. V-shaped valleys are a feature of youthful stage of Himalayan rivers.

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)

Braided streams tend to occur in rivers with high sediment loads and/or coarse grain sizes, and in rivers with **steeper slopes** than typical rivers with straight or meandering channel patterns.

The **Himalayas mountains** are tectonic in origin, dissected by fast-flowing rivers which are in their **youthful stage**. Various landforms like gorges, **V-shaped valleys, rapids, waterfalls, etc.** are indicative of this stage.

11) Consider the following statements.

1. About 98 per cent of the total crust of the earth is composed of titanium, hydrogen, phosphorous, manganese and sulphur.
2. All three rock types (igneous, sedimentary, and metamorphic) can be found in Earth's crust.
3. The oldest rocks on our planet are part of the continental crust.

Which of the above statements is/are correct?

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

Solution: c)

The most abundant elements in the Earth's crust include (listed here by weight percent) oxygen, silicon, aluminum, iron, and calcium.

All three rock types (igneous, sedimentary, and metamorphic) can be found in Earth's crust.

The oldest rocks on our planet are part of the continental crust and date back approximately 4 billion years in age. Ocean crust is constantly recycled through our planet's system of plate tectonics and only dates back to approximately 200 million years ago.

12) Consider the following statements regarding Karst topography.

1. It is commonly associated with carbonate rocks.
2. Such topography occurs only in tropical and temperate environments.
3. Nearly a quarter of the world's population depends upon water supplied from karst areas.

Which of the above statements is/are correct?

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

Solution: b)

The term karst describes a distinctive topography that indicates dissolution (also called chemical solution) of underlying soluble rocks by surface water or ground water. Although commonly **associated with carbonate rocks** (limestone and dolomite) other highly soluble rocks such as evaporates (gypsum and rock salt) can be sculpted into karst terrain.

Understanding caves and karst is important because ten percent of the Earth's surface is occupied by karst landscape and as much as a **quarter of the world's population depends upon water supplied from karst areas**. Though most abundant in humid regions where carbonate rock is present, karst terrain occurs in **temperate, tropical, alpine and polar environments**.

13) Consider the following statements.

1. The location of the thermal equator is not identical to that of the geographic Equator.
2. The location of thermal equator is most affected by the level of insolation received in both hemispheres.

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 location of the thermal equator is not identical to that of the geographic Equator.

This is not due to the Level of insolation received in both hemispheres. They are virtually equal.

What creates the difference is the distribution of land and water that causes changes in the way heat is distributed and transported across the planets.

Land dominated areas will tend to have a large variation in temperature and a higher average temperature under the same conditions (as compared to a water dominated area).

Thus, the thermal equator lies a bit north of the geographical equator.

14) Consider the following statements.

1. The mid-day sun never shines overhead on any latitude beyond the Tropic of Cancer and the Tropic of Capricorn.

2. The areas bounded by the Tropic of Cancer and the Arctic Circle in the Northern Hemisphere, and the Tropic of Capricorn and the Antarctic Circle in the Southern Hemisphere, have moderate temperatures.

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 mid-day sun never shines overhead on any latitude beyond the Tropic of Cancer and the Tropic of Capricorn. The angle of the sun's rays goes on decreasing towards the poles. As such, the areas bounded by the Tropic of Cancer and the Arctic Circle in the Northern Hemisphere, and the Tropic of Capricorn and the Antarctic Circle in the Southern Hemisphere, have moderate temperatures. These are, therefore, called Temperate Zones.

15) Consider the following statements.

1. More fresh water can be found in the atmosphere than in the rivers on earth.

2. Rivers on earth contain less fresh water than Inland seas and salt lakes.

3. Ice-caps contain less fresh water than the fresh water available in the groundwater.

Which of the above statements is/are correct?

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

Solution: a)

Oceans	:	97.3	Saline Water
Ice-caps	:	02.0	
Ground water	:	0.68	
Fresh Water			
Fresh water lakes	:	0.009	} Fresh Water
Inland seas &			
Salt lakes	:	0.009	
Atmosphere	:	0.0019	
Rivers	:	0.0001	
		<u>100.00</u>	

16) A Meteor is

- a) A comet without a tail
- b) Objects in Outer Space
- c) A piece of matter which has entered the earth's atmosphere from outer space
- d) An object of Outer Space that has hit the ground

Solution: c)

NASA notes that the difference between a meteor, meteorite and meteoroid is nothing but where the object is. Meteoroids are objects in space that range in size from dust grains to small asteroids. "Think of them as "space rocks,". But **when meteoroids enter the Earth's atmosphere they are called meteors**. But if a meteoroid enters the Earth's atmosphere and hits the ground, it is called a meteorite.

17) Which of the following does not belong to UNESCO Biosphere Reserve?

- a) Sundarbans
- b) Gulf of Kutch
- c) Nanda Devi
- d) Nokrek

Solution: b)

Twelve of the eighteen biosphere reserves are a part of the World Network of Biosphere Reserves, based on the UNESCO Man and the Biosphere (MAB) Programme list.

#	Name	States/ UT	Year
1	Nilgiri Biosphere Reserve	Tamil Nadu, Kerala and Karnataka	2000
2	Gulf of Mannar Biosphere Reserve	Tamil Nadu	2001
3	Sundarbans Biosphere Reserve	West Bengal	2001
4	Nanda Devi Biosphere Reserve	Uttarakhand	2004
5	Nokrek Biosphere Reserve	Meghalaya	2009
6	Pachmarhi Biosphere Reserve	Madhya Pradesh	2009
7	Simlipal Biosphere Reserve	Odisha	2009
8	Great Nicobar Biosphere Reserve	Andaman & Nicobar Islands	2013
9	Achanakmar-Amarkantak Biosphere Reserve	Chhattisgarh, Madhya Pradesh	2012 ^[2]
10	Agasthyamalai Biosphere Reserve	Kerala and Tamil Nadu	2016 ^[4]
11	Khangchendzonga National Park	Sikkim	2018 ^[5]
12	Panna National Park	Madhya Pradesh	2020 ^[6]

18) Consider the following statements.

1. Cyclones are shaped by the Coriolis effect.
2. The temperature inside the eye of a cyclone is nearly 10°C lesser than that of the surroundings.

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)

Cyclones are shaped by the Coriolis effect. Cyclones are large air masses that rotate around a center. As they rotate, cyclones pull air into their center, or "eye." These air currents are pulled in from all directions. In the Northern Hemisphere, they bend to the right. This makes the cyclone rotate counter-clockwise. In the Southern Hemisphere, currents bend to the left. This makes cyclones rotate clockwise.

The eye is a Calm region with no rainfall and experiences highest temperature and lowest pressure within the cyclonic system.

19) Consider the following statements regarding Badland Topography.

1. Presence of Hard archaic granite rock system.
2. Geologic forms like Canyons, ravines, gullies, buttes and mesas are common in badlands.
3. They are characterized by steep slopes and minimal vegetation.

Which of the above statements is/are correct?

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

Solution: c)

Badlands are a type of dry terrain where **softer sedimentary rocks** and clay-rich soils have been extensively eroded by wind and water. They are characterized by **steep slopes, minimal vegetation**, lack of a substantial regolith, and high drainage density. **Canyons, ravines, gullies, buttes, mesas, hoodoos and other such geologic forms are common in badlands.**



20) Consider the following statements regarding evolution of atmosphere.

1. The process through which the gases were outpoured from the interior is called degassing.
2. The early atmosphere largely contained free oxygen and nitrogen.

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)

During the cooling of the earth, gases and water vapour were released from the interior solid earth. This started the evolution of the present atmosphere. **The early atmosphere largely contained water vapour, nitrogen, carbon dioxide, methane, ammonia and very little of free oxygen.** The process through which the **gases were outpoured from the interior is called degassing.** Continuous volcanic eruptions contributed water vapour and gases to the atmosphere. As the earth cooled, the water vapour released started getting condensed. The carbon dioxide in the atmosphere got dissolved in rainwater and the temperature further decreased causing more condensation and more rains. Oceans began to have the contribution of oxygen through the process of photosynthesis. Eventually, oceans were saturated with oxygen, and 2,000 million years ago, oxygen began to flood the atmosphere.

3. Economy

1) Consider the following statements regarding Real Effective Exchange Rate.

1. It is an indicator of the international competitiveness of a nation in comparison with its trade partners.

2. An increasing REER indicates that a country is losing its competitive edge.

Which of the above statements is/are correct?

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

Solution: c)

- The real effective exchange rate (REER) compares a nation's currency value against the weighted average of the currencies of its major trading partners.
- **It is an indicator of the international competitiveness of a nation in comparison with its trade partners.**
- The formula is weighted to take into account the relative importance of each trading partner to the home country.
- **An increasing REER indicates that a country is losing its competitive edge.**
- A nation's nominal effective exchange rate (NEER), adjusted for inflation in the home country, equals its real effective exchange rate (REER).

2) Human Development Index comprises literacy rates, life expectancy at birth and

- a) Gross National Product per head
- b) Gross Domestic Product per hear at real purchasing power
- c) Gross National Product in US dollars
- d) Gross national income per capita

Solution: d)

The Human Development Index (HDI) is a statistic developed and compiled by the United Nations to measure and various countries' levels of social and economic development. It is composed of: mean years of schooling and expected years of schooling, life expectancy at birth, and **gross national income per capita**. This index is a tool used to follow changes in development levels over time and to compare the development levels of different countries.

3) National Income is

- a) Net National Product at factor cost
- b) Net Domestic Product at factor cost
- c) Net National Product at market price
- d) Net Domestic Product at market price

Solution: a)

A part of the capital gets consumed during the year due to wear and tear. This wear and tear is called depreciation. Naturally, depreciation does not become part of anybody's income. If we deduct depreciation from GNP the measure of aggregate income that we obtain is called Net National Product (NNP).

Net National Product at factor cost or National Income. Thus, $NNP \text{ at factor cost} \equiv \text{National Income (NI)} \equiv NNP \text{ at market prices} - (\text{Indirect taxes} - \text{Subsidies}) \equiv NNP \text{ at market prices} - \text{Net indirect taxes}$ (Net indirect taxes \equiv Indirect taxes – Subsidies)

- 4) Non-performing Assets (NPAs) are loans made by a bank or finance company on which repayments or interest payments are not being made on time. How do high NPAs affect the Banks in India?
1. Banks tend to lower the interest rates on deposits
 2. Results in lesser interest income
 3. Adds to risk weighted assets

Select the correct code?

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

Solution: d)

Statement 1 - In the light of high NPAs, Banks tend to lower the interest rates on deposits on one hand and likely to levy higher interest rates on advances.

Statement 2 - The increased NPAs put pressure on recycling of funds and reduces the ability of banks for lending more and thus results in lesser interest income.

Statement 3 - As per Basel norms, banks are required to maintain adequate capital on risk-weighted assets on an ongoing basis. Every increase in NPA level adds to risk weighted assets which warrant the banks to shore up their capital base further.

- 5) Consider the following statements regarding Fixed Capital Formation.
1. Fixed capital formation is directly related with economic growth rate.
 2. Long term growth can be achieved if resources from Fixed Capital are diverted towards consumption.
 3. Fixed capital includes construction of dwellings, which may not add to the productive capacity of the economy.

Which of the above statements is/are correct?

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

Solution: c)

Fixed capital is assets used in the productive process. Examples of Fixed Capital Formation include - Building or expanding existing factory, Road and bridge construction, Purchase of transport equipment, Office equipment, such as computers, printers, Machinery used in the productive process, Energy infrastructure etc. Generally, the higher the capital formation of an economy, the faster an economy can grow its aggregate income. Increasing an economy's capital stock also increases its capacity for production, which means an economy can produce more. Producing more goods and services can lead to an increase in national income levels.

Fixed capital formation (growth of productive infrastructure etc.) is directly related with economic growth rate.

Only short-term growth may be achieved if resources from Fixed Capital are diverted towards consumption. In the long-term quality and quantity of infrastructure is a major determinant of economic growth.

Dwellings are not directly utilised by businesses and the government to produce output. **Since dwellings do not add to the productive capacity of the economy**, even if its growth rate reduces, the economy can still grow.

(A dwelling is a home — where someone lives)

6) Consider the following statements regarding concerns with Gross Domestic Product (GDP) as a measure of development:

1. If the GDP of the country is rising, the welfare may not rise simultaneously.
2. Positive and negative externalities are not measured.
3. Many activities in an economy are not evaluated in monetary terms.

Which of the above statements is/are correct?

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

Solution: d)

Gross Domestic Product measures the aggregate production of final goods and services taking place within the domestic economy during a year. But the whole of it may not accrue to the citizens of the country.

We may be tempted to treat higher level of GDP of a country as an index of greater well-being of the people of that country. But there are at least three reasons why this may not be correct.

(i) **Distribution of GDP** – how uniform is it: If the GDP of the country is rising, the **welfare may not rise as a consequence**. This is because the rise in GDP may be concentrated in the hands of very few individuals or firms. For the rest, the Income may in fact have fallen.

(ii) **Non-monetary exchanges**: **Many activities in an economy are not evaluated in monetary terms**. For example, the domestic services women perform at Home are not paid for.

(iii) **Externalities**: Externalities refer to the benefits (or harms) a firm or an Individual causes to another for which they are not paid (or penalized).

7) World Investment Report, sometime seen in the news, is released by

- a) Asian Development Bank
- b) World Bank
- c) The United Nations Conference on Trade and Development
- d) The Organisation for Economic Co-operation and Development

Solution: c)

The World Investment Report 2020 was released by the United Nations Conference on Trade and Development (UNCTAD).

8) Capital account convertibility of the Indian rupee implies

- a) That the Indian rupee can be exchanged by authorized dealers for travel
- b) That the Indian rupee can be exchanged for any major currency for the purpose of trade in goods and services
- c) That the Indian rupee can be exchanged for any major currency for the purpose of trading in financial assets
- d) None of the above

Solution: c)

Capital account convertibility means the freedom to conduct investment transactions without any constraints.

Typically, it would mean no restrictions on the amount of rupees you can convert into foreign currency to enable you, an Indian resident, to acquire any foreign asset. Similarly, there should be no restraints on your NRI cousin bringing in any amount of dollars or dirhams to acquire an asset in India.

India has come a long way in liberating the capital account transactions in the last three decades and currently has partial capital account convertibility.

9) A consumer is said to be in equilibrium, if:

- a) he is able to live in full comforts with a given level of income
- b) he can fulfil his needs without consumption of certain items
- c) he is able to locate new sources of income
- d) he is able to fulfil his need with a given level of income

Solution: d)

Consumer Equilibrium: It is the state of balance obtained by end users of products, which refers to the number of goods and services they can buy with their existing level of income and the prevailing level of cost prices. Consumer's equilibrium permits a consumer to get the most satisfaction possible from his income.

10) Consider the following statements regarding Commercial Paper (CP).

- 1. Commercial Paper (CP) is an unsecured money market instrument issued in the form of a promissory note.
- 2. It acts as the debt instrument to be used by large corporate companies for borrowing short-term monetary funds.
- 3. Non-Resident Indians (NRIs) and Foreign Institutional Investors (FIIs) are not allowed to invest in Commercial Paper (CP).

Which of the above statements is/are correct?

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

Solution: a)

Commercial Paper (CP) is an unsecured money market instrument issued in the form of a promissory note.

It was introduced in India in 1990 with a view to enabling highly rated corporate borrowers to diversify their sources of short-term borrowings and to provide an additional instrument to investors. Subsequently, primary dealers and all-India financial institutions were also permitted to issue CP to enable them to meet their **short-term funding requirements for their operations**.

CP can be issued for maturities between a minimum of 7 days and a maximum of up to one year from the date of issue.

Individuals, banking companies, other corporate bodies (registered or incorporated in India) and unincorporated bodies, Non-Resident Indians (NRIs) and Foreign Institutional Investors (FIIs) etc. can invest in CPs.

4. Art and Culture

1) Consider the following statements regarding Indus Valley Civilization

1. Their bronze statues were made using the 'lost wax' technique.
2. The best example is the statue of a girl popularly titled 'Dancing Girl', which was found in Harappa.

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 art of bronze casting was practised on a wide scale by the Harappans. Their bronze statues were made using the 'lost wax' technique.

DANCING GIRL

• One of the best known artefacts from the Indus Valley is this approximately four inch high copper figure of a dancing girl. **Found in Mohenjodaro**, this exquisite casting depicts a girl whose long hair is tied in a bun. Bangles cover her left arm, a bracelet and an amulet or bangle adorn her right arm, and a cowry shell necklace is seen around her neck. Her right hand is on her hip and her left hand is clasped in a traditional Indian dance gesture. She has large eyes and flat nose. This figure is full of expression and bodily vigour and conveys a lot of information.



2) Consider the following statements regarding Pillars

1. The Mauryan pillars are rockcut pillars.
2. The Achaemenian pillars are constructed in pieces by a mason.

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)

Pillars

- The tradition of constructing pillars is very old and it may be observed that erection of pillars was prevalent in the Achaemenian empire as well. But the Mauryan pillars are different from the Achaemenian pillars. The **Mauryan pillars are rockcut pillars** thus displaying the carver's skills, whereas the **Achaemenian pillars are constructed in pieces by a mason**.
- Stone pillars were erected by Ashoka, which have been found in the north Indian part of the Mauryan Empire with inscriptions engraved on them.

3) Consider the following statements regarding Humayun's Tomb.

1. It was the first garden-tomb on the Indian subcontinent.
2. It was commissioned by Akbar.
3. It is a UNESCO World Heritage Site.

Which of the above statements is/are correct?

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

Solution: b)

About Humayun's Tomb, Delhi:

- This tomb, built in 1570, is of particular cultural significance as it was the **first garden-tomb on the Indian subcontinent**. Commissioned by Humayun's first wife and chief consort, Empress Bega Begum (also known as Haji Begum). Humayun's garden-tomb is an example of the charbagh (a four-quadrant garden with the four rivers of Quranic paradise represented), with pools joined by channels. It is also called the 'dormitory of the Mughals' as in the cells are buried over 150 Mughal family members. It is a **UNESCO World Heritage Site**.

4) Under Buddhism, Abhaya Mudra indicates

- a) Gesture of reassurance, blessing and protection.
- b) To invoke earth as witness to the truth
- c) Gesture of threat and warning
- d) Gesture of Charity

Solution: a)



Bhumisparsa Mudra
Touching the earth as Gautama did, to invoke the earth as witness to the truth of his words.



Varada Mudra
Fulfillment of all wishes; the gesture of charity.



Dhyana Mudra
The gesture of absolute balance, of meditation. The hands are relaxed in the lap, and the tips of the thumbs and fingers touch each other. When depicted with a begging bowl this is a sign of the head of an order.



Abhaya Mudra
Gesture of reassurance, blessing, and protection. "Do not fear."



Dharmachakra Mudra
The gesture of teaching usually interpreted as turning the Wheel of Law. The hands are held level with the heart, the thumbs and index fingers form circles.



Vitarka Mudra
Intellectual argument, discussion. The circle formed by the thumb and index finger is the sign of the Wheel of Law.



Tarjani Mudra
Threat, warning. The extended index finger is pointed at the opponent.



Namaskara Mudra
Gesture of greeting, prayer, and adoration. Buddhas no longer make this gesture because they do not have to show devotion to anything.



Jnana Mudra
Teaching. The hand is held at chest level and the thumb and index finger again form the Wheel of Law.



Karana Mudra
Gesture with which demons are expelled.



Ksepana Mudra
Two hands together in the gesture of 'sprinkling' the nectar of immortality.



Uttarabodhi Mudra
Two hands placed together above the head with the index fingers together and the other fingers intertwined. The gesture of supreme enlightenment.

5) Shigmo festival is mainly celebrated in

- a) Assam
- b) Uttarakhand
- c) Goa
- d) Kerala

Solution: c)

Shigmo is the celebration of a 'rich, golden harvest of paddy' by the tribal communities of Goa. It is a vibrant celebration full of colour, song and dance rooted in Goan culture and traditions.

5. History

- 1) Consider the following statements regarding taxation during mahajanapadas
1. Taxes on crops were the most important and it was fixed at 1/6th of the produce.
 2. There were taxes on crafts persons and it was in the form of labour.
 3. Hunters and gatherers were not taxed.

Which of the above statements is/are correct?

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

Solution: a)

The Mahajanapadas were sixteen kingdoms or oligarchic republics that existed in ancient India from the sixth to fourth centuries BCE.

Taxes

As the rulers of the mahajanapadas were

- (a) building huge forts
- (b) maintaining big armies, they needed more resources.

• And they needed officials to collect these. So, instead of depending on occasional gifts brought by people, as in the case of the raja of the janapadas, they started collecting regular taxes.

• **Taxes on crops** were the most important. This was because most people were farmers. Usually, the **tax was fixed at 1/6th of what was produced**. This was known as bhaga or a share.

• There were **taxes on crafts persons as well**. These could have been in the **form of labour**. For example, a weaver or a smith may have had to work for a day every month for the king.

• Herders were also expected to pay taxes in the form of animals and animal produce.

• There were also taxes on goods that were bought and sold, through trade.

• And **hunters and gatherers also had to provide forest produce to the raja**.

- 2) During the Sangam Age, the designation 'vellalar' was used for

- a) Ordinary ploughmen
- b) Landless labourers
- c) Slaves
- d) Large landowners

Solution: d)

There were at least three different kinds of people living in most villages in the southern and northern parts of the subcontinent. In the **Tamil region**, large **landowners** were known as **vellalar**, **ordinary ploughmen** were known as **uzhavar**, and **landless labourers**, including **slaves**, were known as **kadaiyiar** and **adimai**.

- 3) Consider the following statements regarding mansabdari system

1. It was a grading system used by the Mughals to fix rank, salary and military responsibilities.
2. Rank and salary were determined by a numerical value called zat.

Which of the above statements is/are correct?

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

Solution: c)

The term **mansabdar** refers to an individual **who holds a mansab**, meaning a position or **rank**. It was a grading system used by the Mughals to fix (1) rank, (2) salary and (3) military responsibilities. Rank and salary were determined by a **numerical value** called **zat**.

- The **higher the zat, the more prestigious was the noble's position in court** and the **larger his salary**.

4) With reference to the cultural history of India, the term 'Upasaka' refers to

- Renunciant and Wanderer
- Lay follower of Buddhism
- Priest with a high status
- None of the above

Solution: b)

Upāsaka (masculine) or **Upāsikā** (feminine) is the title of followers of Buddhism (or, historically, of Gautama Buddha) who are not monks, nuns, or novice monastics in a Buddhist order, and who undertake certain vows.

5) The name by which Ashoka is generally referred to in his inscriptions is

- Dharmadeva
- Chakravarti
- Dharmakirti
- Priyadarsi

Solution: d)

In inscriptions, the title "Priyadarsin" is often associated with the title "Devanampriya" ("Beloved of the Gods"). Separately, the title also appears in "Devanampriya" in conjunction with the name "Ashoka" as in the Minor Rock Edict inscription discovered in Maski, associating Ashoka with Devanampriya.

6) Consider the following statements regarding the features of Mahayana Buddhism:

- The Buddha's presence was shown in sculpture by using certain signs.
- A belief in Bodhisattvas.

Which of the above statements is/are incorrect?

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

Solution: a)

Development of Mahayana Buddhism:

- By the first century CE, there is evidence of changes in Buddhist ideas and practices. Early Buddhist teachings had given great importance to self-effort in achieving nibbana. Besides, the Buddha was regarded as a human being who attained enlightenment and nibbana through his own efforts. However, gradually the idea of a saviour emerged. It was believed that he was the one who could ensure salvation. Simultaneously, the concept of the Bodhisattvas also developed. **Bodhisattvas were perceived as deeply compassionate beings** who accumulated merit through their efforts but used this not to attain nibbana and thereby abandon the world, but to help others. The worship of images of the Buddha and Bodhisattvas became an important part of this tradition.

- This new way of thinking was called **Mahayana** – literally, the "great vehicle". Those who adopted these beliefs described the older tradition as **Hinayana** or the "lesser vehicle".

- **Mahayana Buddhism** had two distinct features.

- Earlier, the Buddha's presence was shown in sculpture by using certain signs. For instance, his attainment of enlightenment was shown by sculptures of the peepal tree. Now, **statues of the Buddha were made**. Many of these were made in **Mathura**, while others were made in **Taxila**.

2. The second change was a **belief in Bodhisattvas**. These were supposed to be persons who had **attained enlightenment**. Once they attained enlightenment, they could live in complete isolation and meditate in peace. However, instead of doing that, they remained in the world to teach and help other people. The **worship of Bodhisattvas became very popular**, and **spread throughout Central Asia, China, and later to Korea and Japan**.

7) Consider the following statements regarding Upanishads.

1. These were part of the later Vedic texts
2. There were no women Upanishadic thinkers.

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)

Aaranyak and Upanishad are last part of Brahman Granth which ponders over philosophical questions. These throw light on religious and culture life of early Hindus.

Many of their ideas were recorded in the **Upanishads. These were part of the later Vedic texts**. Upanishad literally means 'approaching and sitting near' and the texts contain conversations between teachers and students. Often, ideas were presented through simple dialogues.

Most Upanishadic thinkers were men, especially brahmins and rajas. Occasionally, there is **mention of women thinkers**, such as Gargi, who was famous for her learning, and participated in debates held in royal courts. Poor people rarely took part in these discussions. One famous exception was Satyakama Jabala, who was named after his mother, the slave woman Jabali. He had a deep desire to learn about reality, was accepted as a student by a brahmin teacher named Gautama, and became one of the best-known thinkers of the time.

8) Consider the following statements regarding Agricultural technologies during Harappan periods.

1. Terracotta models of the plough have been found at sites in Cholistan and at Banawali.
2. Evidence of a ploughed field was found at Kalibangan.
3. Traces of canals have been found at Shortughai in Afghanistan

Which of the above statements is/are correct?

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

Solution: d)

Agricultural technologies

- While the prevalence of agriculture is indicated by finds of grain, it is more difficult to reconstruct actual agricultural practices. Were seeds broadcast (scattered) on ploughed lands? Representations on seals and terracotta sculpture indicate that the bull was known, and archaeologists extrapolate from this that oxen were used for ploughing. Moreover, **terracotta models of the plough have been found at sites in Cholistan and at Banawali (Haryana)**.

- Archaeologists have also found evidence of a **ploughed field at Kalibangan (Rajasthan)**, associated with Early Harappan levels. The field had two sets of furrows at right angles to each other, suggesting that two different crops were grown together.

- Archaeologists have also tried to identify the tools used for harvesting.

- Most Harappan sites are located in semi-arid lands, where irrigation was probably required for agriculture.

Traces of canals have been found at the Harappan site of Shortughai in Afghanistan, but not in Punjab or Sind.

9) Which of the following were common to both Buddhism and Jainism?

1. Avoidance of extremities of penance and enjoyment.

2. Indifference to the authority of the vedas.
3. Denial of efficacy of rituals.
4. Non-injury to animal life.

Select the correct answer code:

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

Solution: b)

Certain common points in their philosophic content are also striking. Both of them **reject the authority of the Vedas and the Vedic priests; Both repudiate the efficacy of ceremonies and rituals; both bitterly condemn animal sacrifices; and both ignore God.**

Buddhism: Middle path: moderate method of attaining salvation

Jainism: Extreme methods of attaining salvation.

10) The concept of Anuvrata was advocated by

- a) Jainism
- b) Mahayana Buddhism
- c) Lokayata School
- d) Hinayana Buddhism

Solution: a)

In Jainism, ahimsa is the standard by which all actions are judged. For a householder observing the small vows (*anuvrata*), the practice of ahimsa requires that one not kill any animal life.

11) Consider the following pairs of organizations and their founders.

Organisation	Founder
1. East India Association	Dadabhai Naoroji
2. Bangabhasha Prakasika Sabha	Sisir Kumar Ghosh
3. Indian Association of Calcutta	Raja Rammohan Roy

Select the correct answer code:

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

Solution: a)

• The **East India Association** was organised by **Dadabhai Naoroji** in 1866 in London to discuss the Indian question and influence public men in England to promote Indian welfare. Later, branches of the association were started in prominent Indian cities.

The **Bangabhasha Prakasika Sabha** was formed in 1836 by associates of **Raja Rammohan Roy**.

• The Indian League was started in 1875 by Sisir Kumar Ghosh with the object of “stimulating the sense of nationalism amongst the people” and of encouraging political education.

• The **Indian Association of Calcutta** (also known as the Indian National Association) superseded the Indian League and was founded in 1876 by younger nationalists of Bengal led by **Surendranath Banerjea and Ananda Mohan Bose**.

12) Black Hole Tragedy is associated with

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- a) The Battle of Buxar
- b) The Anglo Maratha wars
- c) The Battle of Plassey
- d) The Carnatic wars

Solution: c)

One of Kolkata's historical monuments, Fort William was built during the time of the Bengal Presidency. Named after William III, the fort sits on the banks of the Hooghly River and was at the centre of the **Battle of Plassey** fought between the British and the Nawab of Bengal, Siraj-ud-Daulah. It is also the site of an infamous dungeon called the **Black Hole of Calcutta** (the city of Kolkata was erstwhile known as Calcutta).

13) Consider the following statements.

- 1. He founded the Indian Home Rule League of America in New York City.
- 2. He was elected President of the Indian National Congress during which saw the launch of Mahatma Gandhi's Non-cooperation Movement.
- 3. He established Dayanand Anglo-Vedic School in Lahore.

The above statements refer to

- a) Gopal Krishna Gokhale
- b) Bal Gangadhar Tilak
- c) Chandra Shekhar Azad
- d) Lala Lajpat Rai

Solution: d)

Lala Lajpat Rai

- 1. Rai is remembered for his role during **the Swadeshi movement and for his advocacy of education.**
- 2. He became a follower of Dayanand Saraswati, the founder of Arya Samaj and went on to become one of the society's leaders.
- 3. He also helped found **the Punjab National Bank.**
- 4. In 1885, Rai established **the Dayanand Anglo-Vedic School** in Lahore and remained a committed educationist throughout his life.
- 5. Rai, Tilak, and Bipin Chandra Pal (called Lal-Bal-Pal) fervently advocated the use of Swadeshi goods and mass agitation in the aftermath of the controversial **Partition of Bengal in 1905 by Lord Curzon.**
- 6. He founded **the Indian Home Rule League of America in New York City in 1917.**
- 7. He was elected President of the Indian National Congress during its Special Session in Kolkata in 1920, which saw **the launch of Mahatma Gandhi's Non-cooperation Movement.**
- 8. The patriot died at Lahore in 1928 after he was attacked by police during a protest rally against the Simon Commission.
- 9. **His important works include:** 'The Arya Samaj', 'Young India', 'England's Debt to India', 'Evolution of Japan', 'India's Will to Freedom', 'Message of the Bhagwad Gita', 'Political Future of India', 'Problem of National Education in India', 'The Depressed Glasses', and the travelogue 'United States of America'.

14) Consider the following statements regarding the recommendations of Nehru Report.

- 1. Complete dissociation of State from religion
- 2. Responsible government at the centre and in provinces.
- 3. Rejection of separate electorates
- 4. Dominion status on lines of self-governing dominions desired by Indians

Which of the above statements is/are correct?

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

Solution: d)

The Nehru Report confined itself to British India, as it envisaged the future link-up of British India with the princely states on a federal basis. For the dominion it recommended:

1. **Dominion status on lines of self-governing dominions** as the form of government desired by Indians.
2. **Rejection of separate electorates** which had been the basis of constitutional reforms so far; instead, a demand for joint electorates with reservation of seats for Muslims.
3. Linguistic provinces.
4. Nineteen fundamental rights including equal rights for women, right to form unions, and universal adult suffrage.
5. **Responsible government at the centre and in provinces.**
6. Full protection to cultural and religious interests of Muslims.
7. **Complete dissociation of state from religion.**

15) Consider the following statements regarding individual satyagraha.

1. The demand of the satyagraha would be the freedom of speech against the war through an anti-war declaration.
2. It was associated with Delhi Chalo Movement.

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)

Individual Satyagraha:-

- The Individual Satyagraha was not to seek independence but to affirm the right of speech.
- The non-violence was set as the center-piece of Individual Satyagraha. This was done by carefully selecting the Satyagrahis.
- The first Satyagrahi selected was Acharya Vinoba Bhave, who was sent to Jail when he spoke against the war.
- Second Satyagrahi was Jawahar Lal Nehru.

Aims of Individual Satyagraha:-

- To show that nationalist patience was not due to weakness.
- To express people's feeling that they are not interested in the war and that they made distinction between Nazism and double autocracy that ruled in India.
- To give another opportunity to the Government to accept congress demands peacefully. **The demand of the Satyagrahi would be the freedom of Speech against the war through an anti-war declaration.** If government did not arrest the Satyagrahi, he or she will move repeating it in villages and start march towards Delhi (Delhi Chalo Movement)

6. Environment

1) Consider the following statements regarding Coringa Wildlife Sanctuary.

1. Coringa Wildlife Sanctuary is situated in Tamil Nadu.
2. It is the second largest stretch of mangrove forests in India.
3. The sanctuary has a fair population of fishing cat.

Which of the above statements is/are correct?

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

Solution: c)

Coringa Wildlife Sanctuary is a wildlife sanctuary and estuary situated near **Kakinada in Andhra Pradesh**. It is the **second largest stretch of mangrove forests in India**.

Apart from the avian fauna, the sanctuary has a fair population of golden jackal, sea turtle and **fishing cat**, and a healthy breeding population of smooth-coated otter.

2) Within biological communities, some species are important in determining the ability of a large number of other species to persist in the community. Such species are called

- a) Keystone species
- b) Allopatric species
- c) Sympatric species
- d) Threatened species

Solution: a)

A **keystone species** is a species which has a disproportionately large effect on its natural environment relative to its abundance.

Keystone species play a critical role in maintaining the structure of an ecological community, affecting many other organisms in an ecosystem and helping to determine the types and numbers of various other species in the community.

3) Consider the following statements.

1. Kyoto protocol deals primarily with the depletion of ozone layer.
2. Methane as a greenhouse gas is more harmful than carbon dioxide

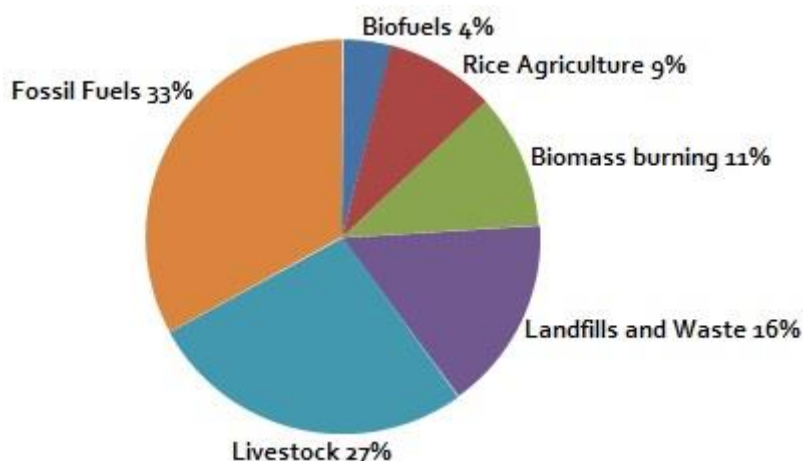
Which of the above statements is/are correct?

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

Solution: b)

Methane is a powerful greenhouse gas with a 100-year global warming potential 28-34 times that of CO₂. Measured over a 20-year period, that ratio grows to 84-86 times.

About 60% of global methane emissions are due to human activities. The main sources of anthropogenic methane emissions are the oil and gas industries, agriculture (including fermentation, manure management, and rice cultivation), landfills, wastewater treatment, and emissions from coal mines. Fossil fuel production, distribution and use are estimated to emit 110 million tonnes of methane annually.



The **Kyoto Protocol** is an international treaty which extends the 1992 United Nations Framework Convention on Climate Change (UNFCCC) that commits state parties to reduce greenhouse gas emissions.

4) Consider the following statements.

1. An ecological niche is the unique functional role or place of a species in an ecosystem.
2. No two species have exact identical niches.

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)

A niche is the unique functional role or place of a species in an ecosystem. It is a description of all the biological, physical and chemical factors that a species needs to survive, stay healthy and reproduce.

A niche is unique for a species, which means **no two species have exact identical niches**. Niche plays an important role in conservation of organisms.

If we have to conserve species in its native habitat we should have knowledge about the niche requirements of the species and should ensure that all requirements of its niche are fulfilled.

5) What is a "Biotope"?

- a) It is an ecosystem that supports the genetic mutation of a contiguous ecosystem.
- b) It is a well-defined geographical area, characterised by specific ecological conditions.
- c) It is a biome that harbours all species of same phenotype.
- d) It is a community of species that reproduces entirely by asexual reproduction.

Solution: b)

Biotope is a well-defined geographical area, characterised by specific ecological conditions (soil, climate, etc.), which physically supports the organisms that live there.

A biotope is generally not considered to be a large-scale phenomenon. For example, a biotope might be a neighbouring park, a back garden, even potted plants or a fish tank on a porch.

In other words, the biotope is not a macroscopic but a microscopic approach to preserving the ecosystem and biological diversity.

Phenotype is the set of observable characteristics of an individual resulting from the interaction of its genotype with the environment.

6) Which of the following National Parks and Wildlife Sanctuaries are located in Kerala?

1. Eravikulam National Park
2. Mathikettan Shola National Park
3. Parambikulam Wildlife Sanctuary
4. Karlapat Wildlife Sanctuary

Select the correct answer code:

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

Solution: a)

Karlapat Wildlife Sanctuary is a wildlife sanctuary located in Odisha.

7) Match the following Tiger Reserves and their location

Tiger Reserve	Location
1. Corbett Tiger Reserve	A. Mizoram
2. Buxa Tiger Reserve	B. Telangana
3. Amrabad Tiger Reserve	C. Uttarakhand
4. Dampa Tiger Reserve	D. West Bengal

Select the correct answer code:

- a) 1-A, 2-B, 3-C, 4-D
- b) 1-D, 2-B, 3-C, 4-A
- c) 1-C, 2-D, 3-B, 4-A
- d) 1-C, 2-B, 3-D, 4-A

Solution: c)

8) Mediterranean trees adapt themselves to dry summers with the help of their thick barks and wax coated leaves. These help them to

- a) Reduce transpiration
- b) Increase rate of water flow from roots to shoots
- c) Cut down the need for photosynthesis
- d) Increase the area of the leaves to step up glucose intake

Solution: a)

Transpiration is the loss of water from the leaves through stomata.

This creates a suction pull in plants that creates demand for more water from the roots.

If transpiration is high due to large area of large pores of the leaves, water demand for the plant is likely to be high, which would not work for a climate like Mediterranean. So, waxy leaves and thick barks reduce transpiration and thus water need.

9) Which of the following are the Ozone depleting substances.

1. Hydrobromofluorocarbons (HBFCs)
2. Halons
3. Methyl bromide
4. Carbon tetrachloride
5. Methyl chloroform

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.

10) Momentum for Change is an initiative of

- a) UN Climate Change secretariat
- b) UNEP
- c) World Bank
- d) UNICEF

Solution: a)

Momentum for Change is an initiative spearheaded by the UN Climate Change secretariat to shine a light on the enormous groundswell of activities underway across the globe that are moving the world toward a highly resilient, low-carbon future.

Momentum for Change recognizes innovative and transformative solutions that address both climate change and wider economic, social and environmental challenges.

11) Consider the following statements regarding Biodiversity

1. Biodiversity is the term popularized by the socio-biologist Edward Wilson.
2. Species diversity means a single species might show high diversity at the genetic level over its distributional range.

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)

Levels of Biodiversity

- Biodiversity is the term popularized by the socio-biologist Edward Wilson to describe the combined diversity at all the levels of biological organisation.

The most important of them are—

(i) **Genetic diversity:** A single species might show **high diversity at the genetic level over its distributional range.**

The genetic variation shown by the medicinal plant *Rauwolfia vomitoria* growing in different Himalayan ranges might be in terms of the potency and concentration of the active chemical (reserpine) that the plant produces. India has more than 50,000 genetically different strains of rice, and 1,000 varieties of mango.

(ii) **Species diversity:** The diversity at the species level, for example, the Western Ghats has greater amphibian species diversity than the Eastern Ghats.

(iii) **Ecological diversity:** At the ecosystem level, India, for instance, with its deserts, rain forests, mangroves, coral reefs, wetlands, estuaries, and alpine meadows has greater ecosystem diversity than a Scandinavian country like Norway.

12) Consider the following statements regarding Community

1. It is a group of organisms usually of the same species, occupying a defined area during a specific time.
2. Communities in most instances are named after the dominant plant form (species).

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)

Population is a group of organisms usually of the same species, occupying a defined area during a specific time.

Community:

- **Communities in most instances are named after the dominant plant form (species).**
- In a community the number of species and size of their population vary greatly. A community may have one or several species.
- The environmental factors determine the characteristic of the community as well as the pattern of organization of the members in the community.

13) Consider the following statements regarding Pyramid of Numbers

1. This deal with the relationship between the numbers of primary producers and consumers of different levels.
2. Inverted pyramid of numbers is found in pond ecosystem.
3. A pyramid of numbers does not take into account the fact that the size of organisms being counted in each trophic level.

Which of the above statements is/are correct?

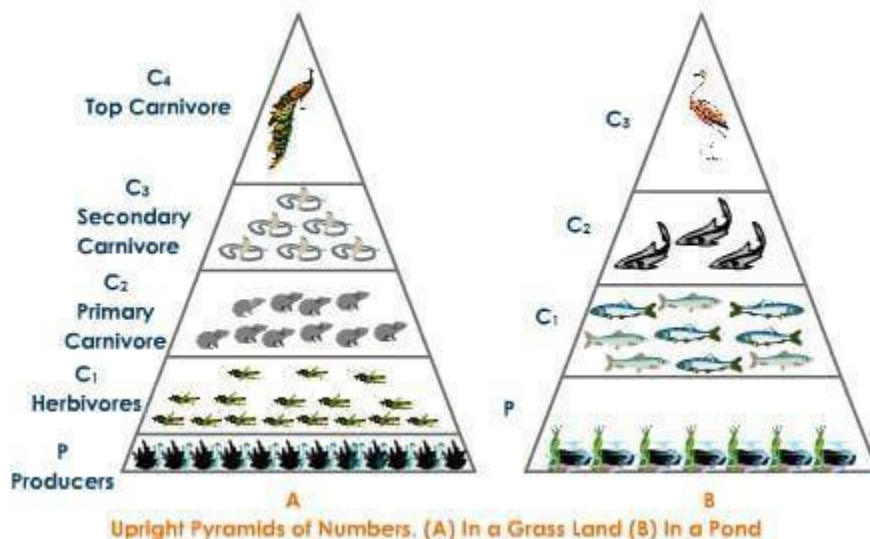
- a) 1, 2
- b) 2, 3
- c) 1, 3
- d) 1, 2, 3

Solution: c)

Pyramid of Numbers:

This deals with the **relationship between the numbers of primary producers and consumers of different levels.** It is a graphic representation of the total number of individuals of different species, belonging to each trophic level in an ecosystem.

A pyramid of numbers does not take into account the fact that the size of organisms being counted in each trophic level can vary.



It is very difficult to count all the organisms, in a pyramid of numbers and so the pyramid of number does not completely define the trophic structure for an ecosystem.

14) Consider the following statements regarding Biodiversity across the world.

1. More than 70 per cent of all the species recorded are plants
2. Among animals, insects are the most species-rich taxonomic group, making up more than 70 per cent of the total.

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)

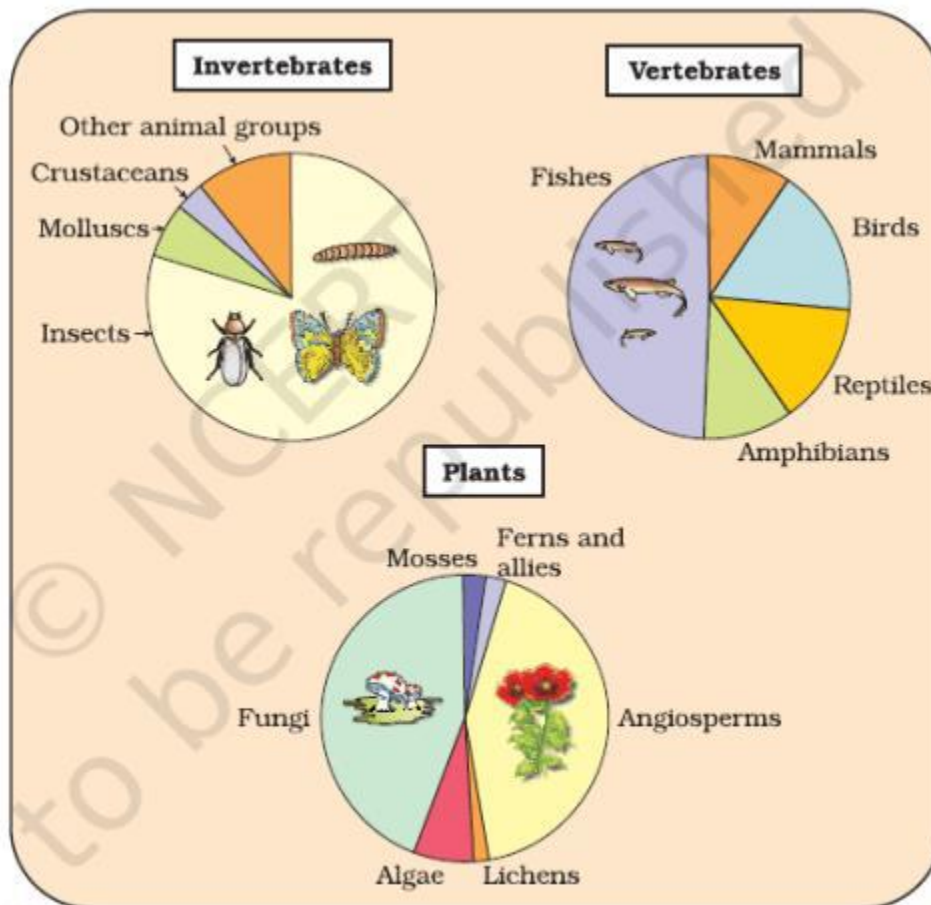


Figure 15.1 Representing global biodiversity: proportionate number of species of major taxa of plants, invertebrates and vertebrates

More than 70 per cent of all the species recorded are animals, while plants (including algae, fungi, bryophytes, gymnosperms and angiosperms) comprise no more than 22 per cent of the total. Among animals, insects are the most species-rich taxonomic group, making up more than 70 per cent of the total. That means, out of every 10 animals on this planet, 7 are insects.

15) Which of the following are Ex situ Conservation methods?

1. Botanical gardens
2. Zoological parks
3. Sacred groves
4. Wildlife safari parks

Which of the above statements is/are correct?

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

Solution: d)

Ex situ Conservation— In this approach, threatened animals and plants are taken out from their natural habitat and placed in special setting where they can be protected and given special care. Zoological parks, botanical gardens and wildlife safari parks serve this purpose. There are many animals that have become extinct in the wild but continue to be maintained in zoological parks.

A **sacred grove** or sacred woods are any grove of trees that are of special religious importance to a particular culture. Sacred groves feature in various cultures throughout the world. Thus, they **belong to in-situ**

conservation efforts. In fact, sacred groves represent the ancient Indian way of in situ conservation of genetic diversity.

16) Which of the following gas/compound is the biggest overall contributor to the greenhouse effect?

- a) Methane
- b) Oxides of Nitrogen
- c) Water vapour
- d) Carbon dioxide

Solution: c)

Water Vapour is the biggest overall contributor to the greenhouse effect and humans are not directly responsible for emitting this gas in quantities sufficient to change its concentration in the atmosphere. However, CO₂ and other greenhouse gases is increasing the amount of water vapour in the air by boosting the rate of evaporation.

Unlike CO₂, which can persist in the air for centuries, water vapour cycles through the atmosphere quickly, evaporating from the oceans and elsewhere before coming back down as rain or snow.

17) Consider the following statements regarding Tso Kar Wetland.

- 1. Tso Kar Wetland is a Ramsar site located in Sikkim.
- 2. The entire Tso Kar basin is a hyper saline lake.
- 3. It is also an Important Bird Area (IBA) as per BirdLife International and a key staging site in the Central Asian Flyway.

Which of the above statements is/are correct?

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

Solution: d)

- Tso Kar Basin is a high-altitude wetland complex, consisting of two principal waterbodies, Startsapuk Tso, a **freshwater lake** and Tso Kar itself, a **hyper saline lake**, situated in **the Changthang region of Ladakh, India.**
- It is called Tso Kar, meaning white lake, because of **the white salt efflorescence** found on the margins due to the evaporation of highly saline water.
- It is also **an Important Bird Area (IBA)** as per **BirdLife International** and a key staging site in **the Central Asian Flyway.**

18) Currently the wetlands of India that are in Montreux record are

- 1. Mansar Lake
- 2. Keoladeo National Park
- 3. Chilka lake

Select the correct answer code:

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

Solution: b)

Currently, two wetlands of India are in Montreux record: Keoladeo National Park (Rajasthan) and Loktak Lake (Manipur).

Chilka lake (Odisha) was placed in the record but was later removed from it.

19) The concept of Carbon credit originated from which one of the following?

- a) Paris Agreement
- b) Montreal Protocol
- c) Kyoto Protocol
- d) Earth Summit, Rio de Janeiro

Solution: c)

A **carbon credit** is a generic term for any tradable certificate or permit representing the **right to emit one tonne of carbon dioxide or the equivalent amount of a different greenhouse gas.**

The United Nations' Intergovernmental Panel on Climate Change (IPCC) developed a carbon credit proposal to reduce worldwide carbon emissions in a 1997 agreement known as the **Kyoto Protocol**. The agreement set binding emission reduction targets for the countries that signed it. Another agreement, known as the Marrakesh Accords, spelled out the rules for how the system would work.

20) Consider the following statements.

1. Rice cultivation is both an important sequester of carbon dioxide from the atmosphere and an important source of greenhouse gases.
2. When nitrogen-based fertilizers are used, nitrous oxide is emitted from the cultivated soil.

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)

Rice cultivation is both an important sequester of carbon dioxide from the atmosphere and an important source of greenhouse gases (e.g. methane and nitrite oxide) emission.

Under anaerobic condition of submerged soils of flooded rice fields, methane is produced and much of it escapes from the soil into the atmosphere.

The burning of rice residues such as straw and husks also contributes to greenhouse gas emission. Similarly the inefficient **application of nitrogen fertilizers in rice production systems promotes the release of nitrous oxide**, a potent greenhouse gas, into the atmosphere.

[Source](#)

7. Science and Technology

1) Which of these are the fundamental properties of a superconductor?

1. Zero resistance to electrical current
2. Ferromagnetism

Select the correct answer code:

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

Solution: a)

Superconductivity is a state in which a material shows absolutely zero electrical resistance. While resistance is a property that restricts the flow of electricity, superconductivity allows unhindered flow.

In a superconducting state, the material offers no resistance at all. All the electrons align themselves in a particular direction, and move without any obstruction in a “coherent” manner.

Because of zero resistance, superconducting materials can save huge amounts of energy, and be used to make highly efficient electrical appliances.

Two fundamental properties of a superconductor:

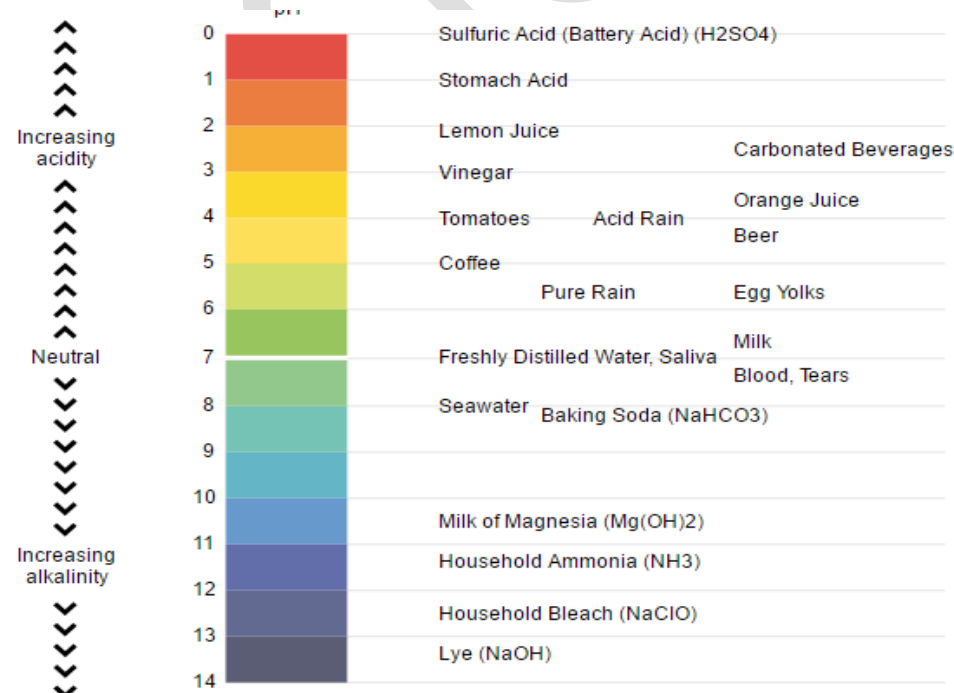
- **Zero resistance to electrical current.**
- **Diamagnetism**

Diamagnetism is a property opposite to normal magnetism that we are used to. A diamagnetic substance repels an external magnetic field, in sharp contrast to normal magnetism, or ferromagnetism, under which a substance is attracted by an external magnetic field.

2) Which of the following human body fluids is the most acidic in nature?

- a) Blood
- b) Gastric Juice
- c) Saliva
- d) Tears

Solution: b)



3) Consider the following statements regarding Measles.

1. Measles is transmitted via droplets from the nose, mouth or throat of infected persons.
2. Severe measles is more likely among poorly nourished young children, especially those with insufficient vitamin A.

Select the correct answer code:

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

Solution: c)

Measles is a highly contagious viral disease.

Measles is transmitted via droplets from the nose, mouth or throat of infected persons.

Initial symptoms, which usually appear 10–12 days after infection, include high fever, a runny nose, bloodshot eyes, and tiny white spots on the inside of the mouth. Several days later, a rash develops, starting on the face and upper neck and gradually spreading downwards.

Vulnerability: Severe measles is more likely among **poorly nourished young children, especially those with insufficient vitamin A**, or whose immune systems have been weakened by HIV/AIDS or other diseases.

The most serious complications include blindness, encephalitis (an infection that causes brain swelling), severe diarrhoea and related dehydration, and severe respiratory infections such as pneumonia.

Prevention: Routine measles vaccination for children, combined with mass immunization campaigns in countries with low routine coverage, are key public health strategies to reduce global measles deaths.

4) Sounding rockets of ISRO are useful for

- a) Adding speed to space shuttles
- b) Providing information on space junk
- c) Weather forecasting
- d) Probing the upper atmospheric regions and for space research

Solution: d)

Sounding rockets are one or two stage solid propellant rockets used for **probing the upper atmospheric regions and for space research**

They also serve as easily affordable platforms to test or prove prototypes of new components or subsystems intended for use in launch vehicles and satellites.

The launch of the first sounding rocket from Thumba near Thiruvananthapuram, in 1963, marked the beginning of the Indian Space Programme. Sounding rockets made it possible to probe the atmosphere in situ using rocket-borne instrumentation.

5) Consider the following statements.

1. Excessive use of chemical fertilisers makes the soil acidic.
2. Plants do not grow well when the soil is either too acidic or too basic.
3. Acidic soil should be treated with more organic matter to reduce acidity.

Which of the above statements is/are correct?

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

Solution: d)

Some of the harm chemical fertilizers may cause include waterway pollution, chemical burn to crops, increased air pollution, acidification of the soil and mineral depletion of the soil.

Chemical fertilizers are high in nutrient content such as nitrogen. Over-application of chemical fertilizer to plants may cause the leaves to turn yellow or brown, damaging the plant and reducing crop yield. This condition is known as chemical leaf scorch. Leaf scorch can cause the leaves of the plant to wither and may cause the plant to die.

When soil is too acidic, it is treated with bases like quick lime (calcium oxide) or slaked lime (calcium hydroxide). If the soil is basic, organic matter is added to it. Organic matter releases acids which neutralises the basic nature of the soil.

6) Consider the following statements.

1. *Energy produced using various forms of ocean energy such as tidal, wave and ocean thermal energy conversion are considered as Non-Renewable Energy.*

2. *Osmotic energy is the energy produced from the movement of water across a membrane between a saltwater reservoir and freshwater reservoir.*

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 government has declared **ocean energy as Renewable Energy.**

Accordingly, the Ministry of New and Renewable Energy has clarified that ***energy produced using various forms of ocean energy such as tidal, wave, ocean thermal energy conversion etc. shall be considered as Renewable Energy and shall be eligible for meeting the non-solar Renewable Purchase Obligations (RPO).***

Osmotic energy: This technique produces energy from the movement of water across a membrane between a saltwater reservoir and freshwater reservoir.

7) Consider the following statements regarding Microbial Fuel Cells (MFCs).

- 1. These are devices that convert chemical energy to electrical energy by the oxidation of organic molecules by the action of microorganisms.
- 2. No moving electrons or cathode/anode are required in an MFC.

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)

A microbial fuel cell (MFC) is a bio-electrochemical device that harnesses the power of respiring microbes to convert organic substrates directly into electrical energy.

At its core, the MFC is a fuel cell, which **transforms chemical energy into electricity** using oxidation reduction reactions. The key difference of course is in the name, microbial fuel cells rely on living biocatalysts to facilitate the movement of electrons throughout their systems instead of the traditional chemically catalyzed oxidation of a fuel at the anode and reduction at the cathode.

A MFC consists of an anode and a cathode separated by a cation specific membrane. Microbes at the anode oxidize the organic fuel generating protons which pass through the membrane to the cathode, and electrons which pass through the anode to an external circuit to generate a current. The trick of course is collecting the electrons released by bacteria as they respire.

8) Scientific interest in gas hydrates is driven mainly by its potential future role as

- a) Energy resource

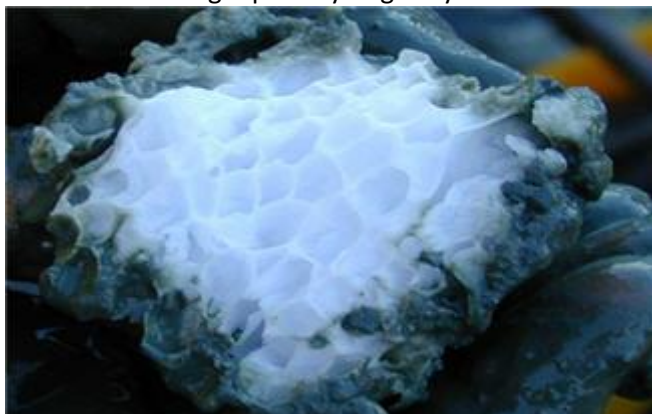
- b) Shale gas fracking
- c) Aerosol applications in climate change mitigation
- d) Nano-agent in reactor coolant

Solution: a)

Gas hydrates are naturally occurring, solid compounds containing natural gas (mainly methane) and water. Methane gas hydrate is stable at the seafloor at water depths beneath about 500 m.

Scientific interest in gas hydrates is driven mainly by its potential future role as an energy resource, and by the role of methane as a strong greenhouse gas and contributor to global climate change.

The preliminary assessment of geological condition and limited available seismic data suggests high possibility of occurrence of large quantity of gas hydrates within the EEZ of India.



9) Consider the following pairs:

1. Grey hydrogen: Hydrogen not produced from fossil fuels
2. Blue hydrogen: Hydrogen generated from fossil fuels with carbon capture and storage options.
3. Green hydrogen: Hydrogen generated entirely from renewable power sources

Which of the above pairs are correctly matched?

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

Solution: b)

The sources and processes by which hydrogen is derived, are categorised by colour tabs.

Hydrogen produced from fossil fuels is called grey hydrogen; this constitutes the bulk of the hydrogen produced today.

Hydrogen generated from fossil fuels with carbon capture and storage options is called blue hydrogen;

Hydrogen generated entirely from renewable power sources is called green hydrogen. In the last process, electricity generated from renewable energy is used to split water into hydrogen and oxygen.

10) Consider the following statements regarding Biofuels.

1. The most common kinds of biofuels in use today are ethanol and biodiesel that represent the first generation of biofuel technology.
2. Ethanol is renewable and made from different kinds of plant materials.
3. Biodiesel is produced by combining alcohol with new and used vegetable oils and animal fats.
4. Biofuels cannot be used as rocket fuels since they have high viscosity.

Which of the above statements is/are correct?

- a) 1, 2

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

Solution: c)

On January 31, Stardust 1.0 was launched from Loring Commerce Centre in Maine, US, becoming the **first commercial space launch powered by biofuel**, which is non-toxic for the environment as opposed to traditionally used rocket fuels.

Biofuels are obtained from biomass, which can be converted directly into liquid fuels that can be used as transportation fuels. The two most common kinds of biofuels in use today are **ethanol and biodiesel** and they both represent the **first generation of biofuel technology**.

Ethanol, for instance, is renewable and made from different kinds of plant materials. Biodiesel on the other hand is produced by combining alcohol with new and used vegetable oils, animal fats or recycled cooking grease.

- 11) Active Noise-cancelling headphones primarily work by
- a) Sending a mirror sound wave inside the headphone speakers
 - b) Radiating sound waves externally (to the headphone) to block any incoming sound
 - c) Passively blocking all the noise coming inside the microphone
 - d) Both (a) and (b)

Solution: a)

Noise-cancelling headphones (a smart wearable device) can be broken down into two main groups: passive and active.

Passive headphones simply reduce background noise by using insulating materials to prevent external noise from entering the ear.

Active headphones, on the other hand, are a little more complex.

Many active headphones have an external microphone that screens incoming sounds. When the microphone detects unwanted noise—such as a humming airplane engine—it sends a sound wave into the headphone speakers that is 180 degrees out of phase with the bothersome sound. Consequently, the two waves cancel each other out, resulting in silence. Unlike traditional earbuds or headphones, noise-cancelers require a rechargeable battery to send out the mirror waves.

- 12) Arrange the following commonly used fuels in terms of calorific value:

- a) Coal < Wood < Biogas < Hydrogen
- b) Wood < Coal < Biogas < Hydrogen
- c) Wood < Biogas < Coal < Hydrogen
- d) Coal < Biogas < Wood < Hydrogen

Solution: b)

Table 6.4 : Calorific Values of Different Fuels

Fuel	Calorific Value (kJ/kg)
Cow dung cake	6000-8000
Wood	17000-22000
Coal	25000-33000
Petrol	45000
Kerosene	45000
Diesel	45000
Methane	50000
CNG	50000
LPG	55000
Biogas	35000-40000
Hydrogen	150000

13) Consider the following statements regarding Tuberculosis.

1. The bacterium that causes tuberculosis is called *Mycobacterium tuberculosis*.
2. Chest X-ray cannot be used as a screening tool for Tuberculosis.

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)

Tuberculosis (TB) is caused by a bacterium called *Mycobacterium tuberculosis*.

Microbiological confirmation on sputum, chest x-ray screening etc. are some of the methods used to screen TB.

14) How is the phenomena of gravitational lensing helpful for astronomers?

1. It helps them to investigate how new stars are born.
2. It is useful to estimate the amount and distribution of dark matter in the universe.

Select the correct answer code:

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

Solution: c)

Using NASA's **James Webb Space Telescope** as a sort of time machine, researchers plan to investigate **how new stars are born**, with the help of a natural phenomenon called "**gravitational lensing**".

- Gravitational lensing is an effect of Einstein's theory of **general relativity** – simply put, **mass bends light**.
- The gravitational field of a massive object will extend far into space, and cause light rays passing close to that object (and thus through its gravitational field) to be bent and refocused somewhere else.
- **The more massive the object, the stronger its gravitational field** and hence the greater the bending of light rays – just like using denser materials to make optical lenses results in a greater amount of refraction.

Gravitational lensing is useful to cosmologists because **it is directly sensitive to the amount and distribution of dark matter**.

Lensing can help astronomers work out exactly how much dark matter there is in the Universe as a whole and also how it is distributed.

Lensing has also been used to help verify the existence of dark matter itself.

15) Consider the following statements regarding High-Temperature Proton Exchange Membrane (HTPEM) technology.

1. It takes nuclear fuel as the input and produces heat and water as its bi-products
2. It is suitable for distributed stationary power applications like small offices and commercial units.

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)

India's first indigenously developed high-temperature based Fuel Cell System. **It is a 5.0 kW fuel cell system that generates power in a green manner.**

It takes methanol as the input and produces heat and water as its bi-products

The developed fuel cells are based on High-Temperature Proton Exchange Membrane (HTPEM) technology.

- Developed under the Public-Private Partnership (PPP) model **by the Council of Scientific and Industrial Research (CSIR)** in partnership with Indian industries.
- Built under India's flagship programme named '**New Millennium Indian Technology Leadership Initiative (NMITLI)**'.

Applications:

1. **Suitable for distributed stationary power applications like;** for small offices, commercial units, data centers etc.; where highly reliable power is essential with simultaneous requirement for air-conditioning.
2. It will also meet the requirement of efficient, clean and reliable backup power generator for telecom towers, remote locations and strategic applications as well.
3. Replace Diesel Generating (DG) sets and help reduce India's dependence on crude oil.

16) How UV radiation is harmful to terrestrial life?

1. It accelerates ageing of skin in humans.
2. It can kill phytoplankton in large numbers.
3. Plant proteins are adversely affected by UV radiation.
4. It may lead to harmful mutation of plant cells.

Select the correct answer code:

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

Solution: d)

With the depletion of ozone layer, more UV radiation filters into troposphere. **UV radiations lead to ageing of skin**, cataract, sunburn and skin cancer in humans.

Many **phytoplankton cannot tolerate the bright, unfiltered solar radiation** at the ocean's surface and are impaired especially by the high-energy, short-wavelength radiation in the UV range of the spectrum.

UV-B impairs photosynthesis in many species. Overexposure to UV-B reduces size, productivity, and quality in many of the crop plant species. UV-B increases plants' susceptibility to disease by sometimes causing **mutations or damaging plant proteins.**

- 17) Lime is usually added to soil in order to
1. Decrease the soil PH
 2. Improve crop yields
 3. Provide a source of calcium and magnesium for plants
 4. Allow improved water penetration for acidic soils

Which of the above statements is/are correct?

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

Solution: a)

Agricultural lime, also called aglime, is a soil additive made from pulverized limestone or chalk.

The primary active component is calcium carbonate.

The effects of agricultural lime on soil are:

- it **increases the pH of acidic soil** (the lower the pH the more acidic the soil); in other words, **soil acidity is reduced and alkalinity increased**
- it provides a source of calcium and magnesium for plants
- it permits **improved water penetration** for acidic soils
- it **improves the uptake of major plant nutrients** (nitrogen, phosphorus, and potassium) of plants growing on acid soils

- 18) Osmosis is a driving force, i.e. assists the mechanism, for which of these diseases?

- a) HIV AIDS
- b) Cholera
- c) Tuberculosis
- d) All of the above

Solution: b)

Cholera would not be possible without osmosis. The choleric bacteria populate in our intestines and begin to reverse the intestinal cells' ionic orientation. In other words, it changes the way ions and, subsequently, water is transported in our intestines.

when our ions' orientations are switched, the intestinal cells are no longer able to absorb water into the body. It actually flows out. Now osmosis happens in the other direction and water moves from our intestinal cells into our intestines. This is what causes cholera's deadly watery diarrhoea.

This is why cholera can kill you so quickly, because it does not rely on how much water you consume.

- 19) James Webb Space Telescope (JWST) aims to understand which of the following?

1. Search for light from the first stars and galaxies that formed in the Universe after the Big Bang.
2. Study the formation of stars and planetary systems
3. Study planetary systems and the origins of life

Select the correct answer code:

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

Solution: c)

The **James Webb Space Telescope** is a joint NASA-ESA-CSA space telescope that is planned to succeed the Hubble Space Telescope as NASA's flagship astrophysics mission.

The JWST has four key goals:

- to search for light from the first stars and galaxies that formed in the Universe after the Big Bang
- to study the formation and evolution of galaxies
- to understand the formation of stars and planetary systems
- to study planetary systems and the origins of life

20) Consider the following statements regarding Block Chain Technology

1. It is a time-stamped series of immutable record of data that is managed by cluster of computers not owned by any single entity.
2. The blockchain network has no central authority.
3. It carries no transaction cost.

Which of the above statements is/are correct?

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

Solution: d)

A blockchain is, in the simplest of terms, a time-stamped series of immutable record of data that is managed by cluster of computers not owned by any single entity. Each of these blocks of data (i.e. block) are secured and bound to each other using cryptographic principles (i.e. chain).

The blockchain network has no central authority — it is the very definition of a democratized system. Since it is a shared and immutable ledger, the information in it is open for anyone and everyone to see.

A blockchain carries no transaction cost. (An infrastructure cost yes, but no transaction cost.)

21) Search-lights and vehicle headlights get powerful parallel beams of light by using

- a) Convex mirrors
- b) Polar mirrors
- c) Biofocal mirrors
- d) Concave mirrors

Solution: d)

A ray passing through the principal focus of a concave mirror or a ray which is directed towards the principal focus of a convex mirror, after reflection, will emerge parallel to the principal axis.

So, concave mirrors are commonly used in torches, search-lights and vehicles headlights to get powerful parallel beams of light. They are often used as shaving mirrors to see a larger image of the face. The dentists use concave mirrors to see large images of the teeth of patients.

Large concave mirrors are used to concentrate sunlight to produce heat in solar furnaces.

22) What is referred to as starch is essentially

- a) a dietary fibre
- b) pure glucose
- c) a form of complex carbohydrate
- d) an indicator for iodine

Solution: c)

Carbohydrates are sugars that come in 2 main forms - simple and complex. This is also referred to as simple sugars and starches.

The difference between a simple and complex carb is in how quickly it is digested and absorbed - as well as its chemical structure.

Sugars are found in a variety of natural food sources including fruit, vegetables and milk, and give food a sweet taste. But they also raise blood glucose levels quickly.

Sugars can be categorised as single sugars (monosaccharides), which include glucose, fructose and galactose, or double sugars (disaccharides), which include sucrose (table sugar), lactose and maltose.

Complex carbohydrates, also known as polysaccharides, are starches formed by longer saccharide chains, which means they take longer to break down.

23) H9N2 viruses are associated with

- a) Foot and Mouth Disease
- b) Influenza epidemics
- c) Widespread tuberculosis
- d) Diarrhoea

Solution: b)

H9N2 is a subtype of the influenza A virus, which causes human influenza as well as bird flu.

24) In the human body significant magnetic field is produced by which of these organs?

- a) Spleen and liver
- b) Heart and Brain
- c) Stomach and Duodenum
- d) Hands and legs

Solution: b)

An electric current always produces a magnetic field. Even weak ion currents that travel along the nerve cells in our body produce magnetic fields.

- When we touch something, our nerves carry an electric impulse to the muscles we need to use. This impulse produces a temporary magnetic field.
- These fields are very weak and are about one-billionth of the earth's magnetic field. Two main organs **in the human body where the magnetic field produced is significant, are the heart and the brain.** The magnetic field inside the body forms the basis of obtaining the images of different body parts.
- This is done using a technique called Magnetic Resonance Imaging (MRI). Analysis of these images helps in medical diagnosis.

25) Consider the following statements regarding photosynthesis.

1. Not only plants, but some bacteria also perform photosynthesis.
2. Glucose and oxygen are the end products of oxygenic photosynthesis.

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)

Photosynthesis is the process by which plants, some bacteria and some protistans use the energy from sunlight to **produce glucose** from carbon dioxide and water. This glucose can be converted into pyruvate which releases adenosine triphosphate (ATP) by cellular respiration. **Oxygen is also formed.**

