ANSWERS & EXPLANATIONS
GENERAL STUDIES (P) TEST – 4717 (2025)

Q 1.B

- The rectangular pattern of rural settlement is characterized by a grid-like layout where houses, farms, and other structures are arranged in a rectangular or square configuration.
- The settlement is organized in a systematic grid pattern, with streets and pathways running parallel and perpendicular to each other, creating rectangular blocks.
- Rectangular pattern is mainly found in the productive alluvial plains and wide inter montane valleys. Alluvial plains and wide intermontane valleys are typically flat, with fertile soils deposited by rivers. The rectangular pattern allows for easy division of this flat, productive land into uniform plots, which can be efficiently used for agriculture.
- **Hence option (b) is the correct answer.**
- **A T-shaped settlement is a rural settlement that develops at the junction of two roads that meet at a 90 degree angle. It is a modification of a linear settlement.**
- A radial settlement is a settlement pattern where houses are built along roads that spread out from a central point in all directions, giving the settlement a star-like appearance. Radial settlements are also known as star-shaped settlements.
- A linear settlement is a group of buildings or settlement that is formed in a long line or arc shape. Linear settlements are often found along transportation routes, like roads, rivers, or canals, or along natural features, like coastlines, mountains, hills, or valleys.

Q 2.B

- **Footloose Industries:**
  - Footloose industries refer to industries **that can be located in a wide variety of places** because they do not depend on specific raw materials, heavy infrastructure, or bulky resources. Unlike traditional industries such as steel, cement, or textiles, which are location-bound due to their need for proximity to raw materials, **footloose industries have flexibility in their placement**. These industries typically involve small components, modern technologies, and often produce high-value goods or services.
- **Features of Footloose Industries:**
  - **Flexibility in Location:**
    - Footloose industries are not tied to specific geographic locations. They do not rely on raw materials that are bulky or perishable, allowing them to choose sites based on other factors such as skilled labor availability or transportation infrastructure.
    - Industries such as **electronics manufacturing or IT services fall into this category** because they use components that can be sourced from multiple locations globally, giving them great flexibility. **Hence, Statement 1 is correct.**
  - **Production Scale and Labor Requirements:**
    - While traditional industries like automotive manufacturing or steel plants employ large labor forces and produce goods in vast quantities, footloose industries **usually have smaller production scales and are less labor-intensive.** They often rely on technology and skilled labor rather than large, unskilled workforces. **Hence, Statement 2 is not correct.**
  - **Environmental Impact:**
    - Many footloose industries, especially those in the technology or electronics sectors, **are known for their relatively low environmental impact.**
    - Unlike industries such as mining or heavy manufacturing that generate significant pollution, footloose industries tend to operate in non-polluting environments. Their environmental footprint is smaller, making them more sustainable. **Hence, Statement 3 is correct.**

Q 3.B

- **Gentrification in Urban Geography:**
  - Gentrification refers to the process by which older, often neglected urban neighborhoods are revitalized and transformed, usually by an influx of middle- and upper-class residents. **Hence option (b) is the correct answer.**
  - This transformation is typically **accompanied by rising property values and the development of new businesses, services, and infrastructure.** However, one of the major consequences of gentrification is that it can lead to the displacement of long-time, lower-income residents who can no longer afford the increasing rent and living costs.
- **Process of Gentrification:**
  - **Revitalization and Renovation:**
    - Gentrification usually begins with the renovation or restoration of buildings in aging or run-down areas of cities. New investment in these neighborhoods brings in amenities such as restaurants, cafes, and art galleries, making the area more attractive to higher-income residents.
  - **Socioeconomic Displacement:**
    - One of the most contentious aspects of gentrification is that it often results in the displacement of lower-income residents. As property values and rents increase, many original residents, particularly in minority and working-class communities, find it increasingly difficult to afford housing in their neighborhoods.
  - **Cultural and Demographic Shifts:**
    - As wealthier residents move in, the demographics of a gentrified neighborhood often change significantly. This shift may also bring changes in the types of businesses, schools, and cultural institutions present in the area. Long-standing community spaces might be replaced by new developments catering to the incoming demographic.
  - **Impact on Infrastructure and Services:**
    - Gentrified neighborhoods often see improvements in infrastructure, public services, and transportation, as well as new developments in housing and commercial space.

Q 4.D

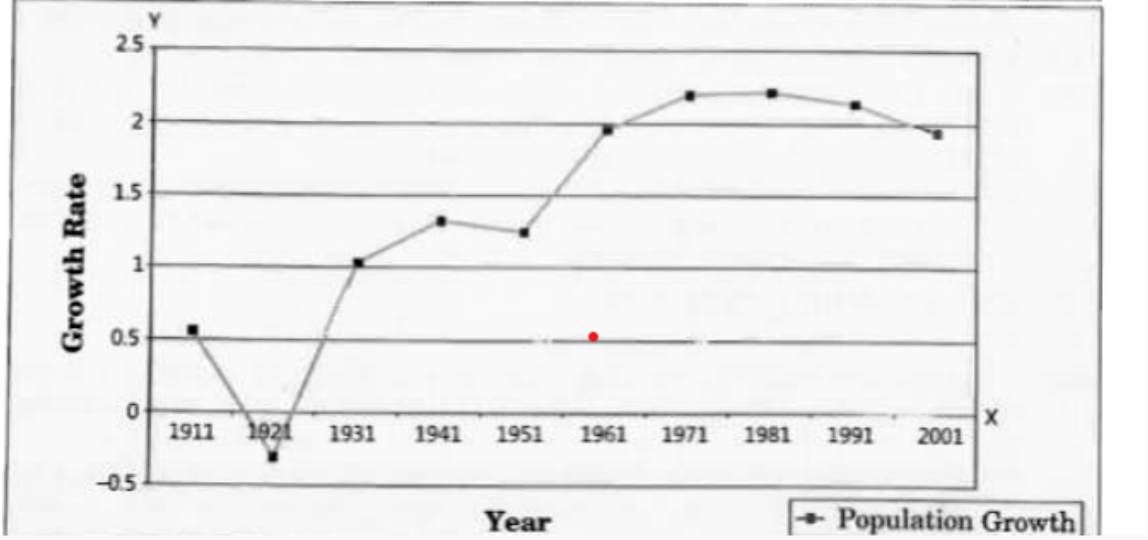
- The **world's leading solar power producer is China**, which produced 584 BU of solar power in 2024 – more than the next four countries combined (the United States, Japan, Germany, and India). In 2023, **India overtook Japan to become the world's third-highest solar power producer.** India generated 113 billion units (BU) of solar power in 2023 compared to Japan's 110 BU. **Hence pair 1 is correctly matched.**
- China has an installed capacity of 221 GW and is the leader in wind energy, with over a third of the world's capacity. It has the **world's largest onshore wind farm, The Gansu Wind Farm**, with 7,965 megawatts (MW) capacity. **Hence pair 2 is not correctly matched.**
- The **United States is the world's leading producer of geothermal energy,** with the highest installed geothermal power generation capacity. The United States also has the world's largest geothermal complex, **the Geysers,** with 22 plants. **Hence pair 3 is not correctly matched.**
- The world's largest tidal power plant is the **Sihwa Lake Tidal Power Station in South Korea**, at 254 megawatts of electricity generation capacity. The oldest and second-largest operating tidal power plant is in **La Rance, France**, with 240 MW of electricity generation capacity. **Hence pair 4 is correctly matched.**
- **Hence option (d) is the correct answer.**

Q 5.D

- **The decades 1921-1951 are referred to as the period of steady population growth.** An overall improvement in health and sanitation throughout the country brought down the mortality rate. **Hence statement 1 is not correct.**
- At the same time, a better transport and communication system improved the distribution system. The crude birth rate remained high in this period leading to higher growth rate than the previous phase. This is impressive at the backdrop of the Great Economic Depression, 1920s and World War II.
- **The period from 1901-1921 is referred to as a period of stagnant or stationary phase of growth of India's population, since in this period growth rate was very low, even recording a negative growth rate during 1911-1921**. **Hence statement 2 is not correct.**

- Both the birth rate and death rate were high keeping the rate of increase low . Poor health and medical services, illiteracy of people at large and inefficient distribution system of food and other basic necessities were largely responsible for a high birth and death rates in this period.
- **The decades 1951-1981 are referred to as the period of population explosion in India, which was caused by a rapid fall in the mortality rate but a high fertility rate of population in the country. Hence statement 3 is not correct.**
- In the post 1981 till present, the growth rate of the country's population though remained high, has started slowing down gradually. A downward trend of crude birth rate is held responsible for such a population growth. This was, in turn, affected by an increase in the mean age at marriage, improved quality of life particularly education of females in the country.

Year	1901	1911	1921	1931	1941	1951	1961	1971	1981	1991	2001
Growth rate (in %)	–	0.56	-0.30	1.04	1.33	1.25	1.96	2.20	2.22	2.14	1.93



Q 6.C

- **According to the Census of India, children aged 0 to 6 are not counted in literacy statistics.** The reasoning is that this age group typically has not yet had the opportunity to learn reading and writing skills. Literacy is only considered for individuals aged 7 and above. Therefore, for census purposes, they are categorized as illiterate, though it is more of a technical categorization rather than a judgment of their ability to read or write. **Hence statement 1 is correct.**
- **The Census of India defines a literate person as someone aged 7 years and above** who can both read and write with understanding in any language, not necessarily one from Schedule 8 of the Indian Constitution. **It could be any language, not limited to the 22 official languages listed in Schedule 8. Hence statement 2 is not correct.**
- **India's literacy rate has been consistently improving since the first census after independence in 1951.** The literacy rate was around 18.3% in 1951 and it has shown a steady rise in subsequent censuses, reaching around 74% in the 2011 census. Although the rate of increase has varied, the overall trend has been upward. **Hence statement 3 is correct.**

3.1 : Trend in Literacy Rates in Post Independent India

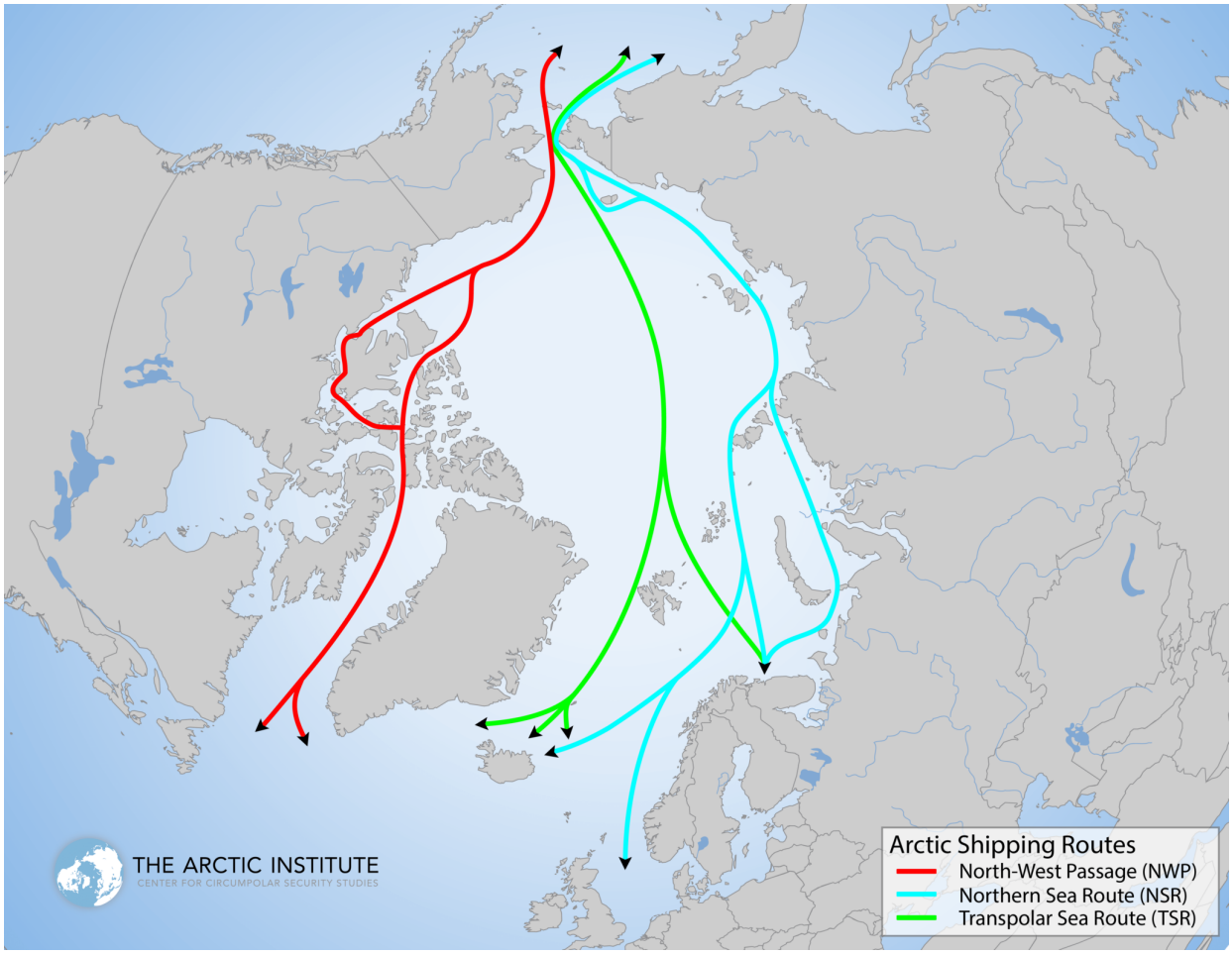
Year	Rural			Urban			Combined		
	Female	Male	Total	Female	Male	Total	Female	Male	Total
1951	4.87	19.02	12.1	22.33	45.6	34.59	8.86	27.15	18.32
1961	10.1	34.3	22.5	40.5	66	54.4	15.35	40.4	28.31
1971	15.5	48.6	27.9	48.8	69.8	60.2	21.97	45.96	34.45
1981	21.7	49.6	36	56.3	76.7	67.2	29.76	56.38	43.57
1991	30.17	56.96	36	64.05	81.09	67.2	39.29	64.13	52.21
2001	46.7	71.4	59.4	73.2	86.7	80.3	53.67	75.26	64.83
2011	57.93	77.15	66.77	79.11	88.76	84.11	64.63	80.88	72.98
% Increase in 2011 over 2001	**24%**	**8%**	**12%**	**8%**	**2%**	**5%**	**20%**	**7%**	**13%**

Q 7.A

- The coverage area of a satellite-based system is greater than that of a terrestrial-based wireless communication system. A GEO satellite with one single antenna can cover about 1/4th of the earth. **Hence statement I is correct.**
- The promise of satellite Internet lies in its boundless reach. A few satellites can knit together a global blanket of coverage, extending a digital hand to the most isolated corners of the Earth. The terrestrial Internet cannot reach where cables have not been sown, leaving the distant and dispersed populations digitally unconnected. **Hence statement II is correct and is a correct explanation of statement I.**
- **Hence option (a) is the correct answer.**

Q 8.C

- The **Northern Sea Route (NSR)**, or the **Northeast Passage (NEP)**, connects the eastern and western parts of the **Arctic Ocean**. While the **Suez Canal** route between Europe and Asia has a distance of 21,000 kilometers, the NSR has a distance of 13,000 kilometers, reducing the to and fro sailing time from one month to less than two weeks between Europe and Asia. The commercial use of the Northern Sea Route, ultimately made possible by the further **melting of the Arctic ice cap**, will represent a major development for the international shipping industry. The NSR represents a reduction of about one-third of the average shipping distance and days of transportation with respect to the currently used Southern Sea Route. Roughly 8% of World trade is transported through the Suez Canal, and it is estimated that two-thirds of this volume will be re-routed over the shorter Arctic route. **Hence statement 1 is correct.**



- The **English Channel is the busiest ocean shipping lane in the world.** More than 500 vessels go through it daily to get from the North Sea to the Atlantic and from the United Kingdom to continental Europe – and vice versa. Every year, more than 16 million people and 5 million trucks pass through the Channel's roughly 170 ports and harbors. Major ports include **Portsmouth**, **Le Havre**, **Cherbourg** and **Brest**. **Hence statement 2 is correct.**

Q 9.C

- Deltas are wetlands that form as rivers empty their water and sediment into another body of water, such as an ocean, lake, or another river. Although very uncommon, deltas can also empty into land.
- A bird-foot delta has few, widely spaced distributaries, making it look like a bird's foot. The Mississippi River forms a bird-foot delta as it empties into the Gulf of Mexico. **Hence pair 1 is correctly matched.**
- The term delta comes from the upper-case Greek letter delta (Δ), which is shaped like a triangle. Deltas with this triangular or fan shape are called arcuate (arc-like) deltas. The Nile River forms an arcuate delta as it empties into the Mediterranean Sea. Other examples include Ganges and Mekong. **Hence pair 2 is not correctly matched.**
- Amazon, Ob and Vistula have their deltas partly submerged in coastal waters hence form estuarine delta. **Hence pair 3 is correctly matched.**
- Stronger waves form a **cuspate delta**, which is more pointed than the arcuate delta, and is tooth-shaped. The Tiber River forms a cuspate delta as it empties into the Tyrrhenian Sea near Rome, Italy.

Q 10.D

- **Offshore wind is a renewable energy source that offers several advantages over onshore wind and solar projects**, such as **higher adequacy & reliability**, **lower storage requirement**, and **higher employment potential.** The development of the offshore wind sector will lead to economic benefits by attracting investments, developing indigenous manufacturing capabilities, creating employment opportunities across the value chain, and developing technology for offshore wind in the country. **Hence statement 1 is not correct.**
- The Union Cabinet in June 2024 approved the **Viability Gap Funding (VGF) scheme** for offshore wind energy projects at a total outlay of Rs.7453 crore, including an outlay of Rs.6853 crore for installation and commissioning of **1 GW of offshore wind energy projects,500 MW each off the coast of Gujarat and**

Tamil Nadu. The VGF scheme is a major step towards implementing the National Offshore Wind Energy Policy notified in 2015 to exploit the vast offshore wind energy potential within India's exclusive economic zone. **Hence statement 2 is not correct.**

- Wind is an intermittent and site-specific energy resource; therefore, an extensive Wind Resource Assessment is essential for selecting potential sites. Through the National Institute of Wind Energy (NIWE), the government has installed over 900 wind-monitoring stations nationwide and issued wind potential maps at 50m, 80m, 100m, 120m, and 150m above ground level. The findings of the study are as follows

Sl. No	State	Wind Potential at 120 m (GW)	Wind Potential at 150 m (GW)
1	Andhra Pradesh	74.90	123.3
2	Gujarat	142.56	180.8
3	Karnataka	124.15	169.3
4	Madhya Pradesh	15.40	55.4
5	Maharashtra	98.21	173.9
6	Rajasthan	127.75	284.2
7	Tamil Nadu	68.75	95.1
8	Telangana	24.83	54.7
	Total 8 windy states	**676.55**	**1136.7**

- **Hence statement 3 is not correct.**

Q 11.D

- Madurai, is a city in south-central Tamil Nadu state. The ancient history of the region is associated with the Pandya kings, and Madurai was the site of the Pandya capital (4th–11th century CE). Later it was conquered by Chola, Vijayanagar, Muslim, Maratha, and British rulers. It is located on the Vaigai River, about 30 miles (48 km) southeast of Dindigul.
- The Phalgu or Falgu, a river that flows past Gaya, India in the Indian state of Bihar, is a sacred river for Hindus and Buddhists. Lord Vishnu's Temple Vishnupad Mandir is situated on the bank of Phalgu river also called Niranjana river.
- Sabarmati is one of the major rivers in the western region of India. It is a monsoon-fed river that originates in the Aravalli hills of Rajasthan and has basin areas in Rajasthan and Gujarat. The river after traversing a distance of 400km meets the Gulf of Cambay. **Gandhinagar, the capital of Gujarat state and Ahmedabad are located on the banks of this river.**
- **Hyderabad stands on the banks of the Musi River,** which divides the historic Old City from the new city. The Musi River flows into Himayat Sagar and Osman Sagar, which are artificial lakes that act as reservoirs that once supplied the twin cities of Hyderabad and Secunderabad with drinking water. **Hence option (d) is the correct answer.**

Q 12.C

- A census town in India is an area that meets specific criteria but is not officially classified as a municipality or urban area by the government. It retains a rural administrative setup, such as a village panchayat, but functions as an urban area due to certain characteristics.
- **The census of India uses the three criteria to define a census town**. These are -
  - **Population size**: the area must have a population of at least 5000 people.
  - **Population density**: the area must have a population density of at least 400 persons per square kilometre.
  - **Major economic activity: at least 75% of the male working population must be engaged in non-agricultural activity.**
- On the other hand, a statutory town is one with a municipality, corporation, cantonment board, or notified town area committee.
- As per the 2011 census, there are 3784 census towns as against 1362 in 2001. On the other hand, as per the 2011 census, there are 4041 statutory towns as against 3799 in 2001.
- **Hence option (c) is the correct answer.**

Q 13.B

- Limestone is an important mineral resource widely used in various industries, primarily in cement manufacturing, steel production, and construction.
  - The cement industry is the largest consumer of limestone, where it acts as the key raw material. India has vast reserves of limestone and is one of the world's leading producers.
- **The cement industry consumes around 75-80% of the total limestone produced in India. Limestone is used to manufacture clinker, which is then ground into cement. Without limestone, cement production would be impossible, making it the most critical input material in the industry. Hence statement 1 is correct.**
- **Rajasthan is the top producer of limestone in India, accounting for about 22% of the country's output.** Major cement industries are concentrated in this state due to its vast limestone reserves. Other significant limestone-producing states include Andhra Pradesh, Karnataka, and Gujarat, but Rajasthan leads in both quantity and quality of production. **Hence statement 2 is not correct.**
- **While India has large reserves of limestone and is a significant global producer, it still imports limestone, particularly high-grade limestone used in steel production and for other industrial purposes. Hence statement 3 is correct.**
  - This is because not all types of limestone deposits in India meet the specific quality requirements of some industries. Consequently, limestone imports are necessary to bridge this gap, especially for industries that require specific grades not available in domestic markets.
  - In the financial year 2023,the import volume of limestone into India amounted to over 29 million metric tons.

Q 14.D

- 20th Livestock Census (2019)
  - **Total livestock population: 536.76 million. Hence statement 1 is not correct.**
  - Total bovine population (Cattle, Buffalo, Mithun, Yak)303.76 million
  - Cattle population: 193.46 million
  - Exotic/Crossbred cattle: 51.36 million
  - Indigenous/Non-descript cattle 142.11 million
  - Buffalo population: 109.85 million
  - Milch animals (Cows and Buffalo): 125.75 million
  - Sheep population: 74.26 million
  - Goat population: 148.89 million
  - Pig population: 9.06 million
  - Mithun population: 3.9 lakh
  - Yak population: 58,000
  - Camel population: 2.5 lakhs
- **The contribution of livestock to the total GVA (at constant prices) in agriculture and allied sectors increased from 24.32 per cent in 2014-15 to 30.38 per cent in 2022-23. Hence statement 2 is not correct.**
  - In 2022-23, the livestock sector contributed 4.66 percent of the total GVA, significantly boosting the per capita availability of milk, eggs, and meat.
- **India is currently the fourth largest exporter of buffalo meat in the world. After peaking in 2014-15 with buffalo meat exports worth $4.8 billion, the exports dropped by 35% to $3.1 billion in FY23. Hence statement 3 is not correct.**
  - India's primary buffalo meat exports go to Southeast Asian countries, such as Malaysia and Vietnam, with Egypt also being a significant market. Egypt accounted for 16% of India's total buffalo meat exports in FY23 but is now facing a currency crisis, leading to reduced trade.

Q 15.B

- **Idukki Dam is located in the state of Kerala and is built across the Periyar River.** It is a double curvature arch dam, one of the highest in Asia, and plays a crucial role in hydroelectric power generation in Kerala. The dam creates a reservoir known as the Idukki Reservoir.
- **Ukai Dam is actually built on the Tapti River, not the Brahmaputra.** It is located in Gujarat and is the second largest reservoir in the state. The dam is primarily used for irrigation, flood control, and hydroelectric power generation. The Brahmaputra River, on the other hand, flows through northeastern India and has no connection to the Ukai Dam.
- **Mettur Dam is built across the Cauvery River in Tamil Nadu.** It is one of the oldest and largest dams in India, completed in 1934. The dam forms the Stanley Reservoir and is a key structure for irrigation in the Cauvery Delta region. It also helps in hydroelectric power generation and flood control.

- List of important dams in India along with their corresponding rivers
  - Bhakra Dam – Sutlej River (Himachal Pradesh)
  - Tehri Dam – Bhagirathi River (Uttarakhand)
  - Hirakud Dam – Mahanadi River (Odisha)
  - Sardar Sarovar Dam – Narmada River (Gujarat)
  - Nagarjuna Sagar Dam – Krishna River (Telangana/Andhra Pradesh)
  - Rihand Dam – Rihand River (a tributary of the Son River, Uttar Pradesh)
  - Srisailam Dam – Krishna River (Andhra Pradesh/Telangana)
  - Bhavanisagar Dam – Bhavani River (Tamil Nadu)
  - Indira Sagar Dam – Narmada River (Madhya Pradesh)
  - Tungabhadra Dam – Tungabhadra River (Karnataka)
  - Almatti Dam – Krishna River (Karnataka)
  - Koyna Dam – Koyna River (Maharashtra)
  - Krishnarajasagara (KRS) Dam – Cauvery River (Karnataka)
  - Rana Pratap Sagar Dam – Chambal River (Rajasthan)
- **Hence option (b) is the correct answer.**

Q 16.C

- **Rural Settlement Patterns in India:**
  - In rural India, settlement patterns vary based on geographical, cultural, and security factors. The type of settlement reflects the social, economic, and environmental needs of the community. One of the key factors influencing settlement patterns, especially in certain historical and geographical contexts, is defense and security from external threats, such as raids, thefts, and attacks.
- **Clustered settlements**, also known as nucleated or agglomerated settlements, **are characterized by a close grouping of houses and other buildings.** These types of settlements are common in areas that have historically faced external threats, such as invasions or raids. People choose to live closer together in order to protect themselves and their resources. This pattern is typically found in regions where communities need to maintain a strong defense and have better communal coordination.
  - **Features of Clustered Settlements:**
    - **Proximity for Security:**
      - In clustered settlements, houses and buildings are tightly packed together. This proximity offers a sense of security as the community can more easily defend itself from external threats like thefts, raids, or attacks. Historically, such settlements were found in regions prone to conflicts or threats from neighboring regions.
      - **Example:** Many parts of northern India, especially during the medieval era, saw clustered settlements as they offered safety from invaders.
    - **Communal Living:**
      - These settlements facilitate close-knit communities where people work, live, and share resources together. This arrangement also allows for collective defense mechanisms, where communities can quickly gather forces to protect their lands or livestock from external threats.
    - **Fertile Plains and River Valleys:**
      - Clustered settlements are often found in areas with fertile land, where agriculture is the primary occupation. People tend to live close together to have easier access to farmland and water sources while also ensuring collective defense.
    - **Defensive Advantages:**
      - The clustered nature of the settlement provides better surveillance and protection. Villagers can coordinate responses to external threats more efficiently and safeguard their common resources, such as crops and livestock.
- **Hence option (c) is the correct answer.**

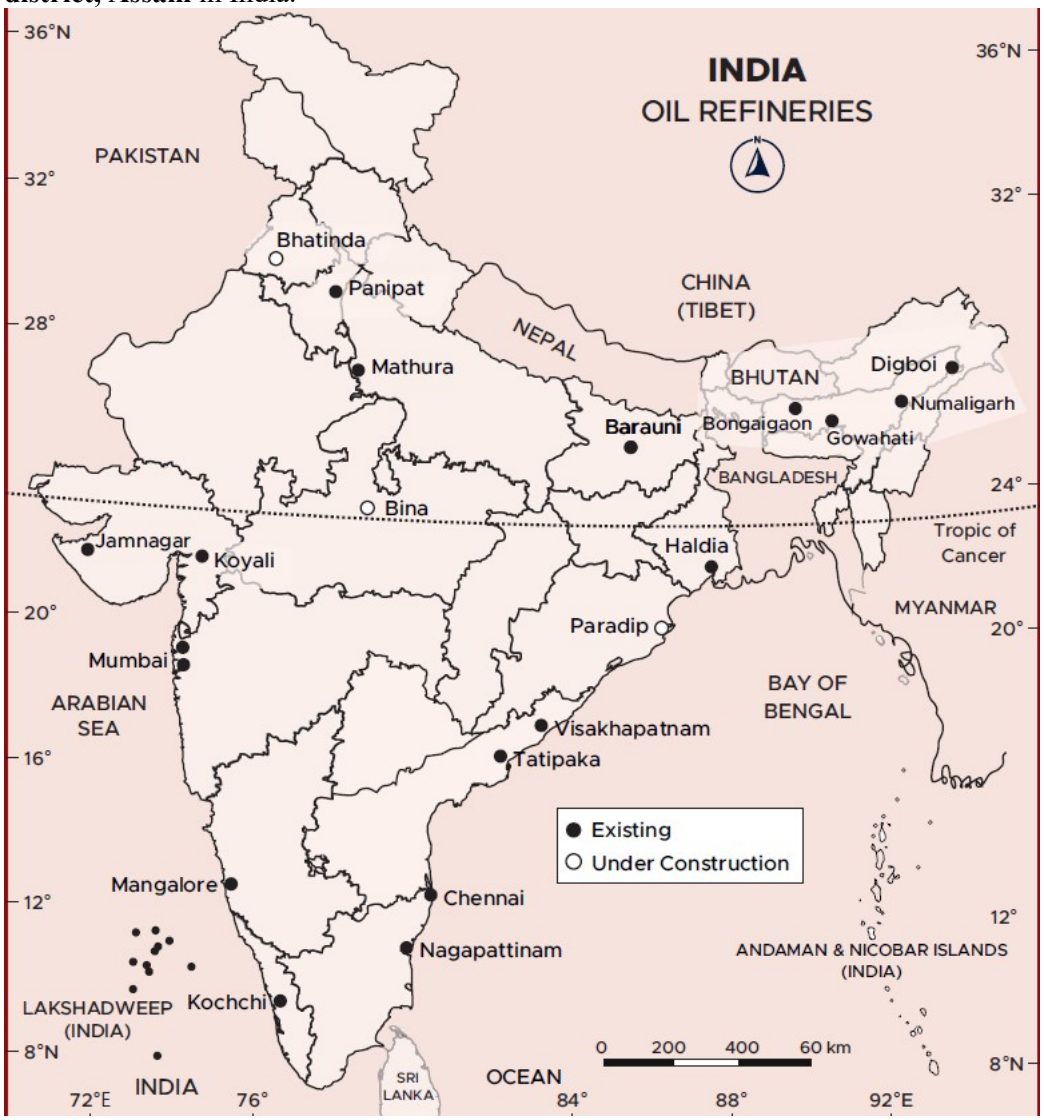
Q 17.D

- Population density refers to the number of people living per square kilometre of land area.
- The population density of India in 2011 was 382 people per square kilometre, with a decadal growth rate of 17.72%. There has been a steady increase of more than 200 persons per square kilometre over the last 50 years as the density of the population increased from 117 persons per square kilometre in 1951 to 382 persons per square kilometre in 2011.
- The National Capital area of Delhi had the highest population density in 2011 among all states and UTs, which was at 11297 people per square kilometre. The state of Arunachal Pradesh has the lowest population density with only 17 people per square kilometre.

- In the case of states, **Bihar was the most populated state with a population density of 1,106 persons per square kilometre, followed by West Bengal with 1028 people per square kilometre**, **Kerala with 859 people per square kilometre, Uttar Pradesh with 828 people per square kilometre,** Tamil Nadu with 555 people per square kilometre.
- States like Assam, Gujarat, Andhra Pradesh, Haryana, Jharkhand, and Odisha have moderate densities. The hill states of the Himalayan region and northeastern state of India excluding Assam have relatively low densities.
- **Hence option (d) is the correct answer.**

Q 18.B

- **Panipat Refinery** is technically one of the most advanced public sector refinery complexes of India. Commissioned in July, 1998, it is situated in the historic district of Panipat in the State of Haryana. Panipat Complex is the **largest integrated Refinery and Petrochemical hub in India** and third largest in South East Asia.
- The **Tatipaka Oil Refinery** is located in the **East Godavari district of Andhra Pradesh**, India. It was inaugurated on September 3, 2001. The Oil and Natural Gas Corporation (ONGC) set up the refinery and is its **first oil refinery to produce petro-products.**
- **Barauni Refinery** was dedicated to the nation in 1965. Established in 1964, it is on the Northern banks of the holy Ganges, at Barauni, on the periphery of the district town **Begusarai, Bihar**. Situated 125 km from Patna, it is also the point where two important railways meet – the Eastern Railways and North Eastern Railways. It was built in collaboration with the Soviet Union with limited participation from Romania, at a cost of ~Rs 49.4 Crore, and went on stream in 1964.
- **The Numaligarh Refinery** is a division of Oil India Limited which is under the ownership of the Ministry of Petroleum and Natural Gas, Government of India. It is located at **Numaligarh, Golaghat district, Assam** in India.



- **Hence option (b) is the correct answer.**

Q 19.A

- Dublin is the capital of Republic of Ireland. It serves as Ireland's political, cultural, and economic center.
- Tbilisi is the capital of Georgia. It lies on the banks of the Kura River with around 1.2 million inhabitants, which is about a third of the country's population.
    - Frankfurt is a major city in Germany but not the capital (Berlin is the capital).
    - New York City is a major city in the United States but not the capital (Washington, D.C. is the capital).
    - **Thus only options 2 and 3 are not capital cities. Hence option (a) is the correct answer.**

Q 20.B

- **Recent Context: The Ministry of Statistics and Programme Implementation (MoSPI) has released the "EnviStats India 2024: Environment Accounts" Report. Hence, option (b) is the correct answer.**
    - The EnviStats India 2024 Report, released by the MoSPI, is the 7th consecutive publication.
    - It compiles environmental-economic accounts based on the System of Environmental-Economic Accounting (SEEA) Framework.

Key highlights:

- **DetailsProtected Areas (SDG 13 & SDG 15)**- 72% increase in the number of Protected Areas (2000-2023), 16% increase in the area of Protected Areas, reflecting biodiversity conservation efforts.
- **Mangrove Cover (SDG 13 & SDG 15)-** 8% increase in mangrove cover (2013-2021), highlighting positive growth in coastal ecosystem protection.
- **According to EnviStats India-2024, Nagarjuna Sagar-Srisailam Tiger Reserve has been ranked first among tiger reserves for hosting largest leopard population.**

Nagarjuna Sagar Srisailam Tiger Reserve (NSTR)

- **Location:** Nallamala hill ranges (offshoot of the Eastern Ghats), Andhra Pradesh.
- **Constitutes of two wildlife sanctuaries** - Rajiv Gandhi WildlifeSanctuary and Gundla Brahmeswaram Wildlife Sanctuary.
- **Natural Vegetation**: Tropical Dry Deciduous Forest having an under growth of bamboo and grass.
- **Fauna:** Tiger, Leopard, Sloth Bear, Asiatic Wild dog, Jackal, Sambar, Wild Boar etc.
- **River Krishna** traverses through reserve.
- **Waterfalls**: Ethpothala Falls, Pedda Dukudu, Gundam,Chaleswaram.

Q 21.B

- India’s fisheries sector plays a vital role in the country’s economy, contributing significantly to food production, employment, and foreign exchange.
- India is the second-largest fish-producing country in the world, contributing approximately 8% to global fish production and contributing about 1.09% to the country’s Gross Value Added (GVA) and over 6.724% to the agricultural GVA
    - Inland aquaculture production increased from 61.36 lakh tons in 2013-14 to 131.33 lakh tons in 2022-23.
    - China has been the leading producer of fish for many years now, with a production of 67.8 million tonnes in 2021.
    - Indonesia is the second-largest producer of fish globally.
    - India is the third largest producer of fish globally.
- **74.7% of fish production was contributed by inland fisheries and the rest 24.3% was contributed by marine fisheries in FY 2022-2023. Hence statement 1 is correct.**
- **Seafood exports in India doubled between 2013-14 and 2023-24, increasing from Rs 30,213 crore to Rs 60,523.89 crore. Hence statement 2 is correct.**
- **Currently, the fish production in India is not more than 200 lakh tonnes.**
    - **Fish production in India reached 175.45 lakh tonnes in 2022-23, which is still below the 200 lakh tonnes mark. Hence statement 3 is not correct.**
- The government has launched several initiatives to promote sustainable and inclusive growth in the sector, such as the Pradhan Mantri Matsya Sampada Yojana (PMMSY), aimed at improving infrastructure, enhancing production, and supporting fish farmers.
    - The Fisheries and Aquaculture Infrastructure Development Fund (FIDF) provides concessional finance to develop fisheries infrastructure. Additionally, programs like Sagar Parikrama and the extension of the Kisan Credit Card (KCC) to fishers support fishermen's welfare.

Q 22.C

- Indian population is constituted of major races of the world. The ancestors of the majority of present population have migrated to India from surrounding territories across the Himalayas. All the races in India, over the past centuries, have got mixed up with one another due to intermarriages. As such, now there is no race in India which is completely pure.
- The present population of the Indian subcontinent can be divided into five racial groups- the Negritos, Western Brachycephals, the Proto-Australoids, the Mongoloids, and the Mediterraneans. The Negritos were the first of the racial groups that came to India.
- **The Proto-Australoid is also known as the Pre-Dravidian race.** Dr. Guha says that the tribal population of central India is fairly dominated by this racial element. **The Santhals, the Mundas, the Juangas, the Soaras, the Kondhs are some of the many tribes belonging to this racial type. Hence both statements 1 and 2 are correct.**
- **People of Mongoloid racial ancestry are mainly found in North-Eastern India.**
- The three races such as the Negrito, the Proto-Australoid and the Mongoloid constitute the tribal population. The other three, namely the Mediterranean, the Western Brachycephals and the Nordic races constitute the general population of India.

Q 23.A

- Panama Canal, a lock-type canal, owned and administered by the Republic of Panama, that connects the Atlantic and Pacific oceans through the narrow Isthmus of Panama. The length of the Panama Canal from shoreline to shoreline is about 40 miles (65 km) and from deep water in the Atlantic (more specifically, the Caribbean Sea) to deep water in the Pacific about 50 miles (82 km). The canal, which was completed in August 1914, is one of the two most strategic artificial waterways in the world, the other being the Suez Canal. **Hence statement 1 is correct.**
- Ships sailing between the east and west coasts of the United States, which otherwise would be obliged to round Cape Horn in South America, shorten their voyage by about 8,000 nautical miles (15,000 km) by using the canal. Savings of up to 3,500 nautical miles (6,500 km) are also made on voyages between one coast of North America and ports on the other side of South America. Ships sailing between Europe and East Asia or Australia can save as much as 2,000 nautical miles (3,700 km) by using the canal.
- While the Panama Canal is crucial for global trade, it is not the longest man-made waterway. The Suez Canal, which connects the Mediterranean Sea and the Red Sea, is longer (approximately 120 miles), whereas the Panama Canal is around 50 miles long. **Hence statement 2 is not correct.**
- The Suez Canal is not a lock-type canal. The Panama Canal utilizes locks to raise and lower the water level, allowing ships to transit between the Atlantic and Pacific Oceans without crossing the continental divide at the Panama Isthmus. Ships are raised when moving from the Pacific to the Atlantic and lowered when moving from the Atlantic to the Pacific. **Hence statement 3 is correct.**

Q 24.C

- The child sex ratio (CSR) measures the number of girls per 1000 boys in the 0-6 age group. **Between 2001 and 2011, the child sex ratio for scheduled tribe STs declined faster than the general population. The child sex ratio in STs fell from 973 in 2001 to 957 in 2011**, showing a decline of 16 points. Whereas, the **child sex ratio in the general population declined from 927 in 2001 to 919 in 2011,** a decline of 8 points. **Hence statement 1 is correct.**
- **The population growth rate of STs has been higher than that of the average general population between 2001 and 2011. Between 2001 and 2011, the growth rate of the general population of the country is 17.7%, whereas STs are growing at 23.7%.** Even in urban areas, the growth rate of STs is 49.7% whereas the general population grew by 31.7%. **Hence statement 2 is correct.**
- The Work Participation Rate (WPR) is the percentage of workers in the total population. The work participation rate of ST women is the highest in the country. As per Census 2011, the work participation rate of ST women is 43.5, whereas the national average for the general population is 25.5.
- However, the work participation rate of SCs and STs in rural areas is declining but increasing in urban areas.

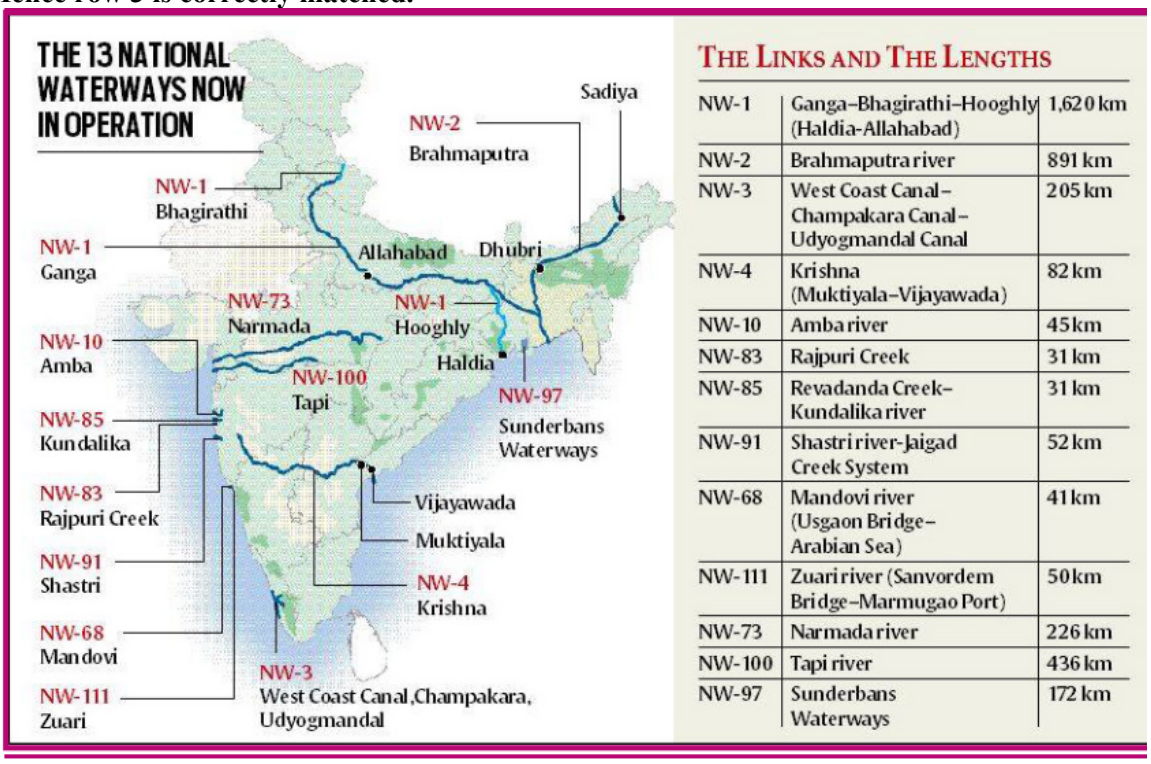
Q 25.B

- **Recent Context:** Indian National Trust for Art and Cultural Heritage (INTACH) has successfully traced the flow of the Sahibi river.
- **About Sahibi River**
  - Also called the Sabi River is an ephemeral, rain-fed river flowing through Rajasthan, Haryana & Delhi.

- It **originates in Rajasthan** and flows through Haryana and Delhi. **Hence, statement 1 is not correct.**
- It is a **tributary of the Yamuna River. Hence, statement 2 is correct.**
- The river course used to join the Yamuna via Najafgarh. Indian Archaeological Society (IAS) article suggests that the Sahibi is an older geological formation than the Najafgarh jheel.
- Origin: Eastern slopes of the Saiwar Protected Forest hills in Sikar (Rajasthan).
- Rigveda and Manusmriti mention its existence as the Drishadvati River.
- **Important wetlands and sanctuaries** along the current and paleochannels of the Sahibi River include Masani Barrage Wetland (Haryana), Khaparwas Wildlife Sanctuary, Bhindawas Wildlife Sanctuary (Haryana), Sultanpur National Park (Haryana), Basai Wetland (Haryana).
- Due to pollution and encroachment, the river's natural flow has been significantly reduced. It is now bracketed into various canals and nullahs and flows only when it rains heavily in the catchment areas.

Q 26.A

- **National Waterway 1 (NW1):**
  - **Associated River: Ganga (including Bhagirathi and Hooghly rivers).**
  - **Key Cities:** Varanasi, Kolkata, Haldia, and Patna.
  - **Significance:** NW1 is India's longest waterway, stretching over 1,620 km. It plays a major role in transporting goods such as coal, fertilizers, and cement between northern and eastern India.
  - **Ports:** Kolkata is one of the major ports and a key hub for international trade.
  - **Hence row 1 is not correctly matched.**
- **National Waterway 2 (NW2):**
  - **Associated River:** Brahmaputra
  - **Key Cities:** Dhubri, Sadiya, and Dibrugarh.
  - **Significance:** NW2 is 891 km long, facilitating cargo movement in the northeastern states of India. It enhances trade links with Bangladesh through the Indo-Bangladesh Protocol Route.
  - **Economic Importance:** This waterway plays a critical role in promoting trade and commerce in the Northeast region, primarily for transporting tea, jute, and coal.
  - Hence, the match is partially correct as Dhubri is part of NW2, but the associated river is incorrect. **Hence row 2 is not correctly matched.**
- **National Waterway 4 (NW4)**:
  - **Associated Rivers: Krishna, Godavari,** and canals from the Krishna-Godavari delta region.
  - **Key Cities:** Rajahmundry, Kakinada, Vijayawada.
  - **Significance:** This waterway is vital for the transportation of agricultural products and industrial goods, especially in the states of Andhra Pradesh and Telangana.
  - **Economic Importance:** NW4 is crucial for industries and inland navigation in southern India. It covers a network of rivers and canals over a length of 1,095 km.
  - **Hence row 3 is correctly matched.**



THE LINKS AND THE LENGTHS

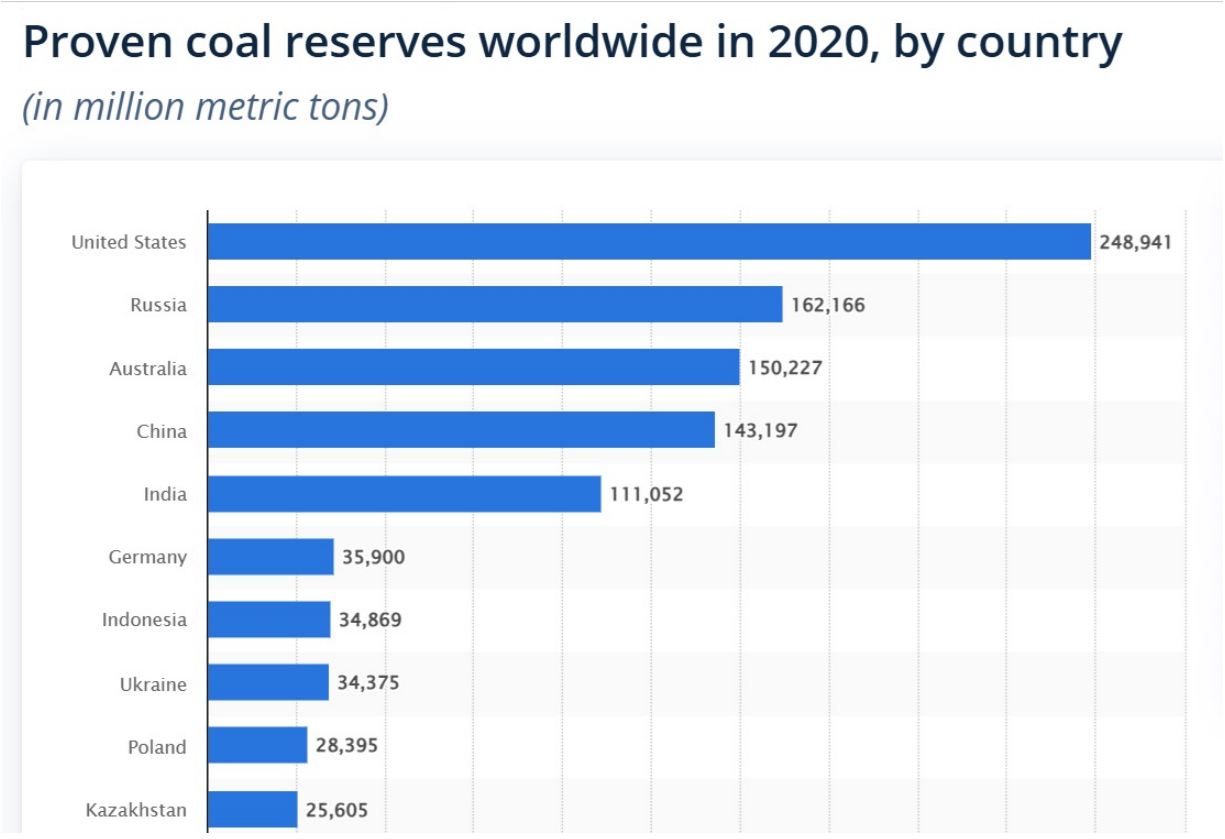
NW-1	Ganga–Bhagirathi–Hooghly (Haldia-Allahabad)	1,620 km
NW-2	Brahmaputra river	891 km
NW-3	West Coast Canal–Champakara Canal–Udyogmandal Canal	205 km
NW-4	Krishna (Muktiyala–Vijayawada)	82 km
NW-10	Amba river	45 km
NW-83	Rajpuri Creek	31 km
NW-85	Revadanda Creek–Kundalika river	31 km
NW-91	Shastri river-Jaigad Creek System	52 km
NW-68	Mandovi river (Usgaon Bridge–Arabian Sea)	41 km
NW-111	Zuari river (Sanvordem Bridge–Marmugao Port)	50 km
NW-73	Narmada river	226 km
NW-100	Tapi river	436 km
NW-97	Sunderbans Waterways	172 km

Q 27.B

- **Koya tribe is located in the hilly and forested regions of Andhra Pradesh, Odisha and Chhattisgarh. Hence pair 1 is correctly matched.**
  - Language: Mother tongue is Gondi (Dravidian language), also speak Odia and Telugu languages.
- **Changpa semi-nomadic tribal community is found in Ladakh.** They are known for rearing the goats that yield the rare Pashmina fibre or Cashmere wool. **Hence pair 2 is correctly matched.**
- The Shompen are an indigenous group of people who live on Great Nicobar Island in the Andaman and Nicobar Islands. They are hunter-gatherers who hunt wild game, forage for fruits and forest foods, and farm yams, roots, vegetables, and tobacco. **Hence pair 3 is not correctly matched.**
  - They are designated as a Particularly Vulnerable Tribal Group (PVTG).
- There are six main tribes in the Andaman Islands: the Great Andamanese, Onge, Jarawa, Sentinelese, Shompens, and Nicobarese.

Q 28.A

- The world's coal reserves are concentrated in a few countries, with North America and Asia Pacific accounting for 66.7% of the total. The distribution of coal reserves within these regions is uneven.
- As of December 31, 2021, estimates of the total world proved recoverable reserves of coal were about 1,161 billion short tons (or about 1.16 trillion short tons), and five countries had about 75% of the world's proven coal reserves. Proved coal reserves are quantities of coal that can be recovered from known deposits in the future under existing economic and operating conditions.
- The top five countries and their percentage share of world-proved coal reserves as of December 31, 2021, were:
  - United States: 22%
  - Russia: 15%
  - Australia: 14%
  - China: 14%
  - India: 11%



- **Hence option (a) is the correct answer.**

Q 29.D

- Particularly vulnerable Tribal Groups (PVTGs) are a special category of tribal groups identified by the government as being more vulnerable than other tribal communities.
- The Government of India, based on the recommendations of the Debar Commission, has established four main criteria to identify PVTGs –

- **Pre-agricultural Level of Technology** - This refers to the use of primitive tools for subsistence-level agricultural practice.
- **Stagnated or declining population** – PVTGs tend to have very low or negative population growth, which indicates their vulnerable demographic condition.
- **Extremely low literacy** – Low literacy level, particularly among adults, is a major criterion for identifying these groups.
- **Subsistence-level economy** - Many PVTGs practice a subsistence economy with limited market integration making them economically vulnerable.

- The Government of India has identified 52 PVTGs in 1975, which has increased to 75 in 1993.
- The GOI has launched 'The Scheme for Development of PVTGs' to adopt a holistic approach to the socio-economic development of PVTGs and gives state government flexibility in planning initiatives that are geared towards the specific socio-cultural imperatives of the specific group at hand.
- **Hence option (d) is the correct answer.**

Q 30.A

- **Recent Context**: Queen of the Gond kingdom of Garha-Katanga Rani Durgavati was remembered on her 500th Birth Anniversary (October 05).
- **About Rani Durgavati (1524 - 1564)**
  - She was a descendant of Chandela dynasty of Mahoba and **a contemporary to Mughal emperor Akbar. Hence, statement 1 is correct.**
  - **She married Dalpat Shah, the son of Gond King Sangram Shah, and ruled the kingdom of Garha-Katanga after the death of her husband in 1550 with great vigor and courage. Hence, statement 2 is not correct.**
  - Repulsed attack by Baz Bahadur, ruler of Malwa [mentioned in Tarikh-i-Firishta (Persian source)].
  - Was a patron of learning, and allowed Acharya Bitthalnath to establish a seat of Pushtimarg Cult at Garha.
  - Constructed reservoirs such as the Ranital, Cherital, and Adhartal.
  - Defended her kingdom to death against contemporary Mughul Subedar Abdul Mazid Khan.
  - **Her encounter with Mughals was documented by Abul Fazl,** Akbar's chronicler and other Persian writers.

Q 31.D

- Economic activities result in the production of goods and services while sectors are the group of economic activities classified on the basis of some criteria. They are broadly grouped into primary, secondary, tertiary and quaternary activities.
- Primary activities are directly dependent on environment as these refer to utilisation of earth's resources such as land, water, vegetation, building materials and minerals. It, thus includes, hunting and gathering, pastoral activities, fishing, forestry, agriculture, and mining and quarrying. People engaged in primary activities are called redcollar workers due to the outdoor nature of their work.
- Secondary activities add value to natural resources by transforming raw materials into valuable products. Secondary activities, therefore, are concerned with manufacturing, processing and construction (infrastructure) industries. People engaged in secondary activities are called blue collar workers. **Hence option (d) is the correct answer.**
- **Quinary Activities i**s the part of the economy where the top-level decisions are made. It focus on the creation, re-arrangement and interpretation of new and existing ideas; data interpretation and the use and evaluation of new technologies. **Profession under this category often referred as 'gold collar' professions, t**hey represent another subdivision of the tertiary sector representing special and highly paid skills of senior business executives, government officials, research scientists, financial and legal consultants, etc.
- Quaternary activities involve some of the following: the collection, production and dissemination of information or even the production of information. Quaternary activities centre around research, development and may be seen as an advanced form of services involving specialised knowledge and technical skills.

Q 32.C

- **Recent Context: National Space Panel Clears India's 5th Lunar Mission 'Lunar Polar Exploration Mission (LUPEX)**. LUPEX will be a precursor to the country's lunar sample return mission and for sending the first Indian to the moon by 2040.

- **About LUPEX Mission**
  - **Purpose:** It will **investigate the quantity and quality of water on the Moon** and is envisaged to **explore the dark side of the moon.**
    - > **Dark side of the moon refers to the 'Far side' of the moon as it is never visible from the Earth due to the 'Tidal Locking' of the Moon with the Earth. The Moon is tidally locked with Earth, which means that it spins on its axis exactly once each time it orbits our planet**.The Moon orbits Earth once every 27.3 days and spins on its axis once every 27.3 days. This means that although the Moon is rotating, it always keeps one face toward us. Because of this, people on Earth only ever see one side of the Moon. We call this motion synchronous rotation. **Hence, option (c) is the correct answer.**
  - **International collaboration project**: **ISRO** is in charge of the lunar rover and Japan's **JAXA** is responsible for the lander.
  - **Observation instruments from NASA and the ESA** will also be mounted on the rover.
  - **Landing Location:** Landing point will be the south pole of the moon as this area is believed to have a high-water potential.
    - > However, landing on the south pole is challenging as there are very few flat, easy landing sites with good illumination and communication conditions.
    - > The successful landing of the Vikram Lander, onboard Chandrayaan 3, made India the first country to land on its south pole and the 4th country to land on the Moon (after US, Russia and China).

Q 33.D

- **Recent Context:** Union Cabinet recently approved classical language status for five languages **Marathi, Pali, Prakrit, Assamese and Bengali were accorded Classical Language status.** The primary states involved are Maharashtra (Marathi), Bihar, Uttar Pradesh and Madhya Pradesh (Pali and Prakrit), West Bengal (Bengali), and Assam (Assamese).

- **About Classical Language**
  - Genesis: Created in 2004
  - Linguistic Experts Committee (LEC) was constituted in 2004, by the Ministry of Culture under the Sahitya Akademi to examine the eligibility of the languages proposed to be accorded classical language status.
  - Earlier 6 languages enjoy the 'Classical' status: Tamil (declared in 2004), Sanskrit (2005), Kannada (2008), Telugu (2008), Malayalam (2013), and Odia (2014).
- **Ministry of Culture has evolved the following criteria to determine the declaration of a language as a Classical language:**
  - High antiquity of a language's early texts/recorded history over a period of 1500-2000 years;
  - A body of ancient literature/texts, which is considered a valuable heritage by generations of speakers;
  - The literary tradition be original and not borrowed from another speech community;
  - The classical language and literature being distinct from modern, there may also be a discontinuity between the classical language and its later forms or its offshoots.
- **Hence option (d) is the correct answer.**

Q 34.B

- **Black Thunder Mine, in the Southern Powder River Basin of Wyoming, United States, is the largest coal mine** in the world in terms of production volume. It is about 54 miles south of Gillette, Wyoming, and is owned by Arch Coal Inc., a diversified coal company headquartered in St. Louis, Missouri. The greenfield mine—which means it is a new mine site in previously unexplored territory—produced an estimated 62.68 million tons (mt) of coal in 2023. Black Thunder Mine produces low-sulfur, sub-bituminous coal. This type of coal is often suitable for power station fuel and does not need much preparation except crushing. The mine was opened in 1977. In 2004, it became the first coal mine in the US to ship a cumulative 1,000Mst (907Mt). **Hence pair 1 is correctly matched.**
- **Kusmunda OC Mine is in central India's Chhattisgarh State, specifically in the south-central part of the Korba Coalfields.** Like Gevra OC Mine, Kusmunda is owned by South Eastern Coalfields Limited (SECL), a subsidiary of the state-run Coal India. Kusmunda produced an estimated 50 mt of coal in 2023, making it the second-largest coal mine in India. The mine produces bituminous coal, a medium-grade type and the world's most abundant form of coal. One of India's largest coal mines opened in 1979 and is expected to operate until 2036. **Hence pair 2 is not correctly matched.**

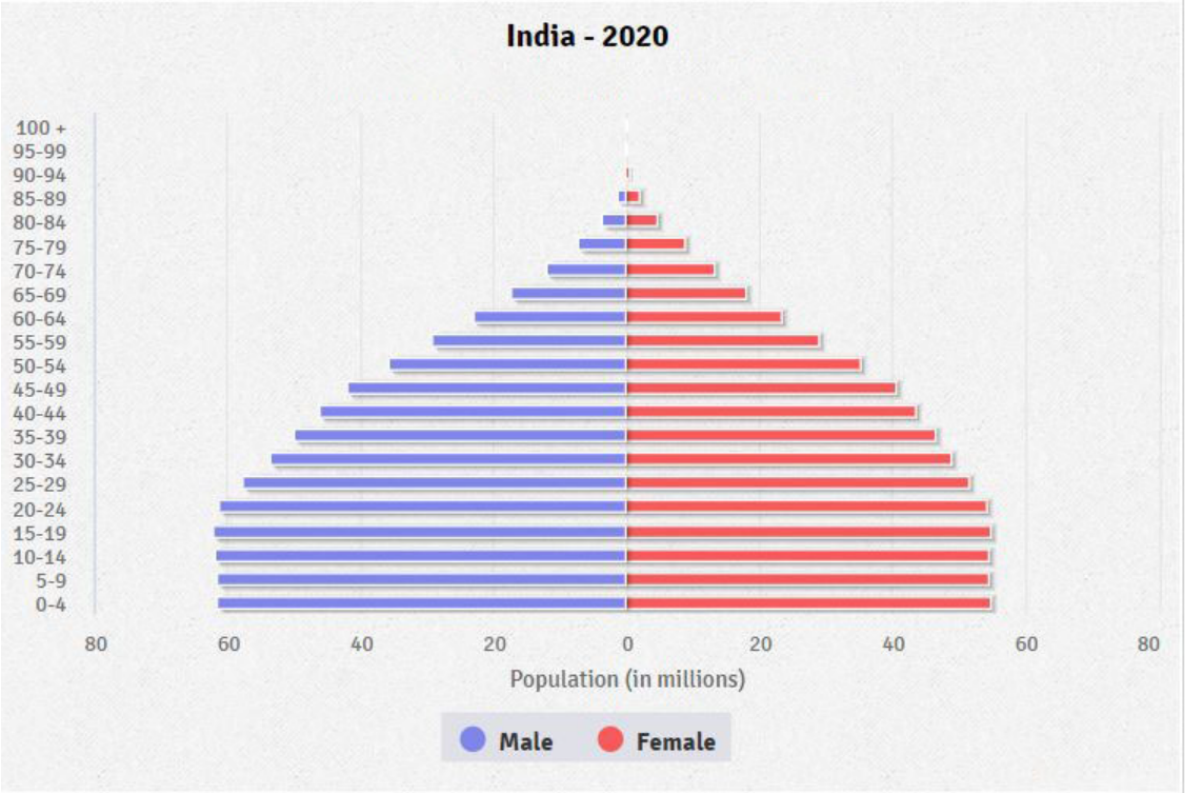
- **Gevra OC Mine is in the Korba district of central India's Chhattisgarh State.** This coal mine is owned by South Eastern Coalfields Limited (SECL), a subsidiary of the state-run Coal India. The latest data shows that Gevra OC Mine produces an estimated 60 million tonnes, making it India's largest coal mine. This part of India is known for Bituminous coal, a medium grade with high heating capacity. Spanning more than 6 miles in length, Gevra OC Mine was opened in 1981. In 2024, the mine was granted environmental clearance to expand production capacity to 70 million tons per annum. The mine is expected to operate until 2036. **Hence pair 3 is correctly matched.**

Q 35.A

- Minimum Support Price (MSP) is a form of market intervention by the Government of India to insure agricultural producers against any sharp fall in farm prices. The minimum support prices are announced by the Government of India at the beginning of the sowing season for certain crops on the basis of the recommendations of the Commission for Agricultural Costs and Prices (CACP).
- Kharif crops (also known as monsoon crops) are sown with the onset of the southwest monsoon in June and harvested at the end of the monsoon season in September or October. These crops typically require hot and humid climates, with plenty of water.
- Government announces minimum support prices (MSPs) for 22 mandated crops and fair and remunerative price (FRP) for sugarcane on the basis of recommendations of the Commission for Agricultural Costs & Prices (CACP), after considering the views of State Governments and Central Ministries/Departments concerned and other relevant factors.
    - **The mandated crops are 14 crops of the kharif season viz. paddy, jowar, bajra, maize, ragi, arhar, moong, urad, groundnut-in-shell, soyabean, sunflower, sesamum, niger seed and cotton.**
    - **6 rabi crops viz. wheat, barley, gram, masur(lentil), rapeseed/mustard and safflowe**r and two other commercial crops viz. jute and copra. In addition, the MSPs of toria and de-husked coconut are fixed on the basis of the MSPs of rapeseed/mustard and copra, respectively.
    - Thus MSP list includes more Kharif crops than Rabi crops,
- **Rabi crops are sown during the winter months, typically from October to December, and harvested in the spring season**, between March and April. Common Rabi crops include wheat, barley, mustard, and gram. **Hence statement 1 is correct.**
- **Castor is primarily grown as a Kharif crop in India but is also grown in Rabi season. Castor is not included under the Minimum Support Price (MSP) list in India** . Castor oil is a significant product derived from this crop, and its inclusion in the MSP helps ensure fair prices for farmers.
    - **Hence statement 2 is not correct.**

Q 36.A

- A population pyramid illustrates the age and sex structure of a country's population and may provide insights about political and social stability, as well as economic development.
- The population is distributed along the horizontal axis, with males shown on the left and females on the right. The male and female populations are broken down into 5-year age groups represented as horizontal bars along the vertical axis, with the youngest age groups at the bottom and the oldest at the top.
- The shape of the population pyramid gradually evolves over time based on fertility, mortality, and international migration trends. India's population pyramid is bottom heavy and tapered top. **Hence option (a) is the correct answer.**



Q 37.C

- Greenhouse gas emissions from heavy trucking have grown rapidly in recent times, and shifting more cargo onto IWT is identified as an alternative because **IWT emits up to six times fewer emissions than trucks** per ton-km. **Hence statement 1 is correct.**
- Inland Water Transport (IWT) is the most economical mode of transportation, especially for bulk cargo like coal, iron ore, cement, food grains, and fertilizer. It remains under-utilized at a **share of 2% in India's modal mix.** The government intends to increase the **share of IWT to 5% as per Maritime India Vision (MIV)-2030. Hence statement 2 is not correct.**
- **Arth Ganga** is based on the principles of the sustainable development model to energize economic activities, which will lead to inclusive growth and play a key role in improving the livelihoods of the population with the transportation of goods and passengers (including tourists) through **National Waterways No. 1 (River Ganga). Hence statement 3 is correct.**

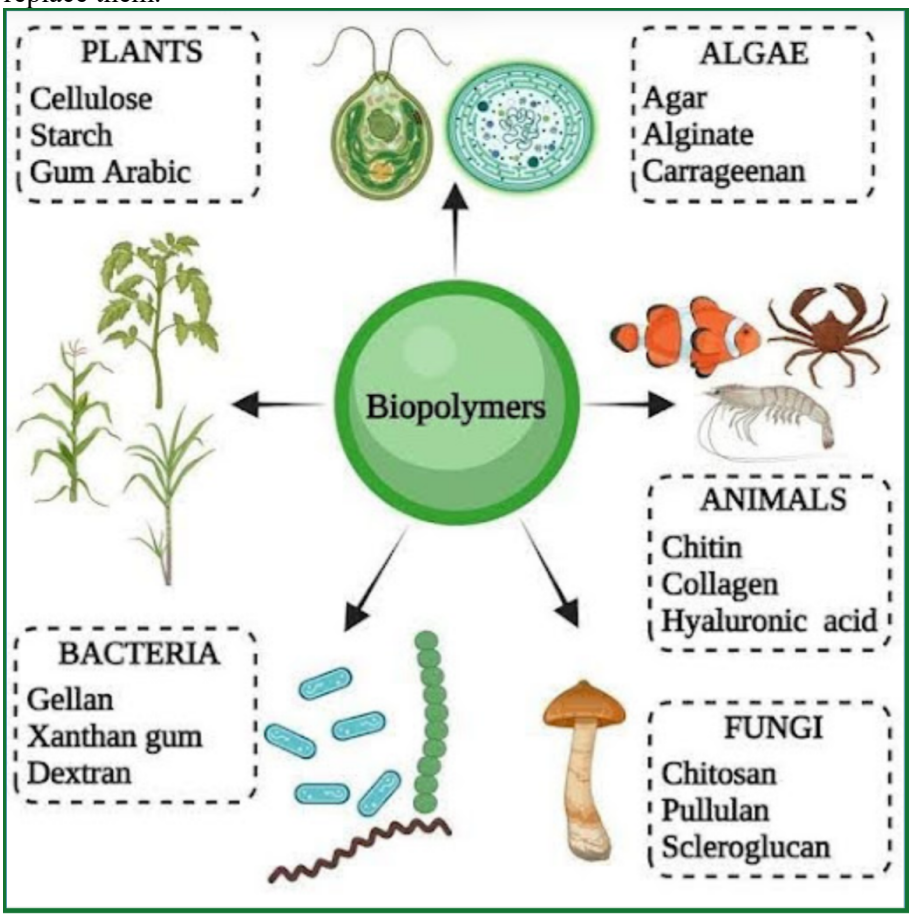
Q 38.A

- **As of 2022, India has 106 thermal power plants. 53 plants use coal, 24 use gas, 11 use oil, nine use mixed fuels, and two use renewable sources.**
- **The total installed capacity of all thermal power plants in India is 221,802.59 MW.**
- Namrup Thermal Power Station (NTPS) is a gas-based Power Station with a total installed capacity of 41 MW situated in the district of Dibrugarh, Assam. **Hence pair 1 is correctly matched.**
- Koradi Thermal Power Station (KTPS) is located at Koradi near Nagpur, Maharashtra. The power plant is one of the four major power plants in Vidarbha Maharashtra. **Hence pair 2 is not correctly matched.**
- Vanakbari Thermal Power Station is a coal-fired power station in Gujarat, India. It is located on the bank of Mahi river in Kheda district. **Hence pair 3 is not correctly matched.**
- Kothagudem Thermal Power Station is an 1800-megawatts (MW) Thermal power plant in Paloncha, Khammam, Telangana. **Hence pair 4 is not correctly matched.**

Q 39.C

- **Recent Context: The Union Minister inaugurated India's first Demonstration Facility for Biopolymers at Jejuri in Pune (Maharashtra).**
  - It is a pioneering effort in developing indigenously integrated technology for the **production of Polylactic Acid (PLA) bioplastic.**
- **About Biopolymer**
  - **Biopolymers are materials that have been manufactured from biological sources like fats, vegetable oils, sugars, etc. Hence, option (c) is the correct answer.**

- **Advantages over Synthetic Polymer**
  - **Biodegradation**: Decomposition is easily done by bacteria in soil environment.
  - **Carbon neutrality:** CO2 released when biopolymers degrade can be reabsorbed by crops grown to replace them.



Q 40.C

- As of the latest available data, here is the list of the countries you mentioned in decreasing order of population:
  - Thailand (~71 million)
  - Japan (~125 million)
  - Kazakhstan (~19 million)
  - South Korea (~52 million)
- So, the correct order is: Japan > Thailand > South Korea > Kazakhstan. **Hence option (c) is the correct answer.**

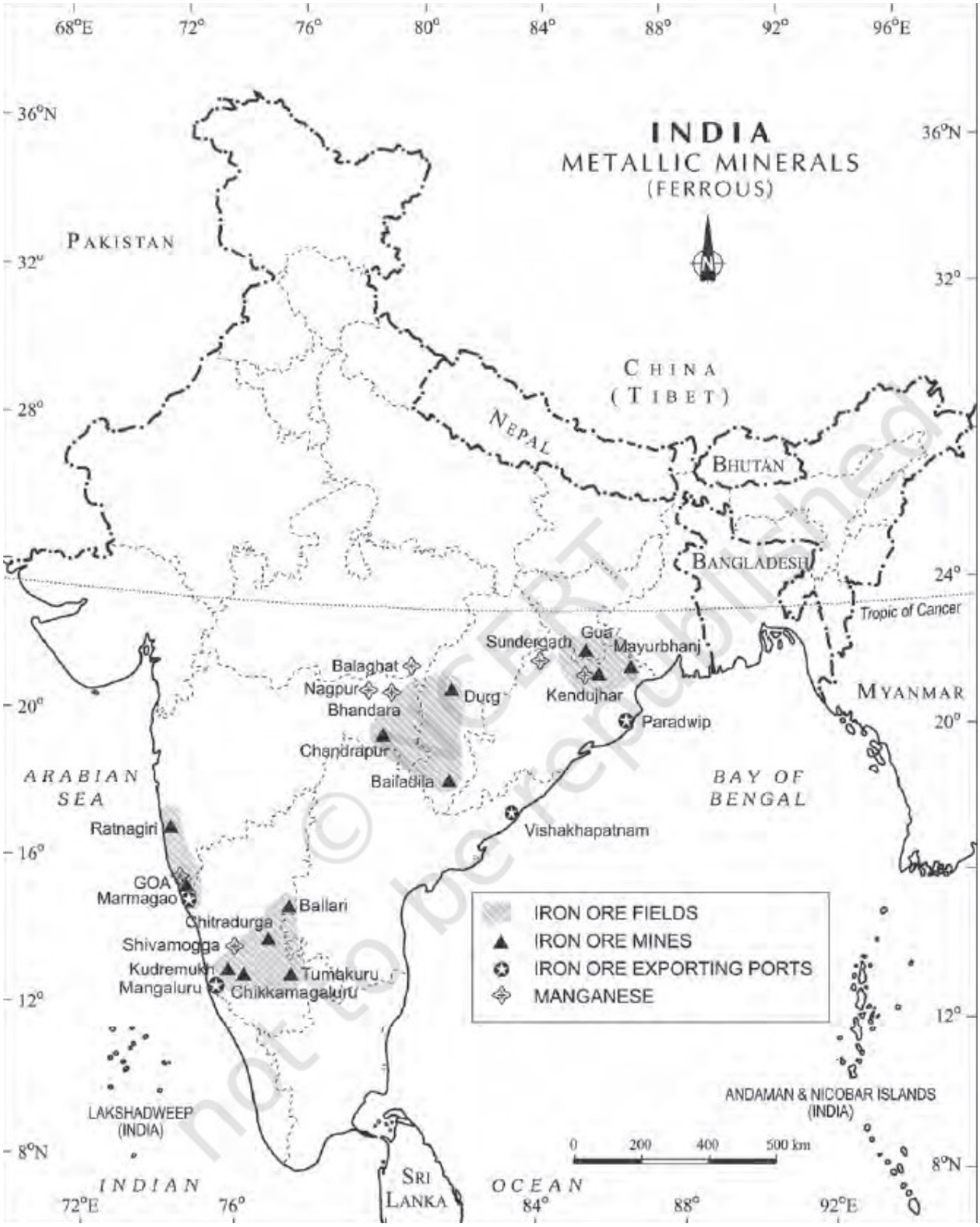
Q 41.C

- Ukraine is a key potential supplier of **rare earth metals**, including titanium, lithium, beryllium, manganese, gallium, uranium, zirconium, graphite, apatite, fluorite, and nickel. **Ukraine holds the largest titanium reserves in Europe (7% of the world's reserves).** It is one of the few countries that mine titanium ores, crucial for the aerospace, medical, automotive, and marine industries. **Hence statement 1 is correct.**
- **Spodumene is a lithium-rich mineral** that's a key source of lithium for commercial use. Over the past two decades, however, the Ukrainian Geological Survey has conducted scientific and strategic research, identifying several areas with lithium minerals, such as spodumene, with very high potential. According to the researcher, **Ukraine and Serbia probably have the greatest potential for extracting lithium in Europe. Hence, statement 2 is not correct.**
- Ukraine has the sixth largest coal reserves in the world, with Ninety percent of Ukraine's coal believed to be in the **Donets coal basin — the Donbas.** Coal mines in the Donets Basin are among the **gasiest in the world** and thus also have a high potential for **coal bed methane. Hence statement 3 is correct.**

- **Hence option (c) is the correct answer.**

Q 42.C

- Kudremukh is the name of a mountain range and an individual mountain peak located in **Chikmagalur district, in Karnataka**, India. The Kudremukha township developed primarily as an iron ore mining town where the government ran Kudremukha Iron Ore Company Ltd. (KIOCL).
- **Tumkur district** is an administrative district that occupies an area in the state of **Karnataka** in India. A range of hills rising to nearly 4,000 feet (1,200 m) crosses it from north to south, forming the **watershed between the systems of the Krishna and the Kaveri**. The principal streams are the Jayamangala and the Shimsha. Iron Ore, Manganese, and Granite are the Chief major mineral resources along with huge building stone deposits found in the Tumkur District.
- **Ratnagiri**, **a port town in the Konkan division of Maharashtra,** has iron ore mines and other mineral occurrences.
- **Bailadila mining area** is India's first enormous open-cast iron ore mine located in **Dantewada District, Chhattisgarh State**. Hematite ore of Bailadila is exported from Visakhapatnam port to Japan and South Korea.
- The **Mayurbhanj district in Odisha** has a rich mineral base and is home to the Similipal Biosphere. Iron-ore (hematite), vanadiferous and titaniferous magnetic, china clay, galena (lead ore), Kyanite, asbestos, steatite (soapstone), and quartzite constitute the principal mineral resources of the Mayurbhanj district.



- **Hence option (c) is the correct answer.**

Q 43.C

- **Recent Context: First rocky planet has been spotted orbiting a burned-out star called a white dwarf.**
- When a star with a mass less than eight times that of the Sun exhausts the hydrogen in its core, it begins to collapse due to the lack of fusion energy to counteract gravity. However, the collapse increases temperature and pressure, igniting helium fusion into carbon. Meanwhile, hydrogen fusion shifts to the outer layers, causing the star to expand and form a red giant.
- **After a red giant has shed all its atmosphere and exhausted its nuclear fuel, only the core remains. Scientists call this kind of stellar remnant a white dwarf.** A white dwarf is usually Earth-size but

hundreds of thousands of times more massive. A teaspoon of its material would weigh more than a pickup truck. **Hence, statement 1 is correct.**

- **Chandrasekhar limit (1.44 times mass of Sun) is maximum mass theoretically possible for a stable white dwarf star. Hence, statement 2 is correct.**
- A white dwarf produces no new heat of its own, so it gradually cools over billions of years.
- Despite the name, white dwarfs can emit visible light that ranges from blue white to red.

Q 44.A

- **Wet equatorial climate, also known as tropical rainforest climate is predominantly found near the equator, typically between latitudes 5° N and 5° S. Major regions include the Amazon Basin in South America, the Congo Basin in Africa, and parts of Southeast Asia.**
- There is little seasonal temperature variation, with daily temperatures remaining relatively stable throughout the year. Rainfall is evenly distributed throughout the year, with no distinct dry season. This climate is known for its high biodiversity, housing numerous species of flora and fauna, many of which are endemic to these regions.
- The equatorial regions are generally sparsely populated with shifting cultivation as a major agricultural practice. **Major Tribes in this climate include Indian tribes of the Amazon basin, Pygmies of the Congo basin, and Orang Asli of Malaysia.**
  - **Pygmy peoples traditionally subsist as foragers and hunter-gatherers, relying on the resources available in their forest environments.**
  - **They are predominantly located in the Congo Basin**, which includes various ethnic groups such as the Mbuti, Aka, and Baka.
  - Short Stature: **The average height of adult males in these communities is typically less than 150 cm** (about 4 feet 11 inches).
- **Savanna or Sudan is a transitional type of climate** found between equatorial forest and trade wind hot desert. It is confined within tropics and best developed in Sudan. Due to abundance of wild animals, it is also known as the big game country known worldwide for hunting. **Main tribes include pastoralists, such as the Masai, and others as settled cultivators, such as the Hausa of northern Nigeria.**
- **Hence option (a) is the correct answer.**

Q 45.B

- **The total Foodgrain production in the country during 2023-24 is estimated at record 332 million tonnes. Hence statement 1 is correct.**
  - Rice: 137.83 million tonnes
  - Wheat: 113.29 million tonnes
  - Nutri / Coarse Cereals: 56.94 million tonnes
  - Maize: 37.67 million tonnes
  - Total Pulses: 24.25 million tonnes
  - Shree Anna: 17.57 million tonnes
  - Tur: 3.42 million tonnes
  - Gram: 11.04 million tonnes
  - Total Oilseeds: 39.67 million tonnes
  - Groundnut: 10.18 million tonnes
  - Soybean: 13.06 million tonnes
  - Rapeseed & Mustard: 13.26 million tonnes
  - Sugarcane: 453.16 million tonnes.
- Uttar Pradesh is the largest producer of sugarcane in India.
- **Uttar Pradesh is the largest producer of potatoes in India. Hence statement 2 is not correct.**

State	Production
Uttar Pradesh	15,892.00
West Bengal	12,600.00
Bihar	9,125.80
Gujarat	3,780.00
Madhya Pradesh	3,582.00

- The production of Pulses has increased at compound annual growth rates (CAGR) of 5 percent (Tur-9%, Gram-11 %, Mung-12%, Urd-6% and Lentil-4%) respectively, during the last six years from 2015-16 to 2021-22. It impacts the livelihood of over 5 crore farmers and their dependents. **India is the largest consumer and producer of Pulses globally, sharing 36% in area and 26% in production. Hence statement 3 is correct.**

Q 46.B

- India is a resource-rich country with a variety of minerals that are critical to its industries and infrastructure.
- **Odisha is the largest producer of chromite in India**. It contributes over 90% of the country's chromite production. The major chromite mines are located in the Sukinda Valley of Odisha, which has one of the largest deposits of chromite in the world. **Hence statement 1 is correct**.
  - Chromite is a key mineral used in the production of ferroalloys, which are essential for the stainless steel industry. It is also used in the manufacturing of refractory materials.
- **Karnataka has historically been the largest producer of gold in India.** The famous Kolar Gold Fields (now closed) and Hutti Gold Mines in Karnataka have been significant contributors to India's gold output. **Hence statement 2 is correct.**
  - The Hutti Gold Mine, which is operational, continues to be the largest in India, producing a substantial portion of the country's gold.
- Rajasthan is an important copper-producing state, and the Khetri Copper Complex located here is one of the largest copper-producing facilities in India.
- **However, Madhya Pradesh holds the title of the largest copper producer in India**. The Malanjkhand Copper Mine in Madhya Pradesh is the largest open-pit copper mine in India and accounts for a significant portion of the country's copper production. Madhya Pradesh contributed 56.83% and Rajasthan 43.17% in total output. **Hence statement 3 is not correct.**

Q 47.B

- Recently, a 75-year-old man from Kerala's capital Thiruvananthapuram was recently diagnosed with Murine Typhus after travelling to Vietnam and Cambodia.
- **Murine Typhus** (a rare disease) is a flea-borne bacterial disease caused by Rickettsia typhi, transmitted through infected flea bites, primarily from rodents and not contagious between humans. **Hence, statement 1 is not correct; statement 2 is correct and statement 3 is not correct.**
- **Definition of Rare Disease:** According to the World Health Organization (WHO), rare diseases are debilitating, lifelong conditions that affect 1 or fewer individuals in 1,000.
  - **Conditions Recognized as Rare Diseases in India**: Approximately 55 conditions, including Gaucher's disease, Lysosomal Storage Disorders (LSDs), and certain muscular dystrophies, are classified as rare diseases.
  - **National Registry:** The Indian Council of Medical Research (ICMR) manages the National Registry for Rare and Other Inherited Disorders (NRROID), which has documented 14,472 patients with rare diseases.

Q 48.C

- **The 29th COP** to the United Nations Framework Convention on Climate Change **(UNFCCC)** will begin on November 11, 2024, in **Baku, the capital of Azerbaijan.**As global leaders gather near the Caspian Sea, the surrounding region of the South Caucasus faces significant climate challenges.
- **Key Areas at Risk:**
  - **Regional/transboundary areas:** Northern Armenia and southern Georgia North-west Azerbaijan and north-east Georgia (Alazani/Ganykh river basin)
  - **Within countries:**
    - Yerevan and Ararat Valley (Armenia)
    - Lake Sevan (Armenia)
    - Kura-Ara(k)s lowlands (Azerbaijan)
    - Baku and Absheron peninsula (Azerbaijan)
    - Adjara and the Black Sea coast (Georgia)
    - Tbilisi, Mtskheta-Mtianeti, and Kakheti regions (Georgia).
- The Caspian Sea is surrounded by five countries of central and west Asia.
  - **Russia**

- **Azerbaijan**
- **Iran**
- **Turkmenistan**
- **Kazakhstan**

Q 49.C

- India is endowed with fairly abundant resources of iron ore. It has the largest reserve of iron ore in Asia. The total reserves of iron ore in the country were about 20 billion tonnes in the year 2004- 05. About 95 per cent of total reserves of iron ore is located in the States of Odisha, Jharkhand, Chhattisgarh, Karnataka, Goa, Telangana, Andhra Pradesh and Tamil Nadu. In Odisha, iron ore occurs in a series of hill ranges in Sundergarh, Mayurbhanj and Jhar. The main types of ore found in our country are
  - **Hematite** iron ore is found in the Dharwad and Cuddapah rock systems of peninsular India. This iron ore is reddish in color and contains 70% of metallic content. 80% of the reserves of hematite ore are

found in Jharkhand, Chhattisgarh Orissa, and Andhra Pradesh, and in the western portion, it is found in Karnataka, Maharashtra, and Goa.
    - **Magnetite** iron ores is black in color and contain around 60 to 70% metallic content. They are also found in Dharwad and Cuddapah systems. This iron ore has a magnetic quality and is found in States like Andhra Pradesh, Rajasthan, Karnataka Tamil Nadu, and Kerala.
    - **Limonite** iron ore is yellowish in color and contains about 40 to 60% iron metal. This iron ore is found in the series in the Raniganj coalfield, Mirzapur in Uttar Pradesh, Garhwal in Uttarakhand, and Kangra valley of Himachal Pradesh.
    - **Siderite** iron ore is an inferior quality iron ore and contains less than 40% of iron. Siderite iron ore contains many impurities and its mining is not economically variable, but due to the presence of lime, it is self-fluxing.
    - **Bauxite is the ore which is used in manufacturing of aluminium.** Bauxite is found mainly in tertiary deposits and is associated with laterite rocks occurring extensively either on the plateau or hill ranges of peninsular India and also in the coastal tracts of the country. Odisha happens to be the largest producer of Bauxite.

Haematite	It is also known as **red-ochre,** as it is reddish in colour. The iron contents in this type ranges from about **60-70 %.** Most of the iron ore reserves in India belong to this type.
Magnetite	It is the best quality of iron ore and contains iron **> 70 %.** The colour of the ore is **dark brown to blackish** and is known as **black ore.** It has magnetic properties.
Limonite	It is **yellow or light brown** in colour and the iron contents ranges from **about 40-60 %.** It is called **hydrated iron oxide,** when the iron ore in mixed with oxygen and water. Its mining is easier and cheaper.
Siderite	It is an inferior variety of iron ore and has many impurities. The iron contents range from about **20-40 %.** It is also called iron carbonate.

- **Hence option (c) is the correct answer.**

Q 50.C

- India's textiles sector to grow to USD 350 Billion by 2030: India's Trade Data India's textiles sector is set for expansion with **11% year-on-year growth in Ready-Made Garments** of all Textiles exports.
- **Factors for growth** of textile industry include end-to-end value chain capability; strong raw material base; large export footprint; and vibrant and rapidly expanding domestic market.

Textile sector of India

- Domestic apparel and textile industry contributes approx. 2.3 % to country's GDP, 13% to industrial production and 12% to exports.
- **India has a 4% share of global trade in textiles and apparel**.
    - India is **3rd largest exporter of Textiles & Apparel in world**. (Ministry of Textiles Annual Report 2022-23). **Hence, statement 2 is not correct.**
- **Textiles and apparel industry is 2nd largest employer in country** providing direct employment to 45 million people and 100 million people in allied industries. **Hence, statement 1 is correct.**
- **100% FDI** (automatic route) is allowed in textile and apparel sector in India. H**ence, statement 3 is correct.**

Q 51.D

- Roads have been important in India since ancient times but were given much lower priority than railways during the British occupation. The **First Road Development Plan (Nagpur Plan)** was formulated in 1943. **Hence statement 1 is not correct.**
- The **India–Myanmar–Thailand Trilateral Highway** (IMT-TH), spanning approximately 1360 kilometers, aims to establish a seamless road link between India, Bangladesh in South Asia, and Myanmar and Thailand in Southeast Asia. The **route begins in Moreh, India,** passes through Tamu and Mandalay

in Myanmar, and **ends in Mae Sot, Thailand**. This connectivity project promises substantial economic benefits by streamlining trade routes and fostering foreign investment. **Hence statement 2 is not correct**.

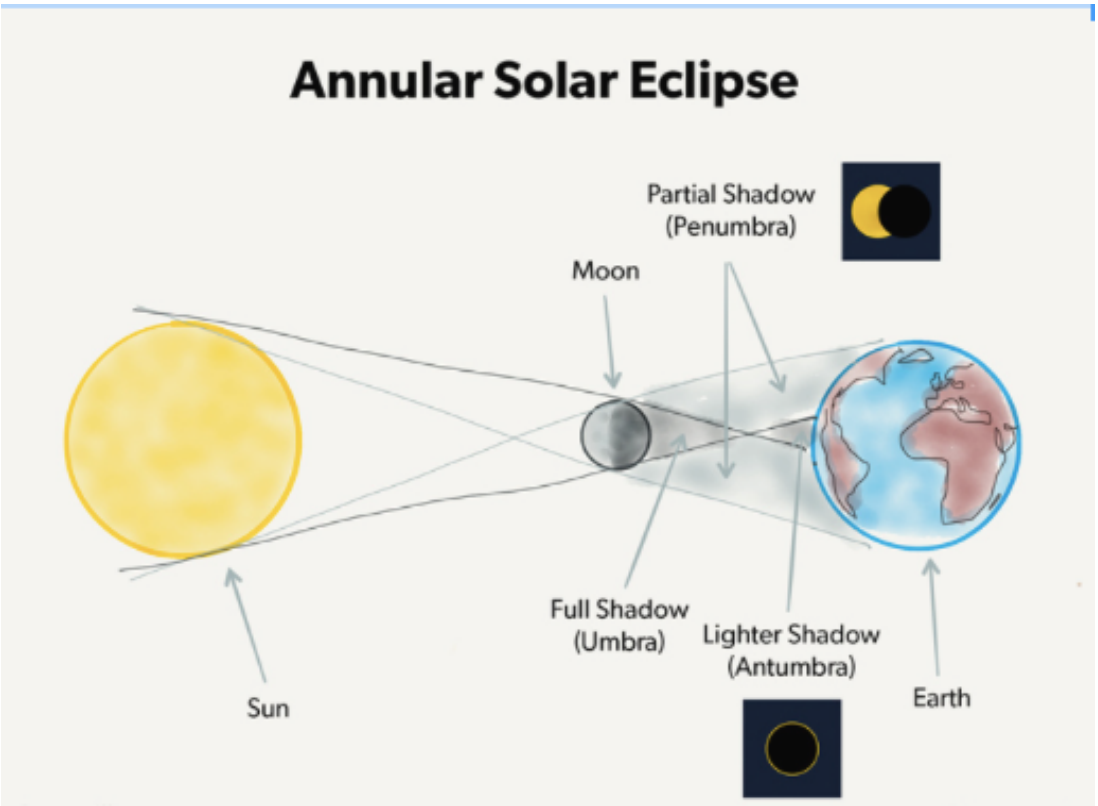
- Chardham project comprises the improvement of 5 existing National Highways (NHs) connecting **Chardham viz. Yamunotri, Gangotri, Kedarnath, and Badrinath in Uttarakhand** including the Tanakpur to Pithoragarh section of the Kailas-Mansarovar yatra, aggregating a length of about 825 km. **Hence statement 3 is not correct.**

Q 52.B

- Panchet Dam is built across the Damodar River in Dhanbad District's Panchet area in Jharkhand. Inaugurated in 1959, Panchet dam is the fourth of the 4 multi-purpose dams of the Damodar Valley Corporation. **Hence pair 1 is not correctly matched.**
- Tilaiya Dam was the first of the four multi-purpose dams included in the first phase of the Damodar Valley Corporation. It was constructed across the Barakar River, at Tilaiya in Koderma district of Jharkhand. **Hence pair 2 is not correctly matched.**
- Salal Hydroelectric Project constructed on river Chenab in the district Reasi of Union Territory Jammu and Kashmir . The project has a capacity of 690 MW. **Hence pair 3 is correctly matched.**
- Rengali Dam was completed in 1984. It is built across the river Brahmani in Rengali village, located in Angul district of Odisha. Brahmani is the second largest river of Odisha. **Hence pair 4 is correctly matched.**

Q 53.B

- **Recent Context:** An **annular solar eclipse was visible in parts of South America on October 2, 2024**.
- **What is a Solar Eclipse?**
  - A solar eclipse occurs when the Moon moves between the Earth and the Sun, blocking the Sun's light either fully or partially, casting a shadow on certain parts of the Earth.
  - **Frequency of Solar Eclipses**
    - **A solar eclipse can only occur during the new moon**, when the Moon and Sun are aligned on the same side of the Earth. **Hence, statement 1 is correct.**
    - A new moon happens approximately every 29.5 days because that is the time it takes for the Moon to orbit the Earth.
    - However, solar eclipses don't happen every month. **They occur two to five times annually, but not every new moon results in an eclipse. Hence, statement 2 is not correct.**
- **Why don't they occur every month:**
  - The Moon's orbit around the Earth is tilted by about 5 degrees compared to the Earth's orbit around the Sun. This means the Moon's shadow usually misses the Earth.
  - A solar eclipse only occur when the Moon crosses specific points in its orbit, called nodes, where the Moon's orbit intersects the plane of Earth's orbit around the Sun.
  - **When a new moon occurs at one of these nodes, a solar eclipse is possible.**
- **Annular Solar Eclipse: Occurs when the Moon is at or near its farthest point from Earth.** The Moon does not fully cover the Sun, leaving a visible ring of fire around the Moon. This is what people in parts of South America will witness on October 2, 2024. **Hence, statement 3 is correct.**



Q 54.A

- As per Second Advance Estimates for the agriculture year 2022-23, the Wheat production in the country is estimated at 112.18 million tonnes which is higher by 4.44 million tonnes than the production achieved during 2021-22.
- Wheat is a highly nutritional & widely-cultivated cereal grain. Over the years, it has been raised & harvested globally. It's one of the world's most important crops & holds the title of the second most-produced grain in the world, beaten only by corn. Over two-thirds of wheat produced globally is ised as food.

State/ UT	Wheat (Th. tonnes)
Uttar Pradesh	33,949.68
Madhya Pradesh	22,977.5
Punjab	14,861.94
Haryana	10,447.21
Rajasthan	10,095.5
Bihar	6,223.76
Gujarat	3,333.24
Maharashtra	2,144.71
Uttarakhand	863.6
West Bengal	655.8

- **Hence option (a) is the correct answer.**

Q 55.A

- **Recent Context: The Cabinet approved development of National Maritime Heritage Complex (NMHC) at Lothal, Gujarat.** NMHC is being developed under the Sagarmala Programme by the Ministry of Ports, Shipping & Waterway.
- **About NMHC**
  - **Aim:** To showcase India's rich and diverse maritime heritage and create the largest maritime heritage complex in the world.

- **Significance of Lothal:** It is located between Bhogavo and Sabarmati rivers near Gulf of **Khambat.** It is a prominent city of Indus-Valley Civilization (IVC) and had the oldest man-made dry-dock (2400 BC ago).
- Discovery of a dry-dock at Lothal gives an insight into the knowledge of tides, winds and other nautical factors that existed during that period.

- **Hence option (a) is the correct answer.**

Q 56.D

- Recently, Following complaints from Overseas Citizen of India (OCI) card holders about being reclassified as "foreigners," the Ministry of External Affairs has recently clarified, that no changes have been made to the rules governing OCI status.
  - **OCI scheme, introduced in August 2005, allows Persons of Indian Origin (PIOs) who were citizens of India after January 26, 1950 or were eligible for Indian citizenship on that date, to register for OCI status.**
    - > Serves as a form of dual citizenship for the Indian diaspora.
  - OCI cardholders receive a **multiple-entry, life-long visa to visit India** and are **exempt from registering with local authorities for extended stays. Hence, statement 3 is correct.**
  - Under the Foreign Exchange Management Act (FEMA) 2003,**OCI card holders are now on par with foreign nationals regarding economic, financial, and educational rights, reversing earlier parity with NRIs. Hence, statement 1 is not correct.**
  - OCI card holders **cannot** vote, **hold constitutional positions**, or be elected as a members of Parliament or Legislative Assembly. **Hence, statement 2 is not correct.**
    - > They are also restricted from holding government employment in India.

Q 57.C

- **Recently, the External Affairs Minister exressed concerns over the increasing "trade weaponization".** He highlighted that trade globalization along with weaponization has caused job losses and impacted quality of life in many countries.
- **About Trade Weaponization**
  - **It refers to the use of trade as a tool of foreign policy and occurs when a country uses its trade leverage over another nation coercing it to take actions for a specific outcome. Hence, option (c) is the correct answer.**
  - It aims at fulfilling national security objectives, geo-political gains, etc.
- **Key Tools for Trade Weaponization**
  - **Creating Impediments to Trade:** Preventing customs clearance, obstacles concerning environment, biosecurity, intellectual property standards, etc.
    - > E.g., In 2022, China blocked the imports of citrus, fish and other foods from Taiwan.
- **Sanctions and Embargo:** Selectively cutting off imports and exports.
  - E.g., USA's Countering America's Adversaries Through Sanctions Act targeting Iran, Russia, and North Korea.
- **Consequences of Trade Weaponization**
  - **Protectionism**: Involves tariff impositions on products imported from a country. E.g., China Shock 1.0 and 2.0 have prompted tariffs against Chinese products.
  - **Trade War**: Occurs when the countries involved impose retaliatory tariffs on each other. E.g., Witnessed between the USA and China since 2018.
  - **Supply Chain Disruptions**: Witnessed during the times of COVID-19; etc.

Q 58.D

- **Biofuel energy** is a renewable energy source produced from biomass, a plant or animal product. Biofuels can be used for transportation, heating, and electricity. In India, agriculture and forest residue, Municipal Solid Waste (MSW), and cow dung can be used for biofuel production. **Hence statement 1 is correct.**
- **SAF is a type of biofuel that's used in aircraft and has similar properties to conventional jet fuel. India is now the world's third-largest producer and consumer of ethanol**, nearly tripling its production over the past five years. India has other opportunities to expand biodiesel for use in diesel vehicles and **biojet fuel** as a replacement for jet fuel. The government has already established a 5% biodiesel target by 2030, which would require almost 4.5 billion liters of biodiesel per year, according to IEA estimates. **Hence statement 2 is correct**.

- **Global Biofuels Alliance (GBA)** is a multi-stakeholder alliance of Governments, International Organizations, and Industries, an initiative by **India as the G20 Chair,** bringing together biofuels' biggest consumers and producers to drive development and deployment. The initiative aims to position biofuels as a key to energy transition and contribute to jobs and economic growth. **Hence statement 3 is correct.**

Q 59.B

- **Magnetite also known as "black ore"** has 60-65% metal content. In India, it is mainly found in the **Dharwar and Cuddapah systems in the Dharwar and Shimoga districts of Karnataka** and Selam districts of Tamil Nadu. **Hence statement 1 is correct.**
- **Sandur range is in** the Bellari district of Karnataka, and the geological formations of the Ballari, Hospet, and Sandur regions are known by the name Sandur Schist Belt, and belong to the Dharwar Super Group. The Sandur Schist Belt is known for its economic deposits of Iron and Manganese. **Hence statement 2 is correct.**
- The provisional production of iron ore in India in 2023-24 is about 275 million tonnes, reflecting a 7.5% increase over the previous year. The major iron ore producers during this period were NMDC, SAIL, Odisha Mining Corporation, and Tata Steel Limited. **Odisha was the largest iron ore producer, holding a 54% share in the country, followed by Karnataka with a 16% share and Chhattisgarh with a 15% share. Hence statement 3 is not correct.**

Q 60.D

- **National Commission for Backward Classes (**NCBC) tendered advice to Union Government for inclusion of certain Castes from Maharashtra, in the Central List of OBCs.
- **Article 342 A empowers the President to specify socially and educationally backward classes for States and UTs. Hence, option (d) is the correct answer.**
- **About NCBC**
  - **Constitutional Body:** Established under Article 338B of Constitution (inserted through 102nd Constitutional Amendment Act, 2018).
  - **Composition:** A Chairperson, a Vice-Chairperson and three other Members
  - **Functions:** to investigate and monitor all matters relating to constitutional safeguards for the socially and educationally backward classes, to inquire into specific complaints concerning the deprivation of their rights and safeguards, etc

Q 61.A

- Monazite is a red/green-brownish, waxy mineral. It is hard and resistant. Monazite is formed when igneous rocks undergo crystallization and when clastic sedimentary rocks undergo metamorphism. It is commonly mined in placer deposits, which are masses of loose sediment mainly consisting of sand. Minerals that are often found with or near monazite are gold, platinum, magnetite, and zircon. These minerals are heavy and resistant, allowing them to withstand weathering and accumulate with monazite. Monazite consists of certain rare-earth elements that can be extracted through mining, such as neodymium.
- **Monazite is a critical source for renewable energy** because it contains a variety of rare-earth metals. Extracting these REE (rare-earth metals) can be done safely and they have the ability to be recycled as magnets, making them the optimal choice for wind energy and other generator systems.
- Occurring as small, brown, resinous, rather heavy crystals in granitic and gneissic rocks and their detritus (called monazite sands), **monazite frequently contains 10–12 percent thorium dioxide (ThO2)** and thus represents a major commercial source of thorium as well. Countries in which monazite is mined include India, Malaysia, Vietnam, and Brazil. **Monazite is a key source of REEs, which are used in wind turbines, hybrid and electric vehicles, and other generator systems**. REEs are also used in consumer goods like cell phones, televisions, and computers.
- **Hence, Both Statement I and Statement II are correct and Statement II is the correct explanation for Statement I.**
- **Hence option (a) is the correct answer.**

Q 62.D

- **Algaculture is a form of aquaculture involving the farming of species of algae.** The majority of algae that are intentionally cultivated fall into the category of microalgae (also referred to as phytoplankton, microphytes, or planktonic algae).

- Macroalgae, commonly known as seaweed, also have many commercial and industrial uses. Still, due to their size and the specific requirements of the environment in which they need to grow, they do not lend themselves as readily to cultivation (this may change, however, with the advent of newer seaweed cultivators, which are algae scrubbers using up flowing air bubbles in small containers).
- Commercial and industrial algae cultivation has numerous uses, including food ingredients such as omega-3 fatty acids or natural food colourants and dyes, food, fertilizer, bioplastics, chemical feedstock (raw material), pharmaceuticals, etc. algal fuel. It can also be used as a means of pollution control. Global production of farmed aquatic plants, overwhelmingly dominated by seaweeds, grew in output volume from 13.5 million tonnes in 1995 to just over 30 million tonnes in 2016.
- **Hence option (d) is the correct answer.**

Q 63.D

- **Recent Context:** BharatGen, world's first government-funded Multimodal Large Language Model (MLLM) Technology was recently launched. It is aligned with the goal of Making AI in India and Making AI for India.
- **About BharatGen**
  - **Aim**: **Creation of Generative AI systems that can generatehigh-quality text (including speech) and multimodal content in various Indian languages. Hence, option (d) is the correct answer.**
  - **Implementing Agency**: IIT Bombay under the National Mission on Interdisciplinary Cyber-Physical Systems (NMICPS).
  - **Features:**
    - > **Building and training based on Bhartiya data set:** Collect and curate India-centric data, reducing dependence on foreign models.
    - > **Multilingual and multimodal nature**: Ensuring representation to the country's diverse languages, dialects, and cultural contexts.
    - > **Open-source platform:** Accessible to all citizens, Ensuring Industrial, Commercial, Cultural, and Inclusive technological development.
- **About MLLM and Generative AI**
  - **MLLM are Large Language Models (LLM) t**rained on **large datasets** including both text and non-textual data (image, audio, video, etc.)
  - **LLM** uses **machine learning** and is capable of recognizing and interpreting human languages or other complex data.
    - > Generative AI is the most well-known application of LLM.
  - **Generative AI** includes algorithms/deep-learning models that can be used to create new content, including audio, code, images, text, etc.

Q 64.C

- The Census of India has categorized migration into two types - migration by birthplace and migration by place of last residence.
- **According to the Census 2011 data, intrastate migration grew faster than interstate migration between 2001 and 2011.** The number of inter-state migration grew at 55% between the 1991 and 2001 censuses. This came down to just 33% between the 2001 and 2011 census. In contrast, the rate of growth in intra-state migration or inter-district migration increased from 30% between the 1991 and 2001 censuses to 58% between the 2001 and 2011 censuses. **Hence statement 1 is correct.**
- The gender gap in migration for economic purposes (like work, business, and education) increased with the distance of migration. This is because women are less likely to migrate long distance for economic reasons compared to men. The reasons include societal norms, security concerns, family responsibilities, and traditional gender roles that limit women's mobility.
- **The rural-to-rural migration pattern was dominant in India in the 2011 census.** Many women move from one rural area to another for marriage, which explains the large number of rural-to-rural migrants. In contrast, rural-to-urban migration is primarily driven by economic factors, like the search for better employment and living conditions. **According to the 2011 census, 47.5% of India's total internal migration was rural to rural, while 17.4% was rural to urban. Hence statement 2 is correct.**

Q 65.A

- **Rural Settlement Patterns and Influencing Factors:**
  - Rural settlement patterns refer to the spatial arrangement of homes and structures within a rural area, which can be influenced by various factors like geography, water resources, agricultural needs, and

transportation access. The way settlements form and develop is often dictated by environmental conditions and societal needs.

- **Dispersed Settlement:**
  - Dispersed settlements **are usually found in regions with less fertile or rugged terrain**, where individual households are separated by large distances. These settlements are more common in hilly, forested, or arid regions where people live on scattered plots of land.
  - Fertile alluvial plains, which provide rich soil and good agricultural conditions, **tend to support clustered or nucleated settlements due to the high agricultural potential** and need for labor-intensive farming, which encourages people to live closer together. **Hence, pair 1 is not correctly matched.**
- **Linear Settlement:**
  - Linear settlements develop along lines such as rivers, roads, or railways. The key feature of this type of settlement is that homes and buildings are aligned along these features, providing easy access to transportation or water resources. These are common in regions where transportation routes or water bodies play a crucial role in the community's livelihood. **Hence, pair 2 is correctly matched.**
- **Circular Settlement:**
  - Circular settlements typically **form around a central feature, often a water resource such as a well, tank, or lake.** In arid or semi-arid regions where water is scarce, people build homes around a communal water source to ensure easy access for everyone. This pattern is observed in parts of Rajasthan and Gujarat, where water management is critical for survival. **Hence, pair 3 is also correctly matched.**

Q 66.B

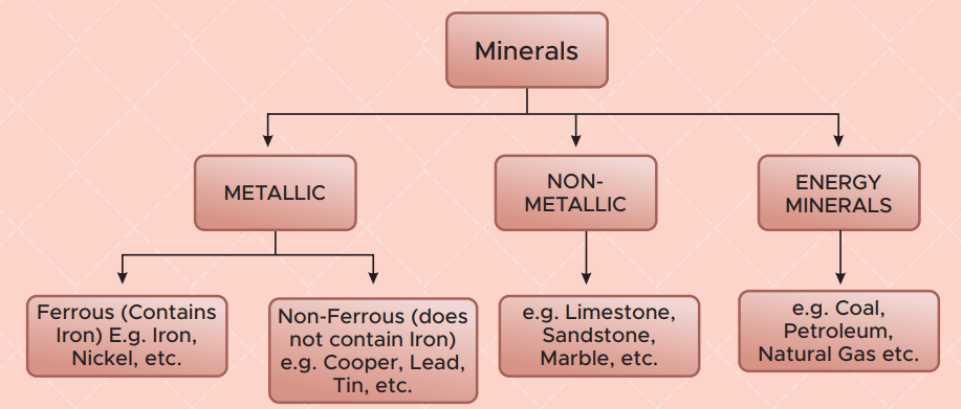
- **Recently, Indian Council of Medical Research (ICMR) and Madras Diabetes Research Foundation (MDRF) study highlighted that Advanced Glycation End Products (AGEs) rich diet is leading cause of diabetes in India.**

About AGEs

- Harmful compounds formed when sugars react with fats or proteins during high-temperature cooking (frying/roasting).
- **Consumption of AGE-rich ultra-processed and fast-foods can lead to oxidative stress and inflammation (underlying cause of diabetes). Hence, option (b) is the correct answer.**
- Study recommends low-AGE diet (fruits, vegetables, whole grains, low-fat milk) cooked by boiling and steaming for overweight and obese individuals.
  - It leads to improvement in insulin-sensitivity and reduction in inflammatory levels in individual.
  - Insulin sensitivity refers to how well cells respond to insulin for glucose uptake from blood.

Q 67.B

- On the basis of chemical and physical properties, minerals may be grouped under two main categories of metallics and non-metallics which may further be classified.
  - **Metallic minerals** are the sources of metals. Iron ore, copper, gold produce metal and are included in this category. Metallic minerals are further divided into ferrous and non-ferrous metallic minerals.
    - **Ferrous minerals** are a class of minerals that contain iron as their primary component. These minerals are essential for the production of steel, one of the most widely used materials in modern society. Ferrous minerals such as iron ore, manganese, chromite, etc., provide a strong base for the development of metallurgical industries. Our country is well-placed in respect of ferrous minerals both in reserves and production.
    - **Non-Ferrous Minerals:** These minerals do not contain iron and are generally non-magnetic. **Examples include gold, silver, copper, lead, bauxite, tin**, and magnesium. Non-ferrous minerals are used in a wide variety of industries, including electrical, electronics, and aviation. **Hence options 2 and 3 are correct.**
  - **Non-metallic minerals** are either organic in origin such as fossil fuels also known as mineral fuels which are derived from the buried animal and plant life such as coal and petroleum. Other type of non-metallic minerals are inorganic in **origin such as mica, limestone and graphite, etc.**



- **Hence option (b) is the correct answer.**

Q 68.B

- **Recent Context: Global Hunger Index (GHI), 2024 ranks India under 'serious' category.**
- **The Index is released by Irish humanitarian organization Concern Worldwide and German aid agency Welthungerhilfe. Hence, statement 1 is not correct.**
- **Key findings of report About India:**
  - **India ranks 105th out of 127th countries**, falling under "serious" category with 41 other nations, including Pakistan and Afghanistan. **Hence, statement 2 is correct.**
  - **India's GHI score has fallen since 2000, however, child wasting and stunting remain very high. Hence, statement 3 is not correct.**
  - Maternal malnutrition perpetuates child under nutrition in India, creating an intergenerational cycle of poor nutritional status.
- **About Global Hunger Index (GHI)**

  255.
  - GHI is a tool designed to measure and track hunger at global, regional, and national levels.
  - Each country's GHI score is calculated based on a formula that combines four indicators:
    - **Undernourishment** (Insufficient caloric intake);
    - **Child stunting** (Children with low height under age 5);
    - **Child wasting** (Children with low weight for their height under age 5);
    - **Child mortality** (Children who die before their fifth birthday).

Q 69.B

- India is one of the leading producers of oilseeds globally, contributing significantly to its agricultural economy. Oilseeds play a crucial role in meeting the country's demand for edible oils, and a variety of oilseeds are cultivated, such as soybean, groundnut, mustard, sunflower, and sesame.
- **Area - Million Hectares. Production - Million Tonnes**

State	2021-22#				
	Area	% to All - India	Production	% to All - India	Yield
(1)	(2)	(3)	(4)	(5)	(6)
Rajasthan	5.76	19.75	8.39	22.25	1456
Madhya Pradesh	7.50	25.70	7.92	21.02	1057
Gujarat	3.32	11.40	6.90	18.30	2075
Maharashtra	5.09	17.47	5.90	15.64	1158
Haryana	0.74	2.54	1.40	3.71	1890
Uttar Pradesh	1.21	4.14	1.24	3.29	1026
West Bengal	0.96	3.28	1.19	3.16	1247
Karnataka	1.25	4.27	1.17	3.11	942
Tamilnadu	0.43	1.47	0.98	2.60	2290
Others	2.92	10.00	2.61	6.91	894
All India	**29.17**	**100.00**	**37.70**	**100.00**	**1292**

- **Rajasthan is the largest producer of oilseeds in India.**
  - Rajasthan is the largest producer of mustard, which is one of the major oilseed crops in India. Mustard accounts for a significant portion of the total oilseeds production in the state. **Hence statement 1 is correct**.
- **Madhya Pradesh has the largest area under oilseeds cultivation, particularly due to its vast soybean cultivation. Hence statement 2 is correct.**
- **The oilseed with the largest share of production in India is soybean, not groundnut. Soybean accounts for a major share of oilseed production due to its vast cultivation, particularly in Madhya Pradesh, Maharashtra, and Rajasthan.**
  - Groundnut is still a significant crop, especially in states like Gujarat and Andhra Pradesh, but it does not surpass soybean in total production. **Hence statement 3 is not correct**.
- Oilseeds Production – 413.55 Lakh tonnes.
  - Groundnut – 102.97 Lakh tonnes.
  - Rapeseed and Mustard – 126.43 Lakh tonnes

Q 70.C

- **Recently, a climate activist Sonam Wangchuk was detained at the Delhi border** while leading a group of protesters seeking to petition the Central government for Ladakh's inclusion in the Sixth Schedule of the Constitution, along with other demands for greater autonomy for the region.
- **Sixth Schedule:** Under **Article 244(2)**, provides greater autonomy to 'tribal areas' in four northeastern states (**Assam, Meghalaya, Mizoram, and Tripura**) through Autonomous District Councils (ADCs). **Hence, option(c) is the correct answer.**
  - ADCs have more legislative, executive, and financial powers, including the ability to regulate land use, social customs, and taxation. It resulted from Bardoloi Committee's recommendations.
- **Other States seeking constitutional safeguards?**
  - **Ladakh:** The Union Territory of Ladakh has seen increasing demands for inclusion in the Sixth Schedule of the Constitution to safeguard its indigenous culture and provide greater autonomy.
  - **Arunachal Pradesh:** The state has passed a resolution seeking inclusion in the Sixth Schedule to grant more autonomy to its tribal populations.
  - **Manipur**: The Hill Area Committee in Manipur has also demanded inclusion in the Sixth Schedule for its tribal areas, particularly the 'Hill areas'.

Q 71.A

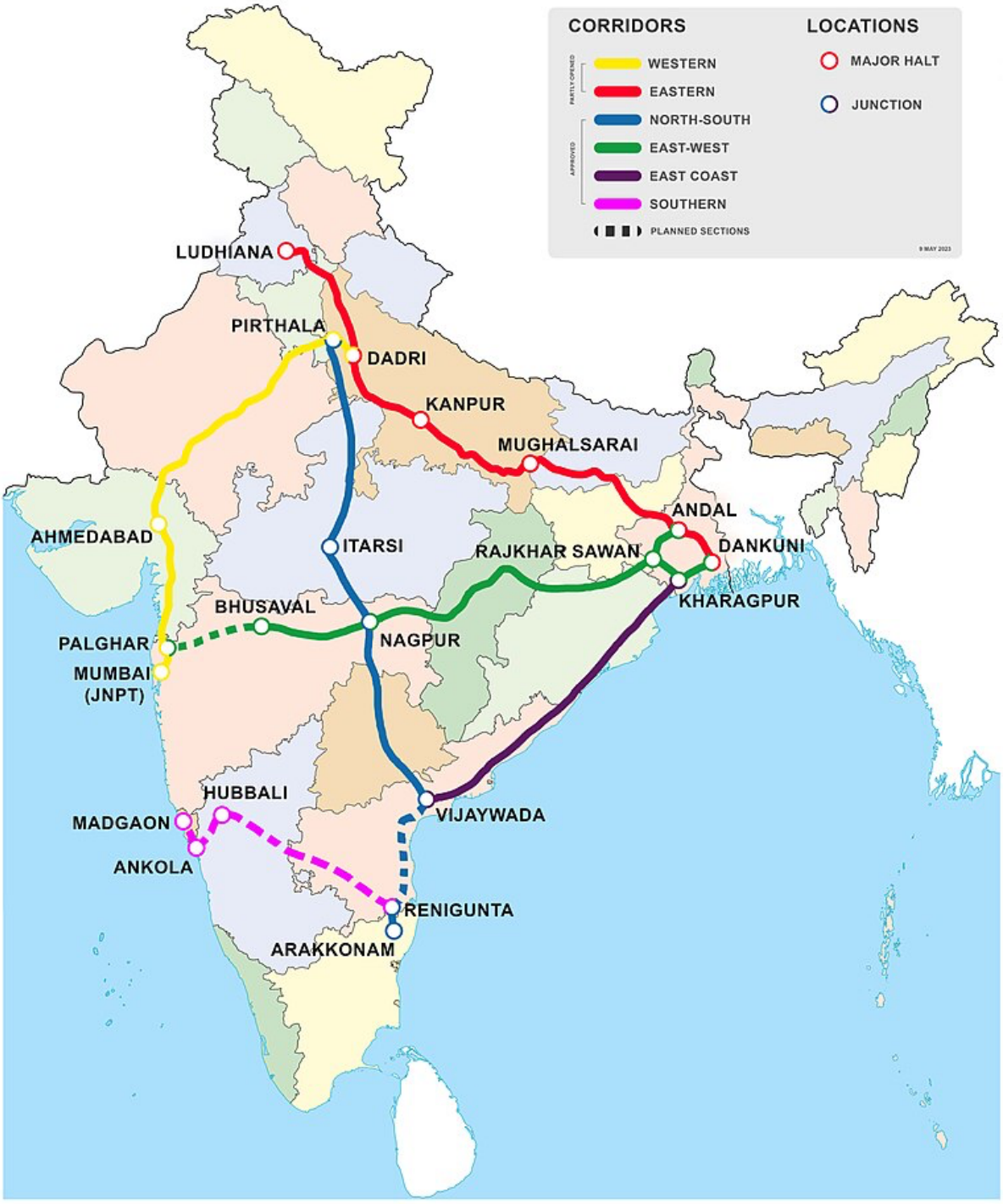
- Traditionally, the major human races are divided into the following categories by physical features and geographical location:
- **Negroid**:
  - Characteristics: Dark skin color, sloping forehead, thick lips, wide nose.
  - Geographic Location: Mostly located in Sub-Saharan Africa.
  - Body Features: Stature varies from tall to very short, typically muscular build.
- **Mongoloid**:
  - Characteristics: **Almond-shaped eyes, folding eyelids, yellowish (**light yellow to yellow-brown, some reddish brown) **skin tone.**
  - Geographic Distribution: **Mostly distributed in East Asia, South-East Asia, Native Americans, and Eskimos.**
  - Body Features: Medium stature with lateral body build.
- **Caucasoid**:
  - Characteristics: Pale skin tones from reddish-white to olive; pointed nose and vertical forehead.
  - Geographic Distribution: Distributed mainly in Europe and parts of the Middle East.
  - Body Features: Medium to tall stature with straight, wavy, and curly hair types.
- **Australoid**
  - Characters: Dark skin tone, wide nose, curly hair, and pronounced eye ridges.
  - Geographic Distribution: regions of Australia, Andaman Islands and Central Africa
  - Body Features: Generally short in stature with special dietary adaptation.
- **Capoid** (Bushmen and Hottentots):
  - Geographic Distribution: Originally the term referred to some Southern African peoples.
  - Characteristics: Versatile skin tones, high cheekbones, strong facial features.
- **Hence option (a) is the correct answer.**

Q 72.C

- **Proximity to Raw Materials in Industrial Location Decisions:**
  - The location of industries is greatly influenced by various factors, including proximity to raw materials, markets, labor, transportation, and energy. Industries that are heavily dependent on bulky, weight-losing raw materials (those that are heavier or more expensive to transport than the finished product) tend to locate close to raw material sources to minimize transportation costs.
- **Textile Manufacturing**
  - **Raw Material Dependency:** Textile manufacturing does rely on raw materials such as cotton, wool, or synthetic fibers, but these raw materials are relatively light and easy to transport over long distances. Modern textile industries are often located near urban centers where labor is cheap, and markets are nearby, rather than near raw material sources.
  - **Proximity Influence:** Moderately influential. While access to raw materials is important, textile industries do not need to prioritize being close to raw material sources as transportation costs are not prohibitively high.
- **Electronics Assembly**
  - **Raw Material Dependency:** Electronics assembly industries primarily depend on small, high-value components (such as semiconductors and circuit boards), which are not raw material-intensive. The final product, such as computers or smartphones, is also compact and lightweight. As such, these industries often prioritize proximity to skilled labor, innovation hubs, and large consumer markets rather than raw material sources.
  - **Proximity Influence:** Not very influential. Electronics industries do not depend on raw material proximity since they deal with small, easily transported components.
- **Cement Manufacturing**
  - **Raw Material Dependency:** Cement manufacturing is a classic example of a weight-losing industry. Cement production requires large quantities of bulky raw materials like limestone, clay, and gypsum, which are expensive to transport over long distances. Hence, cement factories are usually located close to limestone quarries to reduce transportation costs.
  - **Proximity Influence:** Highly influential. Cement manufacturing must prioritize proximity to raw materials to reduce production costs and maximize efficiency.
  - **Hence option (c) is the correct answer.**
- **Software Development**
  - **Raw Material Dependency:** Software development is entirely based on human skills, innovation, and digital infrastructure. It does not require any physical raw materials, making its location decisions more reliant on factors like proximity to skilled labor, innovation ecosystems, and markets rather than raw material sources.
  - **Proximity Influence:** Not at all influential. Software industries have no dependence on physical raw materials, making this factor irrelevant for their location.

Q 73.A

- The Eastern Dedicated Freight Corridor, with a route length of 1856 km, consists of two distinct segments: an **electrified double-track segment** of 1409 km between Dankuni in West Bengal & Khurja in Uttar Pradesh & an **electrified single-track segment** of 447 km between Ludhiana (Dhandarikalan) - Khurja - Dadri in the state of Punjab, Haryana and Uttar Pradesh. **Hence statement 1 is not correct.**
- **Western DFC connects Dadri in Uttar Pradesh to Jawaharlal Nehru Port Trust in Mumbai. The Japan International Cooperation Agency funds it. Hence statement 2 is not correct.**

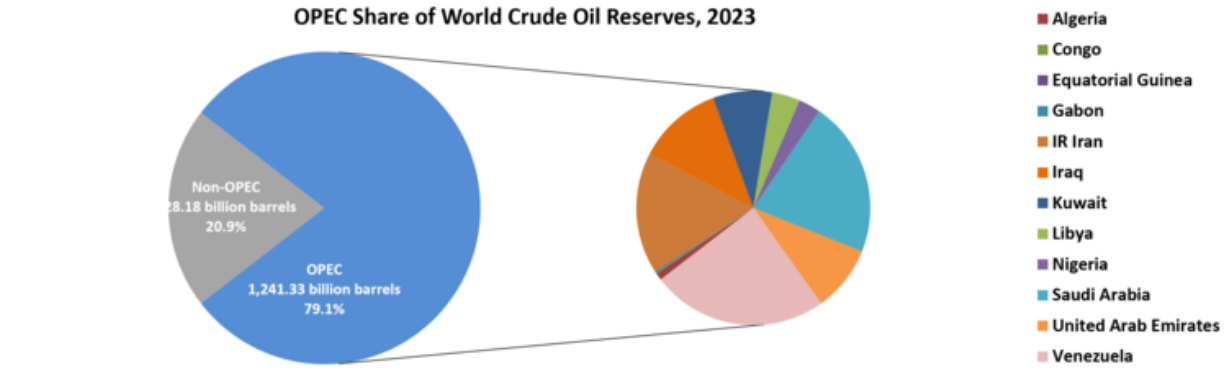


DEDICATED FREIGHT CORRIDORS OF INDIA

- The **Dedicated Freight Corridor (DFC) project aims to increase rail's share to 40% by 2025**. DFC will decongest the already saturated road network & promote shifting freight transport to more efficient rail transport. This shift is expected to significantly reduce greenhouse gas (GHG) emissions in India's transport sector. It is expected that DFC will save more than 450 million tons of CO_2 in the first 30 years of operation. **Hence statement 3 is correct.**

Q 74.B

- The world has proven reserves equivalent to 46.6 times its annual consumption levels. This means it has about 47 years of oil left (at current consumption levels and excluding unproven reserves).



OPEC proven crude oil reserves, at end 2023 (billion barrels, OPEC share)

Venezuela	303.01	24.4%	United Arab Emirates	113.00	9.1%	Algeria	12.20	1.0%
Saudi Arabia	267.23	21.5%	Kuwait	101.50	8.2%	Gabon	2.00	0.2%
IR Iran	208.60	16.8%	Libya	48.36	3.9%	Congo	1.81	0.1%
Iraq	145.02	11.7%	Nigeria	37.50	3.0%	Equatorial Guinea	1.10	0.1%

- **Hence statement 1 is not correct.**
- According to current estimates, 79.1% (1,241.33 billion barrels) of the world's proven crude oil reserves are located in OPEC Member Countries, with the bulk of OPEC oil reserves in the Middle East, amounting to 67.3% of the OPEC total. **Hence statement 2 is correct.**

Q 75.D

- Railways have been a crucial mode of transportation for centuries, connecting people and places across vast distances. Today, they continue to play a vital role in the global economy, providing efficient and sustainable transportation solutions. Railways are a climate-smart and efficient way to move people and freight. Railways promote economic growth while cutting greenhouse gas emissions. They are a clean and compact way to move millions of passengers and millions of tons of goods across countries and continents.

Rank	Country	km
1	United States	293,564.2
2	China	150,000
3	Russia	85,494
4	India	65,554
5	Canada	49,422
6	Germany	39,379
7	Australia	32,606
8	South Africa	30,400
9	Brazil	29,849.9

- **Hence option (d) is the correct answer.**

Q 76.D

- **Recent Context**: **Nobel prize in Physiology or Medicine** has been awarded jointly to **Victor Ambros and Gary Ruvkun for the discovery of microRNA** and its role in post-transcriptional gene regulation.
- **Gene regulation** is how a cell controls which genes, out of many genes in its genome, are expressed, allowing **for production of a specific protein.**
  - **Genetic information flows from DNA to messenger RNA (mRNA),** via a process called **transcription,** and then on to the cellular machinery for protein production.
- **About microRNA**
  - microRNAs are small non-coding RNA (single-stranded molecules playing key role in turning DNA instructions into proteins) that helps cells regulate gene expression.
  - **microRNA controls gene expression by binding with mRNA and preventing them from being translated into proteins or by degrading mRNA altogether. Hence, statement 1 is correct.**
  - There are more than a thousand genes for different microRNAs in humans, and gene regulation by microRNA is universal among multicellular organisms.
- **Other Roles of microRNA**
  - **Cellular Development:** Involved in the differentiation of stem cells and development of tissues and organs. **Hence, statement 2 is correct.**
  - **Immune Response:** miRNAs regulate innate and adaptive immune responses.
  - **Oncogenesis**: **Dysregulation of miRNAs is associated with cancer development, while they may also act as tumour suppressors**. **Hence, statement 3 is correct.**
  - **Disease diagnostics**: Used as biomarkers for diseases such as cancer, parkinson disease etc.

Q 77.D

- **Recent Context:** Department of Atomic Energy (DAE) inaugurated the Major Atmospheric Cherenkov Experiment (MACE) Observatory at Hanle, Ladakh.
- **About MACE Observatory**
  - It is the largest imaging Cherenkov telescope in Asia and 2nd largest in the world.
    - > **Cherenkov Telescope Array (CTA)** will be the largest Cherenkov telescope in the world (currently under construction). It consists of two array located at Spain and Chile, respectively.
  - It is located at an altitude of ~4,300 m, the highest of its kind in the world.
  - **Objective**: **Observe high-energy gamma rays to understand the most energetic phenomena in the universe** (such as supernovae, black holes, and gamma-ray bursts).
  - It is named after scientist **Pavel Alekseyevich Cherenkov,** who discovered that charged particles glow when they pass through a non-conducting medium under certain conditions (referred as Cherenkov radiation).
  - Indigenously built by **Bhabha Atomic Research Centre (BARC) with support from Electronics Corporation of India (ECIL)** and other partners.
  - It will also complement global observatories such as High Energy Stereoscopic System (HESS), etc.
- **What are Gamma Rays?**
  - Gamma rays have the smallest wavelengths and the most energy of any wave in the electromagnetic spectrum.
- **Sources:**
  - **In the universe, such as neutron stars and pulsars, supernova explosions, and regions around black holes.**
  - **On Earth, generated by nuclear explosions, lightning, and the activity of radioactive decay.**
- **Hence, option (d) is the correct answer.**

Q 78.A

- **Rare Earths are a group of 17 elements starting with lanthanum in the periodic table of elements and include scandium and yttrium.** The Rare Earth Elements (REE) are a collection of 17 elements namely scandium, yttrium and lanthanides (15 elements in the periodic table with atomic numbers 57 to 71 namely; lanthanum (La), cerium (Ce), praseodymium (Pr), neodymium (Nd), promethium (Pm), samarium (Sm), europium (Eu), gadolinium (Gd), terbium (Tb), dysprosium (Dy), holmium (Ho), erbium (Er), thulium (Tm), ytterbium (Yb) and lutetium (Lu). **Hence statement 1 is not correct.**
- They are moderately abundant in earth's crust but not concentrated enough to make them economically exploitable. The REEs find key applications in defence, electronics, energy systems etc. For instance, magnets made from rare earths are many times more powerful than conventional ones. Along with energy

critical elements (ECE) such as lithium which has become ubiquitous a battery material, REEs have emerged strategic elements essential for sustainable energy systems.

- **China has been the major supplier of rare earths all over the world. Even though it has only 37% of global RE resources,** it has captured the worldwide market to the extent of 97%. The low cost and efficient production process enabled China to monopolize the rare-earth market, forcing rare earth operations around the world to close down. **Hence statement 2 is correct.**
- **India's reserves are relatively modest. India only produces 1% of the world's rare earth production. Rare Earth Elements (REEs) -** India has significant reserves of rare earth elements in the states of Andhra Pradesh, Karnataka, Odisha, and Kerala. The monazite sands in Kerala are particularly rich in REEs. Graphite - India has substantial reserves of high-quality graphite. **Hence statement 3 is not correct.**

Q 79.C

- Popularly known as **'white gold'**, lithium is one of the most sought-after minerals globally amid the push towards electric vehicles (EVs), owing to climate change. Lithium has emerged as a priority metal for India ,given **India's ambitious target of achieving 30 percent sales of EVs, along with increasing non-fossil fuel energy capacity to 500 gigawatts by 2030.**
- In February 2023, the Geological Survey of India (GSI) announced the discovery of 5.9 million tonnes of **lithium reserves in the Reasi district of Jammu and Kashmir.** In addition, the Atomic Minerals Directorate for Exploration and Research (AMD), a Department of Atomic Energy unit, identified 1,600 tonnes of **lithium in the Marlagalla area of Mandya district.**
- Lithium is typically mined through **brine mining**, which involves extracting lithium from underground saltwater reserves. This process involves pumping saltwater to the surface and evaporating it to remove the lithium and other minerals. Unfortunately, these toxic metals can **contaminate water sources, threatening human and animal biodiversity.**
- **Hence option (c) is the correct answer.**

Q 80.D

- **Zawar Mines,** situated 40 km South of Udaipur in Rajasthan, is a group of four heritage mines, Mochia, Balaria, Zawar Mala, and Baroi, **producing more than 99% of zinc in India.** However, India's industrial need for Zinc is met through imports from Canada, Australia, and Russia. **Hence statement 1 is correct.**
- **Zawar mines**, owned by Vedanta Resources, produced an estimated 2.89 million ounces of silver in 2023. The mine will operate until 2031. In 1988, the American Society of Metals (ASM International) recognized Zawar Mine as an **'International Historical Landmark'**. The Geological Society of India recognized Zawar as a **National Geological Monument/ Geo-heritage site in 2016. Hence statement 2 is correct**.

- The Subarnarekha River originates near **Nagri village in the Ranchi district.** It runs through some major cities and towns in Jharkhand, i.e., Jamshedpur, Chaibasa, Ranchi, and Bhadrak before joining the Bay of Bengal near Kirtania port. The word"Subarnarekha" literally means "**streak of gold**." **Alluvial gold** is obtained from the sand of the river through a process known as **panning. Hence statement 3 is correct.**

Q 81.C

- **Kawahiva Tribe:**
  - **Location:** The Kawahiva tribe is an isolated Indigenous group living in the Amazon rainforest of Brazil.
  - **Recent News**: They have been under threat due to illegal logging, land invasions, and a slow demarcation process aimed at protecting their territory. The Brazilian government has been criticized for not doing enough to secure their land rights. The tribe faces the constant threat of displacement due to external pressures.
  - **Hence pair 1 is correctly matched.**
- **San Tribe:**
  - **Location:** The San, also known as Bushmen, are Indigenous people found in Botswana and neighboring countries in southern Africa.
  - **Recent News**: The San people have faced issues regarding land rights, particularly due to diamond mining operations in Botswana. Their displacement from ancestral lands has sparked international concerns over their rights and environmental degradation.
  - **Hence pair 2 is also correctly matched.**
- **Jarawa Tribe:**
  - **Location:** The Jarawa are an Indigenous group living in the **Andaman Islands, part of India.**
  - • In the News: The Jarawa tribe has been facing threats due to increasing contact with outsiders, including tourists and road construction projects that pass through their territory. This external interaction has raised concerns about the preservation of their culture and exposure to diseases.
  - **Hence pair 3 is also correctly matched.**

Q 82.D

- **Geothermal energy is heat energy from the earth—geo (earth) + thermal (heat).** The geothermal resources are reservoirs of hot water that exist or are human-made at varying temperatures and depths below the earth's surface. Geological Survey of India has identified about 340 geothermal hot springs in the country. Most of them are in the low surface temperature range from 37°C -90°C which is suitable for direct heat applications. These springs are grouped into seven geothermal provinces i.e. Himalayan (Puga, Chhumathang), Sahara Valley, Cambay Basin, Son-Narmada-Tapi (**SONATA) lineament belt**, West Coast, Godavari Basin, and Mahanadi Basin. Some of the prominent geothermal resources include **Puga Valley and Chhumathang in Jammu and Kashmir**, **Manikaran in Himachal Pradesh**, **Jalgaon in Maharashtra,** and **Tapovan in Uttarakhand**. A new location of geothermal power energy has also been found in **Tattapani in Chhattisgarh.**
- **Hence option (d) is the correct answer.**

Q 83.C

- Gold mining is a global business with operations on every continent, except Antarctica, and gold is extracted from mines of widely varying types and scale. At a country level, China was the largest producer in the world in 2023 and accounted for around 10 per cent of total global production. **China with the gold production of 370 MT, holds the distinction of being the largest gold producer in the world, followed by Australia, Russia, Canada and United States. Hence pair 1 is correctly matched.**
- **China tops the list in tin production as the country produces 125,000 metric tons each year,** while Indonesia produces 84,000 metric tons, Peru 23,700 metric tons, Bolivia 18,000 metric tons, Brazil 12,000 metric tons, and Myanmar 11,000 metric tons. **Hence pair 2 is not matched.**
- **South Africa is the world's largest producer of platinum, accounting for about 80% of the world's supply.** In 2023, South Africa produced an estimated 120 metric tons of platinum, while Russia came in second with 23 metric tons. South Africa's platinum mines are located in the northeast of the country, in areas such as Rustenburg and Steelpoort. The majority of the country's platinum comes from the Bushveld region. **Hence pair 3 is correctly matched.**
- **Mexico continues to rank as the largest silver-producing country in the world,** and it produced 6,400 metric tons in 2023, up slightly by 205 MT over the previous year. Mexico is home to Fresnillo, the largest silver company in the world. **Hence pair 4 is correctly matched.**

Q 84.D

- Shale gas & oil is defined as natural gas & oil from shale formations. The shale acts as both the source and the reservoir for these unconventional hydrocarbons. Older shale wells were vertical while more recent wells are primarily horizontal and need artificial stimulation, like hydraulic fracturing, to produce. Only shale formations with certain characteristics will produce gas and oil.
- The Government of India has carried out studies through various national and international agencies for the identification of shale oil and gas resources in the country. Based on the data available from conventional oil/gas exploration in the country for the last so many years, the country holds promising reserves of Shale Gas & Oil resources and the following sedimentary basins are considered prospective from Shale oil and gas point of view:
  - **Cambay Basin: L**ocated in Gujarat, this basin is one of the major shale gas reservoirs in India. In October 2013, ONGC drilled the first exploratory shale gas well in Jambusar near Vadodara in this basin.
  - **Gondwana Basin:** The Gondwana Basin in India has shale gas potential, and some of the areas that may be potential sources include Mohuda sub-basin. This sub-basin in the Jharia Coalfield of Jharkhand has thick shale zones, carbonaceous silty shales, and heterolithic shales.
  - **Krishna-Godavari Basin:** This is another major shale gas reservoir in India along the east coast.
  - **Assam & Assam-Arakan Basin:** Assam-Arakan Basin extends from the northeast of Assam to the Bay of Bengal, the Arakan coast of Myanmar, and the eastern border of Bihar.
  - Cauvery Basin
  - Indo-Gangetic Basin
- **Hence option (d) is the correct answer.**

Q 85.D

- **Recently, Nine captive-bred pygmy hogs released in Assam's Manas national park.**
- **Habitat: Lives in tall, dense grasslands with shrubs and trees, constructing dome-shaped nests from vegetation**.
- **Found in Manas and Barnadi Wildlife Sanctuaries (Assam).**
- **Characteristics:** Smallest and **rarest** wild suid in world.
- An **indicator species**. Its presence reflects health of its primary habitat, tall, wet grasslands of region.
- **Behavior:** Non-territorial, **living in small family groups** of 4-5 members. Adult Males are solitary but stay loosely connected to family groups.
- **Conservation Status: Endangered (IUCN Red List); Schedule I (Wildlife(Protection) Act, 1972).**
- **Hence, option (d) is the correct answer.**

Q 86.B

- The Ken-Betwa Link Project is a part of India's National Perspective Plan under the Interlinking of Rivers Programme. **It aims to transfer water from the Ken River, a surplus river in Madhya Pradesh, to the Betwa River, a water-scarce region of Bundelkhand and Uttar Pradesh. Hence statement 1 is not correct.**
- The Ken River, originating from the Kaimur Range in Madhya Pradesh, is a perennial river with surplus water. The Betwa River, on the other hand, frequently experiences water scarcity, particularly in its lower reaches in Uttar Pradesh.
- The project aims to enhance water availability in the Bundelkhand region by transferring surplus water from Ken to Betwa.
  - **The project is critical for the Bundelkhand region, known for its frequent droughts and water scarcity, as it will improve water availability for both irrigation and domestic use. Hence statement 2 is correct.**
  - The Bundelkhand region, spanning parts of Madhya Pradesh and Uttar Pradesh, is known for its semi-arid climate and frequent droughts. The region's agriculture, heavily dependent on rainfall, often suffers from water shortages. This makes it necessary to improve water resources for irrigation and domestic use.
- The primary infrastructure of the project includes the construction of the Daudhan Dam on the Ken River. Water from the dam will be transferred through a canal system to the Betwa River.
  - **The project also includes the construction of hydropower plants, with an installed capacity of 72 megawatts (MW) from Daudhan Dam. Hence statement 3 is correct.**
- One of the major challenges has been the environmental impact, particularly the submergence of parts of the Panna Tiger Reserve.

Q 87.C

- **Synthetic medical images are AI-generated images created without using traditional imaging devices like MRI, CT scans, or X-rays. Hence, statement 1 is correct.**
  - These images are constructed using mathematical models or AI techniques, such as generative adversarial networks (GANs), diffusion models, and autoencoders.
- **Advantages offered**
  - **Intra- and Inter-Modality Translation**: Generate images from the same or different types of scans, helping when certain scans are unavailable.
  - **Privacy Protection: Created without patient data, reducing privacy concerns** and easing data sharing for research**. Hence, statement 2 is correct.**
  - **Cost and Time Efficiency**: Synthetic images are quicker and cheaper to generate compared to real medical scans.
  - **Scalability:** Easier to produce large volumes of medical data for AI training and research.
- **Challenges posed**
  - **Potential for Misuse**: Could be used to create medical deepfakes, leading to fraudulent claims or fake clinical findings.
  - **Lack of Real-World Complexity**: May not capture subtle details found in real medical data, potentially lowering diagnostic accuracy.
  - **Truth Erosion**: Relying too heavily on synthetic data may distort AI models, leading to diagnoses that don't align with real-world cases.
  - **Ethical and Regulatory Concerns**: Questions around how these images should be controlled and monitored to avoid misuse.

Q 88.C

- **North-South Transport Corridor (NSTC):**
  - **This corridor connects India to Europe via Iran and Russia**. The NSTC is a strategic trade route aimed at improving connectivity between South Asia, Central Asia, Russia, and Europe. The primary route runs from Mumbai, India to Bandar Abbas, Iran, and then connects to Russia through the Caspian Sea. From there, goods are transported further into Europe. **Hence pair 1 is correctly matched.**
  - **Purpose:** The NSTC is aimed at reducing transit time and costs for India's trade with Europe, bypassing traditional sea routes such as the Suez Canal.
  - **Significance**: The corridor is part of India's effort to enhance its economic ties with Central Asia, Russia, and Europe.
- **East-West Economic Corridor (EWEC):**
  - **The East-West Economic Corridor connects Vietnam to Myanmar but also passes through Laos and Thailand**. It spans the Mekong region, linking the South China Sea at Da Nang in Vietnam with the Andaman Sea in Myanmar. **Hence pair 2 is correctly matched.**
  - **Purpose:** EWEC is crucial for promoting economic integration, trade, and transport across Southeast Asia, particularly among the Greater Mekong Subregion (GMS) countries.
  - **Significance:** The EWEC facilitates regional trade and strengthens economic ties between the Southeast Asian nations.
- **The Lapis Lazuli Corridor**
  - The Lapis Lazuli Corridor, a trans-Eurasian trade route **linking Afghanistan to Europe via Turkmenistan, Azerbaijan, Georgia, and Turkey,** has seen increasing regional significance. **Hence pair 3 is correctly matched.**
  - It is named after the Lapis Lazuli gemstone, historically significant in Afghan exports.
  - **Initially signed in 2017 to enhance Afghanistan's access to European markets, the corridor offers an alternative to other traditional transit routes.**
  - This route is becoming a strategic player amid the Russia-Ukraine conflict, **allowing goods to bypass Russia** and enhancing connectivity within Central and South Asia.
  - Major investments have bolstered infrastructure, including railways, roads, and port facilities, with extensions to ports such as Turkmenbashi and Baku. Despite challenges posed by regional instability, particularly in Afghanistan, the corridor's multimodal structure—including **overland routes**, **Caspian Sea ferry links, and railways across the South Caucasus—facilitates trade flows from Asia to Europe.**

Q 89.B

- **Central Plateau and Hills Region:**
  - It is a large region comprising 46 districts of Madhya Pradesh, Uttar Pradesh, and Rajasthan. It is sub-divided into 14 sub-regions having varied topography of low hills, mounds, valleys, and ravines. Nearly one-third of land is not available for cultivation. Irrigation intensity and cropping intensity are low, and cropping is dominated by food crops. The undulating topography, underdeveloped irrigation potential, and large proportion of rainfed farming suggest water conservation, crop diversification, ground water development and input supplies and services to be main measures necessary for proper development and growth of the region.
  - This region spreads over Bundelkhand, Baghelkhand, Bhander plateau, Malwa plateau and Vindhyachal hills. **The climate is semi-arid in western part to subhumid in eastern part with temperature in July month 26°C-40°C, in January month 7°C-24°C and average annual rainfall from 50 cm- 100 cm. Soils are mixed red, yellow and black growing crops like millets, gram, barley, wheat, cotton, sunflower, etc.** The region has dearth of water resources. The suggested measures should include water conservation through water saving devices like sprinklers and drip system; dry farming popularisation; dairy development, crop diversification, ground water development, diversion of 16 lakh ha of low value crops to high value crops, reclamation of ravine lands and improvement in indigenous breed cattle. **Hence options 1 and 2 are correct.**
- **Western Plateau and Hills Region:**
  - **This comprises southern part of Malwa plateau and Deccan plateau (Maharashtra).** This is a region of the regard soil with July temperature between 24°C-41 °C, January temperature between 6°C- 23°C and average annual rainfall of 25 cm-75 cm. Net sown areas is 65 per cent and forests occupy only 11 per cent. Only 12.4 per cent area is irrigated. Jowar, cotton, sugarcane, rice, bajra, wheat, gram, pulses, potato, groundnut and oilseeds are the principal crops. **The area is known for its oranges, grapes and bananas. Hence options 3 and 4 are not correct.**

Q 90.D

- **Aluminum Smelting Industry:** Aluminum smelting is an energy-intensive process that requires specific conditions to minimize production costs. Smelting converts alumina (derived from bauxite ore) into aluminum, and the process consumes vast amounts of electricity, making certain factors more crucial than others in determining the industry's location.
- **Key Factors:**
  - **Access to Cheap Sources of Energy**
    - **Importance**: Aluminum smelting is **one of the most energy-demanding industrial processes,** and **electricity constitutes a significant portion of production costs.** For this reason, aluminum smelting plants **are often located near abundant and inexpensive sources of energy** (e.g., hydroelectric power plants or regions with cheap electricity).
    - **Influence:** Highly influential. This factor plays a critical role in determining the location of smelting industries. In regions like Iceland and Canada, aluminum smelting industries are often located near hydropower plants due to the availability of cheap, renewable energy.
  - **Proximity to Skilled Labor Supply:**
    - **Importance:** While labor is an important factor for many industries, aluminum smelting is heavily mechanized, and it does not require a large, specialized workforce in close proximity. Skilled labor may be required for plant management, maintenance, and technological operations, but it is not a major factor compared to energy and raw material accessibility.
    - **Influence:** Moderately influential. Though some level of skilled labor is needed, aluminum smelting plants do not rely heavily on being near large urban areas with abundant labor.
  - **Access to High-Quality Raw Materials:**
    - **Importance:** Bauxite, the primary ore for aluminum, is essential for the smelting process. The proximity to bauxite mines reduces transportation costs, making it economically viable to locate smelters near these raw material sources. However, raw material can also be shipped efficiently by sea, making it somewhat flexible.
    - **Influence:** Highly influential. Being near raw material sources, particularly bauxite mines, remains an important consideration for locating aluminum smelting plants.
  - **Proximity to a Large Urban Market:**
    - **Importance:** Proximity to large markets is often crucial **for industries that produce consumer goods**, **but aluminum smelting is more focused on production than direct sales.** Aluminum is often sold to industrial clients or for export, and it does not require being near a large urban market.

> **Influence**: **Least influential.** Given that aluminum is traded globally and transported to industrial clients, being near urban markets is not a primary concern for smelters.
> **This is the least influential factor for aluminum smelting. Hence option (d) is the correct answer.**

Q 91.C

- Thorium is a naturally occurring, slightly radioactive metal discovered in 1828 by the Swedish chemist Jons Jakob Berzelius, who named it after Thor, the Norse god of thunder. **Natural thorium is present in trace quantities in virtually all rock, soil, water, plants and animals.** Where higher concentrations occur in rock or sands, thorium may be mined and refined, producing waste products such as mill tailings. Soil contains an average of around 6 parts per million (ppm) of thorium. Thorium is very insoluble, which is why it is plentiful in sands but not in seawater, in contrast to uranium. **Hence statement 1 is correct.**
- **Thorium is solid under normal conditions. There are natural and man-made forms of thorium, all of which are radioactive. In general, naturally occurring thorium exists as Th-232, Th-230 or Th-228. Hence statements 2 and 3 are correct.**
- Thorium is used to make ceramics, welding rods, camera and telescope lenses, fire brick, heat resistant paint and metals used in the aerospace industry, as well as in nuclear reactions. Thorium has the potential to be used as a fuel for generating nuclear energy. Since thorium is naturally present in the environment, people are exposed to tiny amounts in air, food and water. The amounts are usually very small and pose little health hazard.
- Most people are not exposed to dangerous levels of thorium. However, people who live near thorium mining areas or near certain legacy industrial facilities may have increased exposure to thorium. Occasionally, household items may be found with thorium in them, such as some older ceramic wares in which uranium and thorium were used in the glaze. These generally do not pose serious health risks, but may nevertheless be retired from use as a prudent avoidance measure.

Q 92.D

- **Wheat:** This is the second most important cereal crop. It is the main food crop, in north and north-western part of the country. This rabi crop requires a cool growing season and a bright sunshine at the time of ripening. It requires 50 to 75 cm of annual rainfall evenly distributed over the growing season. There are two important wheat-growing zones in the country – the Ganga-Satluj plains in the northwest and black soil region of the Deccan. The major wheat-producing states are Punjab, Haryana, Uttar Pradesh, Bihar, Rajasthan and parts of Madhya Pradesh.
- **Rice:** Cotton is one of the most important commercial crops cultivated in India and accounts for around 25% of the total global cotton production. In India, around 67% of India's cotton is grown on rain-fed areas and 33% on irrigated areas. Cotton cultivation necessitates a hot, and sunny climate with a long frost-free period. It is most productive in warm and humid climatic conditions. Cotton can be successfully grown in a range of soil types, including well-drained deep alluvial soils in northern regions, variable-depth black clayey soils in the central region, and mixed black and red soils in the southern zone.
- **Millets:** Jowar, bajra and ragi are the important millets grown in India. Though, these are known as coarse grains, they have very high nutritional value. For example, ragi is very rich in iron, calcium, other micronutrients and roughage. Jowar is the third most important food crop with respect to area and production. It is a rain-fed crop mostly grown in the moist areas which hardly needs irrigation. Major Jowar-producing States were Maharashtra, Karnataka, Andhra Pradesh and Madhya Pradesh. Bajra grows well on sandy soils and shallow black soil. Major Bajra producing States were: Rajasthan, Uttar Pradesh, Maharashtra, Gujarat and Haryana.
- **Maize:** It is a crop which is used both as food and fodder. It is a kharif crop which requires temperature between 21°C to 27°C and grows well in old alluvial soil. In some states like Bihar: Maize Cultivation maize is grown in rabi season also. Use of modern inputs such as HYV seeds, fertilisers and irrigation have contributed to the increasing production of maize. Major maize-producing states are Karnataka, Uttar Pradesh, Bihar, Andhra Pradesh, Telangana and Madhya Pradesh.
- **Hence option (d) is the correct answer.**

Q 93.B

- **Recent Context:** Taiwanese authorities recently stated that the People's Liberation Army (PLA) is using an 'anaconda strategy' to put pressure on Taiwan.
- **China's Military Maneuvers around Taiwan**
  - China has been steadily increasing its military activities around Taiwan, both by air and sea:

> Air incursions into the Taiwan Strait have increased significantly, from 36 incursions in January to 193 in September.
> Chinese ships operating around Taiwan has also risen, from 142 in early 2024 to 282 by August.
> These maneuvers seem designed to wear down Taiwan's navy and air force, creating constant pressure.

- **What is the Anaconda Strategy?**
  - **The 'Anaconda Strategy' involves a combination of military tactics, psychological pressure, and cyber warfare**. The goal is to weaken Taiwan's defenses and force the island into submission without the need for a full-scale invasion. **Hence, option (b) is the correct answer.**

Q 94.C

- **Coal in India occurs in two important types of coal fields. They are the Gondwana coal fields and Tertiary coal fields.** Out of the total coal reserves and production in India, Gondwna coal fields contribute 98% and the rest 2% is produced by tertiary coal fields. The Gondwana coalfields are located in the sedimentary rock systems of the lower Gondwana Age.
- They are distributed chiefly in the river valleys of the Damodar (Jharkhand - West Bengal); the Son (Madhya Pradesh-Chhattisgarh); the Mahanadi (Odisha), the Godavari (Andhra Pradesh and Telangana) and the Wardha (Maharashtra). Tertiary coalfields occur in the extra-peninsular areas which include Assam, Meghalaya, Nagaland, Arunachal Pradesh, Jammu & Kashmir and Sikkim. Besides lignite or brown coal are found in coastal areas of Tamil Nadu, Gujarat and in land basins of Rajasthan.

- **Hence option (c) is the correct answer.**

Q 95.B

- **Largest reserves/resources of copper ore to the tune of 813 million tonnes (53.81%) are in the State of Rajasthan followed by Jharkhand with 295 million tonnes (19.54%) and Madhya Pradesh with 283 million tonnes (18.75%).** In Rajasthan, copper deposits are located in the districts of Jhunhunu, Sikar, Sirohi, Udaipur, Bhilwara, Ajmer, Alwar, Bharatpur, Chittorgarh, Rajsamand and Dungarpur with **Khetari and Kolihan as major production centres. Hence statement 1 is correct.**
- **Malanjkhand, also referred to as MCP (Malanjkhand Copper Project), is an open-pit copper mine in India, located near the town of Balaghat in Madhya Pradesh.** It is located nearby to the Kanha National Park. It is the **largest base metal mine** in India. **Hence statement 2 is not correct.**
- Currently, three major players dominate the Indian copper industry. Hindustan Copper Limited (HCL) in Public Sector, M/s Hindalco Industries Ltd and M/s Vedanta in private sector. **HCL is the only producer of copper ore in the country**, Vedanta Limited and Hindalco Industries Ltd produce copper metal from imported copper concentrates. **Hence statement 3 is correct.**

Q 96.B

- India has significant reserves of uranium, which is a critical resource for the country's nuclear energy program.
- Uranium is a heavy metal with the symbol U and atomic number 92. It is naturally radioactive and has been used as a critical energy source, especially in nuclear power and nuclear weapons.
- Key Uranium Mines in India
  - **Jaduguda Mine** (Jharkhand): India's oldest and most significant uranium mine, operational since 1967.
  - Bhatin Mine (Jharkhand): Located near Jaduguda, operational since 1986.
  - **Narwapahar Mine (Jharkhand): Modern trackless mine, opened in 1995.**
  - **Turamdih Mine (Jharkhand): Operational since 2003, with nearby processing facilities.**
  - Tummalapalle Mine (Andhra Pradesh): One of the world's largest uranium reserves, operational since 2012.
  - Bagjata Mine (Jharkhand): Reopened in 2008.
  - **Mohuldih Mine (Jharkhand): Opened in 2012.**
- **Hence option (b) is the correct answer.**

Q 97.D

- Mediterranean climate occurs around the Mediterranean Sea, along the **west coast of continents in subtropical latitudes** between 30° - 40° latitudes, e.g., Central California, Central Chile, along the coast in southeastern and south-western Australia. These areas come under the influence of sub-tropical highs in summer and westerly wind in winter. Hence, the climate is characterized by a **hot, dry summer** and a **mild, rainy winter.** The main features of Mediterranean agriculture are orchard farming, viticulture, **cereal** and **vegetable cultivation**. Products grown include olives, pomegranates, oranges, figs, pears, grapes, etc. **Viticulture** is a tradition in the Mediterranean region, and the Regions bordering the Mediterranean Sea account for three-quarters of the world's production of wine. The Mediterranean lands are also known as the **world's orchard lands**, with a wide range of citrus fruits like lemon and limes grown. The **olive tree** is probably the most typical of all Mediterranean cultivated vegetation. Olive oil extracted is a valuable source of cooking oil in a region deficient in animal fat.
- **Hence option (d) is the correct answer.**

Q 98.B

- **Satellite Town:**
  - A satellite town is a smaller town or city that is located near a larger metropolitan area. It is typically independent in terms of governance but functions closely with the larger city, primarily serving as a residential area for people who work in the main city. Satellite towns develop their own infrastructure, economic base, and services, but remain closely linked to the urban core through transportation networks, with many residents commuting daily to work in the larger city.
- **Features of Satellite Towns**
  - **Proximity to Larger Cities:**
    - Satellite towns are often located just outside the metropolitan limits of a larger city. They differ from suburbs, **which are usually continuous extensions of the main urban area.** Satellite towns, on the other hand, are distinct entities but are connected to the main city through well-developed transportation systems, allowing people to commute daily.

    - > **Example:** Gurgaon (now Gurugram), located near Delhi, functions as a satellite town, providing housing, commercial spaces, and employment opportunities while still being economically linked to Delhi.
  - **Residential Purpose:**
    - > While satellite towns do have their own infrastructure, housing, and sometimes even industries, **their primary function is often residential.** People who work in the main city find these towns to be an attractive alternative to the crowded urban core, thanks to cheaper housing and better living conditions. Satellite towns also tend to have lower population densities than central cities. **Hence option (b) is the correct answer.**
  - **Economic and Infrastructure Growth:**
    - > **Over time, many satellite towns grow into urban hubs themselves, with their own industries, offices, and commercial spaces.** They can evolve into self-sufficient towns with their own economic base, schools, hospitals, and services, reducing the need for residents to commute to the larger city.
    - > **Example**: Noida and Faridabad are satellite towns of Delhi that have grown into major employment hubs, with industries such as IT, real estate, and manufacturing thriving in these areas.
  - **Development to Reduce Urban Congestion:**
    - > Satellite towns are often part of a government or urban planning initiative to decongest major cities. By developing infrastructure and housing in nearby areas, these towns reduce the pressure on central cities, balancing the population distribution in a region.
    - > **Example: Navi Mumbai was developed to decongest the city of Mumbai and now stands as a significant residential and industrial hub.**

Q 99.B

- **Recent Context:** Atmospheric rivers are shifting toward higher latitudes which is reshaping global weather pattern.
- **About Atmospheric rivers**
  - They are **long, narrow bands in atmosphere that transport most of the water vapor outside the tropics**. They play a critical role in replenishing water supplies.
  - One **main reason for this shift is changes in sea surface temperatures in the eastern tropical Pacific.** Since 2000, waters in the eastern tropical Pacific have had a cooling tendency, which affects atmospheric circulation worldwide. This cooling, often associated with La Nina conditions, pushes atmospheric rivers toward the poles.
  - During **La Nina conditions,** when sea surface temperatures cool in the eastern tropical Pacific, the Walker circulation — giant loops of air that affect precipitation as they rise and fall over different parts of the tropics — strengthens over the western Pacific. This stronger circulation causes the tropical rainfall belt to expand. The expanded tropical rainfall, combined with changes in atmospheric eddy patterns, results in high-pressure anomalies and wind patterns that steer atmospheric rivers farther poleward.
- **Consequences of Shifting**
  - **Subtropical areas may experience longer droughts and reduced water supplies, impacting agriculture. Hence, statement 2 is correct.**
  - **Higher latitude regions** may witness **more extreme rainfall,** flooding and landslides**. Hence, statement 1 is correct.**
  - More atmospheric rivers could **speed up sea-ice melting in Arctic**, contributing to global warming and affecting wildlife. **Hence, statement 3 is not correct.**

Q 100.D

- India has made significant strides in the renewable energy sector, with solar energy emerging as a key focus area.
- **Currently the installed capacity of Solar energy in India is 90.7 GW. Hence statement 1 is not correct**.
  - Ground Mounted Solar Plant : 70.05 GW
  - Grid Connected Solar Rooftop: 14.30 GW
  - Hybrid Projects(Solar Component) : 2.63 GW
  - Off-Grid Solar: 3.78 GW

- While Gujarat is a significant contributor to India's solar energy production, **Rajasthan currently holds the top position in terms of installed solar capacity (24.1 GW).** Rajasthan benefits from vast stretches of desert land with high solar insolation, making it an ideal location for large solar power plants.
    - **Gujarat has a share of 15 GW of Solar Power capacity. Hence statement 2 is not correct.**
- **Bhadla Solar Park is the largest solar power plant in India and is located in Rajasthan, not Gujarat. The park has a capacity of over 2.2 GW and covers thousands of acres, making it one of the largest in the world. Hence statement 3 is not correct.**
    - The strategic location of the park in the desert of Rajasthan, with high solar radiation levels, enables optimal solar energy generation.