MANTHAN 2.0

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Contents

Career Launcher

1. India has signed 13 free trade agreements with UK

- India has signed 13 free trade agreements (FTAs) and six preferential pacts with its trading partners to promote exports of goods and services, besides ensuring greater market access for the domestic industry.
- Since 2014, the country has signed three such agreements with Mauritius, the UAE and Australia, and EFTA (European Free Trade Association). India is actively negotiating similar pacts with the UK and EU.
- On February 24, Commerce and Industry Minister Piyush Goyal and UK Secretary of State for Business and Trade Jonathan Reynolds announced resumption of negotiations for the proposed FTA between the two countries.
- The India-UK negotiations are resuming after a gap of over eight months. The talks were launched on January 13, 2022. So far 14 rounds of talks have been completed.

What is an FTA?

- A free trade agreement is a pact between 2 or more countries to eliminate or reduce import duties on a maximum number (90-95 per cent) of goods traded between them. It also aims to minimize non-trade barriers on a significant portion of imports from partner nations while easing regulations to boost service exports and bilateral investments.

What are the different types of trade agreements?

- FTAs are sometimes referred to by different names depending on their scope and depth of economic cooperation.
- These include PTA (preferential) or RTA (regional), or BTA (bilateral).
- WTO uses the abbreviation RTA to denote all types of such economic engagements.
- In a PTA, duties are eliminated on a specified number of goods (India-Thailand).
- CECA (Comprehensive Economic Cooperation Agreement - India-Singapore) or CEPA (Comprehensive Economic Partnership Agreement - India-Korea, Japan) or TEPA (Trade and Economic Partnership Agreement) are comprehensive in nature.

What are the benefits of these pacts?

- Zero-duty entry into partner country markets helps in the diversification and expansion of export markets.
- Level playing field vis-a-vis competitors who may have already entered FTAs with partner countries

How do countries protect the interest of domestic companies in these agreements?

- FTAs provide for maintaining sensitive, negative or exclusion lists of items on which limited or no tariff concessions are granted.
- Also, in case of surge in imports and injury to the domestic industry, a country is allowed to take recourse to trade remedial measures such as anti-dumping and safeguards on imports.

With which countries has India signed these pacts?

- India has inked trade deals with Sri Lanka, Bhutan, Thailand, Singapore, Malaysia, Korea, Japan, Australia, the UAE, Mauritius and ASEAN and EFTA blocs.
- According to think tank Global Trade Research Initiative (GTRI), India has shifted its FTA focus from eastern (ASEAN, Japan, Korea) to western partners after securing deals with key Asian economies.

India is now prioritizing FTAs with the UK, EU, and US to expand exports and strengthen trade ties with major western economies.

What is the aim of India-UK FTA?

- To boost trade and investment by reducing tariff and non-tariff barriers and improving market access.
- It would also help expand opportunities in technology, healthcare, and education.

What gains would India achieve from the FTA in merchandise trade?

- In FY24, India's merchandise exports to the UK were valued at USD 12.9 billion.
- GTRI Founder Ajay Srivastava says the pact is expected to have a limited impact on increasing these exports because over half of Indian products already enter the UK with low or no tariffs.
- The average tariff on goods imported from India into the UK is 4.2 per cent. There won't be any benefit from reducing duties for Indian products worth USD 6.8 billion, as they already face no tariffs in the UK, even without the FTA.
- These products include petroleum products, medicines, diamonds, machine parts, airplanes, and wooden furniture, he said.
- However, there will be gains from reducing duties for Indian exports valued at USD 6.1 billion, such as textiles, apparel (shirts, trousers, women's dresses, bed linen), footwear, carpets, cars, marine products, grapes, and mangoes. These products face relatively low to moderate tariffs in the UK.
- GTRI said that India's merchandise imports from the UK were USD 8.4 billion in FY24. UK exports of USD 7.6 billion covering 91 per cent value of total merchandise imports from the UK enter India on payment of average to high tariffs duties. For example, the tariff on cars is 100 per cent and on scotch whisky and wines it is 150 per cent. The simple average tariff in India on goods imported from the UK is 14.6 per cent.
- The UK products that are expected to gain from this FTA include precious metals, cars, make-up items, metal scrap, petroleum products, scotch and other alcohol, machinery and integrated circuits.

What are the major demands of India and the UK in this FTA?

- India is looking for greater access for its students and professionals in the UK market, social security agreement, besides market access for several goods at nil customs duty. On the other hand, the UK is seeking a significant cut in import duties on goods such as scotch whiskey, electric vehicles, lamb meat, chocolates and certain confectionary items.
- Britain is also looking for more opportunities for UK services in India in segments like telecommunications, legal and financial services, including banking and insurance.

What is the proposed bilateral investment treaty (BIT) between India and the UK?

- BITs help promote and protect investments in each other's countries. One key difference in these negotiations is the mechanism for settling disputes. India wants foreign firms to exhaust local judicial remedies before resorting to international arbitration, but its partners resist due to the lengthy nature of Indian judicial proceedings.
- GTRI says that no conclusive research is available to show a link between signing of BIT and increase in investments, though it provides an assurance to investors against arbitrary changes in rules and hence promote investments.

QUESTIONS

Fill in the Blank:

1. India has signed _____ free trade agreements (FTAs) and six preferential pacts with its trading partners.

2. Since 2014, India has signed FTAs with Mauritius, the UAE, Australia, and _____.
3. A free trade agreement (FTA) is a pact between two or more countries to eliminate or reduce import duties on _____ to _____ per cent of goods traded between them.
4. In a _____, duties are eliminated on a specified number of goods, such as in the India-Thailand agreement.
5. India's FTA focus has shifted from eastern partners like ASEAN, Japan, and Korea to western partners such as _____, _____, and the US.
6. The India-UK FTA aims to boost trade and investment by reducing _____ and _____ barriers.
7. In FY24, India's merchandise exports to the UK were valued at _____ billion USD.
8. Indian exports such as _____, _____, and _____ are expected to benefit from reduced duties under the India-UK FTA.
9. The UK is seeking a significant cut in import duties on goods such as scotch whiskey, _____, lamb meat, chocolates, and certain confectionery items.
10. The proposed Bilateral Investment Treaty (BIT) between India and the UK aims to promote and protect _____, but negotiations face challenges regarding the dispute settlement mechanism.

2. SPHEREx, NASA's new space telescope

- National Aeronautics and Space Administration (NASA) is tentatively scheduled to launch its new megaphone-shaped space telescope aboard a SpaceX Falcon 9 rocket from Vandenberg Space Force Base in California.
- During its short two-year mission, the observatory will help better understand things about the formation of the universe, the growth of all galaxies across cosmic history, and the location of water and life-forming molecules in the Milky Way galaxy.

1. Will make the "most colourful" map of cosmos ever

- SPHEREx will map the universe while detecting two kinds of cosmic light, optical and infrared.
- While the human eye can see optical light, infrared light is invisible to it.
- That is an issue when it comes to studying the cosmos as it is the infrared light that contains information about the farthest reaches of space, the stars being born, and the details of galactic structures.
- To overcome this problem, scientists use specialised cameras and telescopes to study infrared which has a heat signature.
- One such instrument is the James Webb Space Telescope (JWST) whose speciality is infrared and it helps show things in the universe that have remained hidden so far.
- Notably, the Hubble Space Telescope's speciality is optical, not infrared light.
- While JWST is great at observing highly localised regions of the universe, SPHEREx will image the entire sky as seen from Earth.

2. Will shed light on a cosmic phenomenon called inflation

- One of the primary aims of SPHEREx will be to measure something called cosmic inflation.
- It refers to a period which took place around 14 billion years ago, during which the universe expanded faster than the speed of light for a fraction of a second. Scientists suggest that inflation explains many aspects of the universe such as its flatness, or lack of curvature, on the largest scales.

- However, cosmic inflation remains poorly understood. SPHEREx can help change that. The telescope will use spectroscopic images to measure the 3D positions of about 450 million galaxies across cosmic history.
- "Astronomers will then create a picture of the cosmos not just in position but in time. This, plus a lot of statistics and mathematics, will let the SPHEREx team test different theories of inflation,".

3. Will explore the Milky Way galaxy to identify water- and life-forming molecules

- SPHEREx will identify water- and life-forming molecules, also known as biogenic molecules (such as carbon, hydrogen, and oxygen), in the Milky Way galaxy, where the Earth is located.
- These molecules are frozen in icy particles which are located in some of the coldest parts of the galaxy. For life to form on Earth, the biogenic molecules would have to somehow travel from these regions to the planet. However, scientists are yet to know exactly how this process happened.
- The new telescope will help resolve the mystery as it will provide a complete census of the icy biogenic molecules in the Milky Way galaxy. SPHEREx will locate these molecules not only in this galaxy but also in nearby systems.

Milky Way

- The Milky Way is the barred spiral galaxy that contains our solar system. It is a vast structure composed of billions of stars, planets, gas clouds, and dark matter, stretching approximately 100,000–200,000 light-years in diameter.

Structure

- It has a galactic center surrounded by a dense bulge of stars.
- Four main spiral arms (Perseus, Scutum-Centaurus, Sagittarius, and Norma) extend outward.
- A halo of globular clusters and dark matter surrounds the galaxy.

Position of the Solar System

- The solar system is located in the Orion Arm, about 27,000 light-years from the galactic center.
- The Sun orbits the Milky Way's center once every 225–250 million years.

Supermassive Black Hole

- At its core, the Milky Way harbors a supermassive black hole, Sagittarius A*, with a mass of about 4 million Suns.

Number of Stars

- The Milky Way contains 100–400 billion stars, with new stars forming in nebulae.

Galactic Motion & Evolution

- The Milky Way is part of the Local Group, a collection of over 54 galaxies, including the Andromeda Galaxy.
- It is on a collision course with Andromeda, expected to merge in about 4.5 billion years.

Dark Matter & Dark Energy Influence

- About 85% of the galaxy's mass is believed to be dark matter, which shapes its structure and motion.

NASA and recent Developments

- The National Aeronautics and Space Administration (NASA) is the United States government agency responsible for the nation's civilian space program and for aeronautics and aerospace research.
- Established in 1958, NASA has been at the forefront of space exploration, scientific discovery, and technological innovation.

Lunar Exploration

- On February 27, 2025, NASA successfully launched the Lunar Trailblazer satellite aboard a SpaceX Falcon 9 rocket from Kennedy Space Center in Florida.
- This mission aims to map and identify water on the Moon's surface, particularly in the permanently shadowed craters at the lunar poles.
- The data collected will be crucial for future long-term lunar exploration, including potential bases, as lunar water can be converted into drinking water, breathable oxygen, and rocket fuel.

Collaborations with Private Companies

- NASA continues to collaborate with private companies to advance lunar exploration. Intuitive Machines, a Texas-based space company, is set to launch its Nova-C lander named Athena to the Moon.
- This mission aims to establish the first 4G network on the Moon using Nokia's Lunar Surface Communication System, which could transmit images and videos from the lunar surface.
- Such collaborations are part of NASA's Commercial Lunar Payload Services program, which includes various scientific investigations to support future lunar exploration.

Organizational Changes

- Since President Donald Trump's return to office, NASA faces a review and potential budget cuts by the Department of Government Efficiency (DOGE), led by Elon Musk.
- This review may impact missions such as Artemis, which aims to return humans to the Moon and establish a sustainable presence.
- The potential cancellation of Artemis could affect international collaborations and the broader goals of lunar exploration.

QUESTIONS

Fill in the Blank:

1. NASA's new space telescope, SPHEREx, is tentatively scheduled to launch aboard a _____ rocket from Vandenberg Space Force Base in California.
2. SPHEREx will map the universe while detecting two kinds of cosmic light, _____ and _____.
3. Unlike the Hubble Space Telescope, which specializes in optical light, the James Webb Space Telescope (JWST) specializes in _____ light.
4. One of SPHEREx's primary goals is to study cosmic _____, a phenomenon that took place around 14 billion years ago when the universe expanded faster than the speed of light.
5. SPHEREx will create a 3D map of about _____ million galaxies across cosmic history.
6. The telescope will also help locate water- and life-forming molecules, known as _____ molecules, in the Milky Way galaxy.
7. The Milky Way is classified as a _____ galaxy that contains billions of stars, planets, gas clouds, and dark matter.
8. At the center of the Milky Way, there is a supermassive black hole known as _____, with a mass of about 4 million Suns.
9. NASA successfully launched the Lunar Trailblazer satellite on February 27, 2025, to map and identify _____ on the Moon's surface.
10. As part of NASA's collaboration with private companies, Intuitive Machines is set to launch the Nova-C lander named _____, which aims to establish the first 4G network on the Moon.

3. Trump's 'Gold Card' US visa

- President Donald Trump has announced a visa program called "Gold Card" for foreign investors seeking permanent residency in the United States, and ultimately American citizenship.
- "We are going to be selling a Gold Card," Trump said. "We are going to be putting a price on that card of about $5 million. It's going to give you Green Card privileges, plus it's going to be a route to (American) citizenship, and wealthy people would be coming into our country by buying this card," he said.
- The scheme, the details of which would be known in two weeks, would replace the EB-5 immigrant investor visa program, Trump said.

EB-5 vs Gold Card

- The EB-5 program, created by Congress in 1990 and administered by the US Citizenship and Immigration Services (USCIS), grants permanent residency (Green Card) to foreigners who invest in American businesses. Investors must put in at least $1.05 million ($800,000 in certain specific cases), and create at least 10 jobs for Americans.
- While details are not known yet, it appears that the Gold Card will not require an investment in American businesses or the creation of new employment. It could simply be a direct purchase of a Green Card by paying a flat fee of $5 million to the US government.
- It appears likely that the USCIS will administer and regulate the issuance of the Gold Card as well. USCIS will likely work with the Department of State and Department of Commerce to administer the investment side of the scheme. Processing times are expected to be short to incentivise the scheme.

Likely benefits to the US

- It could be argued that the "clear and simple" route to residency offered by the scheme will bring high-net-worth individuals to America, whose investments will stimulate the US economy.
- High-net-worth immigrants often invest in real estate, luxury markets, and businesses.
- The program could be seen as putting American citizenship on sale, favouring money over merit, catering to the rich at the expense, perhaps, of talented professionals.
- Immigration programs with an investment component can be vulnerable, in the absence of strong regulatory checks, to possible money laundering and undue foreign influence.
- If the Gold Card comes without a requirement to invest "in jobs-creating enterprises", passive investors could gain residence in the US with no contribution to its economy.
- The central questions remain whether US citizenship is to be put on sale, and whether US immigration policy should privilege skills, contributions, and diversity. A similar program in Canada, albeit with a much smaller investment amount, was shut down after rampant misuse.

Challenges

- **IN CONGRESS:** Any significant change to immigration policy must be approved by Congress. The Republican party currently has a majority in both houses; however, not all Republicans may want to be accused of selling American citizenship. Democrats will almost certainly oppose the proposal.
- **IN COURTS:** Most legal challenges in visa programs originate from the administration of the program, rather than the program itself. It is too early to guess what legal challenges Trump's Gold Card may face.

Indians and Gold Card

- In the 2023 financial year, only 631 Indians obtained US Green Cards through the EB-5 program using consular processing.
- Given this small number for a scheme where the investment required is only about $1 million, it seems unlikely that the idea of buying a Green Card for five times that sum — more than Rs. 43 crore at the current exchange rate — will appear attractive to many Indians.

New immigration schemes across world

- As of February 2025, several countries have introduced new immigration schemes targeting various groups, from wealthy investors to skilled professionals and students.

Sweden: Financial Incentives for Voluntary Repatriation

- In late 2024, Sweden announced a plan to offer immigrants up to £26,000 to voluntarily return to their home countries.
- This is a substantial increase from the previous cap of £750 for individuals or £3,000 for families.
- The initiative reflects a significant shift in Sweden's historically liberal immigration policies, aiming to reduce irregular immigration and address domestic concerns.

Australia: Extended Post-Study Work Rights

- To address labor shortages in specific sectors, Australia extended post-study work rights for international students in 2024.
- Graduates with select bachelor's degrees can now stay for four years, master's graduates for five years, and Ph.D. holders for six years.
- Additionally, the Maitri Scholarships Program supports high-achieving students, and the Maitri Grants and Fellowships Program assists mid-career professionals, enhancing opportunities for Indian students and professionals.

Canada: Increased Immigration Targets

- Canada has set ambitious immigration goals, aiming to welcome 1.3 million immigrants over the next three years to boost post-pandemic economic growth.
- This includes granting permanent residency to over 430,000 individuals in 2022 alone.
- The country offers a smooth immigration process, making it an attractive destination for international students and professionals seeking permanent residency.

Germany: Points-Based Immigration System

- In 2023, Germany approved a points-based immigration system, implemented in stages by 2024.
- This system aims to attract skilled workers by evaluating applicants based on criteria such as education, work experience, language proficiency, and age.
- The goal is to address labor shortages and enhance economic growth by bringing in qualified professionals.

Singapore: Complementarity Assessment Framework (COMPASS)

- Singapore introduced COMPASS in 2022, a points-based immigration system for skilled applicants seeking Employment Passes.
- Effective from September 2023, COMPASS evaluates candidates on factors like qualifications, salary, and skills, ensuring they complement the local workforce. This initiative aims to maintain a balanced and competitive labor market.

European Union: Phasing Out "Golden Visa" Programs

- Several EU countries, including Spain, Portugal, and Greece, have recently scaled back or terminated their "Golden Visa" programs, which granted residency to non-EU nationals through significant property investments.
- This shift addresses concerns over housing affordability and security issues.
- For instance, Spain announced the end of its golden visa scheme, ceasing residency grants to non-EU nationals through high-value property investments.
- The Golden Visa system is a type of residency-by-investment program that allows wealthy individuals to obtain long-term residency or even citizenship in a country in exchange for a significant investment, such as real estate purchases, business investments, or government bonds. Many countries offer Golden Visas to attract foreign capital and boost their economies.

Golden Visa Systems across the World

1. Europe

- **Portugal:** Offers a Golden Visa for investments in real estate (minimum €500,000, or €280,000 in low-density areas), business creation, or investment funds. Recently, real estate investment options have been reduced.
- **Spain:** Requires a minimum €500,000 real estate investment, business creation, or a bank deposit of at least €1 million.
- **Greece:** One of the most affordable, offering residency for a €250,000 property investment (recently increased to €500,000 in major cities).
- **Italy:** Has an Investor Visa with options like a €250,000 investment in startups, €500,000 in an Italian company, or €2 million in government bonds.
- **Malta:** Offers both residency (minimum €150,000 contribution) and citizenship (€600,000 donation plus investment).
- **Cyprus:** Requires a €300,000 investment in real estate for residency. The citizenship-by-investment program was discontinued in 2020.

2. Middle East

- **United Arab Emirates (UAE):** The UAE Golden Visa is for investors, entrepreneurs, and skilled professionals (e.g., doctors, engineers, scientists) with 5- or 10-year residency options. Minimum investment: AED 2 million (~$545,000) in real estate or a business investment.
- **Saudi Arabia:** Launched a Premium Residency Program for wealthy individuals, requiring a one-time payment of $213,000 or an annual fee of $26,000.

3. Asia & Pacific

- **Singapore:** Offers a Global Investor Program (GIP) for investors who invest at least SGD 2.5 million (~$1.85 million) in a Singaporean business or fund.
- **Malaysia:** The Malaysia My Second Home (MM2H) Program offers 5- to 10-year residency to retirees and investors with minimum financial requirements.
- **Thailand:** Has an Elite Visa Program with residency from 5 to 20 years in exchange for a membership fee starting at $16,000.
- **New Zealand:** Offers an Investor Visa for investments of NZD 5 million (~$3 million) or more.
- **Australia:** Has a Significant Investor Visa requiring at least AUD 5 million (~$3.3 million) investment in the country.

4. American Continent

- **United States:** The EB-5 Immigrant Investor Program grants a Green Card in exchange for an investment of at least $800,000 in a Targeted Employment Area (rural or high-unemployment zones) or $1.05 million in a general business that creates 10 jobs.
- **Canada:** The Quebec Immigrant Investor Program (QIIP) (currently suspended) required a minimum investment of CAD 1.2 million. Other provinces have entrepreneur/investor visas.
- **Panama:** The Qualified Investor Visa offers permanent residency for an investment of $300,000+ in real estate or $500,000 in stocks.

5. Caribbean (Citizenship-by-Investment Programs – "Golden Passports")

Many Caribbean nations offer direct citizenship (not just residency) for investment:

- **St. Kitts & Nevis:** Minimum $250,000 donation or $400,000 real estate investment.
- **Dominica:** $100,000 donation or $200,000 real estate investment.
- **Antigua & Barbuda:** $100,000 donation or $400,000 real estate investment.

QUESTIONS

Fill in the Blank:

1. The new visa program announced by Donald Trump, called the _____, would allow wealthy individuals to obtain Green Card privileges for a flat fee of $5 million.
2. The proposed Gold Card program is expected to replace the existing _____ immigrant investor visa program, which requires an investment of at least $1.05 million and the creation of 10 jobs.
3. Unlike the EB-5 program, the Gold Card does not require an investment in American businesses or the creation of new _____.
4. Some critics argue that the Gold Card program may put _____ on sale, prioritizing wealth over merit in the immigration process.
5. In Congress, while the Republican Party holds a majority in both houses, the proposal may face opposition as some members may not want to be accused of _____ American citizenship.
6. In Sweden, a new policy announced in 2024 offers immigrants up to £26,000 for voluntary _____ to their home countries.
7. Australia has extended post-study work rights, allowing Ph.D. holders to stay for _____ years after graduation to address labor shortages.
8. The European Union has been phasing out _____ programs, which previously granted residency to non-EU nationals in exchange for large real estate investments.
9. The UAE Golden Visa offers 5- or 10-year residency options for investors, entrepreneurs, and _____ professionals, such as doctors and scientists.
10. In the Caribbean, nations like St. Kitts & Nevis and Dominica offer direct _____ in exchange for investment, allowing individuals to obtain a second passport.

4. Telangana Backward Classes quota: 3 SC judgements behind the 50% ceiling on reservations

- In March, the ruling Congress party in Telangana will likely table a Bill to increase reservations for Backward Classes from 25% to 42% in the state.
- This would increase overall reservations in the state to 62% in local bodies, public employment, and public education.
- Ahead of the 2023 elections, current Chief Minister Revanth Reddy signed the 'Kamareddy Declaration' which promised this increase in reservations.
- However, even if the Bill passes it will likely meet the same challenge the Bihar government faced last year when it tried to increase its overall quota.
- The 50% ceiling for reservations was laid down by the Supreme Court in 1992, and was invoked by the Patna High Court to strike down the law in July 2024.

Dr Ambedkar's efforts to strike a balance

- During the Constituent Assembly Debate for what would eventually become Article 16 of the Constitution of India, Dr B R Ambedkar discussed the concept of "equality of opportunity" at length. Article 16 allows states to reserve "appointments or posts in favour of any backward class of citizens" who are not adequately represented in public services.
- While Dr Ambedkar was clearly and staunchly in favour of reservations, he was tasked with achieving a balance that would satisfy those who believed such measures shouldn't be adopted in the first place.
- Dr Ambedkar posed a hypothetical question to the assembly.
- If 70% of posts were reserved and only 30% were unreserved in public employment, would that satisfy the principle of "equality of opportunity"?
- He immediately answered his own question, stating "It cannot be, in my judgment".
- He then floated an idea: "Therefore the seats to be reserved…must be confined to a minority of seats."
- By stating that reservations should be confined to "a minority of seats", Dr. Ambedkar effectively laid the groundwork for the 50% ceiling that the Supreme Court would eventually adopt.

Significant Supreme Court judgements to shape the 50% quota as we know it today

M R BALAJI vs STATE OF MYSORE (1962)

- In 1962, the Supreme Court struck down an order by Mysore state reserving 68% of seats in engineering and medical colleges for students from backward classes, Scheduled Castes (SC) and Scheduled Tribes (ST).
- In M R Balaji v. State of Mysore, 23 students had challenged the state order, claiming they would be entitled to admission if not for the order.
- In its ruling, the court held that reservations under Articles 15 and 16 must be within "reasonable limits".
- It went on to say "Speaking generally and in a broad way, a special provision should be less than 50%", putting a hard number to the principle first brought up by Dr. Ambedkar.

- However, the court also clarified, "The actual percentage must depend upon the relevant prevailing circumstances in each case".

STATE OF KERALA vs N M THOMAS (1976)

- In 1976, a seven-judge bench in State of Kerala v. N M Thomas weighed on a challenge to a temporary exemption for Scheduled Caste and Scheduled Tribe employees from the requirement to pass a special departmental test for promotions.
- With five judges in the majority, the court upheld the temporary exemption. Justice Fazl Ali held that the exemption was "fully justified" and stated that the only way to achieve the objective of equality in Articles 14 and 16 "is to boost up the backward classes by giving them concessions, relaxations, facilities, removing handicaps and making suitable reservations so that the weaker sections may compete with the more advanced and in due course become equals and backwardness is banished forever".
- The court also questioned the 50% ceiling proposed in M R Balaji. Justice Ali said the 50% ceiling was merely "a rule of caution" and employed his own numbers-based hypothetical to explain when the ceiling could be breached.

INDRA SAWHNEY v UNION OF INDIA (1992)

- In Indra Sawhney v. Union of India (1992), the court heard a challenge to the Centre's decision to implement the recommendations of the Mandal Commission by introducing a 27% quota for Socially and Economically Backward Classes.
- While upholding the quota, the nine-judge Constitution bench also reiterated the 50% ceiling for SC, ST and Backward Class reservations, though the judges had different ideas on its rigidity.
- Justice B P Jeevan Reddy (writing for himself and three others in the majority) held that this ceiling "has not been held to be inflexible or inviolable for all times to come" and that in certain "exceptional circumstances" the ceiling could be breached to ensure representation for the most marginalised communities.

Has the 50% ceiling ever been breached?

- Over the years, states have routinely attempted to provide reservations exceeding the 50% ceiling. However, these attempts have repeatedly fallen short after court involvement.
- In 2021, the Supreme Court struck down the Socially and Educationally Backward Classes Act, 2018 in Maharashtra which provided reservations to the Maratha community which led to a breach of the 50% ceiling.
- Among other reasons for striking the Act down, Justice Ashok Bhushan held that the 50% ceiling had gained the status of law and none of the material supplied showed any 'exceptional circumstances' to justify a breach.

Article 16 of the Indian Constitution: Equality of Opportunity in Public Employment

- Article 16 of the Indian Constitution guarantees equality of opportunity in matters of public employment. It ensures that no citizen is discriminated against in government jobs based on religion, caste, sex, descent, place of birth, or residence, with certain exceptions for affirmative action.

1. Article 16(1) – Equal Opportunity in Employment

- "There shall be equality of opportunity for all citizens in matters relating to employment or appointment to any office under the State."
- This ensures that every Indian citizen has an equal right to apply for government jobs.
- The government cannot arbitrarily deny employment to any citizen based on subjective criteria.

2. Article 16(2) – Prohibition of Discrimination

- "No citizen shall, on grounds only of religion, race, caste, sex, descent, place of birth, residence or any of them, be ineligible for, or discriminated against in respect of, any employment or office under the State."
- Prohibits discrimination in government jobs based on religion, caste, race, gender, descent, place of birth, or residence.
- Ensures merit-based selection while protecting social justice.

3. Article 16(3) – Exception for Residence-Based Employment

- "Nothing in this article shall prevent Parliament from making any law prescribing, in regard to a class or classes of employment or appointment to an office under the Government of, or any local authority within, a State or Union territory, any requirement as to residence within that State or Union territory prior to such employment or appointment."
- Parliament can make laws reserving jobs for local residents in certain states or union territories.
- This aims to protect local interests in employment, especially in union territories and specific states.

4. Article 16(4) – Reservation for Backward Classes

- "Nothing in this article shall prevent the State from making any provision for the reservation of appointments or posts in favor of any backward class of citizens which, in the opinion of the State, is not adequately represented in the services under the State."
- Allows reservations for socially and educationally backward classes (SCs, STs, OBCs) in government jobs.
- The government has the discretion to determine if a community is underrepresented.

5. Article 16(4A) – Reservation in Promotions

- "Nothing in this article shall prevent the State from making any provision for reservation in matters of promotion, with consequential seniority, to any class or classes of posts in the services under the State in favor of the Scheduled Castes and the Scheduled Tribes which, in the opinion of the State, are not adequately represented in the services under the State."
- Added by the 77th Constitutional Amendment Act, 1995.
- Allows reservation in promotions for SCs and STs in government jobs.

6. Article 16(4B) – Carry Forward of Unfilled Reserved Vacancies

- "Nothing in this article shall prevent the State from considering any unfilled vacancies of a year which are reserved for being filled up in that year in accordance with any provision for reservation made under clause (4) or clause (4A) as a separate class of vacancies to be filled up in any succeeding year or years and such class of vacancies shall not be considered together with the vacancies of the year in which they are being filled up for determining the ceiling of fifty percent reservation on total number of vacancies of that year."
- Introduced by the 81st Constitutional Amendment Act, 2000.
- Allows the government to carry forward unfilled reserved vacancies of SCs, STs, and OBCs to the next year.
- Ensures that reservation policies are effectively implemented.

7. Article 16(5) – Exception for Religious Institutions

- "Nothing in this article shall affect the operation of any law which provides that the incumbent of an office in connection with the affairs of any religious or denominational institution or any member of the governing body thereof shall be a person professing a particular religion or belonging to a particular denomination."
- Allows religious institutions to appoint employees based on religion.

Landmark Supreme Court Judgments on Article 16

- Indra Sawhney Case (1992) – 50% Reservation Cap
  - Supreme Court upheld reservations but capped it at 50% (excluding EWS).
  - Clarified that economic criteria alone cannot determine "backwardness."
- M. Nagaraj Case (2006) – Validity of Promotion Reservations
  - Upheld reservation in promotions (Article 16(4A)) but required states to prove backwardness, inadequacy of representation, and administrative efficiency.
- Jarnail Singh Case (2018) – Removal of Backwardness Requirement
  - Held that SCs/STs do not need to prove backwardness for reservation in promotions.
- EWS Reservation (2019) – 103rd Constitutional Amendment
  - Introduced 10% reservation for Economically Weaker Sections (EWS) in education and jobs.
  - Exceeded the 50% reservation cap but was upheld by the Supreme Court in 2022.

QUESTIONS

Fill in the Blank:

1. Dr. B. R. Ambedkar argued that reservations should be confined to a _____ of seats to maintain equality of opportunity.
2. The Supreme Court, in the case of _____ v. State of Mysore (1962), ruled that reservations should generally be less than 50%.
3. The landmark case _____ v. Union of India (1992) reaffirmed the 50% ceiling for reservations while allowing for exceptions in extraordinary circumstances.
4. Article 16(4) of the Indian Constitution allows for the reservation of appointments or posts in favor of any _____ class of citizens not adequately represented in public services.
5. The _____ Constitutional Amendment Act, 1995, introduced Article 16(4A), allowing reservation in promotions for SCs and STs.
6. The Supreme Court struck down the Socially and Educationally Backward Classes Act, 2018, in Maharashtra, which sought to provide reservations to the _____ community, as it breached the 50% ceiling.
7. The case of _____ v. State of Kerala (1976) questioned the 50% ceiling on reservations, with Justice Fazl Ali calling it a "rule of caution."
8. Article 16(5) provides an exception for _____ institutions, allowing them to appoint employees based on religion.
9. The 103rd Constitutional Amendment introduced a _____% reservation for Economically Weaker Sections (EWS) in education and jobs.
10. The _____ Case (2006) upheld reservation in promotions but required states to prove backwardness, inadequacy of representation, and administrative efficiency.

5. Nadir Shah's victory in Battle of Karnal ended Mughal power in India

- The Battle of Karnal on February 24, 1739 all but sealed the eventual fate of the once mighty Mughal Empire.

- The army of Nadir Shah, founder of the Afsharid dynasty of Iran, defeated the forces of Mughal emperor Muhammad Shah 'Rangila' in under three hours.
- The Shah of Iran subsequently captured and sacked Delhi, the Mughal capital, and emptied the royal treasury, taking home the fabled Peacock Throne and the Koh-i-noor diamond embedded on it.
- While Nadir Shah spared Rangila's life, and even restored most of his territory, he left behind a permanently enfeebled Mughal Empire.
- The Mughals would rule Delhi for another 118 years but with progressively diminishing power, so much so that the authority of the last Mughal Emperor Bahadur Shah 'Zafar' hardly extended beyond the four walls of the Red Fort.

Mughal decline

1. Weak Successors After Aurangzeb

- After Aurangzeb (d. 1707), his successors were weak and often engaged in court intrigues.
- There was frequent succession conflict among princes, leading to instability.

2. Overextension of the Empire

- Aurangzeb's long military campaigns in the Deccan drained the empire's resources.
- Governing such a vast empire became difficult, especially with inefficient administration.

3. Economic Decline

- Heavy taxation and frequent wars led to financial strain.
- The empire's revenue system weakened, and corruption increased among nobles and officials.

4. Rise of Regional Powers

- Many provinces such as Bengal, Awadh, and Hyderabad gained autonomy.
- The Marathas, Rajputs, Sikhs, and Jats challenged Mughal authority.

5. Foreign Invasions

- Nadir Shah (1739) looted Delhi, weakening Mughal prestige.
- Ahmad Shah Abdali's repeated invasions further destabilized the empire.

6. Decline of the Mansabdari System

- The military and administrative system (Mansabdari) became corrupt and inefficient.
- Nobles and governors started acting independently.

7. British and European Interference

- The British East India Company took advantage of Mughal weakness.
- The Battle of Plassey (1757) and the Battle of Buxar (1764) marked the end of Mughal political influence.

8. Social and Religious Policies

- Aurangzeb's orthodox policies alienated non-Muslims and weakened internal unity.
- The empire failed to maintain religious harmony.

9. Lack of Technological Advancement

- The Mughals failed to keep up with military and naval advancements made by the Europeans.

Nadir Shah's invasion

- By the time of Aurangzeb, the Mughal Empire faced continuous challenges from multiple fronts, including the Marathas, Ahoms, Jats, Rajputs, Bundelas, and Sikhs.
- These groups weakened the empire by capturing territory and depleting the treasury.
- However, the most significant challenge came from Nadir Shah, a military genius referred to by some historians as the "Napoleon of Persia."
- Nadir Shah rose to power after overthrowing the Safavid dynasty and expanded his influence across Persia, battling the Ottomans, Russians, and Afghan tribes.
- After capturing Kandahar in 1738, he turned his attention toward India, following the historic invasion route through the Khyber Pass.
- He swiftly conquered Mughal vassal states before marching toward Delhi.
- Mughal Emperor Muhammad Shah, known as Rangila, was slow to respond to the invasion.
- Historian Jadunath Sarkar described the Mughal court's reaction as "disgraceful inefficiency, amounting to imbecility."
- Despite Nadir Shah's capture of Kabul in June and his advance through the Khyber Pass in November, the Mughals did not organize a military response until January.
- By then, Nadir Shah had already taken Lahore and was advancing toward Delhi.
- The two armies clashed at Karnal (present-day Haryana), approximately 125 km from the Mughal capital.
- This confrontation marked a significant moment in Mughal history, as the empire faced a formidable and highly disciplined Persian force, signaling its further decline.

The battle & beyond

- In 1739, the Mughal Empire, under Muhammad Shah (Rangila), faced a devastating defeat at the hands of Nadir Shah of Persia.
- Despite having a massive army of 300,000 soldiers, over 2,000 war elephants, and 3,000 cannons, the Mughals were ill-equipped against Nadir Shah's disciplined force of 55,000.
- The Persian army had superior tactics and modern weaponry, including horse-mounted swivel guns that could penetrate armor.
- During the battle, Nadir Shah skillfully lured Mughal commander Sa'adat Khan's cavalry into a frontal charge.
- As the Mughals advanced, the Persian light cavalry parted, revealing a line of musketeers armed with advanced firearms.
- At point-blank range, they opened fire, decimating the Mughal cavalry within minutes. The battle ended in less than three hours, with Muhammad Shah taken captive.
- Following the victory, the Persians marched into Delhi, unleashing a brutal massacre and large-scale looting.
- Around 30,000 civilians were slaughtered, and thousands of women were enslaved. Historian Ghulam Hussain Khan described the scene as one where Persian soldiers seized everything of value, from gold and jewels to everyday belongings.
- Entire neighborhoods, including those around Dariba Kalan, were destroyed.
- Nadir Shah eventually restored Muhammad Shah to the throne but took with him the vast wealth accumulated by eight generations of Mughal rule, including the famous Peacock Throne and Koh-i-Noor diamond.

- This left the Mughal Empire financially crippled, unable to effectively govern its vast territories.
- Over the next century, the empire steadily declined, losing territory to emerging powers like the British and regional rulers.
- By 1857, the British formally ended Mughal rule after the Indian Rebellion, marking the final chapter of the once-mighty empire.

Mughals after invasion of Nadir Shah

- The invasion of Nadir Shah in 1739 was a turning point in the decline of the Mughal Empire. His conquest of Delhi and the sacking of the Mughal treasury had severe consequences for the empire.

1. Economic Devastation

- Nadir Shah looted immense wealth from Delhi, including the Peacock Throne and the Koh-i-Noor diamond.
- The empire suffered from financial instability, making it difficult to maintain administration and the army.

2. Political Decline

- The invasion exposed the weakness of the Mughals, leading to increased aggression from regional powers.
- The authority of Mughal Emperor Muhammad Shah (r. 1719–1748) diminished significantly.

3. Rise of Regional Powers

- **Marathas:** Expanded their influence, taking control of large parts of northern and central India.
- **Nawabs of Bengal, Awadh, and Hyderabad:** Became virtually independent, though they still acknowledged Mughal suzerainty.
- **Sikhs:** Strengthened their position in Punjab and challenged Mughal authority.

4. Afghan and Rohilla Uprisings

- Ahmad Shah Abdali, a former general of Nadir Shah, led several invasions of India (1748–1767), further weakening the empire.
- Rohilla Pathans gained power in western Uttar Pradesh.

5. British and European Encroachment

- The weakened Mughal administration allowed the British East India Company and the French to increase their influence in India.
- The Battle of Plassey (1757) and Battle of Buxar (1764) marked the growing dominance of the British in Bengal.

6. End of Effective Mughal Rule

- The later Mughal emperors became puppets controlled by regional powers and the British.
- Bahadur Shah II, the last Mughal emperor, was deposed after the Revolt of 1857, leading to the formal end of the empire.

QUESTIONS

Fill in the Blank:

1. The Battle of Karnal took place on _____, leading to a decisive victory for Nadir Shah over the Mughals.

2. The Mughal Emperor at the time of Nadir Shah's invasion was _____.
3. Nadir Shah looted the Mughal treasury and took the _____ and the _____ diamond.
4. The Mughal Empire continued to exist for _____ years after Nadir Shah's invasion but with diminishing power.
5. One of the key reasons for the Mughal decline was the overextension of the empire due to _____'s prolonged military campaigns.
6. The Persian army's superior tactics included the use of _____, which could penetrate armor and defeat the Mughal cavalry.
7. Nadir Shah's invasion led to the massacre of around _____ civilians in Delhi.
8. Following Nadir Shah's invasion, regional powers like the _____, _____, and _____ gained autonomy and weakened Mughal control.
9. The Battle of _____ in 1757 marked the rise of British influence in India.
10. The last Mughal emperor, _____, was deposed after the Revolt of 1857, marking the formal end of the empire.

6. PM Modi to attend 'biggest ever' jhumur event in Guwahati

- Prime Minister Narendra Modi will witness what has been pegged as the "biggest ever" jhumur (also spelt jhumoir or jhumair) event in history.
- Some 8,600 dancers will perform in Guwahati's Sarusajai Stadium at the Jhumoir Binandini 2025 to mark the 200th anniversary of Assam's tea industry.

What is the tea garden community?

- The term "tea tribe" refers to a diverse community of tea garden workers and their descendants in Assam.
- These people primarily migrated from Central India—Jharkhand, Odisha, Chhattisgarh, and West Bengal—in the 19th century to work in tea estates established by the British.
- This migration often took place under coercion and exploitative conditions. Workers endured abysmal working environments, meager wages, and restrictions on their freedom of movement.
- Many perished due to disease during their journey or at the estates, while others faced brutal punishments, even death, for attempting to escape.
- Today, the descendants of these workers are concentrated in Assam's tea-growing regions, particularly in Upper Assam districts such as Tinsukia, Dibrugarh, Sivasagar, Charaideo, Golaghat, Lakhimpur, Sonitpur, and Udalguri, as well as in Barak Valley districts like Cachar and Karimganj. Despite being a significant population in Assam and playing a crucial role in tea production, they remain socio-economically marginalized.
- Currently, they are classified under the Other Backward Classes (OBC) category in Assam, although they have been demanding Scheduled Tribe (ST) status for long.
- Interestingly, some tribes within this community, such as the Munda and Santhal, already enjoy ST status in the states from where they originally migrated.

- According to Assam's Directorate of Tea Tribes and Adivasi Welfare, this community constitutes a sizable portion of the state's population and contributes significantly to its economy.
- However, they continue to face economic hardships and remain among the poorest groups in the state. Their long-standing struggle for social and political recognition reflects the historical and ongoing challenges they endure.

Jhumur dance

- The tea garden community in Assam brought diverse cultural practices from their homelands, with the Jhumur tradition being particularly significant.
- Jhumur is a folk dance of the Sadan ethnolinguistic group, originating from Chotanagpur.
- It is central to tea garden festivals like Tushu Puja and Karam Puja, which mark the harvest season.
- Women perform the dance and songs, while men play traditional instruments such as drums, cymbals, flutes, and shehnai.
- Dancers wear varied attire, with red and white sarees being common. They move in coordinated patterns while singing in languages like Nagpuri, Khortha, and Kurmali, which have incorporated Assamese influences.
- Though lively and rhythmic, Jhumur songs often depict the struggles of tea plantation workers, highlighting their history of migration and labor exploitation.
- Beyond entertainment, Jhumur serves as a means of social cohesion, preserving cultural identity and helping the tea garden community make sense of their displacement and hardships.

Advantage Assam 2.0

- The Advantage Assam 2.0 Investment and Infrastructure Summit 2025, held on February 25-26 in Guwahati, marked a significant milestone in Assam's economic development. Inaugurated by Prime Minister Narendra Modi, the summit attracted substantial investment commitments totaling approximately ₹4.91 lakh crore, nearly five times the amount secured during its first edition in 2018.

Key Investment Highlights

- **Major Conglomerates:** Leading Indian companies such as Reliance Industries and the Adani Group each announced plans to invest ₹50,000 crore in Assam over the next five years. These investments will focus on sectors like energy, infrastructure, and technology.
- **Public Sector Commitments:** Government entities pledged investments amounting to ₹78,000 crore, primarily aimed at infrastructure development, including transportation and urban projects.
- **Sectoral Focus:** The summit saw 270 Memoranda of Understanding (MoUs) worth over ₹2.75 lakh crore across various sectors such as power, information technology, education, healthcare, tourism, and agriculture.

Strategic Developments

- **Economic Growth:** Assam's economy has experienced significant growth, doubling from ₹2.75 lakh crore in 2018 to approximately ₹6 lakh crore in 2025. This reflects the state's dynamic leadership and investor-friendly policies.
- **Infrastructure Enhancements:** The state has prioritized infrastructure development, with significant investments in connectivity projects, including the construction of new bridges over the Brahmaputra River and modernization of railway stations.
- **Semiconductor Manufacturing Hub:** Assam is emerging as a key player in semiconductor manufacturing, highlighted by Tata's approximately USD 3.3 billion Outsourced Semiconductor Assembly and Test (OSAT) project in Jagiroad. This positions the state as a significant contributor to India's technological advancement.

- The summit also featured participation from 67 heads of missions, 76 countries, 12 bilateral agencies, and nine partner nations, underscoring Assam's growing appeal as a global investment destination.
- In his address, Prime Minister Modi emphasized Assam's strategic importance, noting its transformation into a state of "unlimited possibilities" and highlighting its role as a gateway between Southeast Asia and India.
- Overall, Advantage Assam 2.0 has set the stage for Assam's accelerated economic growth, leveraging its strategic location, resource potential, and investor-friendly environment to attract both national and international investments.

Assam

- Assam is a state in northeastern India, known for its rich cultural heritage, biodiversity, and tea plantations.
- It shares borders with Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura, Meghalaya, and West Bengal, as well as international borders with Bhutan and Bangladesh.

2. General Information

Feature	Details
Capital	Dispur
Largest City	Guwahati
Formation	26 January 1950
Official Language	Assamese
Other Recognized Languages	Bodo, Bengali (in Barak Valley)
Chief Minister	Himanta Biswa Sarma
Legislative Assembly	Unicameral (126 seats)
Parliamentary Representation	14 Lok Sabha seats, 7 Rajya Sabha seats
High Court	Gauhati High Court
State Animal	Indian one-horned rhinoceros
State Bird	White-winged wood duck (Deohanh)
State Flower	Foxtail orchid (Kopou Phool)
State Tree	Hollong
Literacy Rate	~73.18% (Census 2011)

3. Unique Features of Assam

A. Natural Beauty & Geography

- **Brahmaputra River:** One of the world's largest rivers flows through Assam, creating fertile plains and rich biodiversity.
- **Majuli Island:** The world's largest river island, known for its unique Vaishnavite monasteries (Satras).
- **Kaziranga National Park:** A UNESCO World Heritage Site and home to the largest population of Indian one-horned rhinoceroses.
- **Manas National Park:** A UNESCO World Heritage Site and a Project Tiger reserve.

- **Dibru-Saikhowa National Park:** Known for its feral horses and rare wildlife species.
- **Tea Gardens:** Assam is the world's largest tea-producing region, known for its strong-flavored Assam Tea.

B. Cultural Heritage & Festivals

- **Bihu Festival:** The most significant festival of Assam, celebrated in three forms—Bohag Bihu (Spring/New Year), Magh Bihu (Harvest), and Kati Bihu (Crop Protection).
- **Assamese Sattriya Dance:** One of India's eight classical dance forms, developed by the saint-reformer Srimanta Sankardeva.
- **Bordoisila:** A unique seasonal storm named after a mythical woman who returns to her parents' home during monsoon.
- **Durga Puja & Ambubachi Mela:** Celebrated at the famous Kamakhya Temple in Guwahati.
- **Me-Dam-Me-Phi:** A festival celebrated by the Ahom community to honor ancestors.
- **Jonbeel Mela:** A rare barter fair where tribes exchange goods without using money.

C. Historical & Political Significance

- **Ahom Dynasty (1228–1826):** The Ahoms ruled Assam for nearly 600 years, resisting Mughal invasions.
- **Battle of Saraighat (1671):** The Ahom General Lachit Borphukan defeated the Mughal army, protecting Assam's sovereignty.
- **British Annexation & Tea Industry:** Assam was annexed by the British in 1826 (Treaty of Yandabo) and became a global tea hub.
- **Assam Accord (1985):** Signed to resolve the Assam Agitation against illegal immigration.

D. Economic & Industrial Importance

- **Tea Industry:** Assam produces over 50% of India's tea.
- **Petroleum & Natural Gas:** The oldest oil refinery in Asia is in Digboi, Assam.
- **Silk Industry:** Assam is famous for Muga Silk, unique to the region and found nowhere else in the world.
- **Bamboo & Cane Handicrafts:** Assamese artisans are known for their intricate bamboo and cane work.
- **Tourism Industry:** Kaziranga, Majuli, Sualkuchi (Silk Village), and Manas attract visitors worldwide.

E. Biodiversity & Wildlife

- **One-Horned Rhinoceros:** Assam has the highest population of this species.
- **Golden Langur:** Found in Assam's Chakrashila Wildlife Sanctuary.
- **Rare Birds:** Home to migratory birds like the Greater Adjutant Stork (Hargila).
- **Orang National Park:** Known as "Mini Kaziranga" for its rhinos and tigers.
- **Dehing Patkai Rainforest:** India's only rainforest, rich in biodiversity.

QUESTIONS

Fill in the Blank:

1. Prime Minister Narendra Modi will witness the "biggest ever" Jhumur event at _____ Stadium in Guwahati to mark the 200th anniversary of Assam's tea industry.
2. The tea garden community in Assam primarily migrated from Central India, including the states of _____, Odisha, Chhattisgarh, and West Bengal.

3. Jhumur is a folk dance originating from the _____ region and is performed by the tea garden community in Assam.
4. The Advantage Assam 2.0 summit in 2025 secured investment commitments of approximately _____ crore, nearly five times the amount in 2018.
5. Assam is emerging as a key player in semiconductor manufacturing, with Tata's USD 3.3 billion OSAT project located in _____.
6. Assam's tea garden community has been demanding _____ status for a long time, although they are currently classified as OBC in the state.
7. The world's largest river island, located in Assam and known for its Vaishnavite monasteries, is called _____.
8. The _____ National Park in Assam is a UNESCO World Heritage Site and is home to the largest population of Indian one-horned rhinoceroses.
9. The Assamese festival _____ is celebrated in three forms—Bohag, Magh, and Kati—to mark different agricultural seasons.
10. The historic Battle of Saraighat in 1671 was led by the Ahom General _____ against the Mughal army.

7. Almost 2 cm of sea level rise this century was due to melting glaciers

- Melting ice from glaciers worldwide has led to the sea level rising by almost 2 cm this century alone, a newly-published study has found.
- Glaciers have been losing 273 billion tonnes of ice each year — equivalent to how much water Earth's entire population would consume over a period of 30 years — for the last 25 years, the study reported.
- While the 2 cm sea level rise may seem insignificant, it can have disastrous consequences for the world.
- "Every centimetre of sea level rise exposes another 2 million people to annual flooding somewhere on our planet."
- The research paper titled 'Community estimate of global glacier mass changes from 2000 to 2023', was published in the journal Nature. It was carried out by scientists from the University of Edinburgh (Scotland) and the University of Zurich (Switzerland).

Why the sea level is rising

- Sea level rise is essentially the increase in the average height of the ocean's surface, measured from the centre of the Earth.
- **There are two primary reasons why sea levels are currently rising.**
  - **FIRST** is the global warming-driven melting of glaciers (accumulation of ice and snow that slowly flows over land) and ice sheets (glaciers which cover more than 50,000 square km of land). According to the latest study, since 2000, glaciers have lost between 2% and 39% of their ice regionally, and about 5% globally. This is roughly 18% more than the two existing ice sheets — in Greenland and the Antarctic — have lost in the same time period.

- **SECOND** is the thermal expansion of seawater, a process by which water expands as it warms up. With global temperatures rising, oceans are becoming warmer, and as a result, the volume of water is increasing as well. Thermal expansion of seawater is responsible for one-third to half of global sea level rise, according to the National Aeronautics and Space Administration (NASA).

- **The rise, in numbers**
  - Since 1880, global sea levels have risen by approximately 21 cm, according to the US National Oceanic and Atmospheric Administration (NOAA). However, this increase has accelerated significantly in recent decades.
  - The annual rise in sea levels has more than doubled from 0.18 cm in 1993 to 0.42 cm in recent years. NASA highlights that this recent surge in sea level rise is unprecedented in the last 2,500 years.
  - Notably, sea level rise is not uniform worldwide.
  - The southwestern Indian Ocean region, for example, is experiencing an increase of 2.5 mm per year, which is higher than the global average, as reported by the World Meteorological Organization (WMO) in 2022.
  - The uneven distribution of sea level rise is attributed to regional variations in ocean heat content and salinity.
  - India's coastal cities are also witnessing rising sea levels.
  - A 2024 report by the Bengaluru-based Center for Study of Science, Technology and Policy (CSTEP) revealed that Mumbai has seen the highest sea level rise among Indian cities, with an increase of 4.44 cm between 1987 and 2021.
  - Given that Mumbai's average elevation is approximately 10 meters above sea level, the city remains highly vulnerable to future sea level rise.
  - Other Indian coastal cities have also recorded rising sea levels. Haldia in West Bengal has experienced an increase of 2.726 cm, Visakhapatnam in Andhra Pradesh 2.381 cm, and Kochi in Kerala 2.213 cm, as per the CSTEP report.
  - This ongoing rise in sea levels poses significant threats to coastal communities, infrastructure, and ecosystems. With climate change accelerating, urgent measures are needed to mitigate the impact of rising sea levels on vulnerable regions worldwide.

Why we should be concerned

- The increasing sea levels pose a significant threat to both human settlements and natural ecosystems.
- One of the most alarming consequences is the increased frequency and intensity of coastal flooding, which accelerates coastal erosion and forces communities to relocate.
- Between 1990 and 2016, the West Bengal coast alone lost nearly 99 square kilometers of land due to sea-level rise, as per a 2018 report by the National Centre for Coastal Research (NCCR).
- A 2024 study published in Scientific Reports highlighted the global population's vulnerability to rising sea levels, stating that 29% of people lived within 50 kilometers of the shore in 2018, with 15% residing just 10 kilometers away. This proximity makes them highly susceptible to the adverse effects of coastal flooding and erosion.
- Beyond human displacement, sea-level rise leads to more intense storm surges, allowing seawater to penetrate further inland during tropical storms. This can severely affect coastal ecosystems such as mangroves, coral reefs, and salt marshes, which serve as natural buffers against storm impacts. Additionally, saltwater intrusion contaminates freshwater supplies, threatening drinking water availability and agricultural productivity.

- Scientific studies indicate that if greenhouse gas emissions are not significantly reduced, sea levels will continue to rise at an accelerated pace.
- Nadya Vinogradova Shiffer, director of NASA's sea level change team and ocean physics program, emphasized in a 2024 statement that current trends suggest a global mean sea level increase of 20 centimeters by 2050.
- This would double the sea-level rise in just 30 years compared to the previous century, leading to more frequent and severe flooding events worldwide.
- Addressing this crisis requires immediate global action to curb carbon emissions and implement adaptive measures such as coastal defenses, managed retreat, and sustainable urban planning.
- Without intervention, millions of people living in low-lying coastal regions face increasing risks of displacement, economic loss, and environmental degradation.

How to control increasing Sea Level

- Controlling the increasing sea level requires a combination of mitigation (reducing the causes) and adaptation (managing the effects).

1. Mitigation Strategies (Reducing the Causes)

- These focus on tackling climate change, the primary driver of rising sea levels.

Reduce Greenhouse Gas Emissions

- Transition to renewable energy sources (solar, wind, hydro) to reduce fossil fuel dependence.
- Promote energy efficiency in industries, transport, and buildings.
- Encourage carbon capture and storage (CCS) technologies.

Protect and Restore Natural Carbon Sinks

- Increase afforestation and reforestation efforts.
- Protect mangroves, wetlands, and peatlands, which act as natural buffers against rising sea levels.

Reduce Ice Melt from Polar Regions

- Implement global policies to curb emissions, as rising temperatures accelerate glacier melt.
- Support research on geoengineering solutions, like artificial cloud seeding over polar ice caps to reflect sunlight.

2. Adaptation Strategies (Managing the Effects)

- These help vulnerable regions cope with rising sea levels.

Coastal Protection Infrastructure

- Seawalls and dikes to block water from flooding cities.
- Storm surge barriers to prevent flooding during extreme weather.
- Floating cities and houses as a long-term solution for low-lying areas.

Nature-Based Solutions

- **Mangrove and coral reef restoration:** These natural barriers reduce wave energy and coastal erosion.
- Artificial islands and sand dune reinforcement to buffer against rising tides.

Urban and Land-Use Planning

- Relocate critical infrastructure away from flood-prone areas.
- Implement zoning laws to prevent construction in high-risk coastal zones.
- Improve drainage systems in urban areas to manage stormwater.

Early Warning Systems and Disaster Preparedness

- Invest in climate-resilient infrastructure to withstand extreme weather events.
- Develop evacuation plans and educate coastal communities about rising sea levels.

3. Global Policies and Collaboration

- Strengthen international climate agreements like the Paris Agreement to limit global warming below 1.5°C.
- Encourage countries to contribute to the Green Climate Fund, supporting climate adaptation in vulnerable nations.
- Promote cross-border cooperation in scientific research and disaster response strategies.

Major Glaciers across world

Asia

- **Siachen Glacier (India) –** The world's highest battlefield, located in the Karakoram Range.
- **Gangotri Glacier (India) –** Source of the River Ganges, located in Uttarakhand.
- **Baltoro Glacier (Pakistan) –** Home to K2, the second-highest peak in the world.
- **Fedchenko Glacier (Tajikistan) –** The longest glacier in the world outside polar regions.
- **Himalayan Glaciers (Nepal, Bhutan, China, India) –** Includes Khumbu Glacier near Mount Everest.

Europe

- **Aletsch Glacier (Switzerland) –** The largest glacier in the Alps.
- **Vatnajökull Glacier (Iceland) –** The largest glacier in Europe, covering about 8% of Iceland.
- **Jostedalsbreen Glacier (Norway) –** The largest glacier in mainland Europe.

North America

- **Hubbard Glacier (Alaska, USA) –** One of the fastest-growing glaciers.
- **Columbia Glacier (Alaska, USA) –** A rapidly retreating tidewater glacier.
- **Athabasca Glacier (Canada) –** Part of the Columbia Icefield in the Canadian Rockies.
- **Malaspina Glacier (Alaska, USA) –** The largest piedmont glacier in North America.

South America

- **Perito Moreno Glacier (Argentina) –** One of the few advancing glaciers in the world.
- **San Rafael Glacier (Chile) –** A rapidly retreating glacier in Patagonia.
- **Upsala Glacier (Argentina) –** One of the largest glaciers in South America.

Antarctica

- **Lambert Glacier –** The largest glacier in the world by volume.
- **Pine Island Glacier –** One of the fastest-melting glaciers in Antarctica.
- **Thwaites Glacier –** Also known as the "Doomsday Glacier" due to its potential impact on sea level rise.

Africa

- **Furtwängler Glacier (Tanzania) –** Located on Mount Kilimanjaro, rapidly shrinking due to climate change.
- **Ruwenzori Glaciers (Uganda, DRC) –** Found in the Rwenzori Mountains, also facing rapid decline.

Oceania

- **Franz Josef Glacier (New Zealand) –** A fast-moving glacier in the Southern Alps.
- **Fox Glacier (New Zealand) –** Located near Franz Josef Glacier, also retreating due to climate change.

QUESTIONS

Fill in the Blank:

1. According to a newly published study, glaciers worldwide have been losing _____ billion tonnes of ice each year for the last 25 years.
2. The research paper titled Community estimate of global glacier mass changes from 2000 to 2023 was published in the journal _____.
3. The two primary reasons for rising sea levels are the melting of glaciers and ice sheets and the _____ of seawater.
4. Since 1880, global sea levels have risen by approximately _____ cm, according to NOAA.
5. The southwestern Indian Ocean region is experiencing a sea level rise of _____ mm per year, which is higher than the global average.
6. Among Indian cities, _____ has recorded the highest sea level rise, with an increase of 4.44 cm between 1987 and 2021.
7. Rising sea levels can cause saltwater intrusion, which contaminates _____ supplies and threatens agricultural productivity.
8. Scientists predict that the global mean sea level will increase by _____ cm by 2050 if greenhouse gas emissions are not reduced.
9. One of the fastest-melting glaciers in Antarctica, known as the "Doomsday Glacier," is called _____ Glacier.
10. The _____ Glacier in India is the source of the River Ganges and is located in Uttarakhand.

8. Amazon unveils Ocelot, its first quantum computing chip

- Amazon Web Services (AWS) announced Ocelot, its first-generation quantum computing chip, as it enters the race against fellow tech giants in harnessing the experimental technology.
- Developed by the AWS Center for Quantum Computing at the California Institute of Technology, the new chip can reduce the costs of implementing quantum error correction by up to 90%, according to the company.
- Unlike conventional computers, which use bits representing values of either 1 or 0, quantum computers utilize quantum bits, or "qubits", that can exist in multiple states simultaneously, potentially solving complex problems exponentially faster than conventional computers.
- Quantum research is seen as a critical emerging field, and both the United States and China have been investing heavily in the area, with Washington also placing restrictions on exports of the sensitive technology.

- Microsoft unveiled its own quantum chip that it said could transform everything from fighting pollution to developing new medicines, arguing that the promise of quantum computing is closer to reality.
- In December, Google unveiled its Willow quantum chip, which it claimed had dramatically reduced computing errors and performed a complex calculation in minutes that would have taken a traditional supercomputer millions of years.

First-generation quantum computing chips

- First-generation quantum computing chips are the foundational hardware platforms for quantum computers, leveraging quantum bits (qubits) to perform calculations beyond the capabilities of classical computers.
- These early chips primarily use superconducting circuits, trapped ions, or photonic systems to achieve quantum operations.

Key Developments in First-Generation Quantum Chips

- **IBM's Quantum Processors** – IBM has developed quantum chips like the Eagle (127 qubits) and Osprey (433 qubits), aiming for large-scale, fault-tolerant quantum computing.
- **Google's Sycamore** – Google's Sycamore chip (53 qubits) demonstrated quantum supremacy in 2019 by performing a complex calculation exponentially faster than a classical supercomputer.
- **Intel's Horse Ridge & Tunnel Falls –** Intel has been developing silicon-based quantum chips like Tunnel Falls (12-qubit silicon spin qubit processor), aiming for scalable quantum architectures.
- **Rigetti Computing** – A startup specializing in superconducting qubit processors, producing 32 and 80-qubit quantum chips.
- **PsiQuantum & Photonic Quantum Chips** – Companies like PsiQuantum are focusing on photon-based quantum processors, which promise better error correction.

Challenges in First-Generation Quantum Chips

- **Decoherence & Noise** – Qubits are highly fragile and lose their quantum state quickly.
- **Scalability Issues** – Increasing qubit counts while maintaining fidelity remains a challenge.
- **Error Correction** – Quantum error correction is still in early stages, requiring more physical qubits to create reliable logical qubits.

Google's Willow

- Google's Willow is a state-of-the-art quantum computing chip introduced in December 2024 by Google Quantum AI.
- This 105-qubit superconducting processor represents a significant advancement in the field of quantum computing, achieving notable milestones in both computational speed and error correction.

Key Achievements of Willow

Exponential Error Reduction:

- Willow has demonstrated the ability to exponentially reduce errors as the number of qubits increases. This breakthrough addresses a longstanding challenge in quantum error correction, paving the way for more reliable and scalable quantum computations.

Unprecedented Computational Speed:

- In benchmark tests, Willow completed a complex computation in under five minutes—a task that would take today's fastest supercomputers an estimated 10 septillion years.

- This performance showcases the immense potential of quantum computing to tackle problems currently beyond the reach of classical computers.
- These advancements suggest that practical, large-scale quantum computers capable of solving real-world problems may be achievable in the near future. Potential applications span various fields, including medicine, energy, and artificial intelligence.

Majorana 1 chip

- Microsoft has recently unveiled Majorana 1, its first quantum computing chip powered by a Topological Core architecture.
- This chip represents a significant advancement in quantum computing, utilizing a novel class of materials known as topoconductors to create and manipulate Majorana particles.
- These particles enable the development of more stable and scalable qubits, which are essential for practical quantum computing applications.
- The Majorana 1 chip is designed to scale up to one million qubits on a single, palm-sized chip, potentially offering computational power surpassing that of all current classical computers combined.
- This breakthrough could accelerate solutions to complex industrial and scientific problems, bringing them within reach in years rather than decades.
- However, the scientific community has expressed both excitement and skepticism regarding this development.
- While the creation of Majorana particles has been a long-sought goal in quantum physics, definitive evidence confirming their existence in the Majorana 1 chip is still pending.
- Further research and peer-reviewed studies are necessary to validate Microsoft's claims and fully assess the chip's potential impact on the field of quantum computing.
- In summary, Microsoft's Majorana 1 chip marks a promising step forward in the quest for practical, large-scale quantum computing.
- Its success could revolutionize various industries by enabling solutions to problems currently beyond the capabilities of classical computers.
- Nonetheless, continued scientific scrutiny and validation are essential to confirm the chip's efficacy and the realization of its anticipated benefits.

QUESTIONS

Fill in the Blank:

1. Amazon Web Services (AWS) announced its first quantum computing chip, named _____, developed at the AWS Center for Quantum Computing.
2. The Ocelot chip aims to reduce the cost of implementing quantum error correction by up to _____%.
3. Unlike conventional computers that use bits representing values of 0 or 1, quantum computers utilize _____, which can exist in multiple states simultaneously.
4. In December 2024, Google unveiled its 105-qubit quantum chip called _____, which significantly reduced computing errors.
5. Google's Willow chip performed a complex calculation in under five minutes, a task that would take classical supercomputers an estimated _____ years.
6. Microsoft's first quantum chip, _____, is based on a Topological Core architecture and uses topoconductors to create Majorana particles.
7. The Majorana 1 chip is designed to scale up to _____ qubits on a single, palm-sized chip.

8. IBM's quantum processors include the Eagle chip with _____ qubits and the Osprey chip with 433 qubits.
9. Intel's quantum chip Tunnel Falls is a _____-qubit silicon spin qubit processor aimed at scalable quantum architectures.
10. Companies like PsiQuantum are developing _____-based quantum processors, which promise better error correction.

9. National Science Day

- National Science Day is celebrated every year on 28th February to commemorate the discovery of the 'Raman Effect' made by the eminent physicist Sir C.V. Raman while working in the laboratory of the Indian Association for the Cultivation of Science, Kolkata.
- For this discovery, he was awarded the Nobel Prize in 1930.
- On National Science Day, theme-based science communication activities are carried out all over the country.
- The first celebration took place on February 28, 1987, marking the beginning of a tradition that continues to inspire generations. The theme for this year is "Empowering Indian Youth for Global Leadership in Science & Innovation for VIKSIT BHARAT."
- It emphasizes the role of young minds in driving India's scientific and technological progress, aligning with the vision of Viksit Bharat 2047, which aims for a developed and self-reliant India.

Objectives

- The basic objective of the observation of National Science Day is to spread the message of the importance of science and its application among the people.
- It is celebrated as one of the main science festivals in India every year with the following objectives:
  - To widely spread a message about the significance of scientific applications in the daily lives of people.
  - To display all the activities, efforts, and achievements in the field of science for the welfare of human beings
  - To discuss all the issues and implement new technologies for the development of science
  - To encourage the people as well as popularize science and technology

Key advancements in Science and Technology

India's Global Standing in Innovation and IP

- India has made remarkable progress in the global science and technology landscape, securing the 39th rank in the Global Innovation Index 2024 and 6th position in global Intellectual Property (IP) filings, as per the WIPO report. The Network Readiness Index (NRI) 2024 also marked India's rise to 49th place from 79th in 2019, showcasing advancements in ICT infrastructure and digital transformation.

Anusandhan National Research Foundation (ANRF): Pioneering Research & Inclusivity

- Launched under the ANRF Act 2023, the Anusandhan National Research Foundation (ANRF) is accelerating India's research and development ecosystem. Several key programs have been introduced:

- PM Early Career Research Grant (PMECRG) supports young researchers, providing them with the resources to pursue independent research.
- EV Mission aims to foster innovation in electric vehicle technology, making India self-reliant in sustainable mobility.
- Partnerships for Accelerated Innovation and Research (PAIR) follows a Hub and Spoke model, ensuring institutional collaboration in scientific research.
- Inclusivity Research Grant (IRG) provides financial support to researchers from Scheduled Castes (SC) and Scheduled Tribes (ST), promoting equal opportunities in frontier research fields.

National Quantum Mission (NQM): India's Leap in Quantum Technology

- With an investment of ₹6003.65 crore over eight years, the National Quantum Mission (NQM) is positioning India as a leader in quantum computing, communication, sensing, and materials.
- A total of 152 researchers from 43 institutions across 17 states and 2 Union Territories are contributing to this mission.
- NQM has also laid out guidelines for startup support, ensuring robust mentorship, funding, and resource allocation.

National Supercomputing Mission (NSM): Expanding India's Computational Power

- India's supercomputing infrastructure has significantly expanded, reaching 32 PetaFlops with the addition of 5 PetaFlops in 2024. The largest supercomputing system, commissioned at the Inter-University Accelerator Centre (IUAC), New Delhi, boasts 3 PetaFlops of computing power. Additional supercomputers at NCRA-Pune and SN Bose Institute-Kolkata further strengthen computational research.
- The future roadmap includes adding 45 more PetaFlops, pushing India's supercomputing capabilities to 77 PetaFlops using indigenous technology.

Artificial Intelligence & Cyber-Physical Systems: BharatGen and Beyond

- Under the National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS), the BharatGen initiative has been launched, focusing on the development of India's first multimodal, multilingual Large Language Model (LLM) for Generative AI (GenAI).
- The I-HUB Quantum Technology Foundation, IISER Pune, has selected eight startups for funding, accelerating research in quantum communication, computing, and sensing.
- Plans are underway to upgrade four top-performing Technology Innovation Hubs (TIHs) into Technology Translation Research Parks (TTRPs), boosting commercialization efforts.

Geospatial Science: Expanding Spatial Thinking and Innovation

- Geospatial technology adoption has increased through Spatial Thinking Programs in Schools, covering 116 schools across seven states and reaching 6205 students.
- Additionally, 575 participants have received training in geospatial science through Summer/Winter Schools. Future plans include expanding the program to five additional states and organizing a national event to showcase research and innovation in this field.

Climate Research and Risk Mapping for Disaster Preparedness

- India has intensified its efforts in climate resilience, launching four new Centres of Excellence focused on risk mapping for floods and droughts.
- These initiatives aim to enhance disaster preparedness and climate adaptation strategies across the country.

Technology Development Board (TDB): Funding Innovation for Future Growth

- The Technology Development Board (TDB) has provided ₹220.73 crore in funding across seven key projects, accelerating advancements in critical technological sectors.
- This initiative ensures that startups and innovators receive the necessary financial and infrastructural support to scale their ideas.

Innovation in Science Pursuit for Inspired Research (INSPIRE): Nurturing Scientific Talent

- The INSPIRE program, a flagship initiative of the Department of Science & Technology (DST), aims to attract and support young talent in science and research.
- It fosters innovation across disciplines, including engineering, medicine, agriculture, and veterinary sciences, strengthening India's S&T and R&D ecosystem.

Achievements in 2024:

- 34343 INSPIRE Scholars, 3363 INSPIRE Fellows, and 316 INSPIRE Faculty Fellows received financial support to pursue higher education and research in Science & Technology.
- 9 INSPIRE Fellows showcased their research at the 15th JSPS-HOPE Meeting in Kyoto, Japan.
- INSPIRE Faculty Fellowship intake increased from 100 to 150 per year to support more postdoctoral researchers.
- The 11th National Level Exhibition and Project Competition (NLEPC) was held in September 2024 at Pragati Maidan, New Delhi, attracting 10,000 students. The Winners Felicitation Ceremony honored 31 students from 350 finalists at Vigyan Bhavan, New Delhi.
- A record-breaking 10,13,157 nominations were received for INSPIRE-MANAK, marking a milestone of one million entries from schools in 2024-25.
- A new initiative, "Exposure Visit of Japanese School Students to India," was launched under INSPIRE-MANAK. In August 2024, 10 Japanese students and 2 supervisors visited India to explore advancements in science, technology, industry, and culture.

Future Vision for 2025:

- From 2025 onwards, the INSPIRE-MANAK scheme will expand its reach to Class 11 and 12 students, ensuring that more young minds are engaged in scientific innovation at a crucial stage of their education. This initiative is expected to strengthen India's scientific workforce and global leadership in research and development.

Bridging the Gender Gap: Empowering Women to Lead in Science

- India has taken significant steps to promote gender parity in STEM. The Department of Science and Technology (DST) has recently implemented the WISE-KIRAN (Women in Science and Engineering-KIRAN) scheme, a comprehensive program designed to support women at various stages of their scientific careers.

Initiatives:

- **WISE-PhD and WISE-Post Doctoral Fellowship (WISE-PDF):** Encourages women to pursue research in basic and applied sciences. More than 340 women scientists have been selected under 3 major fellowship programmes namely, WISE-PhD, WISE-PDF and WIDUSHI to carry out research in Basic and Applied Sciences.
- Launched two new programmes namely, Women's International Grants Support (WINGS) for research training in international labs and Women Leadership Programme for early and mid-level women scientists.

- **Vigyan Jyoti Program:** Encourages female students to pursue higher education and careers in STEM (Science, Technology, Engineering, Mathematics, and Medicine). Under Vigyan Jyoti, more than 29,000 girls of Class IX-XII from 300 Districts of 34 States/UTs of the country benefitted through various activities and interventions.
- Under the CURIE (Consolidation of University Research for Innovation and Excellence) Programme, 22 Women PG Colleges have been selected to establish state-of-the-art research facilities.

The Glorious Heritage

- Ancient India was a land of sages and seers as well as a land of scholars and scientists. Research has shown that from making the best steel in the world to teaching the world to count, India was actively contributing to the field of and technology centuries long before modern laboratories were set up.

Driving Innovation for a Brighter Future

- National Science Day celebrates India's scientific progress and commitment to innovation. With advancements in quantum computing, AI, geospatial technology, and climate research, alongside initiatives fostering inclusivity and young talent, India is shaping a future driven by science and technology.
- As the nation moves towards Viksit Bharat 2047, continued investment in research and innovation will be key to global leadership and sustainable growth.

QUESTIONS

Fill in the Blank:

1. National Science Day is celebrated on _____ every year to commemorate the discovery of the Raman Effect by Sir C.V. Raman.
2. Sir C.V. Raman was awarded the _____ Prize in 1930 for his discovery of the Raman Effect.
3. The theme for National Science Day 2024 is "Empowering Indian Youth for Global Leadership in Science & Innovation for _____."
4. The _____ National Research Foundation (ANRF), launched under the ANRF Act 2023, aims to accelerate India's research and development ecosystem.
5. India's National Quantum Mission (NQM) has an investment of ₹_____ crore over eight years to advance quantum computing and communication.
6. The National Supercomputing Mission (NSM) aims to expand India's computational power, reaching _____ PetaFlops by adding 45 more PetaFlops in the future.
7. Under the National Mission on Interdisciplinary Cyber-Physical Systems, the _____ initiative focuses on developing India's first multimodal, multilingual Large Language Model (LLM) for Generative AI.
8. The _____ Program encourages female students to pursue higher education and careers in STEM fields.
9. The Technology Development Board (TDB) has provided funding of ₹_____ crore across seven key projects to support innovation and startups.
10. The INSPIRE program aims to nurture scientific talent, and in 2024, a record-breaking _____ nominations were received for the INSPIRE-MANAK initiative.

10. India-European Union partnership matter

- At a time when ties between Europe and the United States are facing great pressure, a large delegation of European Commission College of Commissioners is in New Delhi for a two-day visit.
- Twenty-two of the 27 Commissioners are part of the delegation led by European Commission (EC) President Ursula von der Leyen. This is the first trip out of Europe by the College that took office in December, and the first-ever visit to India by the Commissioners together.
- Indian officials said the visit of the College of Commissioners marks a significant new phase in bilateral relations, as India and the EU enter the third decade of their Strategic Partnership.
- Meetings of the India-EU Trade and Technology Council (TTC), bilaterals between Indian Ministers and EU Commissioners, and the meeting at the leaders' level will diversify engagement and promote trade and investments in a range of areas.
- These include artificial intelligence (AI) and semiconductors, as well as green hydrogen, sustainable urbanisation, water management, resilient supply chains, defence, and space.

Relationship

- India established diplomatic relations with the European Economic Community — the first pillar of the future European Union — back in 1962. The Joint Political Statement signed in 1993 and the Cooperation Agreement of 1994 paved the way for the strengthening of ties between India and Europe.
- The multi-tier institutional architecture of cooperation has been presided over by the India-EU Summits, 15 of which have been held so far. The first Summit was held in Lisbon in June 2000, and the bilateral relationship was upgraded to a Strategic Partnership at the 5th Summit in The Hague in 2004.
- Prime Minister Narendra Modi and EC President Ursula von der Leyen have met at least seven times in the past.
- The President paid an official visit to India in April 2022, during which she participated in the Raisina Dialogue as Chief Guest, and delivered the inaugural address.
- Prime Minister Modi and President von der Leyen met briefly on the sidelines of the G20 Rio Summit in November 2024.

Meetings and initiatives

- The India-EU Strategic Partnership: A Roadmap to 2025, was adopted at the last India-EU Summit in July 2020.
- At the Leaders' Meeting in May 2021, the two sides announced the resumption of negotiations for a comprehensive free trade and investment agreement, and an agreement on Geographical Indications. They also launched an ambitious 'Connectivity Partnership'.
- During their meeting in 2022, Modi and von der Leyen announced the establishment of an India-EU TTC as a strategic coordination mechanism to tackle challenges at the nexus of trade, trusted technology, and security.
- The TTC — a new frontier similar to the Initiative for Critical and Emerging Technologies with the US or the Technology Security Initiative with the United Kingdom — represents three significant pillars of India-EU cooperation: Digital and Strategic Technologies; Clean and Green Technologies; and Trade, Investments and Resilient Supply Chains.

- The First Ministerial Meeting of the TTC was held in May 2023; the Second Meeting will be held in New Delhi.
- In the various meetings between the two sides, the issue of global cooperation — including the ongoing war in Ukraine, in which the US under President Donald Trump has done a remarkable switch, leaving the Europeans in the lurch — is certain to be discussed.

Trade and investments

- India and the EU have been negotiating a Free Trade Agreement for the last decade and a half.
- The economic argument for an agreement is strong: the EU is India's largest trading partner in goods, and bilateral trade has increased 90% over the past decade.
- Bilateral trade in goods was $135 billion in FY 2023-24, with Indian exports to the EU accounting for $76 billion and imports for $59 billion. Bilateral trade in services in 2023 stood at $53 billion, comprising Indian exports of $30 billion and imports of $23 billion.
- Cumulative Foreign Direct Investment (FDI) flows from the EU during the period April 2000 to September 2024 was $117.4 billion, which represented 16.6% of the total FDI equity inflow.
- Indian FDI outflows to the EU are valued at approximately $40.04 billion for the period April 2000 to March 2024.

Technology cooperation

- The technology partnership between India and the EU has assumed greater significance and urgency in view of China's advancements in this field.
- Bilateral science and technology cooperation is carried out within the framework of the Science and Technology Cooperation Agreement of 2007. The India-EU Intent of Cooperation in High Performance Computing (HPC) was signed in November 2022, and in November 2023, the two sides signed a Memorandum of Understanding on semiconductor R&D cooperation. The following month, the EU participated in the Global Partnership on AI Summit in New Delhi.

Green energy solutions

- Under the India-EU Green Hydrogen Cooperation initiative, India was the exclusive partner country at the European Hydrogen Week in Brussels in November 2024. The EU was a major partner in the International Conference on Green Hydrogen in Delhi that September.
- The European Investment Bank has committed to supporting Indian hydrogen projects with funding of 1 billion euros. Indian and European companies are collaborating in the renewable and hydrogen sectors with the aim of developing a green hydrogen ecosystem in India by 2030.

People-to-people ties

- Strong and growing people-people ties is one of the foundations of the India-EU relationship. The growing Indian diaspora in the EU contains large numbers of students, researchers, and skilled professionals. Indian professionals received the largest share — more than 20% — of EU Blue Cards issued in 2023-24.
- Over the last 20 years, more than 6,000 Erasmus scholarships have been awarded to Indian students, making them among the top recipients of the scholarships. More than 2,700 Indian researchers have been funded by Marie Sklodowska-Curie Actions (part of the EU's research and innovation programme Horizon Europe) since 2014 — the most in the world.

Defence and space

- India and the EU are strengthening their defence cooperation, specially in maritime security and the Indo-Pacific region under ESIWA+ security programme. This is crucial in the context of China's growing maritime prowess and aggressive policies.

- The first joint naval exercises were held in October 2023 in the Gulf of Guinea. The two sides have stepped up cooperation on global security, natural disasters, piracy, and counter-terrorism.
- The Indian Space Research Organisation's (ISRO's) PSLV successfully launched the EU's PROBA-3 mission in December 2024. ISRO and the European Space Agency (ESA) have cooperated on the Chandrayaan-3 and Aditya-L1 missions, and signed an MoU for cooperation on Gaganyaan, India's human spaceflight mission.

QUESTIONS

Fill in the Blank:

1. The large delegation of European Commission College of Commissioners visiting India is led by _____.
2. The India-EU Strategic Partnership was upgraded at the 5th Summit in _____.
3. The India-EU Trade and Technology Council (TTC) focuses on three key areas: Digital and Strategic Technologies, Clean and Green Technologies, and _____.
4. India and the EU have been negotiating a Free Trade Agreement for the last _____ years.
5. Bilateral trade in goods between India and the EU in FY 2023-24 was valued at _____ billion dollars.
6. The European Investment Bank has committed to supporting Indian hydrogen projects with funding of _____ euros.
7. The India-EU Intent of Cooperation in High Performance Computing (HPC) was signed in _____.
8. The first joint India-EU naval exercises were held in October 2023 in the _____.
9. Indian professionals received the largest share — more than _____ percent — of EU Blue Cards issued in 2023-24.
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