

1) Underline the changes in the field of economy and society from Rig Vedic to later Vedic period (Answer in 150 words) 10

Introduction

The **Vedic period** (c. 1500 – c. 500 BCE), is the period in the late Bronze Age and early Iron Age of the history of India when the Vedic literature, including the Vedas (c. 1500–900 BCE), was composed in the northern Indian subcontinent, between the end of the urban Indus Valley Civilisation and a second urbanisation, which began in the central Indo-Gangetic Plain c. 600 BCE. The Vedic period is divided into two distinct periods: the Early Vedic period also known as Rig Vedic period and the Later Vedic period

Changes in the field of society from Rig Vedic period to later Vedic period

Aspects	Rig Vedic period	Later Vedic period
Family	Family belong to larger group called Vis or Clan. More than one clan called Jana or tribe which was the largest social group.	The family continues to be the fundamental of later Vedic society and family grew larger called a Joint family.
Status of women	The women in society enjoyed respectable position. She was married at a proper age and could choose a husband of her own choice. She could take part in the proceedings of the tribal assemblies called sabha and samiti. Women poets: Lopamudra, Apala etc.	In a text a daughter has been said to be the source of all sorrows. Women had to stay with her husband at his place after marriage. The participation of women in public meetings was restricted.
Varna system and social groups	No varna system existed. No division of society based on occupation.	Developed four varna system viz; Brahmana, kshatriya, Vaishya, Shudras. Division of social groups were based on occupation only but society was flexible.
Gotra system	No Gotra system	Gotra system was developed, people having common Gotra having common ancestor. No marriage between same gotra.
Marriage	Marriage was Monogamous but some chiefs practiced polygamy.	Monogamous marriages were preferred even though polygamy was frequent. Child marriage were becoming common.
Conflicts	Conflicts were based on pasture land. Eg- battle of ten kings.	Now for acquisition of land.

Changes in the field of economy from Rig Vedic period to later Vedic period

Aspects	Rig Vedic period	later Vedic period
Occupation	Pastoral society and Cattle rearing.	Pastoral to sedentary agrarian society.
Domestication	Cattle, sheep, Goat, Horse were domesticated for meat, milk.	Buffalo had been domesticated for agriculture purpose.

Agriculture	Shifting cultivation. Crop: Yava or Barley	Rice became the staple diet, names: Vrihi, Sali. Apart from barley cultivation of rice, wheat, pulses were started.
Iron use	Familiar to copper no use of Iron	Iron axes and Iron ploughshare were used efficiently.
Tax system	Bali, a voluntary grant to chiefs from the tribesmen.	Bali, sulka etc were gradually assumed a regular tribute to chiefs.
Medium of exchange	Cow, Horse, Ornaments.	Gold coins called Niskha.

Conclusion

All these changes ultimately resulted in the rise of janapadas and mahajanapadas i.e. bigger territorial states in the sixth century BC.

2) Estimate the contribution of Pallavas of Kanchi for the development of Art and literature of South India. Answer in 150 words) 10

Introduction:

The Pallava dynasty was a prominent South Indian dynasty that ruled a significant part of the southern region of the Indian subcontinent between the 3rd and 9th centuries CE. The contribution of the Pallavas to the Indian Art and Architecture is immense. It was a gradual evolution starting from the cave temples to the monolithic Rathas and culminated in structural temples.

Contribution in Art:

- **Temple architecture:** The Five Rathas popularly called as the 'Pancha Pandava Rathas (Rock-cut Rathas)' at Mamallapuram signifies five different styles of Architecture. The Kailasanatha temple at Kanchi and Shore temple at Mamallapuram remain the finest examples of early structural temples of the Pallavas.
- **Sculptures:** The Pallavas had also contributed to the development of sculpture. The Mandapas contain beautiful sculptures on its walls. The sculpture depicting the „Descent of Ganges or the Penance of Arjuna“ at Mamallapuram is a master piece of classical art.
- **Music, Dance and Painting :** The Tamil devotional saints exploited music and dance to realize the „concept of compassionate God“. The religious hymns were sung with the accompaniment of music and dance. This became a regular feature in the temple festivals. The Paintings at the caves of Sittannavasal belonged to the Pallava period.

Literature:

- **Sanskrit works:** Several works in Sanskrit were produced during this period. The Kiratarjuniyam of Bharavi, Dasakumaracharita of Dandi and the Mattavilasaprahasana of Mahendravarman I were the best Sanskrit works of the period.
- **Tamil literature:** The Tamil literature had also developed under the patronage of the Pallavas. Tiruvelluvar, the author of kural“ lived during this period. Perundevanar was patronized by Nandivarman II and he translated Mahabharata into Tamil.

- **Religious literature:** The “Thevaram” composed by the Nayanars and „Nalayaradivya prabhandam” composed by the Alvars represent the religious literature of the period.

Conclusion

The Pallava dynasty's enduring legacy remains a testament to their remarkable contributions to South Indian history, culture, and art, solidifying their position as one of the most influential dynasties in the region's history.

3) What were the events that led to the Quit India Movement? Point out its results. (Answer in 150 words) 10

Introduction

Quit India Movement, a pivotal moment in India's struggle for independence from British colonial rule, which was led by Mahatma Gandhi, this movement called for India's immediate independence from British rule, aiming to mobilise Indians in a non-violent civil disobedience campaign against British colonialism.

Events that led to Quit India Movement

- **The failure of Cripps mission:** The failure of this mission to solve the constitutional deadlock exposed Britain's unchanged attitude on constitutional advance and made it clear that any more silence would be tantamount to accept the British right to decide the fate of Indians without consulting them.
- **Popular discontent:** The discontent was because of inflation and shortage of food grains and factors such as commandeering boats in Bengal and Odisha. Fear of Britain following scorched earth policy in Assam, Bengal and Odisha against Japanese aggression.
- **Japanese advancement:** The Japanese troops were approaching the Indian border. The popular faith in the stability of British rule was so low. The leadership wanted to condition the masses for a possible Japanese invasion.
- **Racist Attitude:** British behavior towards the Indian subjects in South-East Asia during evacuation. (White road – for Europeans refugees and Black road for Indian refugees).

Results of Quit India Movement

- **Strengthen Unity without leadership:** Loyalty to the government suffered considerable erosion showed how deep nationalism had reached. All the members of the Party's Working Committee (national leadership) were imprisoned. Despite this, large protests and demonstrations were held all over the country.
Eg: Underground activity and Parallel governments.
- **Drew international action:** Internationally, the Movement drew attention to India's struggle for independence and garnered support from various quarters, including sympathetic voices within the British public and pressure from Allied powers during World War II. The movement's impact on global perceptions of British colonialism contributed to mounting international pressure on Britain to address India's demands for self-rule.
- **Set stage for eventual Independence:** the movement placed the demand for independence on the immediate agenda of national movement after Quit India, there could be no retreat.
- **Gandhi's Fast:** In February 1943, Gandhi started a fast as an answer to exhortation by government, which contributed to raise public morale, strengthen anti-British feeling, opportunity for political activity.

Conclusion

The Quit India Movement was a significant chapter in India's struggle for independence. In 2024, as India celebrates the 82nd anniversary of the Quit India Movement Day, it serves as a reminder of the power of non-violent resistance and civil disobedience in achieving social and political change, in addition to underscoring the values of democracy, freedom, and unity.

4) What is sea surface temperature rise? How does it affect the formation of tropical cyclones? (Answer in 150 words) 10

Introduction

Sea surface temperature (SST) is defined as the temperature of the top few millimeters of the ocean. This temperature directly or indirectly impacts the rate of all physical, chemical, and most biological processes occurring in the ocean. The average temperature of the sea surface is about 20° C (68° F), but it ranges from more than 30° C (86° F) in warm tropical regions to less than 0°C at high latitudes.

Sea surface temperature rise

- Sea surface temperature rise is the increase in the temperature of the top layer of the ocean, usually few meters depth. Changes in sea surface temperatures reflect the overall warming trend in the climate system and, in turn, influence weather and climate patterns worldwide.
- **Primary reason for rise:** the primary reason for rise in sea surface temperature is due to anthropogenic activity. Almost 90 per cent of the extra heat trapped by greenhouse gases has been absorbed by the oceans, making them steadily warmer over the decades.

It affect the formation of tropical cyclones

- Sea surface temperature affects the behavior of the Earth's atmosphere above, so their initialization into atmospheric models is important. Sea surface temperature is important for tropical cyclogenesis.
- With rising global temperatures, tropical cyclones are becoming more intense. Tropical cyclones in **Southeast Asia are now forming closer to coastlines**, intensifying more rapidly, and **lingering longer over land**.
- This could be happening primarily because of **warmer surface temperatures of the ocean** — global mean sea surface temperature has gone up by close to **0.9 degree Celsius since 1850** and around **0.6 degree Celsius over the last four decades**.
- Higher sea surface temperatures **cause marine heat waves**, an **extreme weather event**, which can also make storms like **hurricanes and tropical cyclones more intense**.
- Warmer temperatures escalate the rate of evaporation along with the **transfer of heat from the oceans to the air**. When storms travel **across hot oceans**, they gather more **water vapour and heat**. This results in **stronger winds, heavier rainfall and more flooding** when storms reach the land.
- **Examples: Cyclone Yagi in South China Sea.**

Conclusion

The rise in sea surface temperature is having a profound impact on the formation and intensity of tropical cyclone. Addressing global climate change is crucial to mitigate these escalating risks, as the increasing energy stored in the oceans threatened the safety and livelihoods of coastal communities world wide.

5) Why do large cities tend to attract more migrants than smaller towns? Discuss in the light of conditions in developing countries. (Answer in 150 words) 10

6) What is the phenomenon of 'cloudbursts'? Explain. (Answer in 150 words) 10

Cloudburst phenomena

A cloudburst is a localised but intense rainfall activity. Not all instances of very heavy rainfall, however, are cloudbursts. Rainfall of 10 cm or more in an hour over a roughly 10 km x 10-km area is classified as a cloudburst event. 5 cm of rainfall in a half-hour period over the same area would also be categorized as a cloudburst.

During a cloudburst event, a place receives about 10% of this annual rainfall within an hour.

Sometimes sudden downpour that leads to destruction of life and property in the hilly areas gets described as a "cloudburst", irrespective of whether the amount of rainfall meets the defining criteria.

- **Process:** The phenomenon that is responsible for this large amount of precipitation in such a short duration is 'orographic lift'. It is the process by which clouds that are already to rain are pushed up by warm air currents. As they reach higher elevations, the water droplets within the clouds become bigger and new ones are formed. Lightning within these clouds help in delaying rainfall. These dense clouds eventually burst, unable to hold the large volume of moisture. This results in torrential downpours in the geographical region right below and leads to overflowing of water bodies in a very short duration of time.
- **Geographical distribution:** The phenomenon is more common in mountainous areas because they offer the terrain for moisture-laden air to rise swiftly along the mountain slopes. Most common in Himalayan states.
- **Consequences :** The consequences of these events, however, are not confined to the small areas. Because of the nature of terrain, the heavy rainfall events often trigger landslides and flash floods, causing extensive destruction downstream.
- **Earlier and recent instances:** Mumbai had experienced on July 26, 2005, which is one of the most extreme instances of rainfall in India in recent years, resulting in deaths of over 400 people and more than USD 1 billion in economic losses. 2013 and 2024 incidence in Uttarakhand.
- **Forecast:** No forecast ever mentions a possibility of a cloudburst. But there are warnings for heavy to very heavy rainfall events, and these are routinely forecast four to five days in advance. A doppler-radar system is ideal for predicting the calamity and demands were made to equip monitoring stations in cloudburst-prone areas with this system following the 2013 in Uttarakhand. Stations with the technology are still few and far between even in the Himalayan states, making forecasting difficult.

Conclusion

While the overall amount of rainfall in India has not changed substantially, an increasing proportion of rainfall is happening in a short span of time. That means that the wet spells are very wet, and are interspersed with prolonged dry spells even in the rainy season. This kind of pattern, attributed to climate change, does suggest that cloudburst events might also be on the rise.

7) What is the concept of a 'demographic winter'? Is the world moving towards such a situation? Elaborate. (Answer in 150 words) 10

Introduction

The onset of demographic winter manifests itself in a variety of social symptoms such as lower childbirth rates, ageing, natural decrease, population decline, the depopulation of villages, labour shortages, and pension crises.

Concept of demographic winter

- Demographic winter refers to a significant decline in birth rates, accompanied by an ageing population with reduced working age population. The onset of demographic winter manifests itself in a variety of social symptoms such as lower childbirth rates, ageing, natural decrease, population decline.

Cause of demographic winter

- **Low fertility rate:** The direct cause of this is the low fertility rate, understood as fewer than 2.1 childbirths per woman on average. Societal shifts, including delayed marriage and childbearing, rise in single person household contributes to low birth rate.
- **Expansion of Urbanization:** High cost of living unstable job triggering delayed marriage and discouraging having more children.
- **Ageing population:** By 2020, around 10% population was aged 65 or older projected to rise 16% by 2050.
- **Higher life expectancy:** If mortality is reduced by 50% in 2040, the average life expectancy will be 5 years higher than expected. This has major consequences, especially for the ageing population. If we live longer than expected, new challenges will arise for policy and public health, like housing, work and retirement and healthcare.

The world moving towards such a situation

- The demographic decline no longer affects only the countries where well-being is more widespread. It is a global phenomenon, spanning every continent.
- **South Asia :** Countries such as India, Pakistan and Bangladesh are on track to very quickly reach the low birth rates of Western Europe and the Far East. If in 2021 there were a total of 32 million births in South Asia, by 2050 they could already drop to 18.7 million. India's TFR is 2.1, according to the 'World Population Data Sheet, 2022'.
- **East Asia:** Japan, South Korea and even China are witnessing declining birth rates at a much faster pace than expected – total fertility rates (TFR) for the three countries are 1.3, 0.8 and 1.2 respectively. China's demographic shift created by its one child policy. Around 30% population of Japan are 65 years or above.
- **Europe:** many European countries like Germany, Italy, Spain and Bulgaria have fertility rate below 1.5 children per woman. Europe is among the top-ranked countries for demographic ageing and is expected to reach 35% by 2050.
- Only Tajikistan would have a birth rate (slightly) above the replacement threshold in 2100.

Conclusion:

Demographic context plays a key role in medium- and long-term developmental perspectives. A number of countries introduced policy measures affirming parents' rights in the process of upbringing their children, which constitutes an important factor helping to create more favourable context of procreation decisions. Introduction of such measures very often coincided with positive changes in TFR, despite prior negative long-term prognoses in this respect.

8) Distinguish between gender equality, gender equity and women's empowerment. Why is it important to take gender concerns into account in programme design and implementation? (Answer in 150 words)

9) Intercaste marriages between castes which have socio-economic parity have increased, to some extent, but this is less true of interreligious marriages. Discuss. (Answer in 150 words) 10

10) In dealing with socio-economic issues of development, what kind of collaboration between government, NGOs and private sector would be most productive? (Answer in 150 words) 10

11) "Though the great Cholas are no more, yet their name is still remembered with great pride because of their highest achievements in the domain of art and architecture." Comment. (Answer in 250 words) 15

Introduction

Throughout the Chola dynasty, there was a constant improvement, advancement and refinement of art and architecture. While the Cholas ruled for a handful of centuries, their artistic influence and cultural contribution have stood the test of time and continue to endure to this day.

Achievements in the domain of Art

- **Art and Sculpture:** The temples of the Imperial Cholas are covered with exquisite well composed sculptures and frescoes. The artists used the lost wax technique and followed the complete Indian Shilpa Shastra. The Cholas sculpture of the temples the combination of stone pillars, Gopurams, magnificent sculptures and well-carved relief works. During Chola period the artists did many experiments in doing bronze sculptures. Nataraja bronze sculpture is the best example.
- **Portraits:** The Cholas excelled the Pallavas in the art of portrait making. The best specimens of portraits are found on the walls of Koranganatha temple and Nageswarasamy temple. The portraits of Cholamadevi and Kulothunga-III are there in Kalahasti temple. They are good examples of Chola art of portrait making.
- **Paintings:** Scenes of Periyapuram are beautifully depicted Kailasanathar temple at Kanchipuram, Vishnu temple at Malayadipatti contain fine specimen of the Chola paintings. Rajaraja-I and Rajendra contributed more for the development of the art of painting during the Chola period. There were paintings on the themes of Puranas painted on the Windows inner walls of the Raja Rajeswara Temple and Gangalkonda Cholapuram Temple and the Nataraj Temple at Chidambaram.
- **Music:** The During the Chola period the art of music was developed. Twenty three panns were used seven music alphabets sa, ri, ga, ma, pa, da, ni were used. The hymns of Aiwars and Nayanmars were sung in every

temple. Nambiandar nambi and Nathamuni contributed much for the development of music. Several musicians were appointed in Brahadeeswarar temple. Drums, udukkai, veena, flute were famous music instruments. Sagadakkottigal formed a group of musicians. Endowments were made to promote music. Musicians were honored by the kings. Temples and mutts imparted training in vocal and instrumental music.

- **Dance:** The Chola kings patronized the art of dance. Bharatha natyam and kathakali were two types of dances performed during the Chola period. Lord Siva was represented as the exponent of Karana dance. Natarajar temple at Chidambaram and Sarangapani temple at Kumbakonam have dancing poses of Lord Nataraja.
- **Drama:** Rajarajeswara natakam and Rajarajavijayam were the dramas enacted during festival times. Drama actors received honors from the Chola kings. Koothu is one type of drama. Inscriptions refer about Ariyakuthu, Chakki koothu and Santhi koothu.

Achievements in the domain of Architecture

- Built in the early 11th century, the two magnificent temples at Thanjavur and the Gangaikonda Cholapuram show the best of Chola architecture. The Dravidian feature initiated by the Pallavas acquired the classical forms and features under the Cholas such as gopurams, mandapams and vimanas. Initially, the gopuram features were more prominent but in the later stages, the vimanas took the forefront.
- The sanctums of the Chola temples were both circular and square in size and the walls of the inner sanctum sanatorium were beautified. On the upper side of the sanctum special vimanas are built with dome shaped sikhara and kalasa which were also there on the top of gopurams.
- The walls of the passage around the Brihadeswarar Temple sanctum are covered with panels of exquisite paintings. The 108 dance poses of Shiva carved on the inner walls of this temple testify to the heights attained by the Cholas in the field of art and architecture. The 16 feet Nandi at the entrance of the temple is a monolithic structure and the second largest in the country. Largest and tallest of all Indian temples this temple is known to be the finest creation of Chola craftsmen.
- **Examples:** The Shiva temple at Gangaikonda Cholapuram (182 feet or 55 m) and the Airavatesvara temple at Darasuram dedicated to Lord Shiva. The Airavatesvara temple complex, built by Rajaraja II, at Darasuram features a 24-m vimana and a stone image of Shiva. The temples testify to the brilliant Windows achievements of the Chola in architecture.

Conclusion

Chola art and architecture continues to inspire and influence contemporary art and design, both in India and around the world.

12) How far is it correct to say that the First World War was fought essentially for the preservation of balance of power? (Answer in 250 words) 15

World War I was one of the watershed moments of 20th-century geopolitical history where the world powers were divided among two blocks i.e Central Powers mainly including Germany, Austria-Hungary, Ottoman Empire and Allied Powers mainly including United Kingdom, France, Russia, Italy, United States. While the war had several underlying causes, one of the central reason was to maintain or shift the Balance of Power.

Balance of power is a state of order where military and economic power distributed among the nations to prevent any one country from becoming dominant.

Why balance of power was the central reason in the First World War:

- ❑ **Pre War Military Alliances:** The European countries were divided into two power blocks, i.e. the Triple Entente (Britain, France, Russia) and the Triple Alliance (Germany, Austria-Hungary, Italy) and both the blocks were trying to outpace each other in terms of Economic and military capabilities.
- ❑ Both the alliances were formed primarily to maintain a balance of power in the region and prevent any single nation from becoming too dominant.
- ❑ **Colonial Expansion:** To maintain a strong military, countries like Germany and Britain tried to expand their colonial base in regions like Africa and Asia. The competition for colonies was another aspect of the Balance of Power.
- ❑ **The Rise of Germany:** After the unification of Germany in 1871, its rapid industrialization and military power directly challenged the dominance of Britain and France.
- ❑ **Austria-Hungary and Russia in the Balkans:** The decline of the Ottoman Empire created a power vacuum in the Balkans so both Austria-Hungary and Russia tried to expand their influence which led to the conflict.

Apart from Balance of Power there were several factors that led to the First World War e.g. Nationalism and Ideological Conflicts, imperialism, arms race, domestic politics, economic rivalry. However, the balance of power though not exclusive but played a critical role in the conflict.

13) How far was the Industrial Revolution in England responsible for the decline of handicrafts and cottage industries in India? (Answer in 250 words) 15

The Industrial Revolution started in Britain in the mid 18th Century played a significant role in the economy of Britain especially in the Manufacturing sector. The Industrial Revolution had far-reaching impact not just in Britain but in its colonies too especially in India. Handicrafts and Cottage industries in India faced several challenges because of the cheap goods manufactured in Britain.

Factors contributing to the decline of handicrafts and cottage industries:

- **Mass production & Cheap industrial goods:** The technological advancement and rise of factories in Britain led to the mass production of textiles and other goods. The use of modern technologies also made the manufacturing process cost-efficient. On the other hand, Indian artisans and manufacturers were using traditional methods which made it impossible to compete with Britain.
- **Import of Goods and Colonial Trade Policies:** The discriminatory Trade policies of Britain which facilitated import from Britain while imposing high tariffs on Indian export to Britain. High Tariffs and taxation led to the decline of export of Indian manufactured products.
- **Supply of Raw Material:** The Discriminatory policies adopted by Britain facilitated more raw material export from India while manufactured goods from Britain flooded the Indian market. The policies turned India into a consumer of British Goods and supplies of raw material.
- **Destruction of Traditional Economies:** The cheap goods from Britain flooded the Indian market and Indian products were unable to compete with them both in price point or quality which led to Indian weavers, artisans, and craftsmen losing their livelihoods.

- Lack of invention in traditional manufacturing methods in India.
- Apart from its negative impact the Industrial revolution also had some positive effect on India i.e introduction of railways, new industries, introduction of western education in india.

Conclusion

The Industrial revolution had a profound impact on Britain Economy, it made Britain a global manufacturing power house but it severely impacted the traditional industries in its colonies especially in India. Competition from machine-made goods from Britain led to the decline handicrafts and cottage industries in India.

14) The groundwater potential of the gangetic valley is on a serious decline. How may it affect the food security of India? (Answer in 250 words) 15

Introduction

The total replenishable groundwater resources in the country are about 432 cubic km. Table 6.1 shows that the Ganga and the Brahmaputra basins, have about 46 per cent of the total replenishable groundwater resources.

Groundwater potential of the gangetic valley is on a serious decline

- The Ganga Basin's aquifers are one of the largest reservoirs of groundwater in the world.
- Groundwater storage levels have been declining by 2.6 centimetres per year in the Ganga basin, according to new estimates. The average storage decline in Uttar Pradesh, Bihar and West Bengal was estimated to be roughly 2cm year⁻¹, 1 cm year⁻¹ and 0.6 cm year⁻¹, respectively. The groundwater depletion rate resulted in a net loss of 450 km³ of the groundwater during 2002-2021.

How may it affect the food security of India

- **Crop intensity decline:** The trend may be a significant threat to India's food security as groundwater plays a pivotal role in North India's food production and the country's food security for more than one billion people. For instance, current cropping intensity could decline by 68% due to groundwater depletion.
- **Higher food price:** Groundwater depletion alone would lead to sharp declines in food production, especially of rice and wheat, in groundwater-dependent food production systems in north India, pushing up prices of rice by 7.4% and wheat by 6.7%.
- **Brings suffering for poor:** Higher food prices, in turn, would make food less affordable for the poor, increasing the number of people at risk of hunger by 24 million, particularly in low- and middle-income countries.
- **Hurdle in achieving Sustainable Goal 2 and SDG 6:** Arresting groundwater depletion without complementary actions would adversely impact food production and prices, showing the strong interconnections between Sustainable Development Goal (SDG) 2 (zero hunger) and SDG 6 (water and sanitation).

Conclusion

The growing dependence on groundwater development for agricultural production has put food and water security at risk: Overexploitation of groundwater resources has led to large-scale depletion in key food producing countries, with potential systemic, cascading impacts for global food security and rural livelihoods.

15) What are aurora australia and aurora borealis? How are these triggered? (Answer in 250 words) 15

Auroras

- Auroras are essentially natural lights that appear as bright, swirling curtains in the night sky and can be seen in a range of colours, including blue, red, yellow, green, and orange. These lights primarily appear near the poles of both the northern and southern hemispheres all year round but sometimes they expand to lower latitudes (to know why, scroll down). In the north, the display is called the aurora borealis; in the south, it is known as the aurora australis.

Reason behind occurrence

- It is due to activity on the surface of the Sun. The star continuously releases a stream of charged particles, mainly electrons and protons, and magnetic fields called the solar wind. As the solar wind approaches the Earth, it is deflected by the planet's magnetic field, which acts like a protective shield.
- However, some of the charged particles are trapped in the magnetic field and they travel down the magnetic field lines at the north and south poles into the upper atmosphere of the Earth.
- These particles then interact with different gases present there, resulting in tiny flashes that light up the night sky. When solar wind particles collide with oxygen, a green colour light is produced. Interaction with nitrogen produces shades of blue and purple.

Triggering factor

- Auroras expand to midlatitudes when the solar wind is extremely strong. This happens when the activity on the Sun's surface goes up, leading to solar flares and coronal mass ejections (CMEs), which are essentially extra bursts of energy in the solar wind. In such cases, the solar wind is so intense that it can result in a geomagnetic storm, also known as a magnetic storm — a temporary disturbance of the Earth's magnetic field. It is during a magnetic storm that auroras can be seen in the mid-latitudes.

Recent example

- One such geomagnetic storm was kicked off on recently in May 2024 after a CME hit the Earth. That's why auroras were visible in several parts of the world. The National Oceanic and Atmospheric Administration (NOAA) classified the storm as "extreme" and warned more CME could hit the planet in the following days.

16) What is a twister? Why are the majority of twisters observed in areas around the Gulf of Mexico? (Answer in 250 words) 15

Twisters

Twister and Tornado are different names for the same type of storm—a violently rotating column of air over land associated with a severe thunderstorm.

Formation of twisters

- **Initial stage:** Tornadoes only form when a thunderstorm has a particular combination of winds. Thunderstorms form when cold, dry air is pushed over warm, humid air. When that warm air rises through the colder air, it causes an updraft, or a change in wind direction.
- **Middle stage:** If winds from the thunderstorm vary greatly in speed or direction, the updraft will begin to rotate. As the rotating updraft draws in more warm air from the moving thunderstorm, its rotation speed increases, and a funnel cloud begins to form. As the twister gains strength, the funnel becomes longer. It's

most dangerous when it touches the ground. Winds within tornadoes can reach speeds of up to 300 miles per hour, with a damage path exceeding one mile wide and 50 miles long.

- **End stage:** The average tornado lasts only about 10 minutes, though some can rage for over an hour. Twisters usually die when they move over colder ground or when the clouds above it start to break up.
- **General distribution:** Tornadoes can occur anywhere in the world where thunderstorms form, but they are most common in the mid-latitudes (between 20 and 60 degrees north and south). In these regions, cold polar air masses often meet warm tropical air masses, creating the ideal conditions for severe thunderstorms and tornadoes.

The majority of twisters observed in areas around the Gulf of Mexico

- **Tornado Alley :** Although tornadoes have been spotted in every U.S. state, many form in a region called Tornado Alley. This zone in the Midwest extends from Texas to Ohio and includes Iowa, Kansas, South Dakota, Oklahoma, and Nebraska. These states are in the path of warm, moist air traveling from the Gulf of Mexico as well as cool air blowing from the Rocky Mountains. When the warm and cool airstreams meet, tornadoes are likely to form.
- **Occurrence frequency:** Tornadoes can form at any time of year, but most occur in the spring and summer months along with thunderstorms. May and June are usually the peak months for tornadoes.

Conclusion

Tornadoes occur all over the planet, but the United States (around Gulf Of Mexico) leads the world in the strength and number of storms: About a thousand twisters touch down every year. As part of larger U.S. storm systems, they cause about 80 deaths a year and close to \$1 billion in damage.

17) What is regional disparity? How does it differ from diversity? How serious is the issue of regional disparity in India?

18) Despite comprehensive policies for equity and social justice, underprivileged sections are not yet getting the full benefits of affirmative action envisaged by the Constitution. Comment. (Answer in 250 words) 15

19) Globalization has increased urban migration by skilled, young, unmarried women from various classes. How has this trend impacted upon their personal freedom and relationship with family? (Answer in 250 words) 15

20) Critically analyse the proposition that there is a high correlation between India's cultural diversities and socio-economic marginalities. (Answer in 250 words) 15

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