

# Geography GS Repeat and Hit !

**Neetu Singh**

**Which of the following factors is/are responsible for the variation in the amount of insolation received at the surface of the earth?**

**The rotation of earth on its axis.**

**The angle of inclination of the sun's rays.**

**The transparency of the atmosphere.**

**The configuration of land in terms of its aspect.**

**a.1 and 4 only**

**b.1, 2, 3, and 4**

**c.1, 2, and 3 only**

**d.2 and 3 only**



## **Regarding the Earth's Heat Budget, what does 'Albedo' represent?**

- a. The total amount of solar energy absorbed by the Earth's surface.**
- b. The value of solar constant reaching the top of the atmosphere.**
- c. The proportion of solar radiation reflected from the Earth's surface and atmosphere back into space.**
- d. The energy radiated by the Earth's surface in the form of long-wave radiation.**



## **Why is the maximum temperature on Earth usually recorded in the subtropical deserts rather than at the Equator?**

- a. The Equator has high cloud cover which reflects a significant portion of insolation.**
- b. The duration of day is longer in the deserts throughout the year.**
- c. The Earth's crust is thicker in desert regions.**
- d. Deserts have a higher albedo than equatorial forests.**

**Consider the following statements regarding insolation:**

**Insolation is the solar radiation received at the Earth's surface.**

**All incoming solar radiation is absorbed by the Earth's surface.**

**The amount of insolation decreases from the equator towards the poles.**

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

**a. 1 only**

**b. 1 and 3 only**

**c. 2 and 3 only**

**d. 1, 2 and 3**



**The 'Solar Constant' is measured as 1.94 calories per square centimeter per minute. Where is this value most accurately recorded?**

**a. At the outer limit of the atmosphere.**

**b. At the Earth's surface at the Equator.**

**c. At the North Pole during the Summer Solstice.**

**d. In the center of the Sub-tropical high-pressure belts**

Consider the following statements:

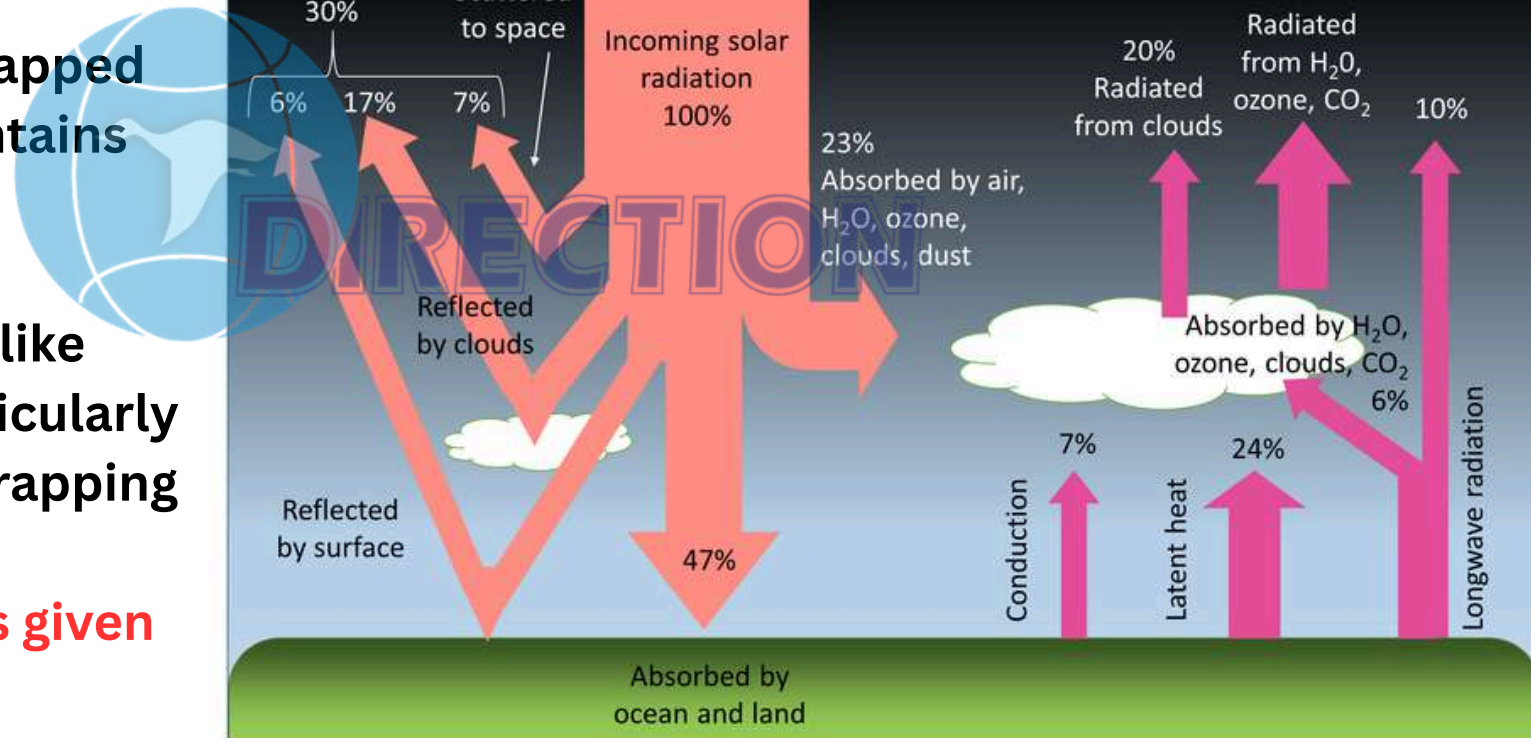
I. Without the atmosphere, temperature would be well below freezing point everywhere on the Earth's surface.

II. Heat absorbed and trapped by the atmosphere maintains our planet's average temperature.

III. Atmosphere's gases, like carbon dioxide, are particularly good at absorbing and trapping radiation.

Which of the statements given above are correct?

- (a) I and III only
- (b) I and II only
- (c) I, II and III
- (d) II and III only



Consider the following statements :

**Statement-I:** The atmosphere is heated more by incoming solar radiation than by terrestrial radiation.

**Statement-II :** Carbon dioxide and other greenhouse gases in the atmosphere good absorbers of long wave radiation

*Which one of the following is correct in respect of the above statements?*

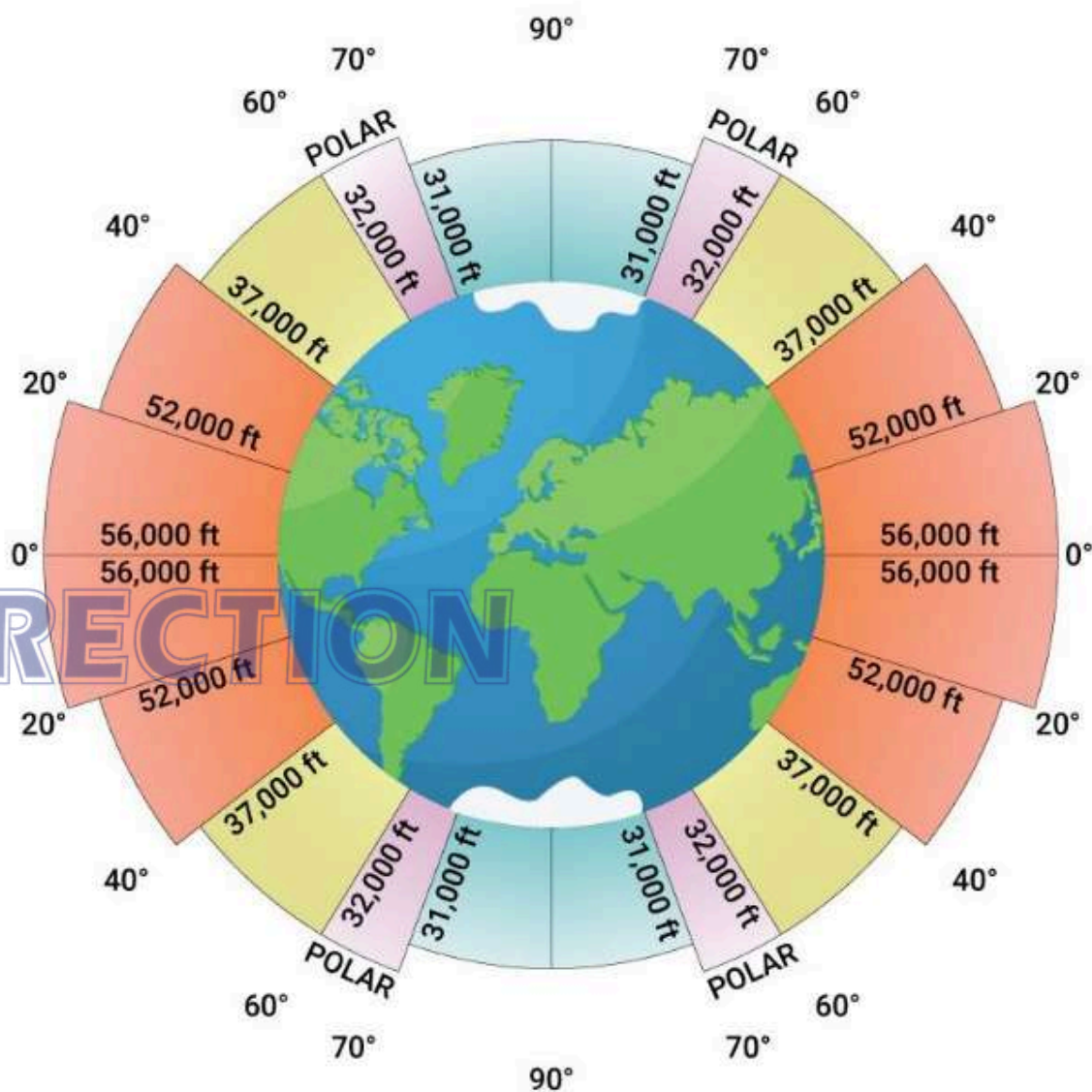
- (a) Both Statement-I and Statement-II are correct and Statement-II explains Statement-I
- (b) Both Statement-I and Statement-II are correct, but Statement-II does not explain Statement-I
- (c) Statement-I is correct, but Statement-II is incorrect
- (d) **Statement-I is incorrect, but Statement-II is correct**

**Heat Accumulation** (The "Delayed Burner" Effect): The earth does not get heated directly by the sun's rays to their maximum potential at noon. Instead, sunlight heats the Earth's surface (ground, buildings, water), which then heats the air above it through radiation. It takes time for this heat to be transferred from the ground to the air, causing a delay of a few hours between the peak intensity of the sun and the highest air temperature.

**Thermal Inertia:** Different surfaces (soil, concrete, water) take time to absorb and release heat. This means the atmosphere continues to heat up long after the sun has passed its highest point.



## Tropopause Distribution Over the EARTH



The temperature at the tropopause can be  $-40^{\circ}\text{C}$  over the poles and can be  $-80^{\circ}\text{C}$  over the Equator. When the altitude of the tropopause gets lower the temperature increases.

Consider the following statements :

**Statement-I:** Thickness of the troposphere at the equator is much greater as compared to poles.

**Statement-II:** At the equator, heat is transported to great heights by strong convectional currents.

Which one of the following is correct in respect of the above statements?

(a) Both Statement-I and Statement-II are correct and Statement-II explains Statement-I

(b) Both Statement-I and Statement-II are correct, but Statement-II does not explain Statement-I

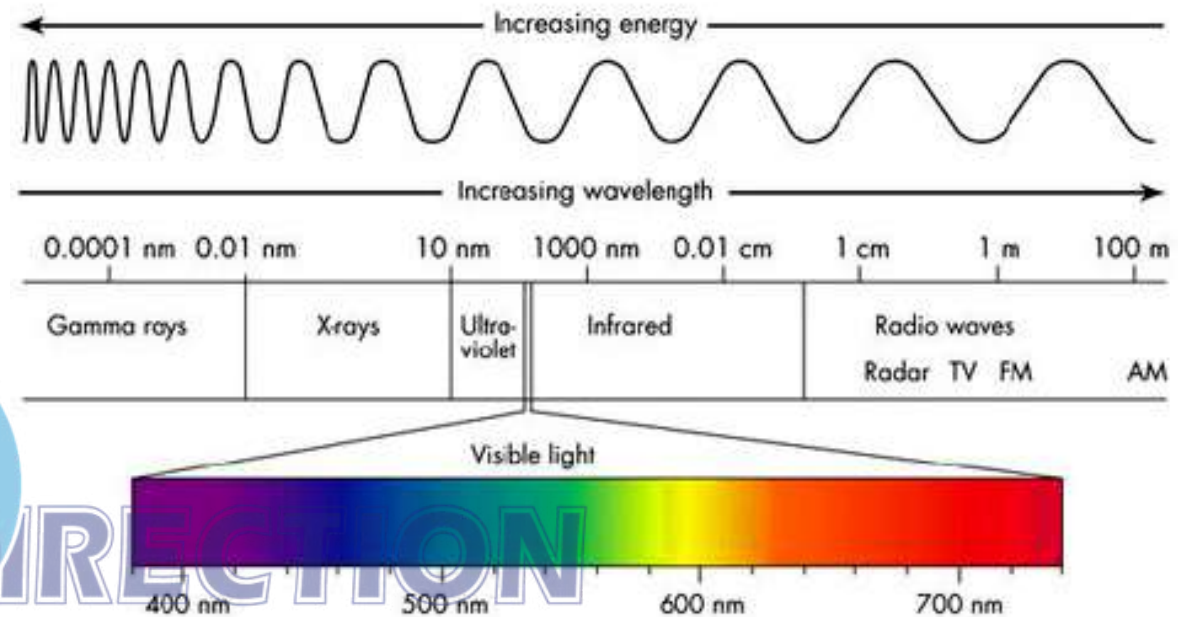
(c) Statement-I is correct, but Statement-II is incorrect

(d) Statement-I is incorrect, but Statement-II is correct

2023

With reference to the Earth's atmosphere, which one of the following statements is correct?

- (a) The total amount of insolation received at the equator is roughly about 10 times of that received at the poles.
- (b) Infrared rays constitute roughly two-thirds of insolation.
- (c) Infrared waves are largely absorbed by water vapour that is concentrated in the lower atmosphere.
- (d) Infrared waves are a part of the visible spectrum of electromagnetic waves of solar radiation.



The amount of insolation received at the equator is roughly about 3 to 4 times that received at the poles, variation from approximately 320 W/m<sup>2</sup> in the tropics to about 70 W/m<sup>2</sup> at the poles.

Solar radiation reaching the Earth's atmosphere consists primarily of visible light (roughly 49-50%), followed closely by infrared (roughly 40-45%), and a small amount of ultraviolet radiation.

infrared radiation emitted from the Earth's surface is strongly absorbed by water vapor and carbon dioxide in the atmosphere, creating the greenhouse effect.

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**Neetu Singh**

The concept of 'Isanomalous Lines' is closely related to isotherms.

Which of the following best describes an isanomalous line?

- a. A line connecting places with the same vertical lapse rate deviation.
- b. A line representing areas where isotherms and isobars intersect at right angles.
- c. A line connecting points where the seasonal migration of isotherms is zero.
- d. A line joining places having equal differences between their actual temperature and the average temperature of their latitude.**



During the Northern Hemisphere summer, why is the 'Thermal Equator' found significantly north of the Geographic Equator (20°N to 25°N over Africa and Asia)?

- a. Due to the South-West Monsoon winds pushing warm air northward.
- b. Because the Earth is at aphelion (farthest from the sun) during July.
- c. Because of the presence of the massive Eurasian and African landmasses which heat up intensely.
- d. Due to the higher concentration of greenhouse gases over the Northern Hemisphere.



In the context of 'Oceanic Control,' why do isotherms over the North Atlantic show a 'convex' shape towards the North Pole even in winter?

- a. The descending limb of the Hadley Cell creates a permanent high-pressure heat zone.
- b. The high albedo of Arctic ice reflects heat back into the North Atlantic air.
- c. The cold Labrador Current pushes the isotherms southward.
- d. The warm North Atlantic Drift transports tropical heat into high latitudes.

Which of the following describes the 'Land-Sea Contrast' regarding the spacing of isotherms between the two hemispheres?

- a. The spacing is identical in both hemispheres due to the Earth's rotation.
- b. Isotherms are always more widely spaced over land than over oceans.
- c. Isotherms in the Northern Hemisphere show a steeper gradient (closer spacing) in winter than in summer.**
- d. Isotherms are more closely spaced in the Southern Hemisphere due to Antarctic influence.

Consider the following statements regarding the horizontal distribution of temperature:

In the Northern Hemisphere, isotherms bend poleward over the oceans and equatorward over the continents during the winter season.

The highest temperatures on Earth are generally recorded along the Geographic Equator due to the perpendicular nature of solar rays year-round.

The spacing of isotherms is wider over the oceans than over the landmasses in the Northern Hemisphere during summer.

Which of the statements given above is/are correct?

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

Consider the following statements:

**Statement I:** In January, in the Northern Hemisphere, the isotherms bend equatorward while crossing the landmasses, and poleward while crossing the oceans.

**Statement II:** In January, the air over the oceans is warmer than that over the landmasses in the Northern Hemisphere.

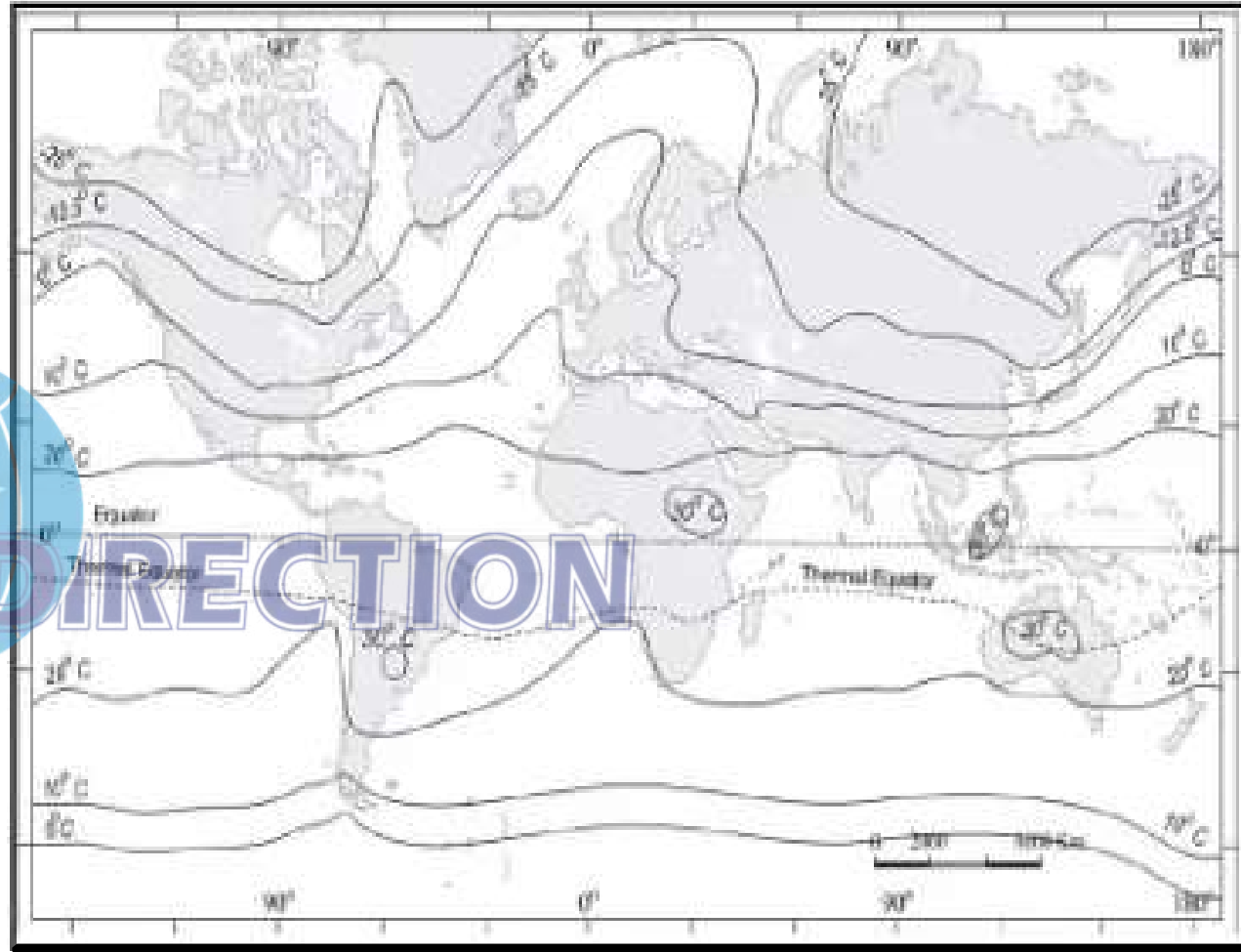
Which one of the following is correct in respect of the above statements?

**(a) Both Statement I and Statement II are correct and Statement II explains Statement I**

**(b) Both Statement I and Statement II are correct but Statement II does not explain Statement I**

**(c) Statement I is correct but Statement II is not correct**

**(d) Statement I is not correct but Statement II is correct**



Which of the following is/are correct inference/inferences from isothermal maps in the month of January?

1. The isotherms deviate to the north over the ocean and to the south over the continent.
2. The presence of cold ocean currents, Gulf Stream and North Atlantic Drift make the North Atlantic Ocean colder and the isotherms bend towards the north.



Select the answer using the code given below :

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

Consider the following statements:

**Statement-I:** The temperature contrast between continents and oceans is greater during summer than in winter.

**Statement-II:** The specific heat of water is more than that of land surface.

*Which one of the following is correct in respect of the above statements?*

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

The temperature contrast between continents and oceans is **greater in summer** because land heats up rapidly due to its low specific heat capacity, while oceans heat slowly, creating a large summer difference; **conversely, in winter**, land cools quickly to very low temps, but oceans retain heat longer, making the winter contrast less extreme in relative terms (though absolute differences can be large).

Water needs much more energy to change temperature than land does, causing oceans to moderate temperatures year-round.

# Geography GS Repeat and Hit !

**Neetu Singh**

Consider the following statements regarding the **Summer Solstice** :

1. The Sun's rays are perpendicular to the Tropic of Cancer .
2. The Southern Hemisphere experiences its shortest day and longest night.
3. Regions beyond the Arctic Circle experience 24 hours of daylight, a phenomenon known as the 'Midnight Sun'.
4. The Earth is at its 'Perihelion' position (closest to the Sun) during this period.

Which of the statements given above are correct?

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



Consider the following statements regarding the **Earth's orbital parameters** and their effect on the seasonal cycle:

1. The Earth moves faster in its orbit during the Northern Hemisphere winter than during the Northern Hemisphere summer.
2. The astronomical summer in the Northern Hemisphere (Equinox to Equinox) is approximately 7 days longer than the astronomical summer in the Southern Hemisphere.
3. If the Earth's axial tilt (obliquity) increased from 23.5 degrees to 24.5 degrees, the Tropics would expand towards the poles, and the Arctic Circles would shift towards the equator.

Which of the statements given above are correct?

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

**Statement I: During the Autumn Equinox (September 23), the length of day and night is approximately equal across all latitudes of the Earth.**

**Statement II: On the day of the Equinox, the Earth's axis is tilted neither toward nor away from the Sun, and the circle of illumination passes through both the North and South Poles.**

*Select the correct answer using the code below:*

**a) Both Statement I and Statement II are correct, and Statement II is the correct explanation for Statement I.**

**b) Both Statement I and Statement II are correct, but Statement II is not the correct explanation for Statement I.**

**c) Statement I is correct, but Statement II is incorrect.**

**d) Statement I is incorrect, but Statement II is correct.**

**Statement I: The date of the highest surface temperature in the Northern Hemisphere middle latitudes usually occurs several weeks after the Summer Solstice (June 21).**

**Statement II: The Earth's surface continues to receive more energy from insolation than it loses through terrestrial radiation for some time after the peak of solar intensity.**

***Select the correct answer:***

- a) Both Statement I and Statement II are correct, and Statement II is the correct explanation for Statement I.**
- b) Both Statement I and Statement II are correct, but Statement II is not the correct explanation for Statement I.**
- c) Statement I is correct, but Statement II is incorrect.**
- d) Statement I is incorrect, but Statement II is correct.**

If the Earth's axis were perpendicular to the plane of the ecliptic (zero tilt), which of the following would be the most likely consequence?

- a) There would be no change in the length of day and night throughout the year at any given latitude.
- b) The Poles would experience 12 months of continuous daylight.
- c) The Sun would never be seen from the Equator.
- d) The seasons would become more extreme (hotter summers and colder winters).



If the Earth's orbit were a perfect circle instead of an ellipse, but the axial tilt remained at 23.5 degrees, which of the following would be true?

- a) There would be no seasons on Earth.
- b) The seasons would be of exactly equal duration in both hemispheres.
- c) The Sun would always be directly over the Equator.
- d) The Arctic Circle would experience 12 months of darkness.

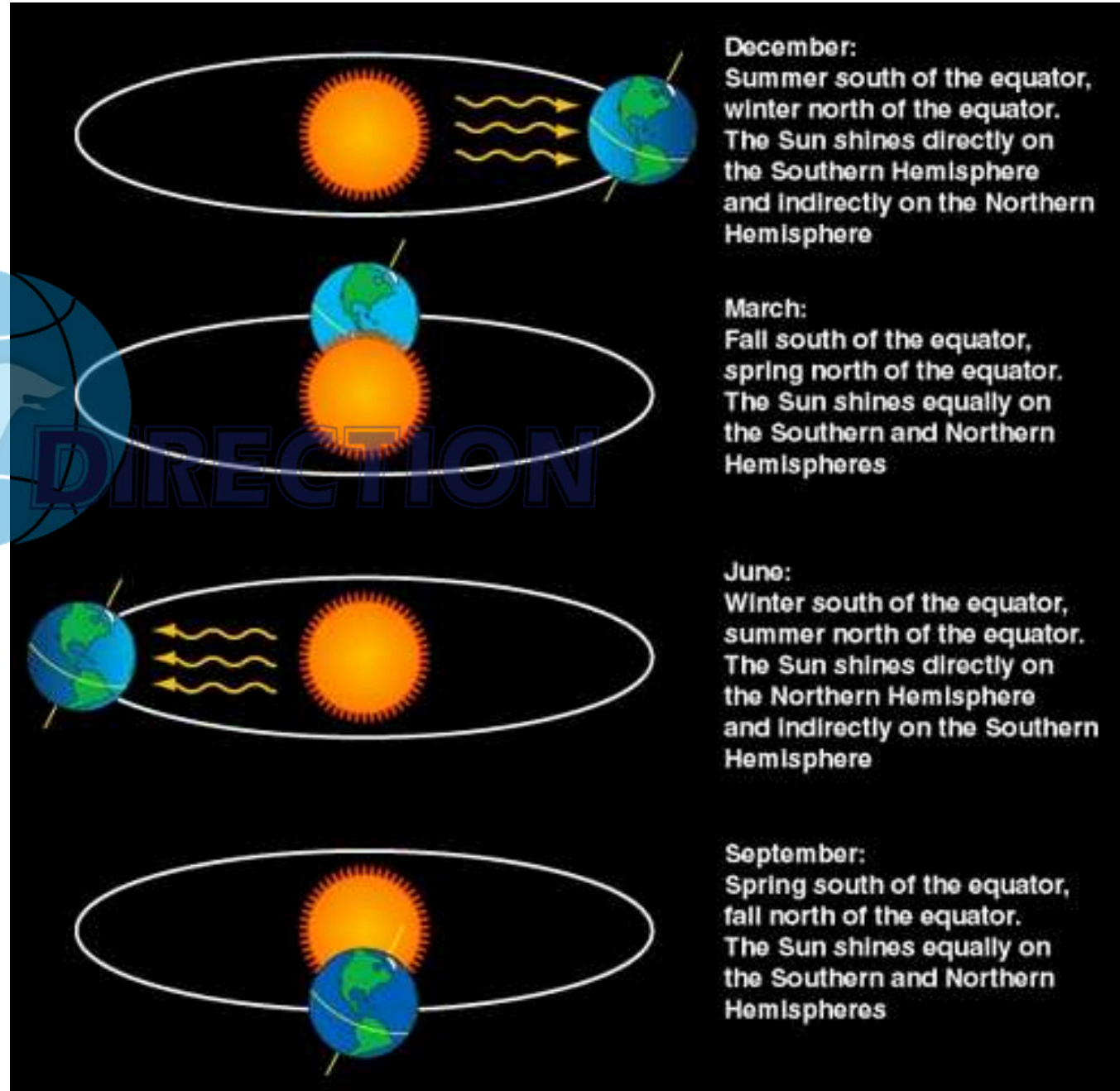
On June 21 every year, which of the following latitude(s) experience(s) a sunlight of more than 12 hours?

- (a) Equator
- (b) Tropic of Cancer
- (c) Tropic of Capricorn
- (d) Arctic Circle

2024

Select the correct answer using the code given below :

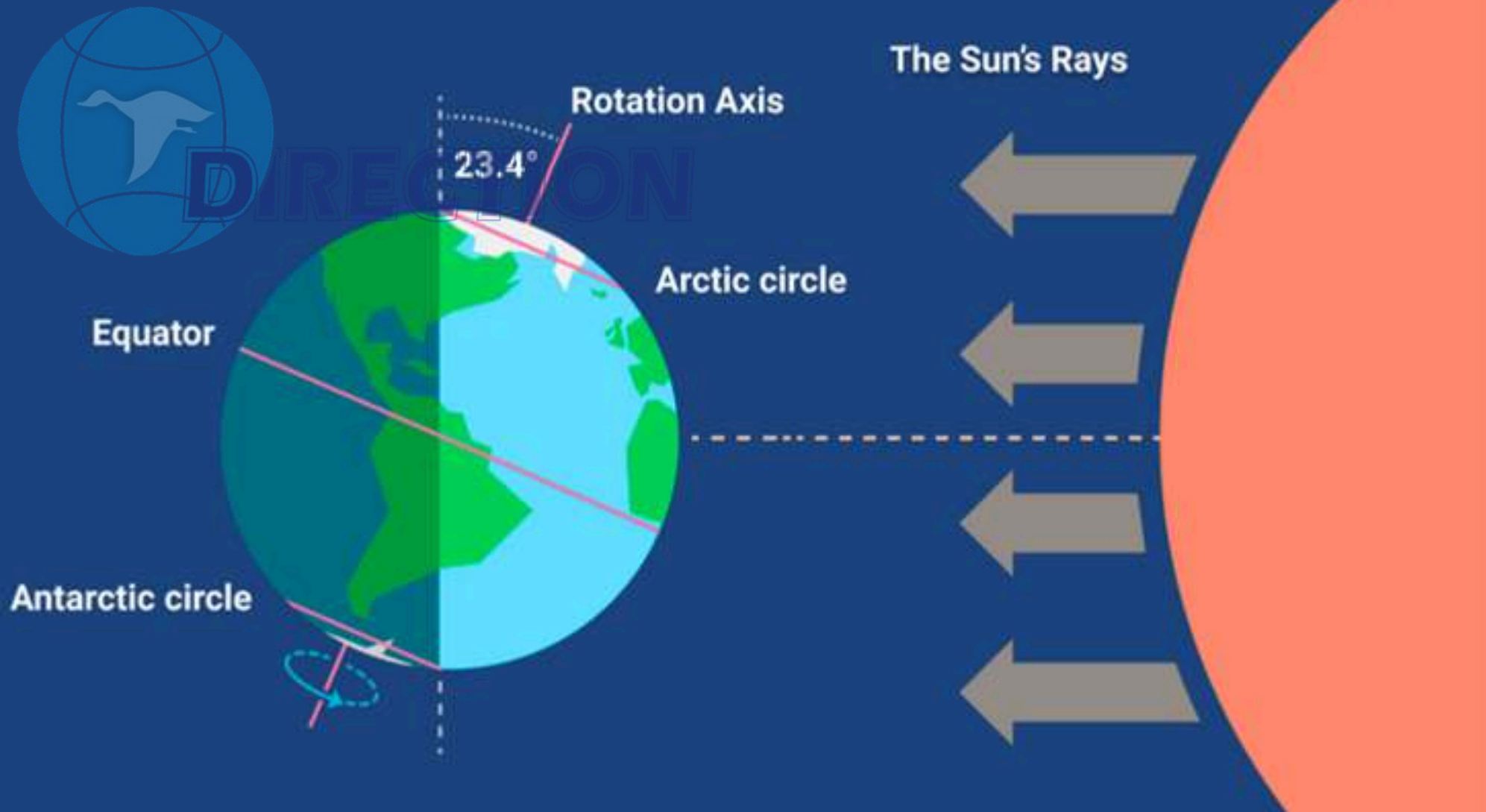
- (a) 1 only
- (b) 2 only
- (c) 3 and 4
- (d) 2 and 4



In the northern hemisphere, the longest day of the year normally occurs in the:

- (a) First half of the month of June
- (b) Second half of the month of June**
- (c) First half of the month of July
- (d) Second half of the month of July

At the June solstice, which marks the northernmost point of its journey, it stops again to start its journey back toward the south.



On 21st June, the Sun

**(a) does not set below the horizon at the Arctic Circle**

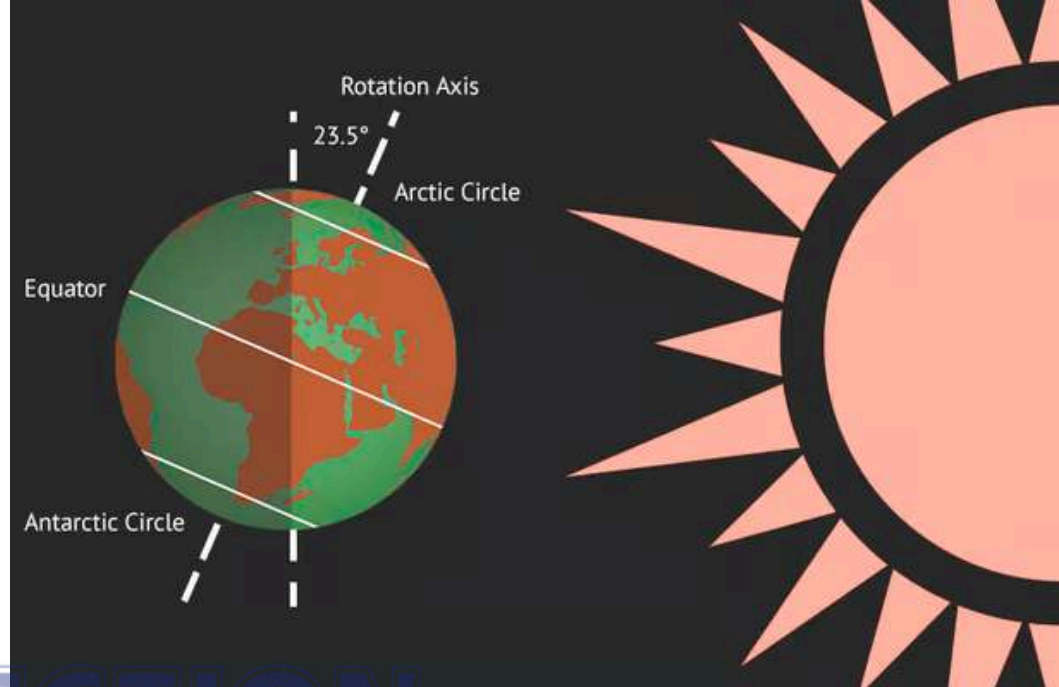
**(b) does not set below the horizon at Antarctic Circle**

**(c) shines vertically overhead at noon on the Equator**

**(d) shines vertically overhead at the Tropic of Capricorn**



**DIRECTION**



**The polar day (or midnight sun) is a natural phenomenon occurring in summer near the Arctic and Antarctic Circles, where the sun remains visible for a full 24 hours or longer. It occurs because of the 23.5° tilt of Earth's axis, allowing the respective pole to lean toward the sun.**

# Geography GS Repeat and Hit !

**Neetu Singh**

The 'Winter Margin' or 'Mediterranean' type of climate is primarily a result of which atmospheric phenomenon?

(a) The thermal contrast between the Mediterranean Sea and the Sahara Desert.

**(b) The seasonal migration of planetary wind belts following the apparent movement of the Sun.**

(c) The permanent establishment of the Sub-Tropical High Pressure Belt over the region throughout the year.

(d) The influence of the Jet Stream bringing temperate cyclones during the summer months.



Consider the following statements regarding the 'Llanos' and 'Campos' regions of South America:

1. They represent the transition zone between the Equator and the Deserts.
2. They experience 'Veranillo' or a short dry spell during the rainy season.
3. The soils are typically 'Latosols' which are rich in silica but poor in iron and aluminum.

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

- (a) One only
- (b) Two only**
- (c) All Three
- (d) None of them

**Why does the 'Laurentian' type of climate (Cool Temperate Eastern Margin) in the Northern Hemisphere experience significant precipitation throughout the year?**

**(a) Because of the meeting of warm and cold ocean currents offshore, leading to cyclonic activity.**

**(b) Due to the rain-shadow effect caused by the Appalachian and Himalayan mountain ranges.**

**(c) Due to the consistent influence of the Easterly Trade winds in all seasons.**

**(d) Because it is dominated by the 'ITCZ' for six months of the year.**

**With reference to the 'Steppe' (Temperate Grassland) climate, consider the following assertions:**

- 1. The Southern Hemisphere Steppes (like the Veld and Downs) have a more moderate climate than the Northern Hemisphere Steppes (like the Prairies).**
- 2. This moderation is due to the 'maritime influence' in the Southern Hemisphere.**



***Which of the following is correct?***

- (a) Statement 1 is incorrect, but statement 2 is correct.**
- (b) Both 1 and 2 are correct, but 2 is not the correct explanation of 1.**
- (c) Both 1 and 2 are correct, and 2 is the correct explanation of 1.**
- (d) Statement 1 is correct, but statement 2 is incorrect.**

**The 'British Type' climate is often described as having 'Natural Weather' rather than 'Natural Climate.' What does this imply?**

- (a) The dominance of cyclonic activity leads to rapid day-to-day fluctuations in weather conditions.**
- (b) It lacks any distinct summer or winter season.**
- (c) The weather is very predictable and changes only with the seasons.**
- (d) The climate is unaffected by global warming.**

**Consider the following statements:**

- 1. Both Tropical Monsoon and Tropical Marine climates experience rainfall primarily in the summer.**
- 2. The Tropical Marine climate is found on the western margins of continents in the trade wind belt.**
- 3. The Tropical Monsoon climate is characterized by a complete seasonal reversal of winds, whereas the Tropical Marine climate is influenced by steady trade winds throughout the year.**

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

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

**What is the primary reason for the 'Diurnal Range' of temperature being higher than the 'Annual Range' of temperature in the Equatorial climatic region?**

**(a) The sun is always nearly overhead, leading to minimal seasonal variation in insolation.**

**(b) The presence of dense vegetation creates a micro climate that prevents seasonal change.**

**(c) The shifting of the ITCZ twice a year causes two distinct summers.**

**(d) The lack of cloud cover during the night allows for rapid terrestrial radiation.**

Consider the following statements:

Statement I: The amount of dust particles in the atmosphere is more in subtropical and temperate areas than in equatorial and polar regions.

Statement II: Subtropical and temperate areas have less dry winds.

Which one of the following is correct in respect of the above statements?

- (a) Both Statement I and Statement II are correct and Statement II explains Statement I
- (b) Both Statement I and Statement II are correct but Statement II does not explain Statement I
- (c) Statement I is correct but Statement II is not correct
- (d) Statement I is not correct but Statement II is correct

Equatorial: High rainfall and humidity cause frequent "rain washout," effectively washing dust out of the air, while dense tropical rainforests bind soil, preventing its release.

Polar: Vast ice and snow cover limit exposed land, and the cold, icy conditions restrict dust generation, with minimal human activity contributing.

Consider the following description :

Annual and daily range of temperatures is low.

Precipitation occurs throughout the year.

Precipitation varies between 50 cm - 250 cm.

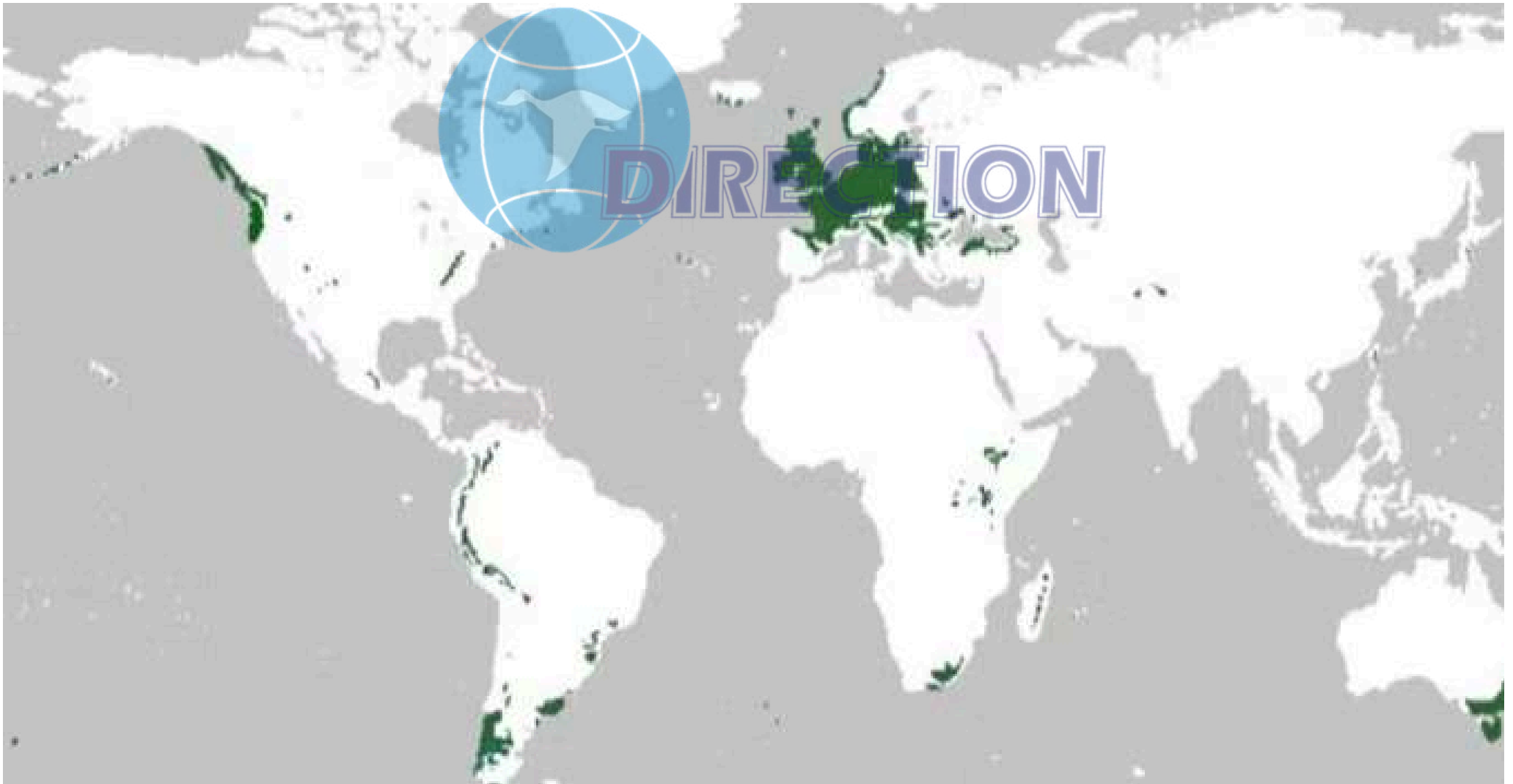
What is this type of climate?

(a) Equatorial climate

(b) China type climate

(c) Humid subtropical climate

**(d) Marine West coast climate**



“Each day is more or less the same, the morning is clear and bright with a sea breeze; as the Sun climbs high in the sky, heat mounts up, dark clouds form, then rain comes with thunder and lightning. But rain is soon over”. Which of the following regions is described in the above passage?

- (a) Savannah
- (b) Equatorial**
- (c) Monsoon
- (d) Mediterranean



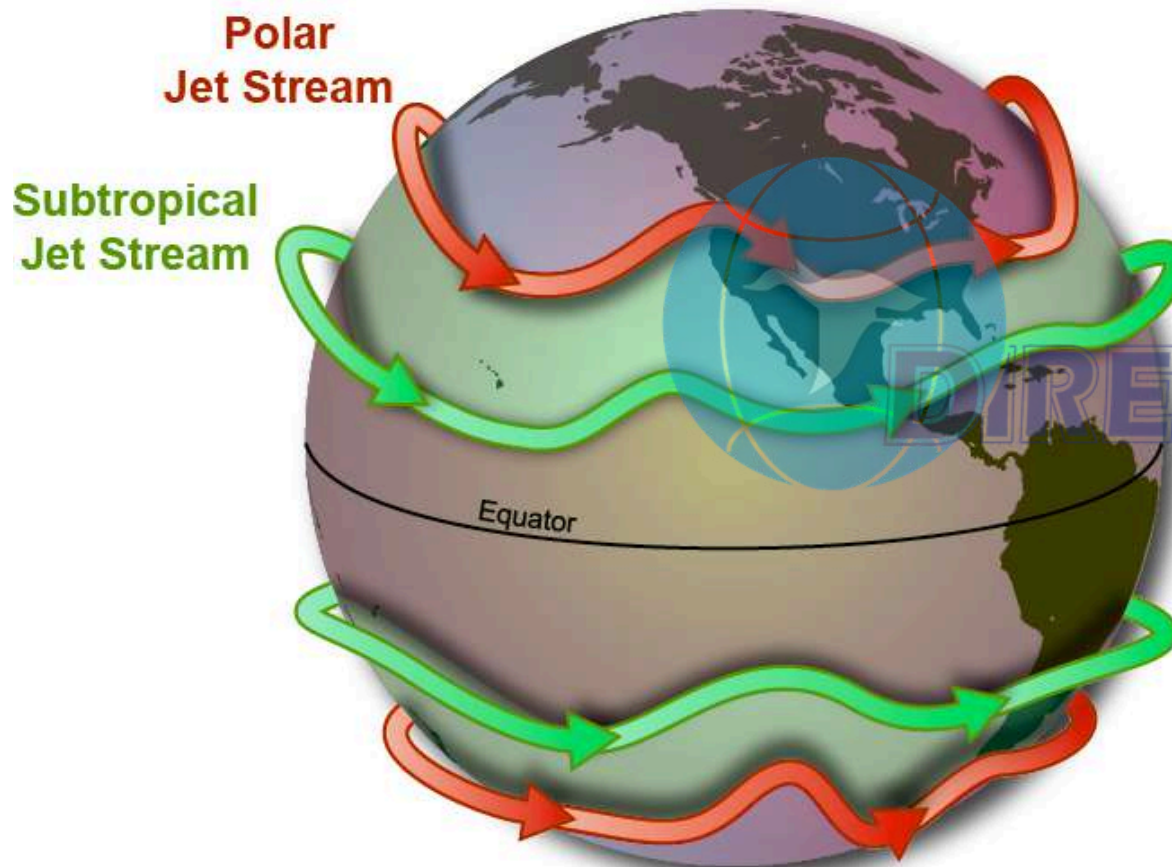
**An equatorial climate (Köppen Af) is a hot, humid, and wet tropical climate located within 10°–15° of the equator, characterized by consistent year-round temperature, high annual rainfall (typically , and no distinct dry season. These regions experience daily convective rain, high humidity (75–80%+), and support dense tropical rainforests.**

Consider the following statements:

1. The winds which blow between  $30^{\circ}\text{N}$  and  $60^{\circ}\text{S}$  latitude throughout the year are known as westerlies.
2. The moist air masses that cause winter rains in North-Western region of India are part of westerlies.

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

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



**Westerlies are prevailing, permanent winds blowing from the west towards the east in the middle latitudes, specifically between  $30^{\circ}$  and  $60^{\circ}$  in both the Northern and Southern Hemispheres**

# Geography GS Repeat and Hit !

**Neetu Singh**

With reference to the Atlantic Meridional Overturning Circulation (AMOC), consider the following statements:

1. It acts as a global conveyor belt moving warm surface waters from the tropics to the North Atlantic.
2. The sinking of water in the North Atlantic is driven by high salinity and low temperatures.
3. An increase in freshwater influx from melting glaciers is likely to accelerate this circulation.

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

- a).1 and 3 only
- b).1, 2, and 3
- c).1 and 2 only**
- d).2 and 3 only



**Consider the following statements about Upwelling and Downwelling:**

**1.Coastal upwelling occurs in the Northern Hemisphere when winds blow parallel to the coast such that the coastline is to the left of the wind direction.**

**2.Areas of persistent downwelling are usually characterized by high primary biological productivity due to the accumulation of surface nutrients.**

**3.The Ekman Transport is responsible for moving surface water at a 90-degree angle to the wind direction.**

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

**a) 1 and 2 only**

**b) 3 only**

**c) 1 and 3 only**

**d) 1, 2, and 3**

**With reference to the Indian Ocean, consider the following statements:**

- 1. Unlike the Atlantic and Pacific, the North Indian Ocean lacks a continuous subtropical gyre due to the presence of the Eurasian landmass.**
- 2. During a 'Positive IOD' event, the African coast experiences cooler-than-normal sea surface temperatures, leading to droughts.**
- 3. The Somali Current reverses its direction biannually in response to the Monsoon winds.**

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

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

**Consider the following statements regarding the Antarctic Circumpolar Current (ACC):**

- 1.It is the only ocean current that flows completely around the globe without being diverted by landmasses.**
- 2.It flows from east to west, driven by the Polar Easterlies.**
- 3.It connects the Atlantic, Pacific, and Indian Oceans, facilitating the global transport of heat and nutrients.**

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

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

Which of the following statements best explains why the 'Canary Current' is associated with the formation of the Sahara Desert? ???

1. It brings cold water which stabilizes the atmosphere and inhibits convection.
2. It increases the moisture-holding capacity of the air, leading to higher evaporation from land.
3. It causes a high-pressure cell to develop permanently over the adjacent coast.

*Select the correct answer using the code below:*

- a).1, 2, and 3
- b).1 and 3 only
- c).1 only**
- d).2 only

Regarding 'Oceanic Gyres', consider the following statements:

1. They are large systems of circulating currents driven primarily by the Earth's rotation and wind patterns.
2. The center of a gyre is typically a high-productivity zone due to the convergence of nutrients.
3. In the Northern Hemisphere, gyres circulate in a clockwise direction.

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

- a). 1 and 2 only
- b). 3 only
- c). 1, 2, and 3
- d). 1 and 3 only**

**Consider the following statements about the 'Global Conveyor Belt':**

- 1. It takes roughly 1,000 years for a single parcel of water to complete the entire circuit.**
- 2. The movement is driven solely by the wind stress on the ocean surface.**
- 3. It plays a vital role in regulating the Earth's climate by transporting CO<sub>2</sub> to the deep ocean.**

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

- a). 1 and 3 only**
- b). 3 only**
- c). 1, 2, and 3**
- d). 1 and 2 only**

**With reference to 'Equatorial Counter Currents', consider the following statements:**

- 1. They flow from west to east, opposite to the direction of the North and South Equatorial Currents.**
- 2. They are primarily caused by the piling up of water on the western sides of ocean basins due to trade winds.**
- 3. They are most prominent in the Atlantic Ocean compared to the Pacific Ocean.**

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

- a).2 and 3 only**
- b).1, 2, and 3**
- c).1 only**
- d).1 and 2 only**

Consider the following statements:

1. In the tropical zone, the western sections of the oceans are warmer than the eastern sections owing to the influence of trade winds.

2. In the temperate zone, westerlies make the eastern sections of oceans warmer than the western sections.

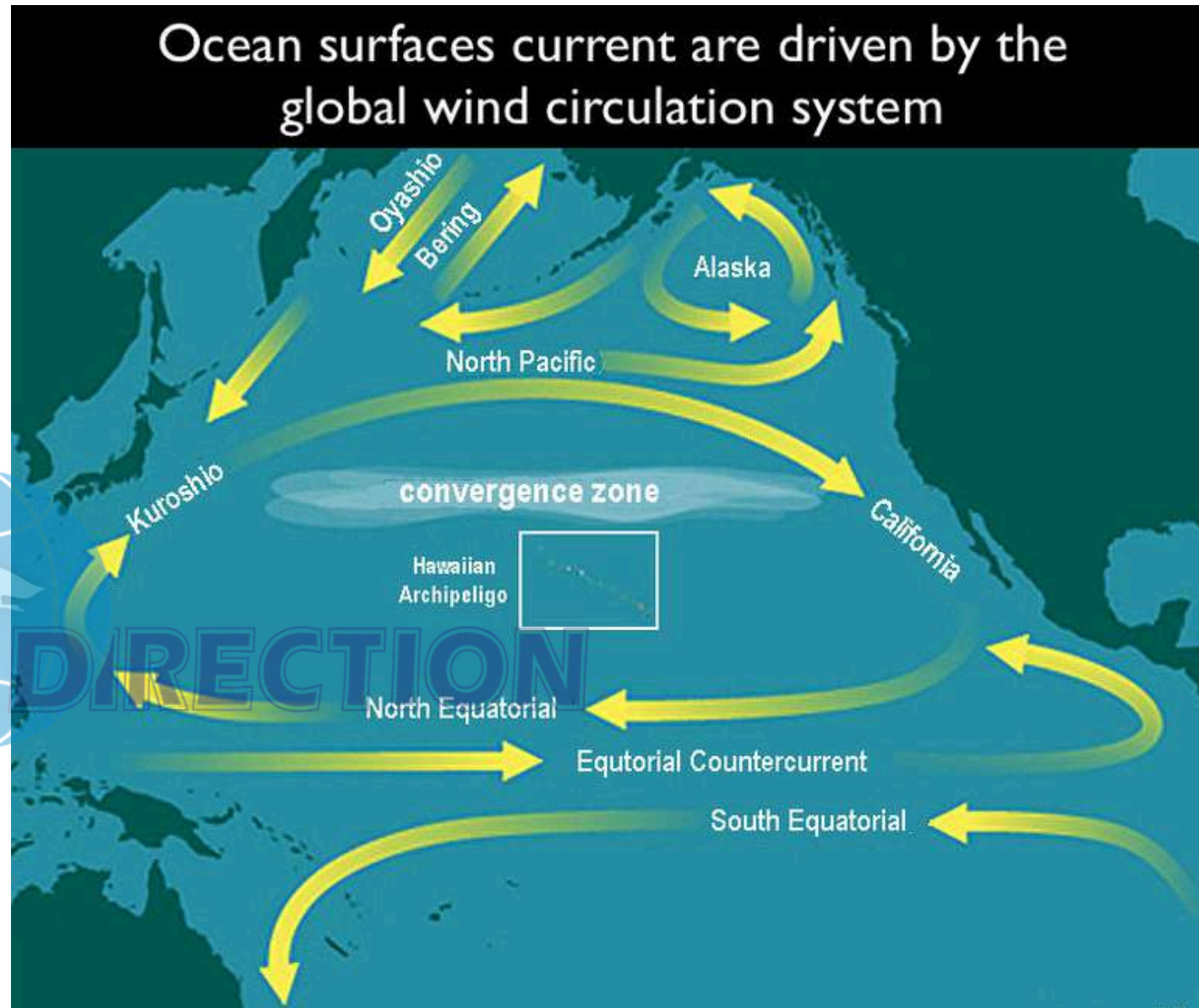
*Which of the statements given above is/are correct?*

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2



**What explains the eastward flow of the equatorial counter-current?**

**(a) The Earth's rotation on its axis**

**(b) Convergence of the two equatorial currents**

**(c) Difference in salinity of water**

**(d) Occurrence of the belt of calm near the equator**



**The Equatorial Counter Current forms because westward-flowing North and South Equatorial Currents pile up warm water in the western ocean basins, creating a slight sea-level slope eastward; gravity then pulls this excess water back eastward, often aided by weaker winds and the Earth's rotation, creating a narrower, eastward current between the main flows**



# Geography GS Repeat and Hit !

**Neetu Singh**

With reference to 'Amphidromic Points' in oceanography, consider the following statements:

1. These are points in the ocean where the tidal range (the vertical distance between high and low tide) is zero.
2. Tidal crests and troughs rotate around these points due to the Coriolis effect.
3. In the Northern Hemisphere, the tidal wave typically rotates in a clockwise direction around these points.

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

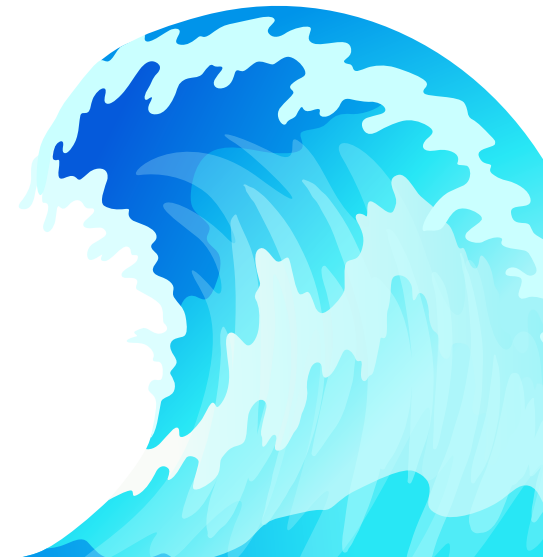
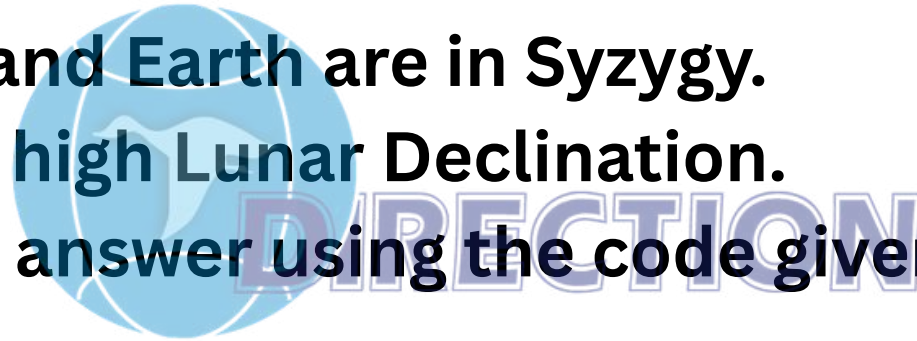
- a) 1 and 2 only
- b) 2 only
- c) 1 and 3 only
- d) 1, 2, and 3

Which of the following astronomical configurations would result in the "Highest Spring Tide" (also known as a King Tide)?

- 1.The Moon is at Perigee.
- 2.The Earth is at Perihelion.
- 3.The Sun, Moon, and Earth are in Syzygy.
- 4.The Moon is at a high Lunar Declination.

Select the correct answer using the code given below:

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



Consider the following statements regarding the 'Cotidal' and 'Corange' lines:

1. Cotidal lines connect places that experience the same tidal range at a given time.
2. Corange lines connect places where the high tide occurs at the same time interval after the Moon's transit.
3. Both sets of lines radiate from or revolve around Amphidromic points where the tidal amplitude is zero.

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

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

**Consider the following statements regarding 'Tidal Bores':**

- 1. A tidal bore occurs when the leading edge of the incoming tide forms a wave (or waves) of water that travels up a river or narrow bay against the direction of the river's current.**
- 2. They are most commonly found in rivers with a shallow depth, a large tidal range, and a wide, funnel-shaped estuary.**
- 3. The Amazon River in Brazil and the Hooghly River in India are known for having significant tidal bores.**

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

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



**Consider the following statements about 'Tidal Currents' (Horizontal movement of water):**

- 1. Flood Current' refers to the movement of the tide toward the shore, while 'Ebb Current' refers to the movement away from the shore.**
- 2. 'Slack Water' is the period of maximum velocity of the tidal current occurring between high and low tide.**
- 3. Tidal currents are generally stronger in the open ocean than in narrow inlets or straits.**

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

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

"Double High Tides" (the phenomenon where high tide stays at its peak for several hours or occurs twice in quick succession) is a rare occurrence. Which of the following locations is most famous for this phenomenon?

- a) Gulf of Mannar, India
- b) Southampton, United Kingdom**
- c) Bay of Fundy, Canada
- d) Yellow Sea, East Asia

**Two-Route Entry:** A primary tidal wave enters from the English Channel, and a secondary, slightly delayed wave travels around the Isle of Wight, leading to interference that creates two distinct peaks.



Tides occur in the oceans and seas due to which among the following

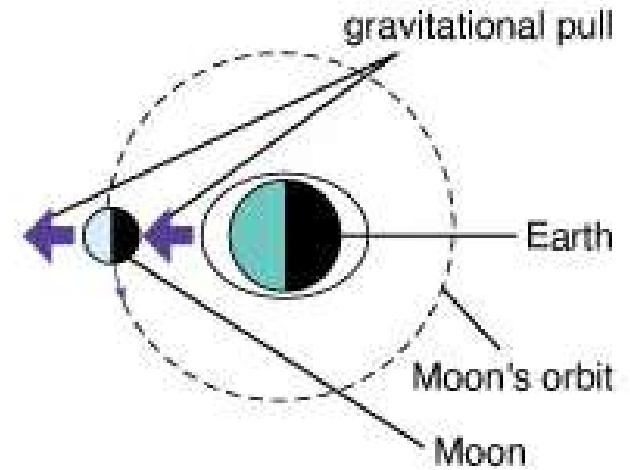
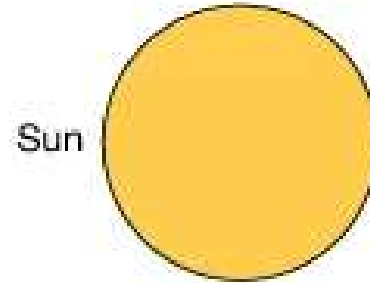
1. Gravitational force of the Sun
2. Gravitational force of the Moon
3. Centrifugal force of the Earth

Select the correct answer using the codes given below.

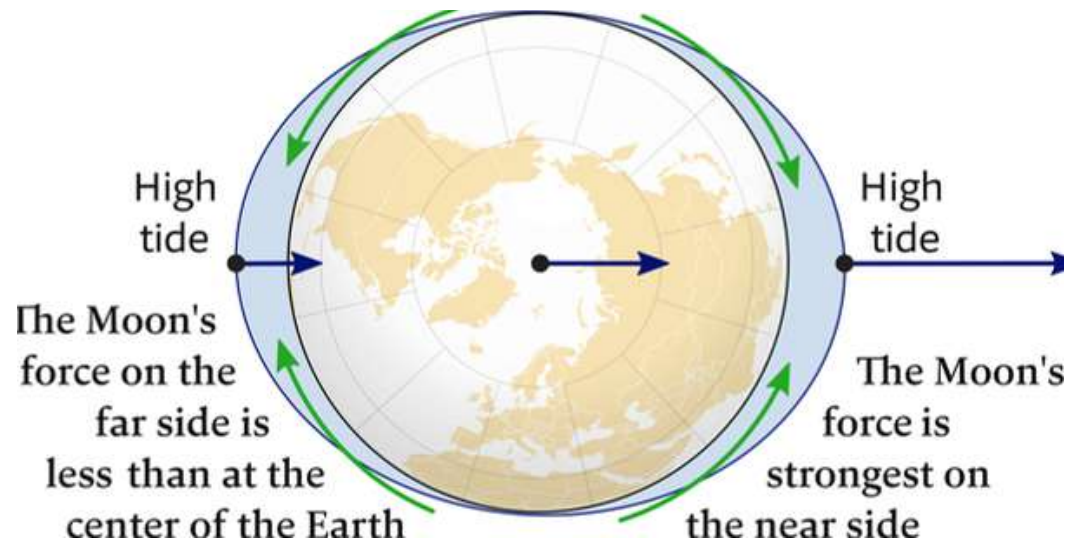
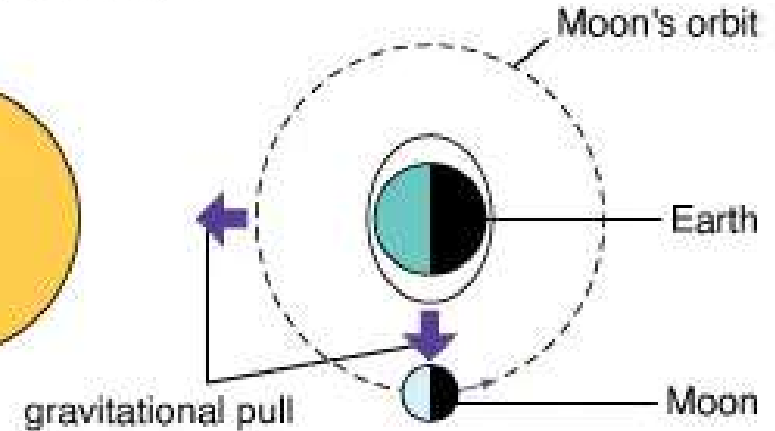
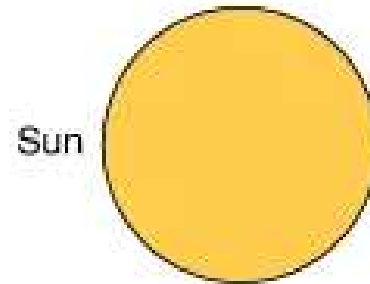
- (a) 1 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

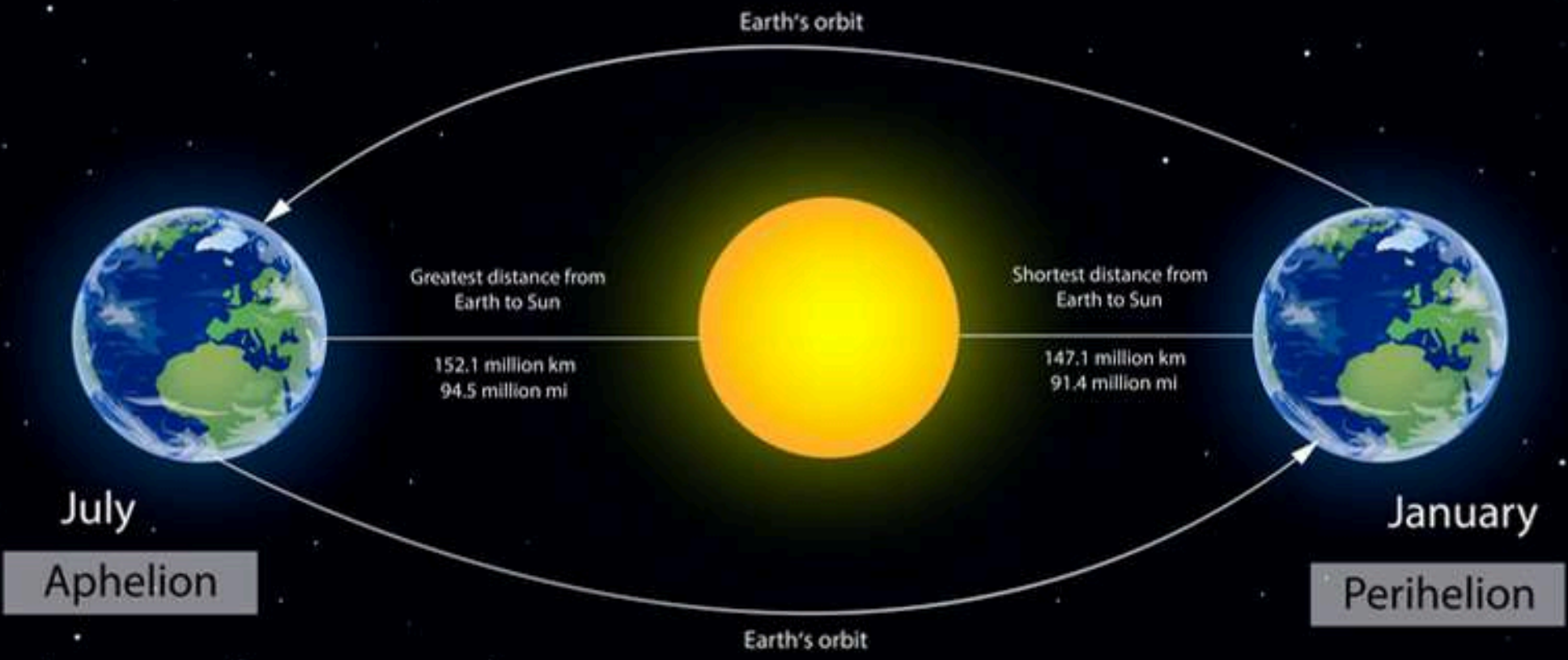


New Moon spring tide

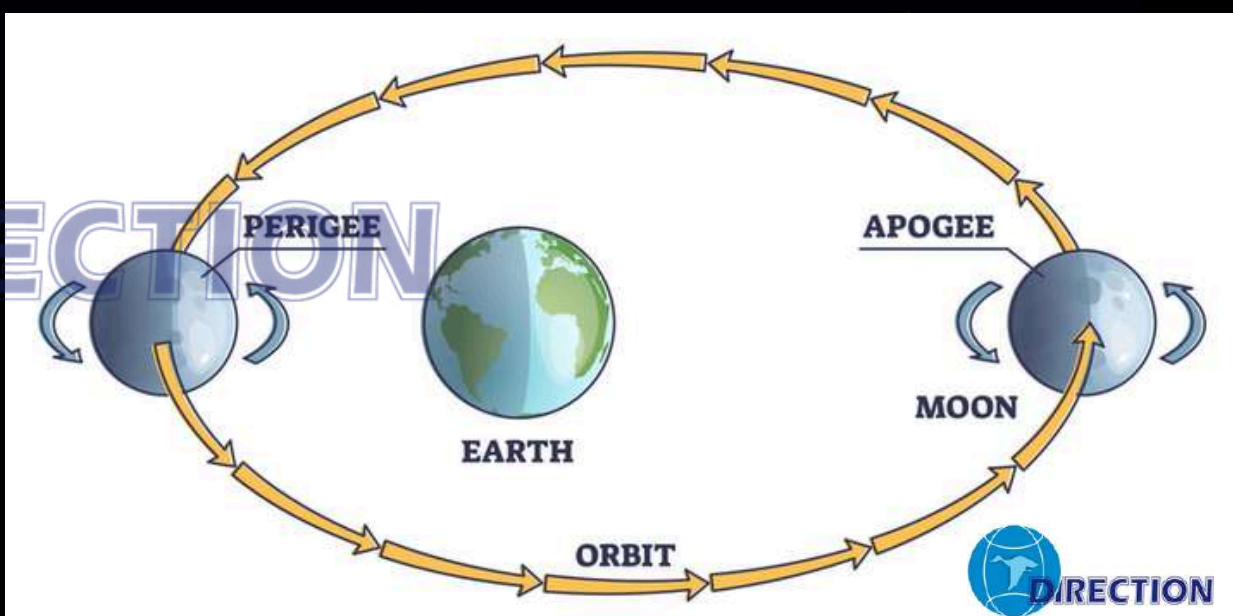


1st quarter neap tide





DIRECTION



# Geography GS Repeat and Hit !

**Neetu Singh**

With reference to the phenomenon of 'Polar Wander' or the shifting of Earth's rotational axis, consider the following statements:

1. The North and South Poles are geographically fixed points and do not move relative to Earth's crust.
2. Large-scale melting of glaciers and ice sheets due to global warming is a primary driver of recent rapid polar drift.
3. The depletion of groundwater for irrigation and human consumption has no measurable impact on the tilt of the Earth's axis.

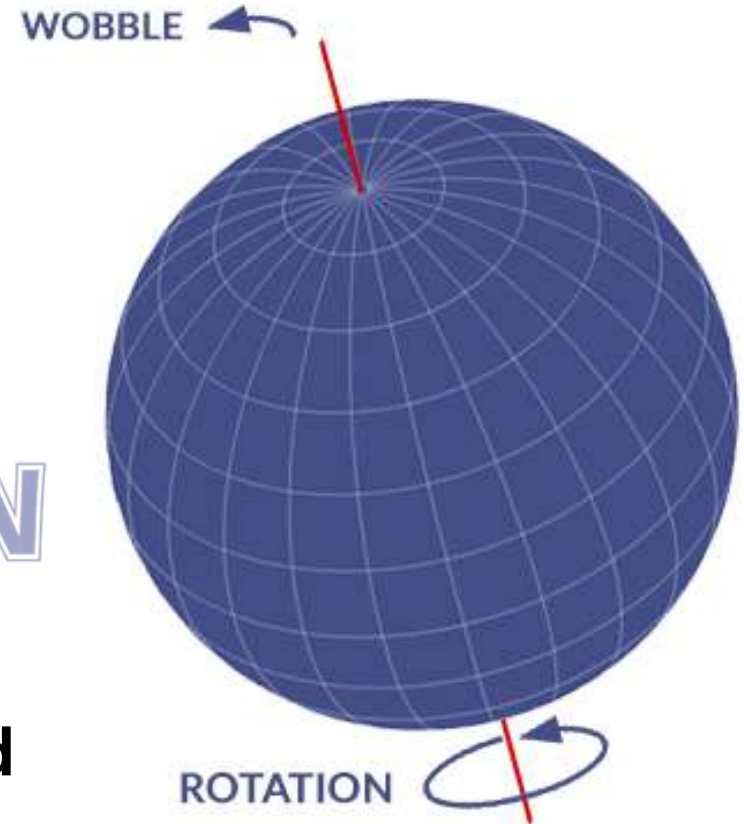
***Which of the statements given above is/are correct?***

- a. 1 and 2 only
- b. 2 only**
- c. 2 and 3 only
- d. 1, 2, and 3



The 'Chandler Wobble' is a term frequently associated with Earth's rotation. Which of the following best describes it?

- (a) The slow change in the orientation of Earth's axis over a 26,000-year cycle.
- (b) A small, periodic deviation in the Earth's axis of rotation with a period of approximately 14 months.**
- (c) The seasonal variation in Earth's orbital speed as it moves from perihelion to aphelion.
- (d) The shifting of the magnetic poles caused by changes in the liquid outer core.



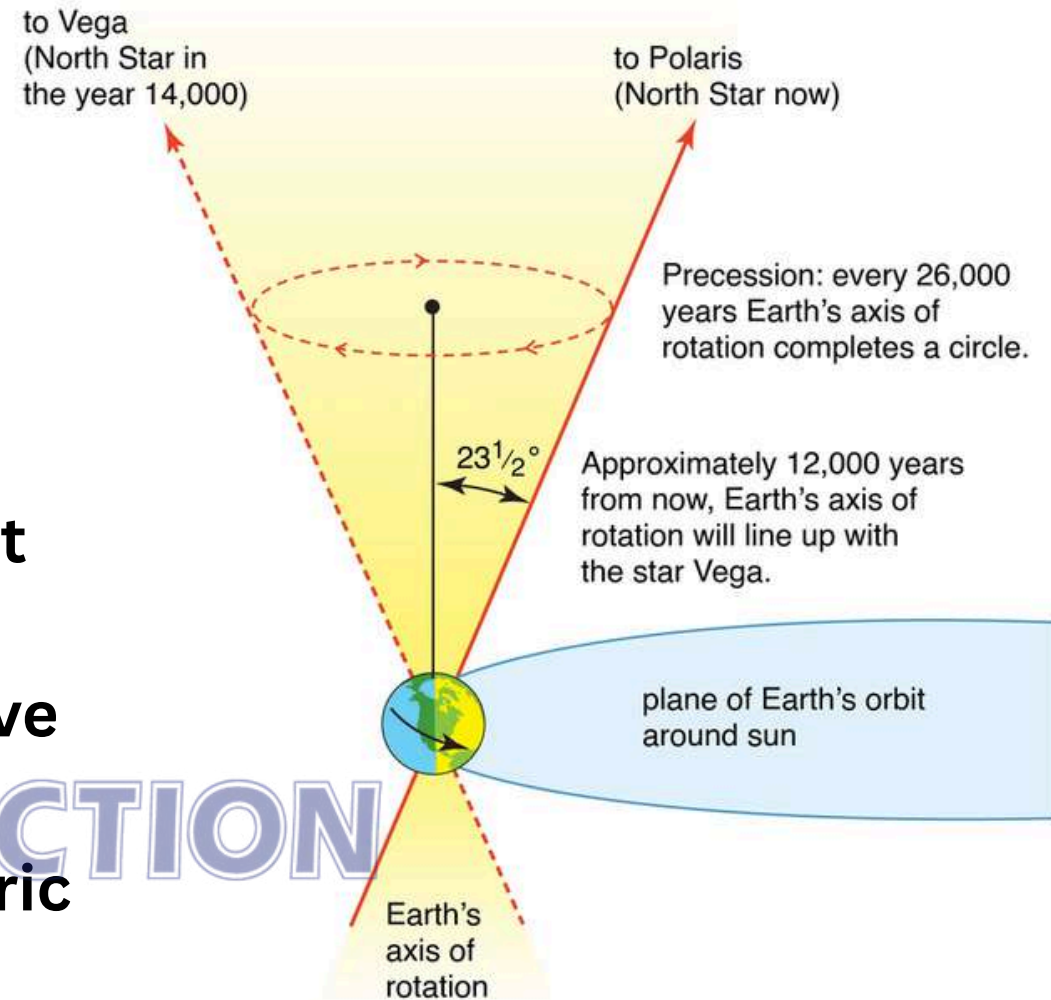
Which of the following best distinguishes Nutation from the Chandler Wobble?

**(a). Nutation is an external forced motion caused by gravity, while the Chandler Wobble is an internal free motion of a non-rigid Earth.**

**(b). Nutation affects the Earth's orbit around the Sun, while the Chandler Wobble affects the Earth's tilt relative to the Moon.**

**(c). Nutation is caused by atmospheric pressure, whereas the Chandler Wobble is caused by solar flares.**

**(d). Nutation only occurs at the Equator, while the Chandler Wobble only occurs at the Poles.**



**The 'Annual Wobble' of the Earth's axis is primarily driven by which seasonal factor?**

**(a). Periodic solar flares and coronal mass ejections.**

**(b). The gravitational pull of Jupiter during its closest approach.**

**(c). The varying speed of the Earth in its elliptical orbit.**

**(d). Seasonal changes in water storage on land and atmospheric mass distribution.**



Consider the following factors:

1. Glacial Isostatic Adjustment (GIA).

2. Convection currents in the Earth's mantle.

3. Changes in the Earth's magnetic field.

4. Redistribution of water through dams and reservoirs.

*How many of the above factors can contribute to the shifting of Earth's rotational axis?*

a. Only one

b. Only two

**c. Only three**

d. All four

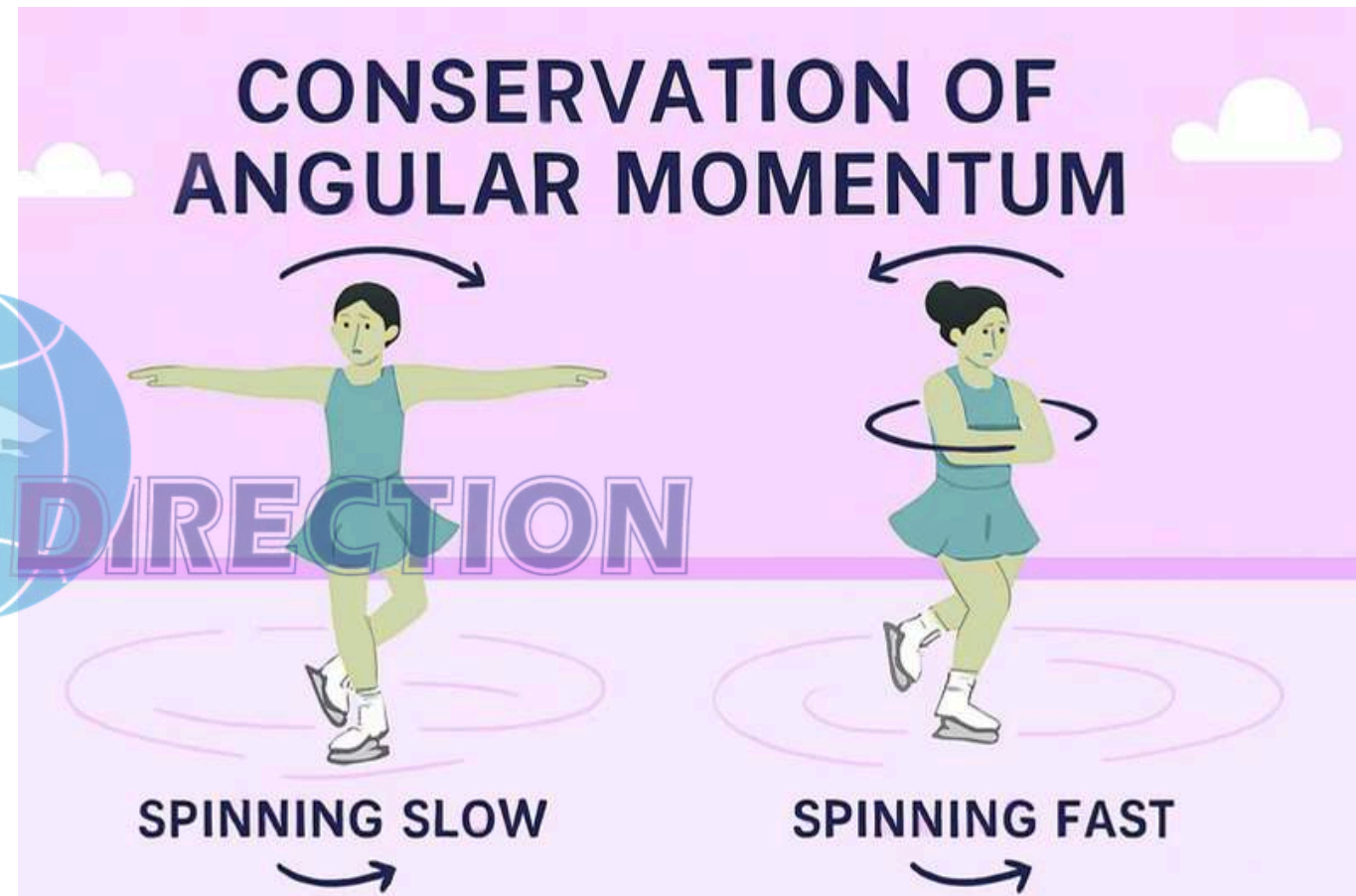
If the Earth's mass were to be redistributed toward the equator, what would be the theoretical effect on its rotation speed according to the conservation of angular momentum?

(a). The Earth would stop rotating entirely.

**(b).The rotation speed would decrease (days get longer).**

(c).There would be no change in rotation speed.

(d).The rotation speed would increase (days get shorter).



**In the context of the 'Conservation of Angular Momentum', if the Earth's axis tilts further (increases obliquity), what is the most direct climatic consequence?**

**(a).The equator becomes significantly colder than the poles.**

**(b).Gravity at the poles decreases.**

**(c).Seasonal contrasts become more extreme in both hemispheres.**

**(d).The Earth's orbit becomes more circular.**



**How does the 'Excitation' of the Earth's rotation axis relate to the global climate system?**

**(a).It is purely a result of core-mantle friction and is independent of the climate.**

**(b).Changes in atmospheric mass distribution (high/low pressure systems) can cause short-term axial shifts.**

**(c).Axial shifts are the primary cause of El Nino events.**

**(d).The axis only shifts when the global mean temperature exceeds a certain threshold.**



**In the context of 'True Polar Wander' (TPW), which of the following statements is most accurate?**

**(a). It involves the entire Earth's mantle and crust rotating over the core to align the planet's maximum moment of inertia with its rotation axis.**

**(b). It is a phenomenon where the Sun's position in the sky changes due to the Earth's orbit becoming more elliptical.**

**(c). It refers specifically to the daily oscillation of the tides caused by the Moon's gravitational pull.**

**(d). It is the process by which the Earth's rotation slows down over millions of years due to tidal friction.**

Consider the following statements:

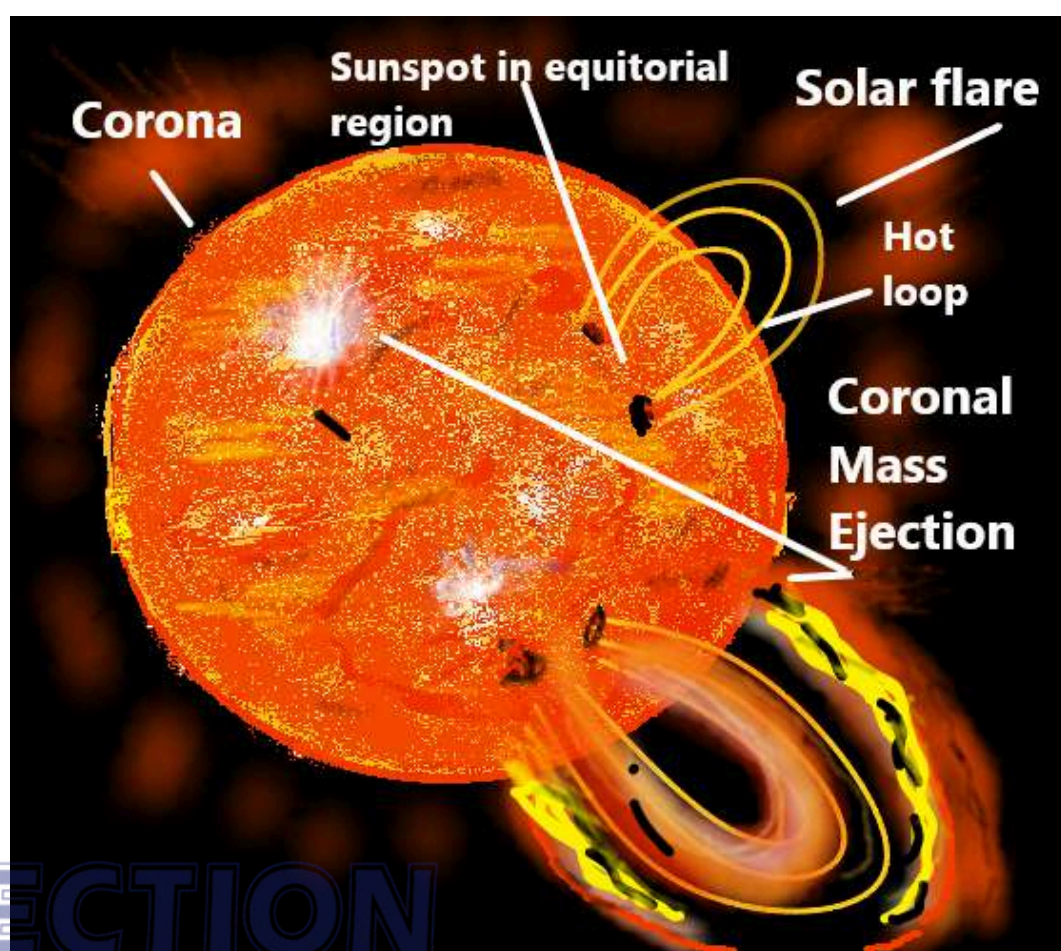
Statement I: Scientific studies suggest that a shift is taking place in the Earth's rotation and axis.

Statement II: Solar flares and associated coronal mass ejections bombarded the Earth's outermost atmosphere with tremendous amount of energy.

Statement III: As the Earth's polar ice melts, the water tends to move towards the equator.

Which one of the following is correct in respect of the above statements?

- a) Both Statement II and Statement III are correct and both of them explain Statement I
- b) Both Statement II and Statement III are correct but only one of them explains Statement I
- c) Only one of the Statements II and III is correct and that explains Statement I
- d) Neither Statement II nor Statement III is correct



Melting polar ice redistributes mass from the poles to the equator, increasing Earth's moment of inertia, which causes the planet to spin slower, lengthening the day by tiny fractions of a second per century, a phenomenon explained by conservation of angular momentum.

# Geography GS Repeat and Hit !

**Neetu Singh**

**Before the Great Oxidation Event, the Earth's atmosphere was primarily 'reducing'. What does this imply?**

- (a) The atmosphere was rich in oxygen and ozone.**
- (b) The atmosphere was composed entirely of noble gases.**
- (c) The atmospheric pressure was significantly lower than today.**
- (d) The atmosphere contained gases like methane and ammonia with little to no free oxygen.**

**Why did it take millions of years for oxygen to accumulate in the atmosphere after cyanobacteria began producing it?**

**(a) Cyanobacteria only produced oxygen during the night.**

**(b) The Sun's radiation was too weak to allow oxygen to persist.**

**(c) Oxygen was immediately escaped into outer space.**

**(d) Oxygen was being consumed by 'sinks' such as dissolved iron and organic matter.**

**Which of the following were the primary sources of heat that led to the 'molten state' of early Proto-Earth?**

- 1. Radioactive decay of short-lived isotopes.**
- 2. Gravitational energy released during accretion and contraction.**
- 3. Intense bombardment by meteorites and planetesimals.**

***Select the correct answer using the code given below:***

- (a) All the three**
- (b) Only one**
- (c) Only two**
- (d) None of them**



**The process often referred to as the 'Iron Catastrophe' in Earth's history refers to:**

**(a) The oxidation of iron in the crust during the Great Oxygenation Event.**

**(b) A period of intense iron-rich meteorite bombardment.**

**(c) The sinking of molten iron and nickel to the center of the Earth to form the core.**

**(d) The depletion of iron in the solar system during planetary formation.**



**With reference to the thermal history of early Earth, consider the following statements:**

- 1. The Earth remained in a molten state for a prolonged period due to the high concentration of short-lived radioactive isotopes**
- 2. The "Iron Catastrophe" refers to the sudden cooling of the Earth's surface that allowed the first oceans to form.**
- 3. Gravitational energy converted into heat during accretion was sufficient to melt parts of the Proto-Earth.**

***How many of the statements given above is/are correct?***

- (a) All the three**
- (b) Only one**
- (c) Only two**
- (d) None of them**



**With reference to the primordial atmosphere of the molten Proto-Earth, consider the following statements:**

- 1. It was largely composed of hydrogen and helium captured from the solar nebula.**
- 2. This early atmosphere was stripped away by intense solar winds and the Earth's low initial gravity.**

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

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

**Consider the following statements regarding the 'Differentiation' of Proto-Earth:**

- 1. It is the process by which Earth developed its layered structure consisting of a crust, mantle, and core.**
- 2. The process was driven by the difference in densities of the materials forming the Earth.**
- 3. Volatile gases like water vapor and carbon dioxide were trapped in the core during this process.**

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

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



**The Giant Impact is believed to have significantly influenced Earth's physical characteristics. Which of the following is attributed to this event?**

- (a) The start of plate tectonics.**
- (b) The creation of Earth's first atmosphere.**
- (c) The formation of the Earth's magnetic field.**
- (d) The tilt of Earth's axis (obliquity) to approximately  $23.5^\circ$ .**

**Why is the Big Splat theory preferred over the 'Capture Theory' (where Earth captured a fully formed Moon)?**

**(a) Capture theory cannot explain the Moon's large size relative to Earth.**

**(b) Capture theory would require a very thick atmosphere to slow the Moon down.**

**(c) The Moon's low density and lack of a large iron core are consistent with mantle-derived debris.**

**(d) The Moon orbits the Earth in a perfectly circular path.**



Consider the following statements:

1. The Earth's magnetic field has reversed every few hundred thousand years.
2. When the Earth was created more than 4000 million years ago, there was 54% oxygen and no carbon dioxide.
3. When living organisms originated, they modified the early atmosphere of the Earth.

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

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



**A magnetic pole reversal** is when Earth's magnetic north and south poles swap places, a natural, common event in geological history driven by shifts in the molten iron in the planet's outer core, occurring irregularly over thousands of years.

**Proto-Earth was a primordial, molten,** and undifferentiated mass formed ~4.6 billion years ago from solar nebula dust, gas, and chondritic meteoric material. It was a scorching, silicate-magma ocean ball with an early reducing atmosphere of hydrogen, helium, methane, and ammonia, **lacking free oxygen**

**Primordial Atmosphere:** Initially contained mostly water vapor, carbon dioxide, methane, carbon monoxide, and nitrogen.

**The Great Oxidation Event** (~2.5-2 billion years ago): Oxygen-producing cyanobacteria and plants drastically increased oxygen and reduced carbon dioxide levels, allowing complex life to evolve.

Consider the following countries :

Finland

Germany

Norway

Russia

How many of the above countries have a border with the North Sea?

(a) Only one

(b) Only two

(c) Only three

(d) All four



The countries bordering the North Sea are the United Kingdom, Norway, Denmark, Germany, the Netherlands, Belgium, and France

Consider the following statements:

1. The Red Sea receives very little precipitation in any form.
2. No water enters the Red Sea from rivers.

Which of the statements given above is/are correct?

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



DIRECTION

The Red Sea is the saltiest sea of all the seas that connect to the ocean without even one river meeting the sea.

The Red Sea's name is a direct translation of its ancient Greek name, Erythra Thalassa. However, only European languages include any mention of "red." In Hebrew it is called Yam Suph, or Sea of Reeds, most likely due to the reeds of the Gulf of Suez, and in **Egypt it is called "Green Space."** A popular hypothesis about the origins of the Red Sea's name is that it contains a cyanobacteria called *Trichodesmium erythraeum*, which occasionally turns the normally blue-green water a reddish-brown.



With reference to the planet Earth, consider the following statements:

I. Rain forests produce more oxygen than that produced by oceans.

II. Marine phytoplankton and photosynthetic bacteria produce about 50% of world's oxygen.

III. Well-oxygenated surface water contains several folds higher oxygen than that in atmospheric air.

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

(a) I and II

**(b) II only**

(c) I and III

(d) None of the above statements is correct



Scientists estimate that roughly half of the oxygen production on Earth comes from the ocean. The majority of this production is from oceanic plankton – drifting plants, algae, and some bacteria that can photosynthesize. One particular species, Prochlorococcus, is the smallest photosynthetic organism on Earth. But this little bacteria produces up to 20% of the oxygen in our entire biosphere. That's a higher percentage than all of the tropical rainforests on land combined.

**Atmosphere: About 21% oxygen by volume (around 210 mg/L).**



**Well-Oxygenated Surface Water: Typically 8-10 mg/L (milligrams per liter).**

# Pulses in India



India leads globally in **pulse production**

Major Pulse Types constitute nearly 80% of India's total pulse production

Pulse Name	Common Name	Production Share	Primary Season	Top Producing States
Chickpeas	Gram / Chana	~48%	Rabi	MP, Maharashtra, Rajasthan
Pigeon Pea	Tur / Arhar	~14%	Kharif	Maharashtra, Karnataka, MP
Black Gram	Urad		Kharif / Rabi	MP, UP, Andhra Pradesh
Green Gram	Moong	~8%	Kharif / Zaid	Rajasthan, MP, UP
Lentils	Masoor	~7%	Rabi	

## Minor & Regional Pulses



Beyond the major crops, several other pulses are vital for regional food security and niche markets:

- **Moth Beans:** Primarily grown in arid regions like Rajasthan due to their high drought tolerance.
- **Horse Gram (Kulthi):** Often grown in hilly or rain-fed areas (Karnataka, Odisha, Uttarakhand); known for its medicinal properties.
- **Kidney Beans (Rajma):** Cultivated mainly in the northern hilly regions and parts of Maharashtra.
- **Cowpea (Lobia):** Grown across various states as a vegetable or pulse.
- **Field Peas (Matar):** Primarily a Rabi crop in North India.



# Geographical Distribution

Pulse cultivation is concentrated in the central and western parts of the country. As of 2025-26, the leading states are:

- **Madhya Pradesh: The "Pulse Bowl of India,"** contributing about 20-22% of national output.
- **Maharashtra: A major hub for Tur and Gram.**
- **Rajasthan: Dominant in Moong and Moth bean production.**
- **Uttar Pradesh: A key producer of Lentils and Peas.**
- **Karnataka: Significant contributor to Tur production.**

# Key Production Facts (2025-26)

- **Self-Sufficiency Goal:** The Indian government has launched the "Mission for Aatmanirbharta in Pulses (2025–31)" to eliminate import dependence by 2027.
- **Rabi vs. Kharif:** Rabi pulses (like Gram and Lentils) generally have higher yields and account for over 60% of total production compared to Kharif pulses.
- **Soil Health:** Pulses are highly valued in Indian agriculture because they are "nitrogen-fixing" crops, which naturally improve soil fertility and reduce the need for chemical fertilizers.

With reference to pulse production in India, consider the following statements:

1. Black gram can be cultivated as both kharif and rabi crop.
2. Green-gram alone accounts for nearly half of pulse production.
3. In the last three decades, while the production of kharif pulses has increased, the production of rabi pulses has decreased.

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

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



India is the largest producer and consumer of pulses in India. The top pulse-producing states of India are Rajasthan, Madhya Pradesh, Maharashtra, Uttar Pradesh, and Karnataka. Growing pulses is a sustainable agricultural practice as it improves soil biodiversity and intercropping. Pulses are a low-carbon future food and to fulfil the needs of the growing population, 39 million tonnes of pulses are needed by 2050.

**Among all pulses chickpea is the major pulse and ranks first in terms of area, production and productivity at the national level.**

**Shree Anna (or Shri Anna)** is the official term used by the Government of India to describe millets, a group of ancient, climate-resilient, and highly nutritious grains. India is currently the world's largest producer of these grains, accounting for approximately 38% of global production.

Category	Production States
Bajra (Pearl Millet)	Rajasthan: (Largest share, ~60%)
Jowar (Sorghum)	Maharashtra
Ragi (Finger Millet)	Karnataka
Small Millets	Foxtail Millet (Kangni), Proso Millet (Cheena), Kodo Millet (Kodo), Barnyard Millet (Sawa), and Little Millet (Kutki)

# Why "Shree Anna"



The name was popularized during the International Year of Millets (2023) to rebrand these "coarse grains" as "superfoods."

- **Climate Resilience:** They require significantly less water than rice or wheat and can grow in poor soil with minimal fertilizers.
- **Nutritional Powerhouse:** They are gluten-free, have a low Glycemic Index (good for diabetics), and are rich in iron, calcium, and fiber.
- **Economic Strategy:** The government has established the Indian Institute of Millets Research (IIMR) in Hyderabad as a "Centre of Excellence" to share best practices and technology globally.

# India's Leadership in High-Value Cash Crops- Sugarcane

India is the world's second-largest producer of sugarcane, trailing only Brazil. For the 2025–26 season, the sector is characterized by a strong recovery in production levels and a significant shift toward ethanol blending

	State	Key Features
1	Uttar Pradesh	Largest producer; known for the Ganga-Yamuna fertile plains.
2	Maharashtra	High sugar recovery rates; strong cooperative mill network.
3	Karnataka	Third largest; leading producer in the southern belt.
4	Gujarat	Notable for high productivity per hectare.
5	Tamil Nadu	Primarily tropical varieties; high use of drip irrigation.

# Economic and Policy Drivers

The industry has seen a massive shift in focus over the last two years:

- **Fair and Remunerative Price (FRP):** For the 2025–26 season, the Central Government increased the FRP to ₹355 per quintal, ensuring a high profit margin (over 100% above production cost) for farmers.
- **Ethanol Blending Program (EBP):** A significant portion of sugarcane juice and B-heavy molasses is now diverted to produce ethanol. India is targeting a 20% ethanol blending in petrol by late 2026.
- **Yield Improvements:** Newer varieties like Co 0238 (Karan 4) in the North and Co 86032 in the South have significantly boosted both cane weight and sugar content.

## Challenges and Outlook



- **Water Intensity:** Sugarcane is a water-guzzling crop. The government is heavily subsidizing drip irrigation (up to 100% for small farmers in some states) to sustain production amid changing monsoon patterns.
- **Export Restrictions:** To prioritize the domestic 20% ethanol blending target and keep local sugar prices stable, the government continues to strictly monitor and regulate sugar exports as of 2026.

**DIRECTION**

Among the following, which one is the least water-efficient crop?

- (a) Sugarcane
- (b) Sunflower
- (c) Pearl millet
- (d) Red gram

Crops	Duration (days)	Water requirement (cm)
Rice	100	95–100
Ragi	105	45–50
Pulses	70	20–25
Pulses (long duration)	150–250	30–50
Maize	100	40–45
Cotton	165	60–75
Groundnut	105	60–65
Sugarcane	300	225–250

With reference to the current trends in the cultivation of sugarcane in India, consider the following statements:

1. A substantial saving in seed material is made when 'bud chip settlings' are raised in a nurse, and transplanted in the main field.
2. When direct planting of setts is done, the germination percentage is better with single-budded setts as compared to setts with many buds.
3. If bad weather conditions prevail when setts are directly planted, single-budded setts have better survival as compared to large setts.
4. Sugarcane can be cultivated using settlings prepared from tissue culture.

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

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

**Bud Chip Technique:** Utilizing single-bud chips instead of traditional multi-bud setts reduces seed requirement by 75-80% and ensures higher germination rates.

**Tissue Culture:** Used for rapid multiplication of disease-free, high-yield varieties.

When directly planting sugarcane setts in the field, setts with multiple buds (2-3 buds) typically exhibit a higher germination percentage and better survival rates compared to single-budded setts, as they possess more stored nutrients and moisture to support initial growth. Single-budded setts are highly effective when raised in a nursery first (as "bud chips") and then transplanted, but they underperform when directly placed in the field.

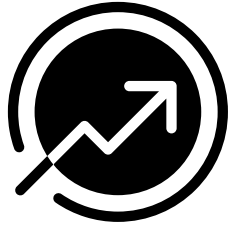
# India's Leadership in High-Value Cash Crops- Cotton

India is the world's second-largest producer of cotton, following China.

## Varieties Grown-

India is unique because it grows all four species of cultivated cotton:

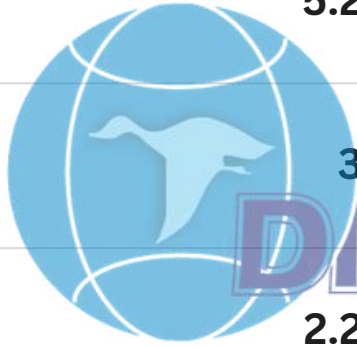
- **G. hirsutum (American Cotton):** Occupies nearly 90% of the area (mostly Bt hybrids).
- **G. arboreum (Desi Cotton):** Known for its hardiness and drought resistance.
- **G. herbaceum:** Grown in parts of Gujarat and Karnataka.
- **G. barbadense (Egyptian/Sea Island):** Grown in small quantities for extra-long-staple fiber.



## Recent Trends and Challenges (2025-2026)

- **Shift in Sowing:** Farmers in Central India (MP and Maharashtra) have slightly shifted acreage away from cotton toward more remunerative crops like paddy and pulses due to lower market prices in early 2025.
- **Mission for Cotton Productivity:** In the 2025–26 Union Budget, the government launched a specialized five-year mission to boost yields, specifically targeting 37 "low-productivity" districts with better technology and pest-resistant seeds.
- **The HTBT Factor:** Approximately 15–25% of India's cotton area is now estimated to be under unapproved HTBT (Herbicide Tolerant Bt) cotton, showing a massive farmer-led demand for technology to reduce weeding costs.

State	Est. Production (Million Bales) 1 bale = 170 kg	National Share (%)	Key Growing Regions
Gujarat	9.5	~30%	Rajkot, Amreli, Bhavnagar, Surendranagar
Maharashtra	7.8	~24%	Vidarbha, Marathwada, Khandesh
Telangana	5.2	~16%	Adilabad, Warangal, Khammam
Andhra Pradesh	3	~9%	Guntur, Kurnool, Prakasam
Rajasthan	2.2	~7%	Sri Ganganagar, Hanumangarh
Haryana	1.5	~5%	Sirsa, Fatehabad, Hisar
Punjab	1.2	~4%	Bathinda, Mansa, Fazilka
Karnataka	0.6	~2%	Raichur, Dharwad, Haveri

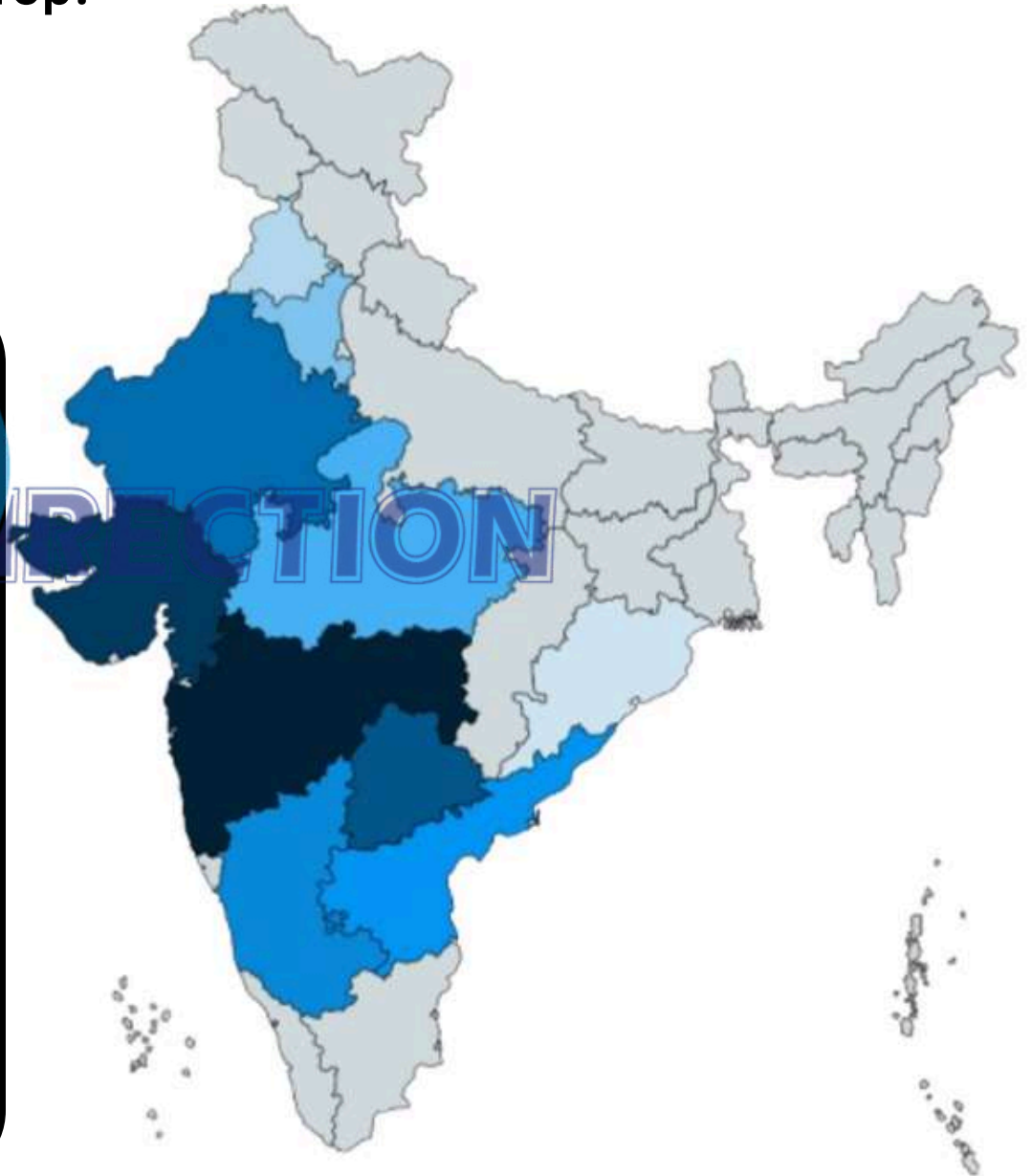


**DIRECTION**

“The crop is subtropical in nature. A hard frost is injurious to it. It requires at least 210 frost-free days and 50 to 100 centimeters of rainfall for its growth. A light well-drained soil capable of retaining moisture is ideally suited for the cultivation of the crop.” Which one of the following is that crop?

- (a) Cotton (b) Jute  
(c) Sugarcane (d) Tea

Cotton cultivation requires a warm, tropical/sub-tropical climate, with optimal temperatures between 21 degree C and 30 degree C and a frost-free period of at least 210 days. It thrives in well-drained, deep, nutrient-rich soils, particularly black clayey soil, with moderate rainfall (50–100 cm) and dry conditions during harvesting to prevent pest issues.



# India's Leadership in High-Value Cash Crops- Tea

India is the world's second-largest producer of tea and the largest consumer of the beverage.

State	Est. Production (Lakh Tonnes)	National Share (%)	Key Regions
Assam	6.65	~50%	Brahmaputra Valley, Barak Valley
West Bengal	4.15	~31%	Darjeeling, Dooars, Terai
Tamil Nadu	1.7	~13%	Nilgiri Hills, Anamalai
Kerala	0.62	~5%	Munnar, Wayanad, Idukki
Others	0.18	~1%	Tripura, Himachal Pradesh, Karnataka

# Iconic Indian Tea Varieties

India is famous for producing three distinct, world-renowned types of tea:



- **Assam Tea:** Grown in the lowlands of the Brahmaputra Valley. It is a full-bodied, **malty black tea**, often used in breakfast blends (like Irish or English Breakfast).
- **Darjeeling Tea:** Grown in the high-altitude Himalayan foothills of West Bengal. Known as the "Champagne of Teas," it is a delicate, floral orthodox tea **with a GI (Geographical Indication) tag**.
- **Nilgiri Tea:** Grown in the Blue Mountains of South India. It is **highly aromatic, brisk**, and dark, making it popular for high-quality iced teas and blends.

# Production Trends & Sector Overview



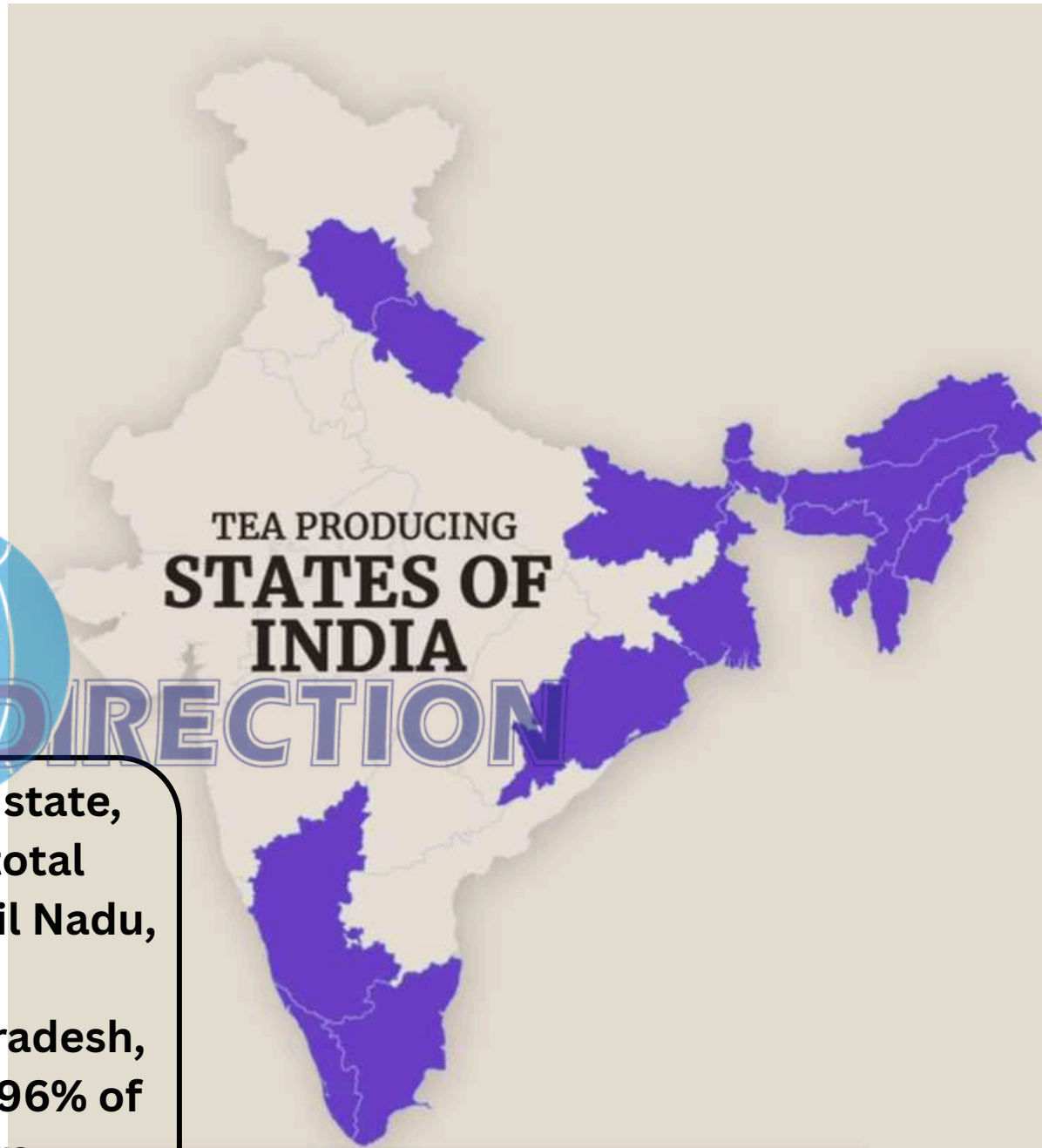
- **Small Tea Growers (STGs):** One of the biggest shifts in recent years is the rise of small-scale farmers. STGs now contribute over 50% of India's total tea production, moving away from the traditional large estate model.
- **Market Dominance:** While India is a massive producer, roughly 80% of the tea produced is consumed domestically.
- **Modernization Initiatives:** For 2026, the Tea Board of India has emphasized "Mission Tea," focusing on replanting old tea bushes (some are over 50 years old) and digitizing the auction process to ensure better prices for growers.
- **Climate Challenges:** Production in 2024–25 faced hurdles from extreme heatwaves and erratic monsoon patterns, leading to a push for climate-resilient clones and sustainable farming practices.

Consider the following States:

1. Andhra Pradesh
2. Kerala
3. Himachal Pradesh
4. Tripura

How many of the above are generally known as tea-producing States?

- (a) Only one State
- (b) Only two States
- (c) Only three States**
- (d) All four States



Assam is India's largest tea-producing state, contributing over half of the nation's total output, followed by West Bengal, Tamil Nadu, Kerala, and Karnataka.

Together with Tripura and Himachal Pradesh, these regions produce approximately 96% of India's tea, spanning Darjeeling, Dooars, Nilgiri, and Assam valley regions.

## India's Leadership in High-Value Cash Crops- Coffee

India is the 7th largest coffee producer in the world, renowned for **growing its coffee under a unique "canopy of shade,"** often alongside spices like pepper and cardamom.

- **Robusta:** Accounts for nearly 70% of total production . It is favored for its resilience and high caffeine content, used widely in instant coffee and espresso blends.
- **Arabica:** Accounts for roughly 30% of production . Known for its superior aroma and mild flavor, it is grown at higher altitudes

# Top Producing States



The "Traditional Coffee Belt" in Southern India accounts for over 98% of the nation's output.

State	Production Share	Primary Districts	Main Varieties
Karnataka	~71%	Kodagu (Coorg), Chikmagalur, Hassan	Both Arabica & Robusta
Kerala	~21%	Wayanad (Robusta hub), Idukki	Primarily Robusta
Tamil Nadu	~5%	Nilgiris, Shevaroy Hills, Anamalai	High-altitude Arabica

**"Non-traditional" areas like Andhra Pradesh (Araku Valley) and Odisha (Koraput) are emerging as specialty hubs, focusing on organic Arabica grown by tribal cooperatives.**

### **The "Big Five" Regional GI Tags**

**These were granted collectively by the Commerce Ministry to protect the heritage of South Indian coffee.**



Coffee Variety	Region	Key Characteristics
Coorg Arabica	Kodagu, Karnataka	Grown in the lush hills of Coorg. It is bold, rich, and earthy with a slightly bitter but lingering finish.
Araku Valley Arabica	Andhra Pradesh & Odisha	Grown by tribal farmers at 900–1100m altitude. It is organic, mild, and floral with a very clean finish.
Chikmagalur Arabica	Chikmagalur, Karnataka	From the "Birthplace of Coffee." It offers a balanced taste, smooth texture, and mild acidity.
Bababudangiris Arabica	Chikmagalur, Karnataka	Grown at very high altitudes where coffee first landed in India. It is famous for its full-bodied flavor with notes of chocolate.
Wayanad Robusta	Wayanad, Kerala	A premium Robusta grown alongside spices. It is smooth, fruity, and lacks the harsh bitterness found in mass-market Robusta.

<b>Crop</b>	<b>Rainfall Type</b>	<b>Top State (2025-26)</b>	<b>Unique Keyword</b>
<b>Pulses</b>	<b>Low (Dryland)</b>	<b>Madhya Pradesh</b>	<b>Nitrogen Fixation</b>
<b>Millets</b>	<b>Very Low</b>	<b>Rajasthan</b>	<b>C4 Photosynthesis</b>
<b>Cotton</b>	<b>Moderate</b>	<b>Gujarat</b>	<b>210 Frost-free days</b>
<b>Cane</b>	<b>High</b>	<b>Uttar Pradesh</b>	<b>Ethanol Diversion</b>
<b>Tea</b>	<b>Very High</b>	<b>Assam</b>	<b>Acidic soil (pH 4.5-5.5)</b>
<b>Coffee</b>	<b>High</b>	<b>Karnataka</b>	<b>Shade-grown / Monsooned</b>

Identify the crop: It requires 150-250 cm rainfall, acidic soil (pH 4.5 to 5.5), and provides the highest employment per hectare in the plantation sector.

- (a) Sugarcane
- (b) Coffee
- (c) Tea
- (d) Rubber



*Tea is exceptionally labor-intensive (plucking) and strictly requires acidic, well-drained soil.*



**What is the primary reason why Tea is grown on hill slopes while Coffee is grown under a 'canopy of shade' in India?**

- (a) Tea roots cannot tolerate stagnant water, and Coffee beans need protection from direct sun to develop flavor.**
- (b) Hill slopes are cheaper to lease for tea, but coffee requires expensive forest land.**
- (c) Tea requires high frost for flavor, whereas Coffee needs extreme heat.**
- (d) Tea is C4 plant whereas coffee is C3 plant**



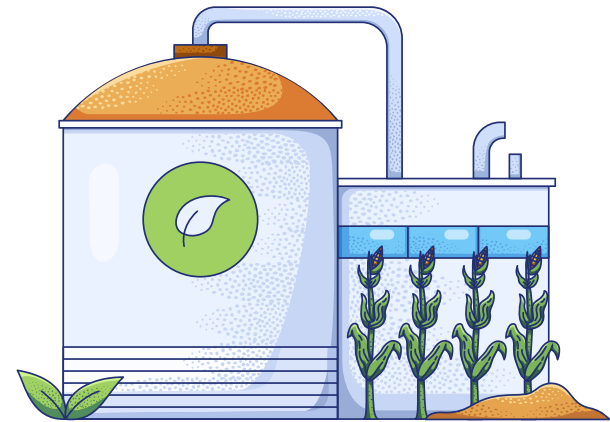
**Slopes ensure drainage for tea, while shade-growing for Indian coffee results in lower acidity and higher quality.**



**In the 2025-26 sugar season, why is the diversion of sugarcane to ethanol considered a 'win-win' for the Indian economy?**

- (a) It eliminates the need for Fair and Remunerative Price (FRP).**
- (b) It manages sugar surpluses and reduces crude oil import bills.**
- (c) It allows sugarcane to be grown in arid regions like Rajasthan.**
- (d) It reduces the amount of water required to grow sugarcane.**

**Rerouting excess sugar to ethanol production stabilizes domestic sugar prices and helps achieve E20 blending targets.**



Regarding '**Shree Anna**' (Millets), which characteristic allows them to be classified as 'Climate Warriors' in the context of global warming?

- (a) They are C4 plants with high water-use efficiency.
- (b) They can only be grown in areas with rainfall exceeding 150 cm.
- (c) They have a long maturation cycle of over 200 days.
- (d) They require heavy chemical fertilizers to fix nitrogen.

**C4 photosynthesis allows plants to fix carbon more efficiently at higher temperatures and with significantly less water than C3 plants like rice.**

# India's Leadership in High-Value Cash Crops- Spices

India, **known as the 'Land of Spices'**, is the world's largest producer, consumer, and exporter of **spices**. Of the 109 spices recognized by the International Organization for Standardization (ISO), India cultivates over 60 varieties. The spice sector contributes approximately 9% to India's total agricultural exports and over 40% of horticultural exports.



# Types of Spices



- **Aromatic Spices:** Cardamom, Cloves, Cinnamon, Nutmeg, Mace, Vanilla. These add warmth, sweetness, and complexity to dishes.
- **Pungent & Fiery Spices:** Black Pepper, White Pepper, Chilli (various types like Byadgi, Guntur, Kashmiri). These bring heat and a sharp bite.
- **Earthy & Savory Spices:** Cumin, Coriander, Fenugreek, Turmeric. These form the base of many Indian curries and add depth of flavor.
- **Pungent & Aromatic Root Spices:** Ginger, Garlic. Essential for their spicy kick and aromatic qualities.
- **Anise-flavored Spices:** Fennel, Star Anise. Offer a sweet, licorice-like flavor.
- **Specialty Spices:** Saffron (grown in Kashmir, though production is limited), Asafoetida (imported, but widely used).

## Major Spice Producing States

Production is spread across the country, but the "Spice Basket" is primarily located in the Central and Southern regions.

	State	Primary Spices Produced
1	Madhya Pradesh	Garlic, Coriander, Chilli, Ginger
2	Rajasthan	Cumin, Coriander, Fenugreek
3	Gujarat	Cumin, Fennel, Garlic
4	Andhra Pradesh	Chilli, Turmeric
5	Telangana	Turmeric, Chilli

# Top Spices by Volume

Five spices account for roughly 76% of India's total spice production:

- **Chilli:** The most produced and exported spice. In 2026, production is recalibrating due to tighter supply and weather variability in the south.
- **Turmeric:** India produces 80% of global turmeric, with production expected to rise by 15% in 2026 as acreage expands in Maharashtra.
- **Cumin:** Primarily grown in Gujarat and Rajasthan; witnessed a massive export surge of 73% recently.
- **Ginger:** India is the second-largest producer (~2 million tonnes), though much of it is consumed domestically.
- **Coriander:** Madhya Pradesh and Gujarat are the primary contributors to this staple seed spice



# Kerala - The Spice State of India

**Cardamom:** Kerala is the undisputed king of cardamom production. The rolling hills of Idukki are particularly famous for their "green gold," known for its intense aroma and flavor.

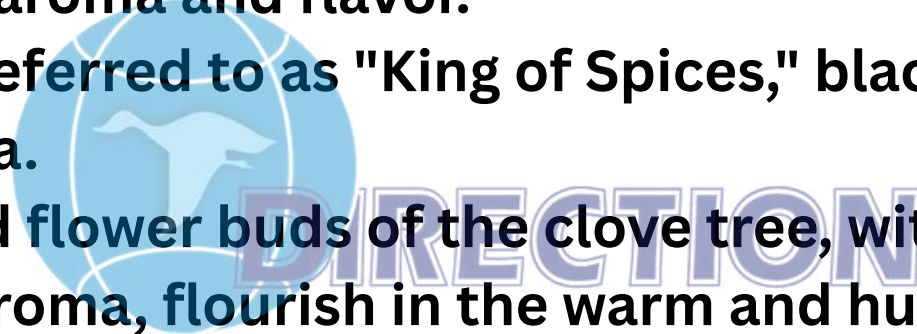
**Black Pepper:** Often referred to as "King of Spices," black pepper has its ancient roots in Kerala.

**Cloves:** The unopened flower buds of the clove tree, with their strong, sweet, and pungent aroma, flourish in the warm and humid climate of Kerala.

**Cinnamon:** While primarily cultivated in Sri Lanka, significant cinnamon production also takes place in parts of Kerala.

**Nutmeg and Mace:** These two distinct spices, derived from the same fruit, find ideal growing conditions in Kerala's fertile soil.

Beyond these primary spices, Kerala also contributes significantly to the production of ginger, turmeric, and vanilla.



# Spices Board of India



स्पाइसेस बोर्ड भारत  
वाणिज्य एवं उद्योग मंत्रालय, भारत सरकार  
**SPICES BOARD INDIA**  
Ministry of Commerce & Industry, Govt. of India

It was established in 1987 to develop, promote and regulate export of 52 spices and spice products that fall under its purview. It also engages in the promotion of production, processing, domestic marketing and export of cardamom (both small and large). initiatives like ***SPICED and modern***

## ***Spices Parks***

The **SPICED** (Sustainability in Spice Sector through Progressive, Innovative, and Collaborative Interventions for Export Development) scheme -aims to enhance the export of spices, improve cardamom productivity, and upgrade the post-harvest quality of spices.

The Spices Board has established eight crop-specific Spices Parks across India to enhance spice processing, value addition, and export opportunities.

Spice Park Location	State	Primary Focus Spices	Key Facilities
Chhindwara	Madhya Pradesh	Garlic and Chilli	Dehydration and extraction plants.
Guna	Madhya Pradesh	Coriander	Cleaning, grading, and grinding.
Jodhpur	Rajasthan	Cumin and Seed Spices	Color sorting and steam sterilization.
Guntur	Andhra Pradesh	Chillies	Large-scale sorting and packaging.
Puttady	Kerala	Cardamom and Pepper	E-auctions and specialized storage.
Sivaganga	Tamil Nadu	Chilli and Turmeric	Value addition and processing.
Ramganjmandi	Rajasthan	Coriander	Post-harvest grading and sorting.
Raebareli	Uttar Pradesh	Mint	Oil extraction and distillation.

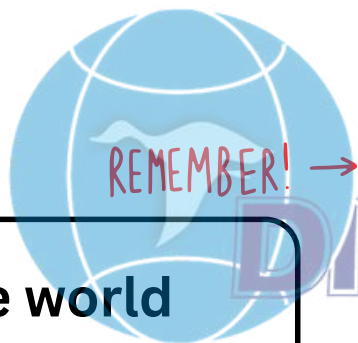


Consider the following statements about turmeric during the year 2022-23:

- I. India is the largest producer and exporter of turmeric in the world.
- II. More than 30 varieties of turmeric are grown in India.
- III. Maharashtra, Telangana, Karnataka and Tamil Nadu are major turmeric producing States in India.

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

- (a) I and II only
- (b) II and III only
- (c) I and III only
- (d) I, II and III**



“ India dominates the world production scenario contributing 80% followed by China (8%), Myanmar (4%), Nigeria (3%) and Bangladesh (3%). ”



India is the largest producer, consumer and exporter of turmeric in the world. In the year 2022-23, an area of 3.24 lakh ha was under turmeric cultivation in India with a production of 11.61 lakh tonnes (over 75% of global turmeric production). More than 30 varieties of Turmeric are grown in India and it is grown in over 20 states in the country. The largest producing states of Turmeric are Maharashtra, Telangana, Karnataka and Tamil Nadu.

India has more than 62% share of world trade in turmeric. During 2022-23, 1.534 lakh tonnes of turmeric and turmeric products valued at 207.45 million USD was exported by more than 380 exporters. The leading export markets for Indian Turmeric are Bangladesh, UAE, USA and Malaysia. With the focused activities of the Board, it is expected that turmeric exports will reach USD 1 Billion by 2030.

The Indian government has set an ambitious target of reaching 10,000 GI tags by 2030. The Geographical Indications (GI) Registry of India has been particularly active in recognizing indigenous crops from the North-East and traditional "tribal" varieties that were previously overlooked.

As of April 2026, India has surpassed 650 total GI tags, with the following being the most notable agricultural additions from the last 12–18 months

### **Trends in the 2025-26 Registry**

- **Fee Reduction:** In late 2025, the government reduced GI filing fees by 80% to encourage small farmer cooperatives and FPOs (Farmer Producer Organizations) to apply.
- **The "One District One Product" (ODOP) Alignment:** Most new GI tags are now aligned with the ODOP scheme, ensuring that every district in India eventually has at least one protected agricultural hallmark.
- **Millet Momentum:** Following the International Year of Millets, several regional varieties like the Marua Millet (Arunachal) have been fast-tracked for registration.

# India's Global Position in Horticulture

India is the **world's second-largest producer of fruits and vegetables**



## Global Leadership:

- **Bananas:** India produces roughly 25% of the world's bananas.
- **Mangoes:** India contributes nearly 40% of global mango production.
- **Okra (Lady's Finger):** India accounts for over 70% of global production.
- **Pomegranates & Papayas:** India holds a dominant global market share in these categories due to year-round availability.

India is rapidly expanding the cultivation of **Dragon Fruit (Kamalam), Avocados, and Blueberries** to reduce import dependency and target premium export markets.

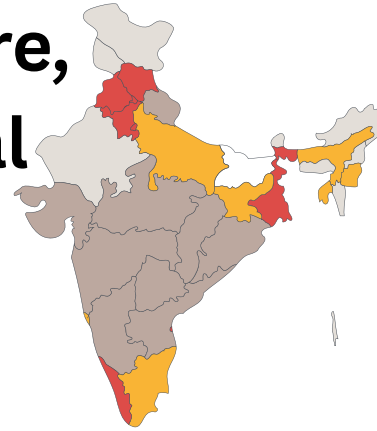
Fruit	Top Producing State	Key Varieties	Why this State?
Banana	Andhra Pradesh	Grand Naine, Robusta	High adoption of Drip Irrigation and "Tissue Culture" tech.
Mango	Uttar Pradesh	Dasherri, Langra	Vast Gangetic plains and dedicated "Mango Belts" in Lucknow.
Citrus	Maharashtra	Nagpur Orange, Sweet Orange	Ideal semi-arid climate; the "Orange City" (Nagpur) is the hub.
Grapes	Maharashtra	Thompson Seedless	Uses advanced Export-Net traceability for the EU market.
Papaya	Gujarat	Taiwan, Red Lady	Rapidly expanding due to high yield and low water needs.

# Recent GI Tags: Fruits (2024–2026)

Product Name	State	Key Features
Indi Lime	Karnataka	High juice content and thin peel; first exported to the UK in late 2025.
Puliyankudi Lime	Tamil Nadu	Known for high ascorbic acid (Vitamin C) and intense aroma.
Goa Mankurad Mango	Goa	Considered one of the best mango varieties in India for its fiberless pulp.
Kachchhi Kharek	Gujarat	A unique variety of dates from the Kutch region; first of its kind in India.
Chiraigaon Karonda	Uttar Pradesh	A small, sour fruit used extensively in pickles and traditional medicine.
Cumbum Paneer Thratchai	Tamil Nadu	Also known as "Cumbum Grapes," famous for their sweet-tangy flavor.

## State-Wise Vegetable Powerhouses (2025–26)

Vegetables are the "backbone" of Indian horticulture, and three states produce nearly 40% of the national total:



- **Uttar Pradesh (The Leader):** The undisputed heavyweight in **Potato and Peas**. It produces over 16 million tonnes of **Potatoes** annually, roughly 30% of India's total.
- **West Bengal:** A close second, dominating in **Cabbage, Brinjal (Eggplant),** and the "Rabi" potato crop.
- **Madhya Pradesh:** Emerging as a major hub for **Garlic, Ginger, and Tomatoes,** largely due to improved irrigation in the Malwa region.

# Recent GI Tags: Vegetables (2024–2026)

Product Name	State	Key Features
Nayagarh Kanteimundi Brinjal	Odisha	Notable for its green color and tiny thorns; stays fresh longer than other varieties.
Riyawan Lahsun (Garlic)	Madhya Pradesh	Known for its high oil content and pungent, long-lasting flavor.
Muzaffarnagar Gur	Uttar Pradesh	While a processed product, it is tied to the unique sugarcane varieties of the region.
Naga Cucumber	Nagaland	Famous for its juicy, sweet taste and unique green-to-yellow transition.
Bhiwapur Chilli	Maharashtra	Small, dark red, and intensely pungent; highly sought after for spice mixes.

# "T.O.P." Crops (Tomato, Onion, Potato)

These three crops are critical for India's food security and inflation control. In 2025, the government launched the "Value Chain Development" initiative for these specific crops:



- **Onion:** Maharashtra (Nashik district) produces nearly 40% of India's onions. Recent innovations include "Onion Storage Structures" to prevent rotting during the monsoon.



- **Tomato:** Andhra Pradesh and Karnataka are the leaders. To combat climate-led price spikes, these states are moving toward Poly-house (Greenhouse) farming.



- **Potato:** Uttar Pradesh and Bihar. The focus here is on "Processing Quality" potatoes for the chips and snacks industry (Pepsico, Balaji, etc.).

# "One District, One Product" (ODOP)

Under the ODOP scheme, India has mapped specific districts to specific fruits/vegetables to create Export Hubs:

- Malda (WB): Mango export hub.
- Jalgaon (MH): The "Banana City" focus.
- Solapur (MH): Pomegranate cluster.
- Agra (UP): Potato processing zone.



# Tech-Driven Transformation



The sector undergoing a digital revolution to solve old problems like waste and low productivity:

- **Precision Farming:** Over 70% of farmers are now expected to use digital tools (satellite imagery and soil sensors) to optimize water and fertilizer use.
- **The "Drone" Boom:** Large-scale adoption of drones for "precision spraying" has reduced chemical waste by up to 20% and improved pest management in tall orchards (mango/citrus).
- **Cold Chain Integration:** Through the Agriculture Infrastructure Fund (AIF), India has added massive cold storage capacity, reducing post-harvest losses which previously stood at nearly 15–20%.

# Strategic Export Focus



India's export strategy has shifted from "surplus selling" to "market-specific production."

- **New Markets:** In 2025–26, countries like Canada opened their doors to Indian pomegranates and garlic, while the EU remains a high-value target for residue-free grapes and mangoes.
- **Processed Food Growth:** The share of processed fruits and vegetables in exports has risen to over 20%, moving India up the value chain from selling raw produce to selling juices, pulps, and frozen items.
- For the 2026–27 cycle, the focus has shifted toward high-value crops like walnuts, almonds, and dragon fruit to further boost export revenue and reduce post-harvest losses, which remain a challenge for the industry.

# India is implementing a three-tier strategy through MIDH, CDP, and the Clean Plant Programme.

As of 2026, these schemes have shifted from simple "production targets" to "global value chain integration."

- **Clean Plant Programme:** Ensures the seedling is 100% healthy and high-yielding.
- **Mission for Integrated Development of Horticulture MIDH:** Provides the subsidy and tech (drip irrigation, poly-houses) for the farmer to grow that seedling.
- **Cluster Development:** Connects that farmer to a global market through a dedicated logistics and branding network.

# The 9 Clean Plant Centres (CPCs)

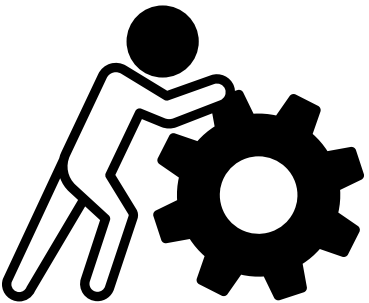
Location	Primary Focus Crop(s)
Pune, Maharashtra	Grapes
Nagpur, Maharashtra	Citrus fruits (Oranges, Mandarin)
Solapur, Maharashtra	Pomegranate
Bengaluru, Karnataka	Mango, Guava, Dragon Fruit, Avocado
Lucknow, Uttar Pradesh	Mango, Guava, Litchi
Srinagar, J&K	Temperate Fruits (Apple, Almond, Walnut)
Mukteshwar, Uttarakhand	Temperate Fruits (Apple, Pear, Peach)
Bikaner, Rajasthan	Arid Citrus varieties
East India (Kolkata/Assam hub)	Tropical and Subtropical plants



DIRECTION

# The 12 Pilot Clusters (CDP)

Cluster / District	State	Focus Crop
Shopian	Jammu & Kashmir	Apple
Kinnaur	Himachal Pradesh	Apple
Lucknow	Uttar Pradesh	Mango
Kutch	Gujarat	Mango
Mahbubnagar	Telangana	Mango
Anantapur	Andhra Pradesh	Banana
Theni	Tamil Nadu	Banana
Nashik	Maharashtra	Grapes
Solapur	Maharashtra	Pomegranate
Chitradurga	Karnataka	Pomegranate
West Jaintia Hills	Meghalaya	Turmeric
Siphahijala	Tripura	Pineapple



## Major Challenges & The "Vision 2030"



**India faces hurdles that prevent it from overtaking China:**

- **Yield Gaps:** India's average productivity per hectare for many fruits is still 30–40% lower than global leaders like the US or Brazil.
- **Fragmented Land:** Small farm sizes make it difficult to implement large-scale mechanization.
- **Climate Risk:** Unexpected heatwaves (like those seen in early 2024 and 2025) have caused "flower dropping" in mangoes and early ripening in tomatoes, leading to price volatility.

# "Climate creates the Color."

Climate Type	Dominant Color	Primary examples	Nutritional Value
Temperate/High Diurnal	Red / Purple	Apple, Pomegranate, Grapes, Onions, Beetroot, Jamun.	Heart Health & Antioxidants
Tropical / High Sun	Yellow / Orange	Banana, Mango, Papaya, Lemon, Pineapple.	Energy & Immunity
Moist / Cool Plains	Deep Green	Okra, Peas, Spinach, Cabbage, Broccoli, Bitter Gourd.	Iron / Folate
Hot & Arid (Dry)	Deep / Dark Tones	Dates/Ber	Anti-aging

# India's floriculture sector

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- **India ranks 2nd globally** in terms of area and production of traditional "loose flowers" (like Marigold and Jasmine), trailing only behind China.
- **Despite high production**, India currently holds about 0.6% of the global flower trade (ranking around 18th in exports). This is because nearly 90% of production is consumed domestically for religious ceremonies, weddings, and festivals



State	National Share	Primary Varieties
Tamil Nadu	21%	Jasmine (Madurai Malli), Marigold, Crossandra.
Karnataka	16%	Roses, Gerberas, Anthuriums (Export hub in Bengaluru).
Madhya Pradesh	14%	Marigolds, Tuberose, Loose flowers for ceremonies.
West Bengal	12%	Gladiolus, Orchids, Chrysanthemums.
Mizoram	Emerging	Anthuriums (Recently exported first consignment to Singapore).





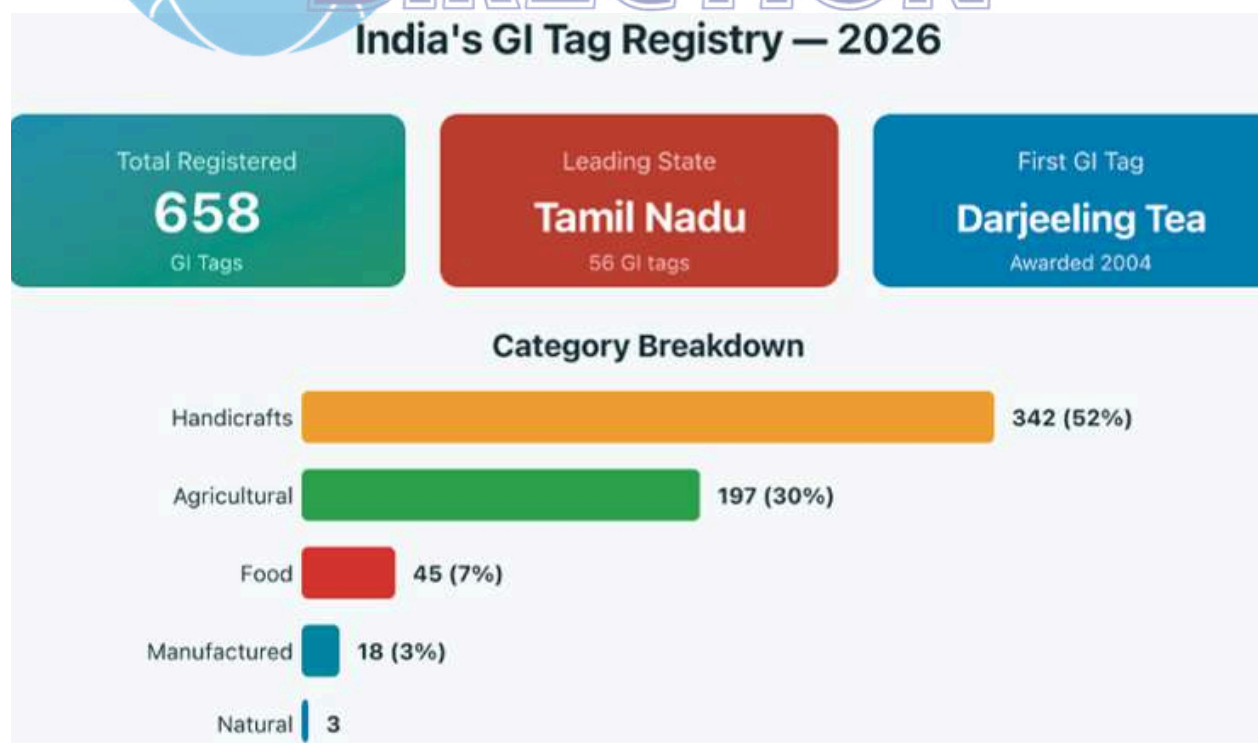
## Recent Strategic Shifts (2025–2026)

- **The "Exotic" Boom:** There has been a surge in demand for non-native flowers. In 2025, cities like Mumbai and Delhi saw record sales for Proteas, Tulips, and Cymbidium Orchids, driven by luxury home décor and high-end gifting.
- **Infrastructure Boost:** Under the Horticulture Development Mission, major clusters like Prayagraj (UP) and Hosur (TN) have installed high-tech polyhouses to grow export-quality roses shipped to Russia and the Middle East.
- **Export Growth:** Floriculture exports reached approximately \$233 million (₹2,000 Crore) in FY25, with the US, Netherlands, and UAE being the top buyers.

## Recent GI Tags: Flowers

While the number of GI tags for flowers is smaller compared to fruits, the focus is on high-fragrance and decorative varieties:

- **Madurai Malli (Jasmine):** While tagged earlier, its "Brand Protection" was renewed in 2025 to include specific extraction methods for the perfume industry.
- **Karthika Flower (*Gloriosa superba*):** Specifically from the Tamil Nadu region, often used in traditional medicine and décor.
- **Kewda Flower: (Ganjam, Odisha)** Famous for its aromatic oil used in food and cosmetics.



# Geography GS Repeat and Hit !

**Neetu Singh**

**With reference to the horticulture sector in India, consider the following statements:**

- 1. India is the largest producer of fruits and vegetables in the world.**
- 2. Horticulture production has consistently remained lower than foodgrain production in the last decade.**
- 3. The Mission for Integrated Development of Horticulture (MIDH) is a Centrally Sponsored Scheme.**

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

- 1, 2 and 3**
- 3 only**
- 2 and 3 only**
- 1 and 2 only**



**Regarding the 'Clean Plant Programme' (CPP), consider the following statements:**

- 1. It aims to establish a network of Clean Plant Centers to provide virus-indexed planting material.**
- 2. The program is implemented under the administrative control of the Ministry of Environment, Forest and Climate Change.**
- 3. It includes the establishment of a legal framework for the mandatory certification of nurseries.**

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

- a. 2 and 3 only**
- b. 1 and 2 only**
- c. 1, 2 and 3**
- d. 1 and 3 only**



**CPP focuses on virus-indexed (clean) material and developing a certification regime for nurseries to ensure quality standards.**

**With reference to floriculture in India, consider the following statements:**

- 1. Tamil Nadu is the leading producer of loose flowers in India.**
- 2. The Agricultural and Processed Food Products Export Development Authority (APEDA) is the nodal agency for flower exports.**
- 3. India is the largest exporter of cut flowers in the world.**

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

- a. 2 and 3 only**
- b. 1 only**
- c. 1 and 2 only**
- d. 1, 2 and 3**

**Tamil Nadu leads in loose flowers and APEDA manages exports, but India's share in global cut flower exports is very small (~0.6%).**

**Which of the following conditions is/are essential for the successful cultivation of 'Temperate Fruits' like Apples and Walnuts in India?**

- 1. A specific number of 'chilling hours' below 7°C during the winter.**
  - 2. High humidity and heavy rainfall during the fruit ripening stage.**
  - 3. Well-drained soil with a slightly acidic to neutral pH.**
- a. 3 only**
  - b. 2 and 3 only**
  - c. 1 and 3 only**
  - d. 1 and 2 only**



**Temperate crops require winter dormancy triggered by chilling hours and specific soil drainage to prevent root rot.**

**Which of the following accurately describes the 'Area Expansion' strategy under the Mission for Integrated Development of Horticulture (MIDH)?**

**(a) Encouraging the cultivation of water-intensive crops in arid regions to increase green cover.**

**(b) Focusing solely on urban terrace farming to meet city-level demand.**

**(c) Converting all existing foodgrain land into horticulture parks through mandatory legislation.**

**(d) Bringing fallow lands and less productive foodgrain areas under high-value fruit and spice cultivation.**



**MIDH incentivizes the use of underutilized land for horticulture to improve farmer income and land productivity.**

**Consider the following statements regarding the 'Horticulture Cluster Development Programme' (CDP):**

- 1.It aims to leverage geographical specialization for global competitiveness.**
- 2.It addresses only the marketing aspect of the horticulture value chain.**
- 3.National Horticulture Board (NHB) is the implementing agency.**

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

- a. 1, 2 and 3**
- b. 1 only**
- c. 2 and 3 only**
- d. 1 and 3 only**



**The CDP is implemented by the NHB and focuses on the entire value chain—pre-production, production, and post-harvest—not just marketing.**

**Regarding the seasonal classification of horticultural crops in India, which of the following statements is/are correct?**

- 1. Watermelons and muskmelons are primarily grown as Zaid crops.**
- 2. Potatoes are traditionally cultivated during the Kharif season to utilize the heavy monsoon rains.**
- 3. Perennial crops like Bananas do not strictly follow the Rabi-Kharif cycle for planting.**

- a. 1, 2 and 3**
- b. 1 and 2 only**
- c. 2 only**
- d. 1 and 3 only**



# Geography GS Repeat and Hit !

Neetu Singh

## The 16th Finance Commission report

The report, released in early 2026, has fundamentally redefined the relationship between the Union government, states, and rural local bodies (RLBs)- **moves away from "entitlement" toward "compliance-driven fiscal federalism**. For the period of 2026–2031, agriculture and land use are no longer just "sectors" but are now "performance indicators" that determine how much money a state receives.

1. Productivity-Linked Fiscal Incentives
2. Land Governance and Digital Infrastructure
3. Climate Resilience and Sustainable Practices
4. Market Liberalization and Value Chain Integration

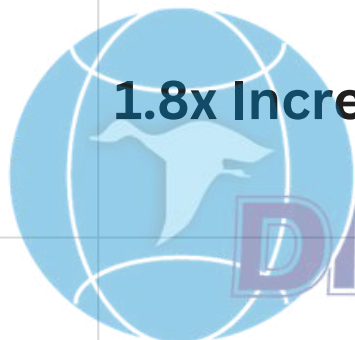


# Impact on State Policy

<b>Pillar</b>	<b>Focus Area</b>	<b>Desired Outcome</b>
<b>Productivity</b>	<b>Performance Grants</b>	<b>Higher yields with fewer inputs.</b>
<b>Land</b>	<b>Digital Records/Leasing</b>	<b>Reduced litigation; better credit access.</b>
<b>Sustainability</b>	<b>Climate Adaptation</b>	<b>Lower disaster relief expenditure.</b>
<b>Markets</b>	<b>e-NAM &amp; Processing</b>	<b>Higher price realization for farmers.</b>

# The Fiscal Shift (2026-2031)

Feature	Change from 15th FC	Impact on Agri/Land Use
Total RLB Grants	1.8x Increase (₹4.4L Cr)	Massive capital for rural infrastructure.
Revenue Deficit Grants	Discontinued	States must now fund agri-subsidies from their own tax share.
Forest Weightage	Includes "Open Forests"	High incentive for Agro-forestry and orchards.
Matching Grants	States must match 20%	States are now "co-investors" in central agri-schemes.



**DIRECTION**

# 1. The "Performance-Driven" Grant Structure

The Commission has allocated a record ₹4.4 lakh crore to Rural Local Bodies (Panchayats). Unlike previous cycles, this funding is strictly bifurcated to drive agricultural and rural efficiency:

- **Basic Grants (80%):** These are "untied" funds given to Panchayats. They can be used for "first-mile" agricultural infrastructure—such as village-level cold storage, drying yards, and rural roads—without central interference.
- **Performance Grants (20%):** These are "earned" funds. To unlock this 20%, states must show a 5% annual increase in their Own Source Revenue (OSR).
  - **Land Use Impact:** This is a direct nudge for states to modernize Land Records and digitize Property Tax collection in rural areas. States that don't digitize their "Abadi" (residential) land records will likely lose out on billions in funding.

## 2. The 41% Vertical Devolution -A New Criterion

The Commission has retained the states' share of central taxes at 41%. While the percentage is unchanged from the 15th FC, the "horizontal" formula (how that 41% is split between states) has a 10% weightage introduced State's Contribution to GDP as a criterion for the horizontal distribution of taxes.

- **Impact on Agriculture:** States with high agricultural productivity (contributing significantly to GSDP) will now see higher tax rewards, incentivizing states to modernize their farm sectors.
- **The Agriculture Link:** This rewards states that have moved from subsistence farming to high-value agricultural exports and processing. States like Maharashtra, Gujarat, and Tamil Nadu, which contribute heavily to the national agricultural GDP, now receive a larger slice of the tax pool.

### **3. Discontinuation of Sector-Specific Grants**

**In a major policy change, the 16th FC has discontinued the separate "Sector-Specific Grants" (which previously funded specific agricultural projects) and "Revenue Deficit Grants."**

**DIRECTION**

- The Logic: States are now expected to use their 41% tax share and untied grants to fund their own agricultural priorities.**
- The Goal: This encourages states to be fiscally disciplined and "rationalize subsidies" (e.g., moving away from unconditional cash transfers to targeted agri-support)**

## 4. "Forest & Ecology" Expanded to "Open Forests"

Previous commissions only rewarded states for maintaining dense forests. The 16th FC has changed the math: It now counts "Open Forests" and rewards the increase in forest cover between 2015 and 2023.

- **Agriculture/Land Impact:** This creates a massive incentive for Agro-forestry. Farmers are now being encouraged to plant trees on the boundaries of their Net Sown Area.
- This "Greening of Fallow Lands" helps the state earn higher central devolution while providing farmers with secondary income from timber and carbon credits.

## 5. The "Urbanisation Premium" and Peri-Urban Land

The Commission introduced a ₹10,000 crore Urbanisation Premium.

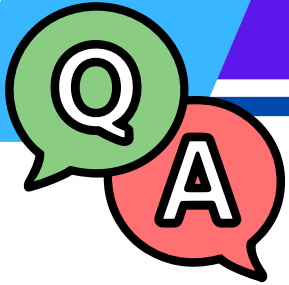
- **The Policy:** This is a one-time grant for states that successfully merge "peri-urban" villages (semi-rural areas on city outskirts) into urban local bodies.
- **Land Use Impact:** This signals a planned shift in land use. It discourages the "haphazard" conversion of prime agricultural land into urban slums, instead pushing states to create "Planned Transition Policies" that protect agricultural zones while expanding cities.

"Urbanisation Premium" (₹10,000 crore) is a double-edged sword for agriculture. It rewards states for merging "peri-urban villages" into cities. This highlights the ongoing trend of agricultural land conversion into urban centers

<b>Status</b>	<b>State</b>	<b>Why?</b>
<b>Top Gainer</b>	<b>Karnataka</b>	<b>High GDP contribution &amp; tech-agri exports.</b>
<b>Big Winner</b>	<b>Kerala</b>	<b>Massive boost from "Open Forest" &amp; ecology metrics.</b>
<b>Winner</b>	<b>Andhra Pradesh</b>	<b>Benefited from the new GDP and efficiency weights.</b>
<b>Top Loser</b>	<b>Madhya Pradesh</b>	<b>Lost out on "Area" weightage and reduced "Income Distance."</b>
<b>Big Lose</b>	<b>Uttar Pradesh</b>	<b>Still the leader (17.6%), but share diluted by new metrics.</b>
<b>Loser</b>	<b>West Bengal</b>	<b>Impacted by the total removal of Revenue Deficit Grants.</b>

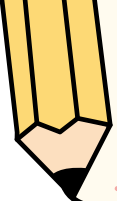
# Geography GS Repeat and Hit !

**Neetu Singh**



The 16th Finance Commission expanded the 'Forest and Ecology' metric to include 'Open Forests'. What is the most likely strategic environmental-economic goal of this change?

- (a) To discourage the expansion of agricultural land into forest fringes.
- (b) To create a fiscal incentive for states to promote large-scale agro-forestry and social forestry programs on degraded or fallow lands.**
- (c) To provide direct cash transfers to farmers who maintain at least 33% tree cover on their plots.
- (d) To penalize states that have successfully converted 'Open Forests' into 'Dense Forests'.



## Expected Questions

The total discontinuation of 'Sector-Specific Grants' in the 16th FC cycle implies which of the following for state agricultural policy?

(a) Agricultural spending is now prohibited from exceeding 10% of the state's total expenditure.

**(b) States now have greater fiscal autonomy but must bear the full financial risk of innovative agricultural schemes from their general tax share.**

(c) All Centrally Sponsored Schemes (CSS) like PM-KISAN have been merged into a single state-run grant.

(d) The Union Government will now directly execute all major agricultural projects in the states.

**Analysis of the 16th FC's 'Urbanisation Premium' suggests it may lead to a 'Land Use Conflict' in peri-urban areas. Which statement best explains this conflict?**

- (a) Farmers in peri-urban areas will be required to pay double the tax—both rural land cess and urban property tax.**
- (b) The incentive to merge villages into cities may lead to the rapid conversion of prime agricultural land into real estate, threatening local food security.**
- (c) The premium is only paid if the merged village maintains its 100% agricultural land-use status.**
- (d) Urban areas will lose their industrial status as they are forced to absorb rural populations.**

**The 16th Finance Commission has discontinued 'Revenue Deficit Grants' (RDG) for several states. Which of the following is the most likely consequence for agrarian states with high debt-to-GSDP ratios?**

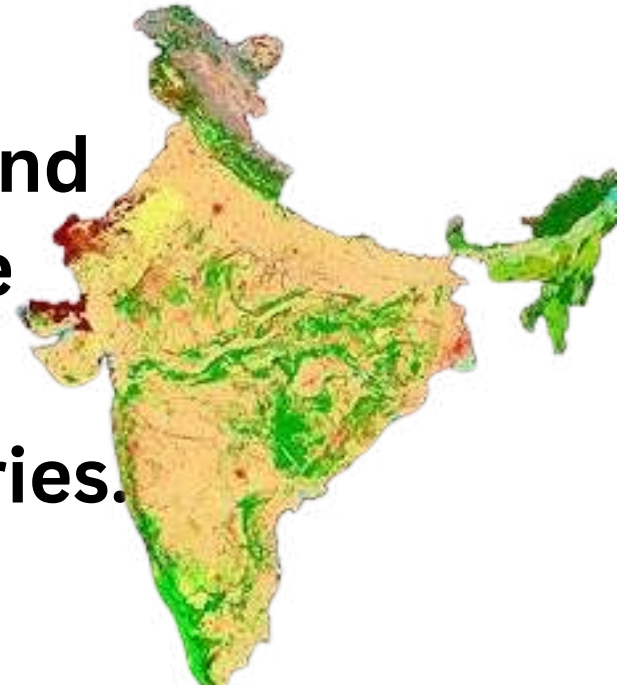
- (a) They will receive an automatic increase in their borrowing limit under Article 293(3) to compensate for the lost grants.**
- (b) The Union Government will assume the state's agricultural debt as a one-time fiscal measure.**
- (c) They will be forced to internalize the cost of agricultural subsidies, leading to a potential rationalization of 'freebie' power and water schemes.**
- (d) The state will be reclassified as a 'Special Category State' to ensure continued funding.**



**The removal of the RDG safety net compels states to improve their own revenue generation and reconsider high-expenditure, non-productive subsidies.**

# Land Classification

- In the Indian agricultural system, land is classified into nine specific categories (the Nine-Fold Classification) to optimize resource use and promote sustainable farming practices.
- *“Over 60% of India’s land is used for agriculture, making land classification vital for environmental sustainability.”*
- Developed by the Ministry of Statistics and Programme Implementation (MoSPI), the
- nine-fold classification system organizes
- all land in India into nine distinct categories.



# 1. Forests

- **Definition:** All lands legally designated as forests, including both state-owned and private forests, under official enactments and administration.
- **Role:** Apart from supporting biodiversity, forests regulate climate, prevent soil erosion, and sustain groundwater cycles.
- **Key Resource Management Practices:** Afforestation, controlled logging, community forestry projects, and sustainable harvesting.



## **2. Land under Non-Agricultural Uses**

- **Definition:** Lands occupied by buildings, roads, railways, or under water bodies (rivers, canals, tanks, reservoirs).
- **Role:** Though not directly agricultural, these areas play a crucial role in infrastructure, transportation, and water supply for farming.
- **Practices:** Urban planning, water management, and integration of agricultural zones with infrastructure.



### **3. Barren and Uncultivable Land**

- **Definition:** Lands that cannot be brought under cultivation except at exorbitant cost. Includes mountains, deserts, rocky terrains, and saline or alkaline soils.
- **Role:** Although not suitable for most crops, these areas may occasionally support silviculture or renewable energy projects.
- **Practices:** Reclamation, soil improvement, and selective afforestation.



## **4. Permanent Pastures and Other Grazing Lands**

- **Definition:** Grazing lands and permanent pastures, including common village lands.
- **Role:** Essential for livestock production and rural livelihoods.
- **Practices:** Rotational grazing, grassland management, and integration with agroforestry.



## **5. Land under Miscellaneous Tree Crops and Groves**

- **Definition:** Cultivable land not included in net sown area but used for specific tree crops (casuarina, bamboo, other groves) not classified as forests.
- **Role:** Provides timber, fuelwood, and non-timber forest products, often playing a supplementary economic role.
- **Practices:** Tree plantation, sustainable pruning, intercropping with annual crops.

## 6. Culturable Waste Land

- **Definition:** Lands available for cultivation but not currently in use; often covered with shrubs, jungles, or lying fallow due to lack of inputs or development.
- **Role:** Represents potential for increasing agricultural productivity.
- **Practices:** Land reclamation, soil conservation, conversion to arable land with appropriate investments.

## **7. Fallow Lands Other Than Current Fallows**

- **Definition:** Lands taken up for cultivation but left unused for a period of not less than one year and not more than five years.
- **Role:** Recovery periods for soil, helps in breaking pest, weed, and disease cycles.
- **Practices:** Crop rotation, organic amendments, regulated resting cycles.

## 8. Current Fallows

- **Definition:** Areas sown and then kept fallow during the current year to restore soil fertility.
- **Role:** Prepares soil for future cropping seasons, maintains long-term fertility.
- **Practices:** Green manuring, adding organic matter, controlled grazing.

## 9. Net Area Sown

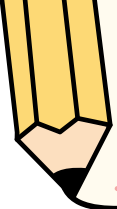
- **Definition:** The total area actually sown with crops and orchards, not counting land sown multiple times in a single year.
- **Role:** Core indicator of agricultural intensity and food production capacity.
- **Practices:** Efficient irrigation, use of high-yield varieties, integrated pest management.

- **Arable Land:** The total potential area (Net Sown + All Fallows + Culturable Waste + Tree Crops).
- **Cultivated Land:** Only the land actually in the production cycle (Net Sown Area + Current Fallow).
- In India, while the Arable Land area is relatively stable, the Net Sown Area (what we actually harvest) fluctuates based on irrigation expansion and monsoon performance.



**The terms "Arable" and "Fallow" are not mutually exclusive; rather, Fallow Land is a sub-category of Arable (Agricultural) Land.**

<b>Category Type</b>	<b>Classification Name</b>	<b>Use Case</b>
<b>Non-Arable</b>	<b>1. Forests</b>	<b>Ecology/Timber</b>
	<b>2. Non-Agri Uses</b>	<b>Cities/Infrastructure</b>
	<b>3. Barren Land</b>	<b>Mountains/Deserts</b>
<b>Common Land</b>	<b>4. Pastures</b>	<b>Livestock Grazing</b>
	<b>5. Tree Crops</b>	<b>Groves/Bamboo</b>
<b>Potentially Arable</b>	<b>6. Culturable Waste</b>	<b>Idle &gt;5 years</b>
<b>Fallow</b>	<b>7. Old Fallow</b>	<b>Idle 1–5 years</b>
	<b>8. Current Fallow</b>	<b>Idle for &lt; 1 year</b>
<b>Active</b>	<b>9. Net Sown Area</b>	<b>Active Farming</b>



## Expected Questions

Consider the following statements regarding 'Current Fallow' land:

1. It is land that is left unseeded for one agricultural year or less.
2. It is primarily done to allow the soil to naturally replenish its nutrients.

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

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



**In the context of land use classification, 'Culturable Waste Land' refers to land that has been left uncultivated for a period of:**

**(a) More than 10 years**

**(b) Between 1 and 5 years**

**(c) Exactly 1 year**

**(d) More than 5 years**



**Land left idle for more than five consecutive years is moved from the fallow category to the culturable waste category.**



**Consider the following statements regarding 'Barren and Unculturable Land':**

- 1. It includes land that cannot be brought under cultivation except at a high cost.**
- 2. Examples include rocky terrain, deserts, and steep mountain slopes.**

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

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

**Barren land is characterized by physical limitations like rocks or deserts that make cultivation practically impossible or prohibitively expensive.**



**Consider the following statements regarding 'Permanent Pastures and Other Grazing Lands':**

**1. This category includes all grazing lands, whether they are permanent pastures or not.**

**2. Most of this land is owned by the village 'Panchayat' or the Government.**

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

**a. Both 1 and 2**

**b. 1 only**

**c. Neither 1 nor 2**

**d. 2 only**



**This category captures all grazing land, much of which is community-owned (Gauchar land) and used for village livestock.**



## Expected Questions



With reference to 'Land Put to Non-Agricultural Uses', consider the following:

1. This includes land occupied by buildings, roads, and railways.
2. Land under water, such as rivers and canals, is excluded from this category.

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

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

**The 'Net Sown Area' represents:**

- (a) The area currently left fallow to recover fertility.**
- (b) The total area of the country used for all types of agriculture.**
- (c) The total area sown with crops, counting the area sown more than once in the same year multiple times.**
- (d) The physical extent of land on which crops are sown and harvested at least once during the year.**



**Net Sown Area counts the physical area once, regardless of how many crops are grown on it in a year.**

**Total area sown describes 'Gross Cropped Area,' not Net Sown Area.**

# Top Flagship Programs of 2026

- **PM-KISAN (22nd Installment):** Learn about the latest ₹2,000 disbursement (March 2026) and the new Mandatory e-KYC and Farmer ID requirements.
- **PM Fasal Bima Yojana (PMFBY):** How AI and drones are now being used for lightning-fast crop loss assessment.
- **Agriculture Infrastructure Fund (AIF):** A look at the ₹80,000+ crore sanctioned for cold storage and warehouses to reduce post-harvest loss.
- **Namo Drone Didi:** Empowering 15,000 Women SHGs with agricultural drones for precision spraying.
- **PM-KUSUM:** The push for solarized pumps to reduce electricity costs for farmers.
- **Soil Health Card 2.0:** Moving toward customized, digital fertilizer advisories.

# **The Umbrella: Krishonnati Yojana (KY)**

Krishonnati Yojana is a "Centrally Sponsored Scheme" designed to boost farmer income through 11 distinct missions. As of the 2026-27 Union Budget, it has been restructured to better align with the 16th Finance Commission.

- **National Food Security and Nutrition Mission (NFSNM):** Focuses on rice, wheat, pulses, and nutri-cereals.
- **Mission for Integrated Development of Horticulture (MIDH):** Holistic growth of fruits, vegetables, and spices.
- **National Mission on Edible Oils (NMEO):** Targeted focus on Oil Palm and Oilseeds to reduce import dependency.
- **Mission for Aatmanirbharta in Pulses:** A newly prioritized mission (2025–2031) to achieve self-sufficiency in pulses.

- **Sub-Mission on Seed and Planting Material (SMSP):** Enhancing the Seed Replacement Rate (SRR).
- **Sub-Mission on Agricultural Extension (SMAE):** Includes programs like ATMA (Agricultural Technology Management Agency) to educate farmers.
- **Sub-Mission on Agricultural Mechanization (SMAM):** Promoting Custom Hiring Centres (CHCs) for smallholders.
- **Sub-Mission on Plant Protection (SMPPQ):** Ensuring bio-security and pest management.
- **Integrated Scheme on Agricultural Marketing (ISAM):** Developing marketing infrastructure and e-NAM.
- **Digital Agriculture Mission (DAM):** Use of AI, Remote Sensing, and the Krishi Mapper platform.
- **Mission Organic Value Chain Development (MOVCDNER):** Specifically for the North Eastern Region.

# Key 2026 Flagship Updates

- **Fund-Linking to Reforms:** Starting April 2026, central fund allocation to states is linked to performance parameters. 30% weightage is given to states that implement structural agricultural reforms.
- **SATHI Portal: The Seed Authentication, Traceability & Holistic Inventory platform** is now fully operational for verifying seed quality.
- **Digital Farmer ID:** Mandatory for schemes like PM-KISAN to ensure transparency and eliminate leakages.
- **Climate-Resilient Seeds:** Over 1,500+ climate-resilient varieties have been released under the NFSNM to combat erratic weather patterns.

# India's Rare Earth Strategy in 2026

- India is taking decisive steps toward self-reliance in critical materials by establishing a domestic ecosystem for Rare Earth Permanent Magnets (REPMs) .
- Rare Earth Permanent Magnets (REPMs) are among the strongest types of permanent magnets, known for their high magnetic strength and stability.
- Their compact size and powerful performance make them indispensable for advanced engineering applications such as electric vehicle motors, wind turbine generators, consumer and industrial electronics, aerospace systems, defence equipment, and precision sensors.



**DIRECTION** Neetu Singh

***The strategy is built on three pillars: Integrated Manufacturing, Dedicated Corridors, and Strategic Global Partnerships.***

# 1. REPM Manufacturing Scheme

To strengthen India's self-reliance in critical materials, the government on 26TH November, 2025, approved a major scheme for Rare Earth Permanent Magnets (REPMs). This initiative provides financial support and incentives to build a fully integrated domestic manufacturing ecosystem.



- **Financial Outlay:** ₹7,280 crore
- **Capacity Creation:** 6,000 MTPA integrated manufacturing capacity of sintered REPMs, distributed among up to five beneficiaries through global competitive bidding
- **Incentives:** ₹6,450 crore in sales-linked incentives over five years
- **Capital Subsidy:** ₹750 crore to support advanced facilities
- **Timeline:** Two-year gestation for setup, followed by five years of incentive disbursement linked to production
- **Objective:** Establish an end-to-end ecosystem from rare-earth oxides to finished magnets, ensuring supply for sectors like electric mobility, renewable energy, electronics, aerospace, and defence.

## 2. Rare Earth Corridors

To complement the REPM scheme, the Union Budget 2026–27 announced Dedicated Rare Earth Corridors .

These corridors will focus on mining, processing, research, and manufacturing, leveraging the mineral-rich base of these states. The initiative is expected to generate stronger local economies, enhance R&D capacity, and integrate India more deeply into global advanced-materials value chains.



## **Four Strategic States:**

- **Odisha: Centered around Chhatrapur ( Orissa Sands Complex).**
- **Kerala: Focused on Chavara and the Vizhinjam Port region.**
- **Andhra Pradesh: Coastal zones in Srikakulam and Visakhapatnam.**
- **Tamil Nadu: Leveraging deposits in Manavalakurichi.**

**These corridors directly complement the existing presence of IREL (India) Limited in Odisha and Kerala.**

**IREL (India) Limited, formerly Indian Rare Earths Limited, has been operating under the Department of Atomic Energy since 1963.**

- **With a processing capacity of 10 lakh tonnes per annum, it produces strategic minerals such as ilmenite, rutile, zircon, sillimanite, and garnet.**
- **Importantly, IREL runs a Rare Earth Extraction Plant in Odisha and a Rare Earth Refining Unit at Aluva in Kerala, both of which align with the corridor initiative.**
- **By integrating IREL's established facilities with the new corridors, the government aims to expand domestic rare earth capacity, foster advanced manufacturing, and accelerate India's transition toward self-reliance and clean energy.**



# 3.Global Integration & Supply Chain Security



India is positioning itself as a "China+1" alternative in the global rare earth value chain through several strategic moves:

- **Overseas Acquisitions:** Through KABIL (Khanij Bidesh India Ltd), the government is securing lithium and rare earth assets in Australia, Argentina, and Africa.
- **Strategic Partnerships:** Pax Silica: India was recently invited to join this US-led strategic initiative to secure semiconductor and critical material supply chains.
- **India-ROK Strategic Partnership:** In April 2026, India and South Korea launched an Economic Security Dialogue focused on supply chain resilience and critical mineral technology.
- **Export Potential:** By building surplus capacity in the Rare Earth Corridors, India aims to become a net exporter of high-value refined rare earth products by 2030.

# India's Resource Base

India possesses a substantial reserve of rare-earth minerals, providing a strong foundation for downstream industries like REPM manufacturing.

- **Monazite Deposits:** India holds 13.15 million tonnes of monazite, containing an estimated 7.23 million tonnes of rare-earth oxides (REO).
- **Geographic Spread:** These deposits occur across Odisha, Kerala, Andhra Pradesh, Tamil Nadu, West Bengal, Gujarat, Maharashtra, and Jharkhand, primarily in coastal beach sands, teri/red sands, and inland alluvium.
- **Additional Resources:** In Gujarat and Rajasthan, 1.29 million tonnes of in-situ REO resources have been identified in hard-rock areas.
- **Exploration Efforts:** The Geological Survey of India (GSI) has further augmented reserves, identifying 482.6 million tonnes of rare-earth ore resources in 34 exploration projects.

# Rare Earth Development Aligned with National

## Goals



- **Self-Reliance (Atmanirbhar Bharat):** By reducing dependence on imports, where 60–80% of the value and 85–90% of quantity of permanent magnets were sourced from China between 2022–25, India aims to strengthen its domestic capability and secure critical supply chains.
- **Clean Energy Transition:** Rare earth magnets are essential for electric vehicle motors and wind turbine generators, both central to India's renewable energy expansion and its Net Zero 2070 vision. The corridors announced in the Union Budget will ensure that mineral-rich states directly contribute to this transition.
- **National Security and Defence:** Rare earth magnets are vital for aerospace systems, defence equipment, and precision sensors. Domestic corridors and manufacturing capacity ensure secure access for strategic applications, reducing vulnerability to global supply chain disruptions.

- **Policy and Institutional Reforms:** These initiatives complement reforms under the Mines and Minerals (Development and Regulation) Act (MMDR Act, amended in 2023), which introduced a dedicated list of critical minerals and opened exploration and mining to private participation.
- They also align with the National Critical Minerals Mission (NCMM, approved in January 2025), which aims to secure sustainable supply chains for rare earths and other strategic minerals.

## **Need to Explore and Invest in the Sector -**

- **Although India has a strong rare-earth resource base, domestic production of permanent magnets is still at a developing stage,**
- **imports mainly from China, meeting most of the demand (nearly 60–80% by value and 85–90% by quantity between 2022–25).**
- **With the consumption of Rare Earth Permanent Magnets expected to double by 2030 due to rapid growth in electric mobility, renewable energy, electronics, and defence applications.**

**It is essential for India to expand domestic capability and invest in this sector to reduce import dependence and ensure long-term self-reliance.**

**The Mineral (Auction) Amendment Rules, 2026** ( the Second Amendment Rules ,March 30, 2026) represent a major overhaul aimed at fast-tracking the operationalization of mines and improving the "Ease of Doing Business" in India's mining sector.

<b>Feature</b>	<b>Before 2026 Amendments</b>	<b>After 2026 Amendments</b>
<b>Letter of Intent Issuance</b>	Manual, subject to State discretion/delays.	Automatic via Unified Mining Portal.
<b>Security Deposit</b>	Cash or Bank Guarantees.	Insurance Surety Bonds allowed.
<b>Performance Security</b>	Must be furnished within 15 days.	Timeline extended to 45 days.
<b>Block Area</b>	Fixed; often leads to project stalling.	Up to 25% exclusion allowed for hurdles.
<b>State Delay</b>	No direct financial penalty for the State.	5% reduction in upfront payment to State.



**DIRECTION**

**The Ministry of Mines achieved a historic milestone by successfully operationalizing 30 mineral blocks. This marks the highest number of blocks ever brought into production within a single fiscal year in India's history.**

	<b>State</b>	<b>Blocks Operationalized</b>	<b>Key Minerals</b>
1	Gujarat	8	Bauxite, Limestone, Marl
2	Madhya Pradesh	5	Limestone, Iron Ore
3	Odisha	5	Iron Ore, Manganese
4	Goa	4	Iron Ore
5	Karnataka	2	Iron Ore
6	Rajasthan	2	Limestone
7	Andhra Pradesh	1	Limestone
8	Maharashtra	1	Limestone
9	Chhattisgarh	1	Limestone
10	Assam	1	Limestone



# Key Highlights of the Achievement



- **Auction Momentum:** Alongside these 30 operationalized blocks, the government auctioned a record 200 mineral blocks during the same period (123 Mining Leases and 77 Composite Licences).
- **Strategic Focus:** The operationalization includes critical minerals necessary for the vision of Viksit Bharat 2047, specifically targeting domestic production to reduce import reliance.
- **Economic Impact:** These 30 blocks are projected to generate approximately 150,000 direct jobs and significantly boost the supply chain for core industries like aluminum and steel.
- **Regulatory Efficiency:** The transition from auction to production was accelerated by the Unified Mining Portal, which automated the Letter of Intent (LoI) process and penalized state-level administrative delays.

# The Ministry of Mines notified the Minerals (Other than Atomic and Hydro Carbons Energy Minerals) Concession (Third Amendment) Rules, 2026 on April 10, 2026.



## Mineral Concession (Third Amendment) Rules 2026

Notified on  
**10th April 2026**

Methodology for Average Sale Price  
(ASP) of Low-Grade Iron Ore Notified.

### Key Highlights

- Introduces methodology for calculating ASP of iron ore below threshold value
- Covers Banded Haematite Quartzite (BHQ) and Banded Haematite Jasper (BHJ)
- ASP for iron ore having 35-45% Fe grade set at 75% of ASP of 45-51% Fe grade.
- ASP for iron ore below 35% Fe grade set at 50% of ASP of 45-51% Fe grade.

Threshold value refers to the grade below which minerals are classified as waste.

Facilitates beneficiation of low-grade iron ore.

Ensure transparency in mineral valuation.

This reforms enhances transparency, ensures uniform pricing mechanisms, and strengthens regulatory clarity in mineral valuation—further improving ease of doing business in India's mining sector.

This amendment specifically addresses the pricing of low-grade haematite iron ore, which was previously an economic bottleneck for miners.

The primary objective is to make the beneficiation (upgrading) of low-grade ore—like Banded Haematite Quartzite (BHQ) and Banded Haematite Jasper (BHJ)—commercially viable by decoupling their taxes from high-grade benchmarks.

# 1. The Core Problem: The "Waste" Pricing Trap



Prior to this amendment, the threshold value for Haematitic Iron Ore was set at 45% Fe (minimum). Anything below this was considered waste.

- **The Issue:** There was no methodology to calculate the Average Sale Price (ASP) for ore below 45% Fe.
- **The Consequence:** Miners were forced to pay royalties and auction premiums for low-grade ore (e.g., 30% Fe) based on the price of much higher-grade ore (45% to 51% Fe). This made the cost of processing these "host rocks" higher than the value of the final product



## 2. New ASP Calculation Methodology

The 2026 Amendment establishes a clear, tiered formula for calculating the ASP of low-grade haematite:

Ore Grade (Fe Content)	New ASP Formula
35% to below 45% Fe	75% of the ASP of the 45% to <51% Fe grade.
Below 35% Fe	50% of the ASP of the 45% to <51% Fe grade.



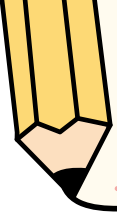
By significantly lowering the ASP for these grades, the government has reduced the effective royalty and tax burden, encouraging miners to process BHQ and BHJ rather than discarding them as overburden or waste.

### 3. Key Definitions & Clarifications

- **BHQ and BHJ:** These are the principal "host rocks" of iron ore. With modern beneficiation technology, these can now be upgraded to high-grade feed for steel plants.
- **Run-of-Mine (ROM) Clarification:** The rules now state that if processing ROM results in a decrease in its economic value (e.g., through accidental degradation), royalty will still be charged based on the lumps and fines obtained after initial screening of the unprocessed material. This prevents miners from artificially lowering the value of the mineral during processing to pay less royalty.

## 4. Strategic Impact

- **Resource Conservation:** Encourages "zero waste" mining by turning billions of tonnes of low-grade resources into usable mineral reserves.
- **Steel Sector Security:** Provides a steady supply of domestic raw materials as high-grade iron ore reserves deplete.
- **Scientific Mining:** Promotes the adoption of advanced beneficiation technologies in the Indian mining sector.



# Expected Questions

UPSC 2026

With reference to the Rare Earth Permanent Magnet (REPM) Manufacturing Scheme launched in 2026, consider the following statements:

1. It aims to achieve an integrated manufacturing capacity of 6,000 Metric Tonnes Per Annum (MTPA).
2. The scheme provides only capital subsidies for setting up facilities without any sales-linked incentives.
3. It focuses exclusively on the extraction of Rare Earth Oxides (REO) rather than the finished alloy production.

How many of the statements given above is/are correct?

- (a) only two (b) only one  
(c) all three (d) none



1. The scheme indeed targets 6,000 MTPA and includes both capital subsidies (₹750 crore) and sales-linked incentives (₹6,450 crore) across the entire value chain.

**Which of the following states have been identified as part of the 'Rare Earth Corridors' announced in February 2026?**

- 1. Odisha**
- 2. Rajasthan**
- 3. Andhra Pradesh**
- 4. Kerala**
- 5. Gujarat**

**Select the correct answer using the code given below:**

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



**The corridors are strategically located in coastal states (Odisha, Andhra Pradesh, Kerala, and Tamil Nadu) to leverage monazite beach sand deposits.**



The term 'Pax Silica', which has gained prominence in India's 2026 strategic dialogues, refers to:

- (a) A bilateral agreement between India and China for rare earth processing technology.
- (b) A new regulatory body under the Ministry of Mines for silica-based minerals.
- (c) A domestic initiative to increase silicon extraction for solar panels.
- (d) A US-led strategic initiative for securing semiconductor and critical material supply chains which India recently joined. ✓**



Pax Silica is an international alignment aimed at supply chain resilience in high-tech materials, including rare earths.

Regarding Khanij Bidesh India Ltd (KABIL), consider the following statements in the context of the 2026 strategy:

1. It is a joint venture of three CPSEs: NALCO, HCL, and MECL.
2. Its primary mandate is to identify and acquire critical mineral assets abroad.
3. In 2026, it expanded its focus to include rare earth assets in Australia and South America.

Which of the statements given above are correct?

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



KABIL is the strategic arm for overseas mineral security, formed by

- NALCO National Aluminium Company Limited.
- HCL Hindustan Copper Limited.
- MECL Mineral Exploration and Consultancy Limited (formerly Mineral Exploration Corporation Limited)

,and is actively pursuing REE assets globally.

**The 2026 Amendment Rules introduced the 'Unified Mining Portal'. What is the primary administrative function automated by this portal to ensure 'statutory certainty'?**

- (a) The daily tracking of mineral excavation volumes.**
- (b) The verification of the bidder's net worth.**
- (c) The environmental clearance (EC) approval process.**
- (d) The issuance of the Letter of Intent (LoI) to the preferred bidder. ✓**



**Automating the LoI issuance reduces administrative discretion and ensures that rights are granted immediately upon meeting financial obligations.**

**Regarding the execution of a Mining Lease (ML), how do the 2026 Rules treat blocks that do NOT involve forest land?**

**(a) They exempt the bidder from paying the performance security during this period.**

**(b) They allow for a two-year extension beyond the initial three-year period.**

**(c) They require execution within 5 years to match forest land timelines.**

**(d) They mandate execution within a strict timeline of 3 years with no further extensions. ✓**

**The amendment aims to fast-track production by removing extension flexibility for blocks without forest-related complexities.**

Under the 2026 Rules, critical and strategic minerals found in a block may be exempt from the auction premium. Which of the following minerals is EXCLUDED from this exemption?

- (a) Lithium
- (b) Cobalt
- (c) Nickel
- (d) Graphite**



Graphite, along with Phosphate and Potash, is explicitly excluded from this specific premium exemption framework.

The 2026 Rules emphasize 'resource conservation' by incentivizing the use of low-grade minerals. Which pair of iron-bearing rocks is specifically addressed in the related Concession Rules?

a. Magnetite and Goethite

b. Banded Haematite Quartzite (BHQ) and Banded Haematite Jasper (BHJ) 

c. Siderite and Pyrite

d. Laterite and Limonite



DIRECTION



The rules now provide a methodology to price these low-grade ores to make their beneficiation economically viable.

**How does the 2026 Amendment attempt to solve the issue of miners paying high royalties for low-grade ore (below 45% Fe)?**

**(a) By calculating royalty based on a fixed percentage (50% or 75%) of the Average Sale Price (ASP) of the next higher grade. ✓**

**(b) By exempting all ore below 45% Fe from royalty entirely.**

**(c) By mandating that the state government pays for the beneficiation costs.**

**(d) By reclassifying all low-grade iron ore as 'minor minerals'.**

**Which of the following is TRUE regarding Notified Private Exploration Agencies (NPEAs) under the 2026 Rules?**

**(a) They can now participate in auctions for all types of mineral blocks they have explored. **

**(b) They are restricted to exploring only in non-forest areas.**

**(c) They are only allowed to explore, but cannot participate in the auction of blocks they found.**

**(d) They must have at least 51% government ownership to participate in auctions.**