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Seventh Assam State Finance Commission**

Syllabus: GS Paper-II Constitutional Bodies

Why in the News?

The Assam Government recently constituted the Seventh Assam State Finance Commission with Lieutenant General Rana Pratap Kalita (Retd) as its chairman and six other members.

About the Assam State Finance Commission (SFC)

- The Assam State Finance Commission is a **quasi-judicial body constituted** by the **Governor** of the state under the **provisions** of the **Constitution**.
 - **Article 243-I** and **243-Y** of the Constitution deals with the provisions of the **State Finance Commission**.
- It is a **temporary body** and the **governor constitutes** the SFC every **fifth year** or at **such earlier times**, as considered necessary.
- The SFC **presents** its **report** to the **Governor**, who shall lay the report before the legislature of the State.
- The **recommendations** made by the **state Finance Commission** are only **advisory** in **nature**.
 - Hence, they are **not binding** on the State Government.

About the Seventh Assam State Finance Commission

- The members of the Commission include **Debeswar Malakar, Prof Mrinal Kanti Dutta, Special Secretary to the Finance Department** and the **senior most Secretary** of the
 - Finance Department
 - Panchayat and Rural Development Department
 - Department of Housing and Urban Affairs
- The Commission shall make its **report available** to the **Governor** by **December**,

2024, covering a period of **five years** commencing on the 1st April, 2025.

Key Functions of the Assam State Finance Commission

- The Commission make recommendations to the matters such as
 - The principles governing the distribution between the State of Assam and the Panchayats and the Municipalities of the net proceeds of taxes and duties levied and collected.
 - The measures needed to improve the fiscal health of the Panchayats and Municipalities.
 - Any other matter referred to the State Finance Commission by the Governor in the interests of the sound financial position of the Panchayats and Municipalities among others.
- SFC recommends grants-in-aid to local bodies from the state's consolidated fund.
- SFC monitors and evaluates the financial performance of local bodies within the state.
- The SFC promotes fiscal decentralization by empowering local governments with financial autonomy.

Challenges and Limitation of State Finance Commission

- SFC often faces issues like **lack of office space, technical staff, and basic office infrastructure** such as computers, office furniture, and other supporting logistics
- The **lack of expertise** among people at the helm of SFCs as majority of the members and chairpersons of the SFCs are bureaucrats.
- The **non-availability** of **data** related to local government also hampers the workings of SFCs
- The recommendations made by SFC are only advisory in nature. This makes it challenging for the commission to ensure that its recommendations are **properly implemented** and **monitored**.

Finance Commission of India

- It is a **quasi-judicial body**, mentioned under **article 280**, **constituted** by the **President** every fifth year or even earlier.
- It makes **recommendations** to the **President** on the following matters:
 - The distribution of the net proceeds of taxes to be shared between the Centre and the states, and the allocation between the states, the respective shares of such proceeds.
 - The principles which should govern the grants-in-aid to the states by the Centre (i.e., out of the Consolidated Fund of India).
 - The measures needed to augment the Consolidated fund of a state to supplement the resources of the panchayats and the municipalities in the state on the basis of the recommendations made by the State Finance Commission.
 - Any other matter referred to it by the President in the interests of sound finance.
- Till **1960**, the Commission also **recommended** the **amounts paid** to **Assam, Bihar, Orissa** and **West Bengal** in lieu of assignment of any share of the net proceeds in each year of export duty on jute and jute products.
- The Finance Commission acts as the **balancing wheel** of **fiscal federalism** in India.

State Finance Commissions play a crucial role in ensuring balanced fiscal management and equitable resource distribution within a state. However, they face significant challenges, hampering their functioning. The 'poor' shape of State Finance Commissions is also affecting the decentralization process. Addressing these challenges is essential for enhancing the effectiveness and impact of State Finance Commissions in achieving their fiscal objectives

and promoting sustainable development at the state level.

Q. Discuss the role of State Finance Commission in promoting fiscal management and equitable resource distribution within Assam. What are the major challenges and limitations faced by the commission?

(150 word /10 marks)

Project Nexus

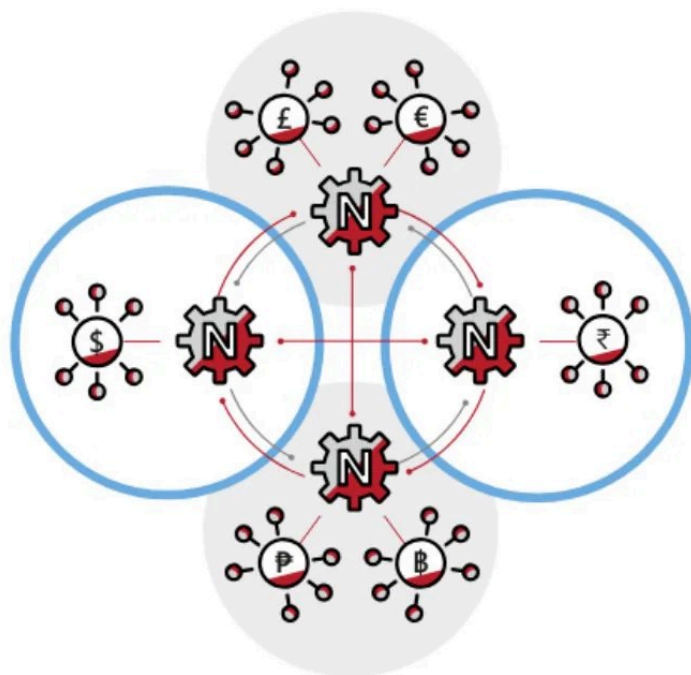
Syllabus: GS Paper- III-Banking Sector & NBFCs

Why in the News?

The Reserve Bank of India (RBI) has recently joined Project Nexus, a multilateral international initiative to enable instant cross-border retail payments. With this, India joined Malaysia, the Philippines, Singapore, and Thailand as the founding members of this initiative.

What is Project Nexus?

- The concept of **Project Nexus** was **developed** by the **Innovation Hub** of the **Bank for International Settlements (BIS)**.
- It **aims to interlink domestic Fast Payments Systems (FPSs) of participating countries**.
- It is the **first BIS Innovation Hub project in the payments area** to move towards live implementation.
- Under it India's **Unified Payments Interface (UPI)** and **FPSs of Malaysia, the Philippines, Singapore and Thailand** will be **interlinked** through Nexus.
- The platform is expected to be **fully operational in two years** i.e. 2026.



Nexus overcomes the limitations of bilateral interlinking by standardising the way that Instant Payment Systems (IPSs) of each country connect to each other.

Significance of the Platform

- **Speed and Efficiency:** Project Nexus is expected to reduce the transaction times. Cross-border payments will be processed in under a minute, compared to the hours or even days required by traditional banking systems.
- **Costs Effective:** Cross-border payments often incur fees for currency conversion, message translation, and sanctions screening. Project Nexus reduces these costs by interlinking FPS participants, who generally incur minimal fees per transaction, keeping the overall cost base low.
- **Enhanced Transparency:** Traditional cross-border payments often lack clarity, with accumulating fees causing uncertainty about the final amount received. Project Nexus ensures greater transparency by allowing fees to be calculated upfront.

- **Expanded Reach:** Project Nexus simplifies cross-border payments by allowing banks to offer instant payment services to more countries without the costly and time-consuming need to maintain correspondent accounts. It provides a standardized, scalable framework for interlinking FPSs, expanding the reach of instant payments.
- **Increased Reliability:** Traditionally, cross-border payments often face delays and failures. Project Nexus enhances reliability by ensuring payments are either completed or failed within seconds, providing immediate feedback and reducing the risk of lost or delayed transactions.
- **Benefits for Businesses:** By facilitating quicker, cheaper, and more reliable cross-border payments, Project Nexus can boost international trade and commerce, Businesses, especially for small and medium-sized enterprises (SMEs) and enhance cash flow and global competitiveness.
- **Internationalization of Indian Payment system:** Project Nexus is a multilateral approach that will provide impetus to the RBI's efforts in expanding the international reach of Indian payment systems.

Internationalization of Indian Payment system: It refers specifically to the efforts to make the **Indian Payment system** like UPI, RuPay cards RTGS, NEFT etc. a global player.

Steps taken by RBI for Internationalization of the Indian Payment System

- **Bilateral Agreements:** Establishing bilateral payment arrangements with other countries to link their payment infrastructures. For Instance:
 - RBI and the Central Bank of the UAE (CBUAE) signed an MoU in 2023 to link their payment systems.
 - In February 2024, RuPay cards and UPI connectivity between India and Mauritius was launched.
- **Establishment of NIPL (NPCI International Payments Limited):** NIPL was established in 2020 as a wholly owned subsidiary of NPCI for promoting UPI and RuPay cards outside of India.
 - NIPL is planning to extend the UPI to 20 countries by FY29.
- **Expansion of UPI:** RBI has been collaborating bilaterally with various countries to link UPI, with their respective FPSs for cross-border Person to Person (P2P) and Person to Merchant (P2M) payments.
- **Enhance RuPay acceptance:** RuPay has tied up with international players like Discover, Japan Credit Bureau and China Union Pay to enhance its international acceptance.
- **Integration with Global Payment Networks:** Aligning with international payment standards and networks to enable seamless transactions.
- **India's Initiative under G20:** Global Digital Public Infrastructure (DPI) Repository and Social Impact Fund to advance DPI in the global south will create a conducive environment for internalization of the Indian payment system.
- **Special Vostro Rupee Accounts (SVRAs):** SVRAs are rupee denominated accounts that foreign banks can maintain in India to facilitate trade settlements in INR and enhance cross-border payments.
- **Regulatory Frameworks:** Developing supportive regulations to enhance the security and efficiency of cross-border payments.

Benefits of Internationalization of Indian Payment system: Reduced transaction costs, increased trade, enhanced rupee internationalization, strengthened India's digital diplomacy and financial integration.

Challenges of Internationalization of Indian Payment system: Tough competition from other long-established global payments giants like Visa and Mastercard, Compliance with various digital regulations

Q. What do you understand by Internationalization of the Indian Payment system? Explain the benefits and challenges associated with Internationalization of the Indian Payment system.

(250 words/15 marks)

Stampede

Syllabus: GS III- Disaster and Disaster management.

Why in the News?

The recent stampede at a religious congregation at Hathras in Uttar Pradesh claimed over 120 lives.

What is Stampede?

- Stampede refers to the **chaotic disruption** of orderly **crowd movement**, often resulting in injuries and fatalities, triggered by perceived danger, loss of space, or the pursuit of something desirable.
- According to Jeff Wise, there are two types of stampedes - unidirectional and turbulent.
- **Unidirectional stampedes**- When a crowd moving in the same direction encounters a sudden positive or negative change in force, altering its movement.
 - A **positive force** can be a “**sudden stop**” situation like a bottleneck and blocked exit.
 - A **negative force** would be a **release of constraining pressure**, something like a broken barrier or column which sends a group of people tumbling.
- **Turbulent stampede**- When two crowds merge from different directions or a stationary crowd is induced to panic.

Causes of Stampede

- **Collapse of a structure** like barricades, a makeshift bridge, or the temporary structure.
 - *Ex- Datta stampede, October 2013.*
- **Challenging terrain**, particularly for well-known holy sites.
 - *Ex- killed 12 pilgrims at the Mata Vaishno Devi shrine.*
- **Lack of light** and **non-availability of fire extinguisher, fire hazards** in enclosed places.
- **Lack of crowd surveillance systems and an evacuation plan:** Lack of sectoral partitions to segregate assembled crowds and inappropriate or poorly managed control procedures.
 - *Ex- Kumbh Mela stampede of 1954.*
- **Crowd Behavior:** Surge of individuals in a crowd, in response to a perceived danger or loss of physical space.
 - *Ex- Elphinstone Road railway station stampede, 2017*
- **Psychological triggers:** Rumor spreading through the crowd, or a loud noise or one person slipping.
 - *Ex- Chennai Flood Relief Centre stampede, 2005.*
 - *Ex- Russian Tsar Nicholas II's coronation ceremony in Moscow, Russia (1896), the first documented human crowd disasters.*
- **Crowd density:** Critical density level- 8 people are pressed together and each has less than 1.5 sq. ft.

- The **South Asian Disaster Knowledge Network** explained the **causes** of a **stampede** with a ‘**FIST**’ model i.e.
 - **Force**- Force of the crowd or the crowd pressure
 - **Information** - Information to which a crowd reacts
 - **Space**- Space involved in the incident
 - **Time**- Time duration of the incident

Causes of Death in stampedes

- **Traumatic asphyxia** (partial/complete cessation of respiration due to external compression of the thorax and/or upper abdomen) is the main cause of stampede casualties.
- Significant **compression forces**, enough to hurt and kill humans, have been reported in even moderate crowds of six to seven people pushing in one direction.
- **Other possible reasons** include **myocardial infarction** (heart attack, caused by decreased or complete cessation of blood flow to a portion of the heart), **direct crushing injury** to internal organs, head injuries, and neck compression.

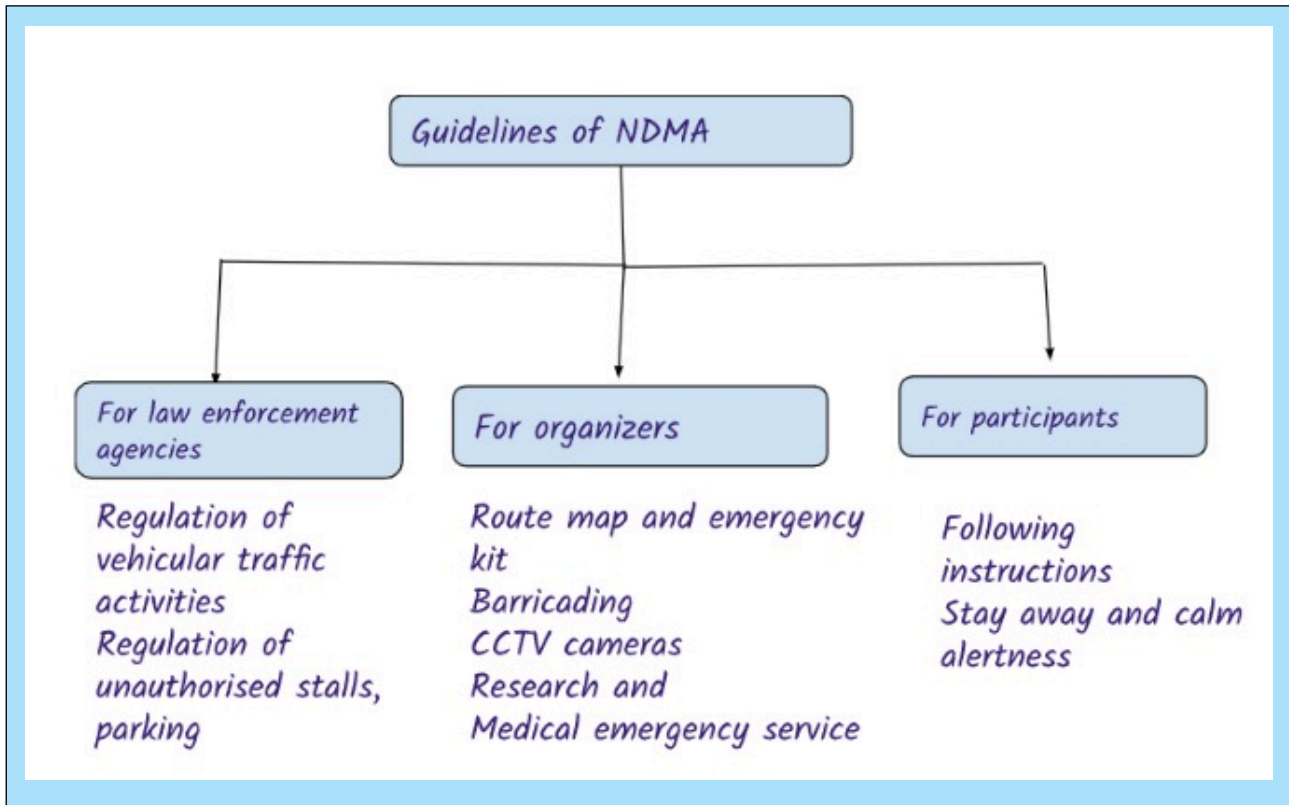
Methods for Stampede risk reduction

- **Keep the crowd moving**
 - Entry and exit gates must be kept free of any obstacles.
- **No surprises**
 - Ensure that a streaming crowd does not confront a surprise.
- **Control Craze**
 - Crowd is attracted to one single object.
- **Development of a large database**
 - Considerable time should be spent collecting information from different sources in the public and private sectors.
- **Development of a density monitoring system**
 - Necessary for organizers to manage capacity for stampede prevention.
- **Development of risk-checklist**

Includes participants, location, building, and time, should be customized to show the specific risks in the checklist.

NDMA Guidelines for Crowd Disaster Management

1. Understanding visitors
2. Understanding stakeholders
3. Crowd Management approaches
 - Capacity planning
 - Understanding Crowd behavior
 - Crowd disaster process
 - Crowd control
 - Stakeholder approach
4. Risk estimation and preparedness
 - Determine threats or causes
 - Risk assessment
 - Planning- Develop a course of action
5. Information dissemination and management
6. Security and safety measures
7. Medical Emergency Services



India-Nepal

Syllabus: GS II & GS-V - International Relations

Why in the News?

Shankar P Sharma, former Ambassador of Nepal recently stated that Nepal and India have a unique relationship. The open border, shared culture, economic interdependence and deep-rooted people-to-people relationship make bilateral ties special.

Background	<ul style="list-style-type: none"> • India-Nepal Treaty of Peace and Friendship of 1950 forms the basis of bilateral relations between two countries.
Strategic Partnership	<ul style="list-style-type: none"> • Nepal is a priority partner of India under its 'Neighbourhood First' policy.
Economic Partnership	<ul style="list-style-type: none"> • India is the largest trading partner of Nepal with bilateral trade crossing US\$ 7 billion in FY 2019-20. • Indian firms are among the largest investors in Nepal, accounting for more than 30% of the total approved foreign direct investments. • India is Nepal's top-source country for tourists and the only supplier of petroleum products.
Defence Cooperation	<ul style="list-style-type: none"> • India has been assisting the Nepal Army (NA) in its modernisation by supplying equipment and providing training. • The Joint Military Exercise 'SURYA KIRAN' is conducted alternately in India and in Nepal.
Multilateral Cooperation	<ul style="list-style-type: none"> • Both the countries are engaged in the regional and sub-regional frameworks of SAARC, BIMSTEC and BBIN (Bangladesh, Bhutan, India, and Nepal).
Energy Cooperation	<ul style="list-style-type: none"> • Both sides have had a Power Exchange Agreement since 1971 for meeting power requirements in border areas of the two countries. • Recently, India and Nepal formally inked an agreement to export 10,000 megawatts of electricity from Nepal to India over next decade. • The countries are working on constructing two new petroleum pipelines between Siliguri, India and Jhapa, Nepal and Amlekhgunj and Chitwan.
Diaspora	<ul style="list-style-type: none"> • Around 6,00,000 Indians are living/domiciled in Nepal. • Nearly 8 million Nepalese citizens live and work in India.

Factoring Assam in India-Nepal Relation

<p>Historical Ties</p>	<ul style="list-style-type: none"> The Pasupati inscription of Nepal mentioned that Raja Jaydeva II of Nepal's Licchavi dynasty married Rajyamati, daughter of Sri-Harshadeva, first ruler of Salastambha a Dynasty (650-990 AD) of Assam. The first large flush of Nepali-speaking persons came in the form of soldiers in the Gorkha Corps when the British annexed Assam in 1826.
<p>Cultural Exchange</p>	<ul style="list-style-type: none"> Both regions share cultural similarities, including language (both are part of Indo-Aryan language), and traditions, which foster a sense of shared heritage.
<p>Economic Relations</p>	<ul style="list-style-type: none"> Assam exports tea, bamboo products, methanol and other goods to Nepal and Nepal exports agricultural products and handicrafts to Assam. The tourism sector benefits from the movement of people between Assam and Nepal, with Nepalese visiting Assam's natural and cultural sites and Assamese traveling to Nepal for its landscapes and pilgrimage sites.
<p>Diaspora</p>	<ul style="list-style-type: none"> The Nepalese community in Assam plays a crucial role in strengthening bilateral ties through social and cultural organizations. There are more than five lakh Nepali-speaking people residing in Assam.

China's Initiative in Nepal

- Last year **China and Nepal signed 12 agreements** to enhance **Bilateral Cooperation** in sectors including trade, road connectivity, and information technology.
- Nepal signed** the framework agreement of the **Belt and Road Initiative (BRI)** with China in 2017.
- China's influence** in Nepal is **evident** across major **infrastructure and energy projects** in Nepal.
 - These include the West Seti Dam, the Pokhara Airport, Upper Trishuli hydropower project, Kathmandu Ring Road from Kalanki to Maharjgunj, the Araniko Highway upgrade, Nepal-China cross-border transmission line and the Hilsa-Simikot road.
- The Chinese government-funded **Asia-Pacific Exchange and Cooperation Foundation** plans to **invest \$3 billion** to convert **Lumbini**, the birthplace of Buddha, into a cultural "zone" that will attract millions of Buddhist pilgrims and tourists.
- In 2016, Nepal and China signed a **Transit and Transport Agreement** that allows Nepal to use Chinese ports for third country trade.
- China also provided military aid to Nepal**, and both the countries are engaged in joint military exercises.

About Nepal

- Nepal lies along the **southern slopes** of the **Himalayan Mountain ranges**.
- It is a **landlocked country** located **between India** to the east, south, and west and the **Tibet Autonomous Region of China** to the north.
- The country **shares** a border of over **1,850 km** with **five Indian states** – Sikkim, West Bengal, Bihar, Uttar Pradesh and Uttarakhand.



Q. "As close neighbors, India and Nepal share unique ties of friendship and cooperation characterized by an open border and deep-rooted people-to-people contacts of kinship and culture." Examine critically. **(150 words/ 10 marks)**

Shanghai Cooperation Organisation Summit

Syllabus: GS II - International Organisations

Why in the News?

The 24th Shanghai Cooperation Organisation (SCO) Summit was recently held in Kazakhstan's capital Astana, and was attended by the Indian External Affairs Minister.

Key Highlight of the Summit

- **Belarus** becomes the **10th Member** to join the Organisation.
- SCO member states endorsed the Initiative '**On World Unity for a Just Peace, Harmony and Development**'.
- Adopted the **Astana Declaration**, under which member states underscored SCO's role in bolstering global peace, and shaping a new democratic and economic order.
- Adopted the **SCO Development Strategy** until 2035, outlining collective contributions of the member states.
- Other key resolutions include the **cooperation programs to combat terrorism, separatism, and extremism** for 2025-2027, the **Anti-Drug Strategy** for 2024-2029, strategies for energy cooperation until 2030 and the **Economic Development Strategy's Action Plan** until 2030.
- The summit also saw the **adoption** of an **interaction plan among member states** on international information security issues.
- The member states also formalized an **agreement on environmental protection cooperation** among SCO governments.
- The summit concluded with **China assuming the SCO chairmanship** for the next term, and **Qingdao appointed** as the **SCO's tourism and cultural capital** for 2024-25.

What is the Shanghai Cooperation Organisation?

- SCO was **founded** in **1996** by **China, Russia, Kyrgyzstan, Tajikistan** and **Kazakhstan** under the name "Shanghai Five".

- The grouping was created to build mutual trust among Member States, to disarm the border regions and to encourage regional cooperation.
- On June 15, 2001 **Shanghai Five** was **transformed** into an **international organization** and was renamed as **SCO** and also included **Uzbekistan** as a **sixth member**.
- Before the inclusion of Belarus, **SCO** had **nine members: India, Iran, Kazakhstan, China, Kyrgyzstan, Pakistan, Russia, Tajikistan, and Uzbekistan**.
 - **Afghanistan** and **Mongolia** hold **Observer Status**.
- SCO has emerged as an **influential economic and security bloc** and one of the **largest trans-regional international organizations**.
- The SCO promotes **common approaches** to **external security threats** such as drug trafficking and also focuses on countering any domestic instability.

Significance of SCO

- **Geopolitical Influence**
 - **Alternative to Western Order:** The SCO is seen as a counterbalance to Western-dominated international organizations, primarily representing Asian interests.
 - **Balancing Act:** Smaller member states use the SCO to balance the influence of major powers and to gain leverage in their own geopolitical strategies.
- **Security Focus**
 - **Regional Security:** It is one of the few international organizations focused on security issues in Asia, dealing with terrorism, separatism, and extremism.
- **Economic and Infrastructure Projects**
 - **Infrastructure Investments:** The SCO facilitates infrastructure development, enhancing regional connectivity and economic integration.

- **Membership and Influence**
 - **Inclusion of India and Pakistan:** Reflects the strategic balancing within the organization, with Russia supporting India and China backing Pakistan to maintain a power equilibrium.
 - **Recent Expansions:** The inclusion of countries like Iran, especially in the context of deteriorating US relations with Russia and China, shows the growing geopolitical significance of the SCO.
- **Platform for Dialogue**
 - **Addressing Rivalries:** Provides a platform for countries with historical and ongoing conflicts (e.g., India and Pakistan, India and China) to engage in dialogue.

Relevance of SCO for India

- **Global Standing:** Membership in the SCO enhances India's diplomatic standing and influence in the region.
- **Strategic Engagement:** Provides India with a platform to strengthen its ties with Central Asian countries, which have historically had limited interaction with India since their independence in 1991.
- **Economic Opportunities:** With 40% of the world's population and 30% of global output, SCO opens up avenues for India's economic cooperation, trade, and investment in the resource-rich Central Asian region.
- **Energy Security:** With 4% of the world's natural gas reserves and about 3% of oil reserves, SCO is of significant importance for India. Additionally, SCO could also facilitate the TAPI pipeline.
- **Counter-Terrorism Efforts:** Participation in the SCO's Regional Anti-Terrorist Structure (RATS) enables India to collaborate on counter-terrorism initiatives, share intelligence, and conduct joint exercises with member states.
- **Communication Platform:** Offers a platform for India to engage in dialogue with significant regional players, including China and Pakistan, despite existing

tensions.

- **Balancing Regional Interests:** Enable India to counterbalance China's growing influence in the region and at the same time engage with Pakistan on neutral grounds
- **Strategic Act:** Allows India navigate its foreign policy by engaging with a multilateral organization that includes both allies and rivals.

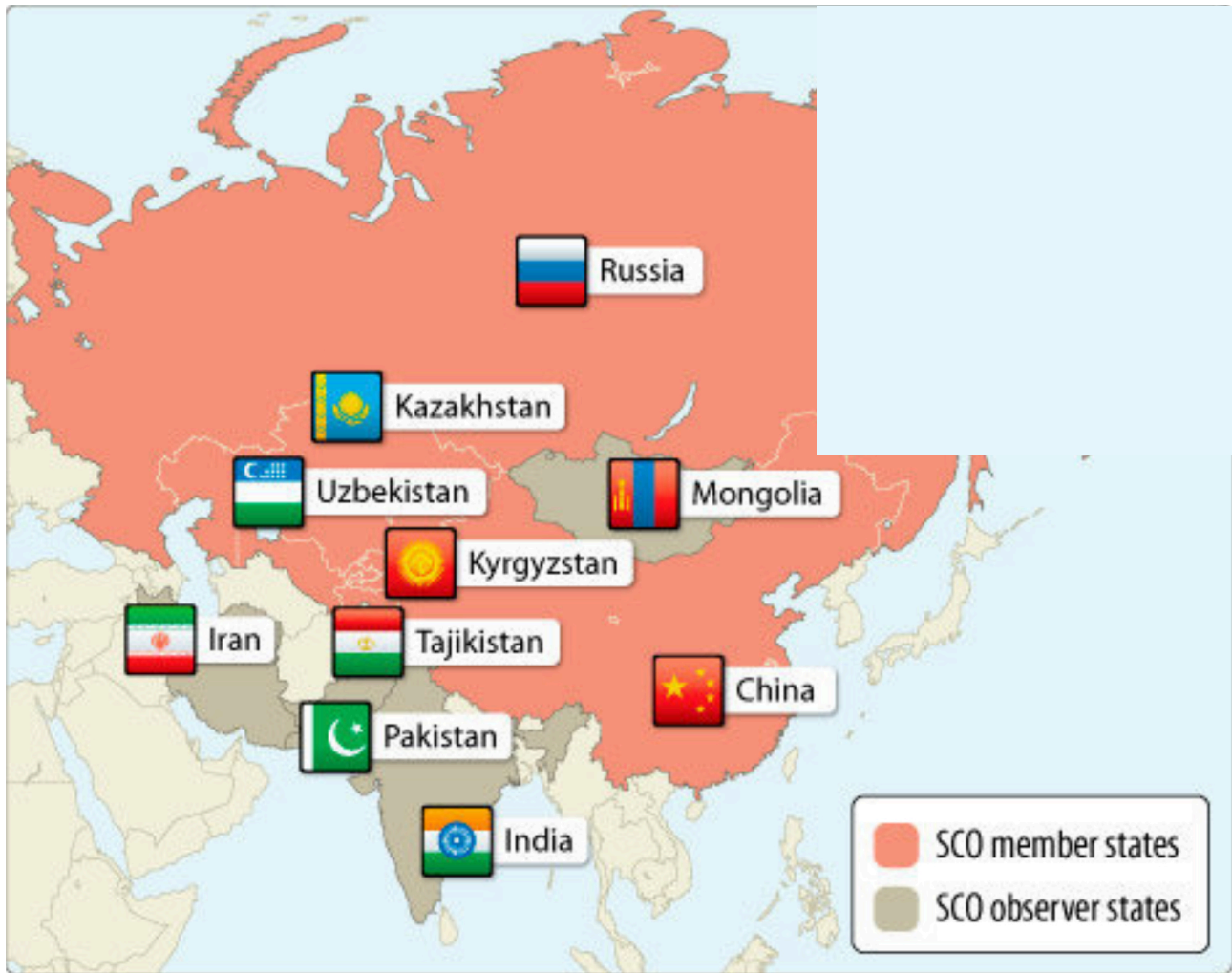
Challenges Associated with SCO

- **Vague Initiatives:** The broad and ambiguous nature of many SCO initiatives allows countries to participate without deeply committing, providing rhetorical support without significant concessions.
- **Limited Tangible Outcomes:** SCO failed to resolve underlying tensions between countries within the grouping like India Pakistan.
- **National Interests Prevail:** Member states prioritize their own national interests, often limiting the effectiveness of collective actions and agreements.
- **Russia-China Partnership:** Despite some competition, the SCO highlights the emergence of Russia-China partnership as the dominant force in central Asia.
- **Internal Corporation:** Tense relations within the grouping, limits the effectiveness of cooperation.
- **Anti-West forum:** SCO is increasingly perceived as an "anti-West" forum and the entry of Iran and Belarus has only strengthened this view.

SCO is important for its role in shaping regional security dynamics, balancing global power structures, and fostering economic and infrastructure development, despite its limitations in producing concrete outcomes due to the diverse interests of its member states.

Q. Critically examine the aims and objectives of SCO. What importance does it hold for India?

(15 marks/250 words)



AJMAL IAC

Air Pollution

Syllabus: GS III - Environmental pollution and degradation

Why in the News?

The first-of-its-kind multi-city study in India, published in the Lancet, has revealed that air pollution causes about 7% of deaths in 10 cities of India.

Key Highlight of the Study

- Across **10 cities** (Ahmedabad, Bengaluru, Chennai, Delhi, Hyderabad, Kolkata, Mumbai, Pune, Shimla, and Varanasi), over **33,000 deaths** annually are **attributed to air pollution**.
- **Delhi** has the **highest mortality rate** due to air pollution, with 11.5% of deaths each year.
- **Shimla** has the **lowest pollution-related mortality burden**, with only 59 deaths annually, accounting for 3.7% of its total deaths.
- Overall, **7.2% of deaths** in these cities, approximately 33,000 annually, are **caused by air pollution**.
- The study also highlighted that **PM2.5 concentrations** in these 10 cities **exceeded the WHO safe limit** of 15 micrograms per cubic meter on 99.8% of days.
- The study found a **1.42% rise in mortality** for every **10 micrograms** per cubic meter **increase in PM2.5 levels**.

About Air Pollution

- WHO defines air pollution as the presence of harmful substances in the air at concentrations that pose a risk to human health and the environment.
- These harmful substances can be gasses, particulates, or biological molecules that can cause diseases, allergies, or death in humans, and can also harm animals and plants.
- Key pollutants include:
 - **Particulate Matter (PM):** PM10 and PM2.5
 - **Nitrogen Dioxide (NO2):** Produced by motor vehicles and industrial processes.
 - **Sulfur Dioxide (SO2):** Produced by volcanic eruptions and industrial

processes, particularly the burning of coal and oil at power plants and refineries.

- **Ozone (O3):** Forms in the atmosphere when pollutants chemically react in the presence of sunlight.
- **Carbon Monoxide (CO):** Produced by burning fossil fuels.

Major Contributors to Air Pollution in India

- **Vehicular Emissions**
 - Significant contributor, especially in urban areas.
 - As per Centre for Science and Environment, vehicular emissions are responsible for 40% of PM2.5 emissions in Delhi, 30% in Mumbai, 28% in Kolkata, and 20% in Bengaluru.
- **Emissions from Industries**
 - Release harmful substances like sulfur dioxide, nitrogen oxides, carbon monoxide, lead, mercury, and VOCs.
- **Fossil Fuel Combustion**
 - Emissions from power plants, factories, and households using coal, oil, or natural gas.
 - According to the World Bank, India is the world's third-largest CO2 emitter (Group).
- **Agricultural Practices**
 - Stubble burning, use of fertilizers and pesticides, and livestock farming, releases smoke, dust, ammonia, methane, and nitrous oxide.
 - SAFAR's data shows that the peak single day component of stubble burning in Delhi's PM2.5 was 34% in 2022.
- **Indoor Air Pollution**
 - Over 56% of households in rural India still use some form of biomass fuels like wood, dung, or charcoal for cooking, according to the National Sample Survey Office.
- **Open Waste Burning**
 - Studies have shown that about 2% to 24% of the municipal solid waste (MSW) generated in cities gets burned, releasing PM2.5, PM 10, carbon monoxide and other non-methane, volatile organic compounds.

- **Construction Dust:**

- Dust from construction activities and unpaved roads can worsen air quality, especially during dry seasons.
- According to the Central Pollution Control Board (CPCB), road dust accounts for 45% of PM10 emissions and 10.9% of PM2.5 emissions in Indian cities.
- Apart from these, factors like **weather conditions** and **topography** can worsen air pollution in some regions.
- For instance, Delhi experiences stagnant wind conditions that trap pollutants close to the ground, leading to smog formation.

IMPACT OF AIR POLLUTION

HEALTH - OUTDOORS



Ambient air pollution (cities & rural areas) caused an estimated 4.2 million premature deaths worldwide in 2016.

HEALTH - INDOORS



Household air pollution was responsible for an estimated 3.2 million deaths per year in 2020 worldwide.

CLIMATE



Short-lived 'super pollutants' are responsible for nearly half of global warming to date.

WATER



Air pollution is affecting the monsoon and disrupting rainfall patterns worldwide.

ENERGY



Haze and dust from the air pollution can reduce solar yields by as much as 29%.

FOOD



Air pollution reduces global crop yields, upto 15% for wheat and soy, 5% for maize.

Government Initiatives to Curb Air Pollution

- **National Clean Air Programme (NCAP):** It was launched in 131 cities of India with the objective to reduce PM2.5 and PM10 concentrations by 20-30% by 2024.
- **Graded Response Action Plan (GRAP):** It is a multi-stage program designed to combat air pollution in Delhi and the NCR specifically.

- It's implemented by the Commission for Air Quality Management (CAQM).
- **Crop Residue Management:** The government provides a subsidy of 50-80% for crop residue management machinery to help farmers incorporate stubble into the soil instead of burning it.
- **National Air Quality Index (AQI):** It was launched so that the common man can easily judge the air quality within his/her vicinity.
 - There are six categories of air quality in AQI, namely Good, Satisfactory, Moderately polluted, Poor, Very Poor, and Severe.
- **Bharat Stage Emission Standards (BS-VI) Norms:** It is the emission regulation standards maintained in motor vehicles across India.
- **System of Air Quality and Weather Forecasting And Research (SAFAR):** It is India's first indigenous initiative to provide location-specific information about the air quality on a real-time basis.
- Notification regarding **SO₂** and **NO_x emission standards** have been **issued** for **Thermal Power Plants**.
- **Ban on use of pet coke and furnace oil** as fuel in NCR States and ban on use of imported **pet coke** in the country, with exception for use in permitted processes.

Air Pollution in Guwahati

- The latest 2023 World Air Quality Report by IQAir ranked **Guwahati** as the second most polluted city in the world.
- As per the report, Guwahati recorded an average annual PM 2.5 concentration of 105.4 microgram per cubic metre of air ($\mu\text{g}/\text{m}^3$), 20 times more than the WHO's recommended level of $5 \mu\text{g}/\text{m}^3$.
- The report by **IQAir** placed **Begusarai** in Bihar as the **first** and **Delhi** as the **third** most polluted cities in the world.
- It also ranked **India** as the **third most polluted country** in the world after Bangladesh and Pakistan.

Reasons for Rise in Pollution Levels in Guwahati

Guwahati has certain geographical disadvantages:

- It is a valley **surrounded by hills** from **three sides** causing pollution to get trapped, especially in winter.
- The air quality in Assam and more specifically, Guwahati, generally drops during the winter and pre-monsoon period due to **lack of rainfall**.
- Over the years, **several trees** have also been **cut down** in the city, leading to an increase in pollution levels.
 - In 2023, NGT highlighted that about 2,000 trees were being cut down for a road expansion project between Guwahati and Goalpara in Assam.
- **Encroachment** of various **wetlands** in and around the city is also responsible for the degrading level of air quality.
 - Wetlands absorb almost 50% of carbon dioxide which is even more effective than forest.
- **Open burning of waste, emissions from vehicles, dust from construction activities** are other causes of air pollution in the city.

Way Forward

- **Regulatory Measures:** Implementation of stricter emission norms for industries and vehicles. Ex: Clean city action plan, Emission Compliance Testing.
- **Technological Intervention:** Adoption of cleaner technologies and fuels. Ex- electric vehicles, CNG, cloud seeding technology, use dust suppressant and smog towers.
- **Adopt International Best Practices:** Using satellite technology to monitor air pollution as done by NASA and European
- **Policy Interventions:** To introduce measures like improving public transportation and promoting cleaner industrial practices.
- **Public Awareness:** Campaigns to educate the public about the sources and effects of air pollution and ways to reduce it.
- **Emergency Measures:** Implementation of emergency measures like revised Graded Response Action Plan (GRAP) to tackle severe air pollution episodes.
- **Waste Management:** Effective waste management can control air pollution by reducing the burning of waste, proper disposal along with recycling, and composting.
- **Other actions:** In order to control road dust emissions, there should be construction/ repair of roads and procurement of anti-smog guns and Mechanical Road sweepers.

Soil Erosion**

Syllabus: GS Paper- V Environmental Conservation

Why in the News?

A recent study has highlighted that the width of the Brahmaputra is increasing with every passing year due to bank erosion and sedimentation.

Key Highlights of the Report

Research by the Department of Geology, Gauhati University highlighted the following points:

- From **1967 to 2016, around 2,678 sq km of land of Assam was eroded** and around **616 sq km** were **deposited** to form chars.
- **Morigaon** was one of the **worst affected**

districts due to soil erosion, as during the period from 1967 to 2019, the district lost more than 200 sq km of land.

- The **total area** occupied by the **Brahmaputra River increased** from **2,000 sq km** in the early part of the 20th century to more than **6,000 sq km** in 2016.
- The **average channel** width of the river **increased** from 6 km to more than 10 km during this time.

Soil Erosion in Assam

- Soil erosion refers to the **removal of topsoil** caused by wind, water, or anthropogenic activities.
- According to Rashtriya Badh Aayog
 - Soil erosion since 1950 has **destroyed 7.4% of Assam's land area.**
 - Average Annual Erosion rate of Assam is **8000 hectares of land.**
- Soil erosion caused by floods is a major concern in Assam, leading to **land degradation, reduced agricultural productivity, and increased vulnerability to disasters.**

Factors Responsible for Soil Erosion

Natural Factors:

- **Heavy Rainfall:** Intense and frequent rainfall can wash away the topsoil, especially on slopes.
- **Topography:** Steep slopes and uneven terrain increase the speed of water runoff, leading to greater soil erosion.
- **River Dynamics:** The natural movement and flow of rivers can erode banks and carry away soil.
- **Seismic Activity:** Earthquakes and tremors can destabilize the soil, making it more prone to erosion.
- **Global Warming:** Climate change leads to extreme weather patterns, including heavier rainfall and increased flooding, which exacerbate soil erosion.

Anthropogenic Factors:

- **Unsustainable Agricultural Practices:** Over-farming, improper irrigation, and excessive use of chemical fertilizers degrade soil structure and increase erosion.
- **Deforestation:** Clearing forests for infrastructure and agricultural expansion removes tree cover that protects soil from erosion.
- **Construction and Mining Activities:** These activities disturb the soil, making it loose and more susceptible to being washed or blown away.
- **Jhum Cultivation:** This traditional slash-and-burn farming method removes vegetation cover, leaving soil exposed and vulnerable to erosion.

Impact of soil erosion

Soil erosion has a devastating impact on Assam affecting its environment, economy and social fabric.

Impact on Environment

- **Loss of fertile land:** Eroded soil loses its nutrients and organic matter, leading to reduced crop yields.
- **Habitat Destruction:**
- **Reduced agri-productivity:** A study by the Assam Agricultural University found that soil erosion has decreased crop productivity by 10-15% in some areas.
- **Increased flooding:** Soil erosion contributes to sedimentation in rivers, reducing their carrying capacity and exacerbating floods.
 - The Brahmaputra River is estimated to carry 735 million tons of sediment annually, much of which comes from eroded soil.

Economic Impact

- **Loss of Livelihood:** Erosion depletes fertile topsoil, reducing agricultural productivity and affecting farmers' incomes.
- **Infrastructure Damage:** Soil erosion can undermine roads, bridges, and buildings, leading to costly repairs and maintenance.

Social Impact

- **Displacement of People:** Nearly 90,000 people have been rendered landless due to soil erosion in Assam in the last five years (2014-2019).
- **Poverty and Food insecurity:** Reduced agricultural productivity due to loss of fertile soil leads to lower crop yields,

increasing poverty and food scarcity.

- **Rise in Land Conflicts:** As fertile land becomes scarcer, disputes and conflicts over land ownership and usage tends to increase.

Measure to Curb Soil Erosion

Structural Measures:

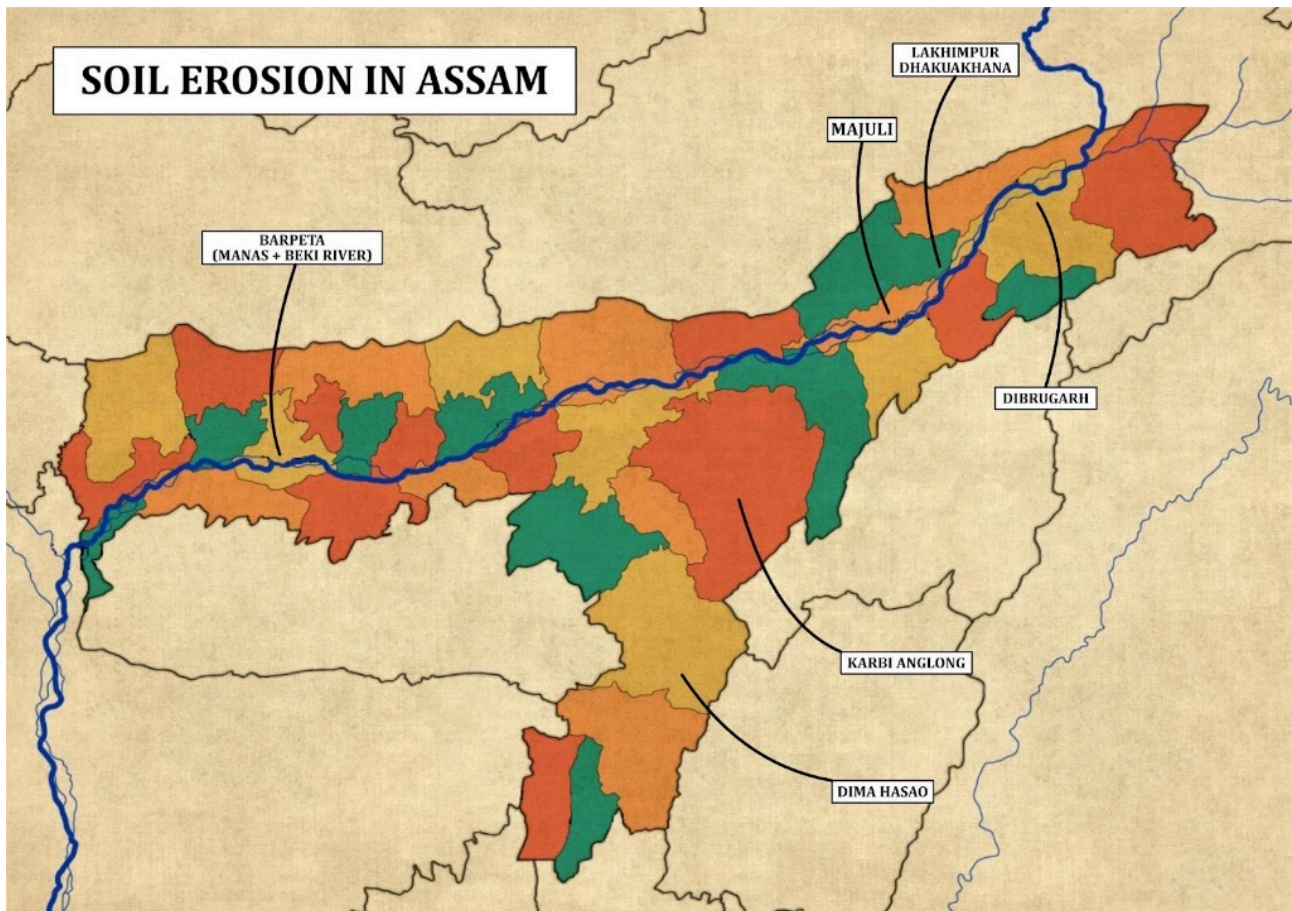
- **Gabion Structures:** Wire mesh cages filled with rocks or stones placed along riverbanks or slopes to reduce erosion by stabilizing soil and controlling water flow.
- **Revetments:** Sloped structures made of concrete, stone, or vegetation planted along riverbanks to protect against erosion caused by water currents.
- **Terracing:** Creating step-like structures on steep slopes to reduce water runoff, allowing water to infiltrate the soil and minimizing erosion.
- **Geotextile tubes (geo tubes):** Engineered tube-like sacks filled with sand and slurry are placed in trenches along shorelines or riverbanks, creating an effective erosion barrier.

Non-structural Measures

- **Afforestation:** Planting trees and vegetation to stabilize soil, reduce water runoff, and enhance soil structure.
- **Agroforestry:** Integrating trees or shrubs into farming systems to improve soil health, reduce erosion, and provide additional income from tree products.
- **Contour Farming:** Plowing and planting crops along the contour of slopes to slow down water runoff and reduce erosion.
- **Mulching:** Covering soil with materials like straw, leaves, or plastic to conserve moisture, improve soil structure, and reduce erosion.
- **Reduced Tillage:** Minimizing soil disturbance during planting to maintain soil structure, increase water infiltration, and reduce erosion.

Steps Taken by Government of Assam to Control Soil Erosion

- **Brahmaputra Flood and Erosion Risk management project:** It is a joint project of Asian Development Bank and Government of Assam
- **Assam Integrated River Basin management programme:** It is a joint project of World Bank and Government of Assam.



Q. What are structural and non-structural mitigation measures for soil erosion?
(150 words/ 10 marks)

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National Quantum Mission

Syllabus: GS III - Achievements of Indians in Science & Technology

Why in the News?

A recent assessment by a non-profit organization has highlighted that although India has launched the National Quantum Mission last year, it still has a large gap to bridge in quantum capabilities.

About the National Quantum Mission (NQM)

- The Union Cabinet approved the **National Quantum Mission (NQM)** in 2023 at a total cost of **Rs. 6003.65 cr** (USD 0.75 billion) from **2023-24 to 2030-31**.
- NQM is **implemented** by the **Department of Science & Technology (DST)** under the Ministry of Science & Technology.
- Its **objective** is to **seed, nurture and scale up scientific and industrial R&D** and **create a vibrant & innovative ecosystem** in **Quantum Technology (QT)**.
- Following are the targets of NQM:
 - Develop intermediate **scale quantum computers** with 50-1000 physical qubits in 8 years.
 - Establish Satellite based secure **quantum communications** between ground stations over a range of 2000 kms within India.
 - Develop **inter-city quantum key distribution** over 2000 km
 - Develop **multi-node Quantum network** with **quantum memories**
 - Develop **magnetometers** with **high sensitivity** in atomic systems and Atomic Clocks for precision timing.
- Under NQM four Thematic Hubs (T-Hubs) will be set up, namely:
 - Quantum Computing
 - Quantum Communication
 - Quantum Sensing & Metrology
 - Quantum Materials & Devices
- These hubs will focus on generation of new knowledge through basic and applied research as well as promote R&D in areas that are mandated to them.

Significance of the National Quantum Mission (NQM)

- NQM has the potential to **enhance the country's technology development ecosystem** to a level of global competitiveness.
- The Mission will help in **developing magnetometers** with high sensitivity in atomic systems and Atomic Clocks for **precision timing, communications, and navigation**.
- It will also support the **development of quantum materials** such as superconductors, novel semiconductor structures, and **topological materials** for **quantum devices**.
- The Mission would greatly **benefit** various **other sectors** like **health, financial, energy** with applications in **drug design, space, banking, security** etc.
- The Mission will provide a huge **boost** to **National priorities** like Digital India, Make in India, Skill India and Stand-up India, Start-up India, Self-reliant India and SDGs.

Challenges of the National Quantum Mission (NQM)

- **India** is far **behind** the **United States** and **China** in **terms of patents** obtained in quantum technologies.
- India is also **lagging behind** the **global leaders** in quantum technologies in **terms of funding** for research and development related work.
 - China is estimated to be spending USD 15 billion, followed by the UK at USD 4.3 billion, the US at USD 3.75 billion, Germany at USD 3.3 billion and South Korea at USD 2.35 billion for developing quantum technologies.
- India would have to overcome a **large gap** that currently exists between its **quantum capabilities** and those of other leading countries.
 - For instance, **China** launched the **world's first quantum communications satellite** named as **Micius satellite**.

Way Forward

- India needs to **increase** both **research and development efforts** and **translate** these into **practical applications** to compete with global leaders in quantum technologies.
- Although India produces the most graduates in quantum-related fields, they still require **targeted training** in various aspects of quantum technologies to be effective in the workforce.
- The government should consider creating a **dedicated cadre** for each of the four areas under the NQM, similar to that in India's space and nuclear sectors.

What is Quantum technology?

- Quantum technology **uses** the principles of **quantum mechanics**—the science of sub-atomic particles—to **develop new technologies and devices**.
- It **leverages unique quantum properties**, such as superposition and entanglement, to achieve capabilities and efficiencies that are not possible with classical systems.
 - In superposition particles can exist in multiple states at once.
 - In entanglement particles become linked and instantly affect each other regardless of distance.
- Quantum technologies **develop** such **processes** and **devices** with **capabilities** and **efficiencies** that are **impossible** to achieve with classical, **non-quantum, systems**.
 - A quantum computer, for instance, can perform certain tasks that a normal computer, however fast or powerful it may be, might not be able to finish in any useful amount of time.
 - Quantum computer uses, **quantum bit** (qubit) which is the **smallest unit** of **quantum information**.
 - Unlike classical bits (binaries), which can be either 0 or 1, **qubits** can be both **0 and 1** at the same time due **superposition**.
 - Additionally, **qubits** can be **entangled**, meaning the state of one qubit can depend on the state of another, even if they are far apart, enabling even more complex computations.
- Once developed fully, **quantum technologies** can cause a **disruption** in almost **every field**.
- Some of the areas that are expected to be impacted the most are computing, communications, cryptography, cybersecurity, and healthcare.

Awards

1. Order of Saint Andrew the Apostle

- Recently, the Indian Prime Minister was officially **awarded Russia's highest civilian honor**, the Order of Saint Andrew the Apostle, during his visit to the country.
- This prestigious award, **conferred upon him in 2019**, in recognition of his exceptional contributions to enhancing bilateral relations between India and Russia.
- The award is given to prominent government and public figures, military leaders, and outstanding representatives of science, culture, art, and various sectors of the economy for exceptional services to Russia.
- It can also be awarded to heads of foreign states for outstanding services to the Russian Federation.
- Its name comes from **Saint Andrew**, who is believed to be one of the **apostles or 12 original followers of Jesus**.

Defence

2. Rudram 1 Missile

- India has successfully test-fired its **first indigenous anti-radiation missile**, the Rudram-1, developed by the DRDO for the Indian Air Force (IAF).
- It is a **surface-to-air** missile, integrated with the IAF's Sukhoi-30MKI fighter jets.
- It can be **launched from varying altitudes** (from 500m to 15 kms) and boasts a **range** of up to **250 kms**.
- It is equipped with **inertial Navigation System (INS)-GPS navigation** and a **Passive Homing Head** which **allows the precise targeting** of radiation-emitting sources.
- The missile **enables IAF to conduct Suppression of Enemy Air Defence (SEAD) missions and neutralize enemy radars/communication systems** from extended ranges.

Exercises

3. Exercise MAITREE

- The **13th edition** of India- Thailand **joint military exercise MAITREE** has commenced at Fort Vachiraprakan in **Tak Province, Thailand**.
 - Last edition of the same exercise was conducted at Umroi, Meghalaya in September 2019.
- The exercises aim at further **enhancing the operational synergy** between the **Indian Army** and the **Royal Thailand Army**.
- The exercise emphasizes the **exchange of best practices**, with soldiers from India and Thailand sharing and imbibing each other's expertise.

Important Days

4. International Cooperative Day

- Recently the International Cooperative Day was celebrated on **July 6th, 2024**.
- The **International Cooperative Alliance established the first International Cooperative Day in 1923** to honour the ideals and principles of cooperation.
- Officially declared by the United Nations General Assembly, the Day is **observed annually** on the **first Saturday of July**, marking the establishment of the International Co-operative Alliance.
- This day aims to **raise awareness about cooperatives** and their **vital role in sustainable development, social inclusion, and economic resilience**.
- This year the theme of International Day of Cooperatives is **"Cooperatives Building a Better Future for All."**

Schemes

5. Samridhhi Poultry Scheme**

- **State Innovation and Transformation Aayog (SITA)**, recently **inaugurated phase two** of the SITA-funded project **Samridhhi Poultry scheme**.
- The scheme is an innovative approach for **economic empowerment of rural women** of Assam through **development of 'model egg village'**.
- The project aims to **enhance the economic security of farm women** through increased egg production and to establish the egg sector as a viable enterprise to double farm income.
- It also focuses on **improving gender mainstreaming, capacity building, and skill development** among rural farm women in improved layer farming techniques.

Miscellaneous

6. AI washing

- AI washing is a term used to **describe businesses** that **claim** to have **integrated AI** into their **products**, when they're **actually using less sophisticated technology**.
- AI washing basically consists of **advertisements** that **overstate** the **capabilities of a company's AI tools** or **mislead consumers** about features that are **not yet operational** in their AI products.
- The **term AI washing** was **popularized** by the **US Securities and Exchange Commission (SEC)**.

7. Project Anubhusan**

- Project Anubhusan of Gauhati Commerce College (GCC) has been selected for the ECHO (Environment Conservation Heroes) programme of WWF.
- The project aimed at **uplifting the slum areas** nearby Guwahati Railway Station by **empowering residents**, especially women, with sustainable livelihoods.

- They **collect cloth waste** from **local businesses**, **provide eco-friendly workshops** on making traditional Assamese jewellery, and offer business training.
- It also **promotes upcycling** and **reduces waste** while **creating income opportunities**.
- It **emphasizes community empowerment** and **sustainable urban development** through local partnerships and educational outreach, supporting sustainable urbanization (SDG 11.3) and preserving cultural heritage (SDG 11.4) by teaching traditional crafts.

8. SEHER Program

- Women Entrepreneurship Platform (WEP) and TransUnion CIBIL Partner recently launched the SEHER Program to Empower Women Entrepreneurs.
 - **WEP is a public-private partnership platform** incubated at NITI Aayog.
- SEHER is a **credit education program** for **empowering women entrepreneurs** in India with **financial literacy content** and **business skills**.
- The Program is a **part of WEP's Financing Women Collaborative (FWC)**, a first-of-its-kind initiative aimed at **accelerating access to finance** for **women entrepreneurs**.
- India has 63 MSMEs, with 20% owned by women, employing 27 million people.
 - Accelerating women's entrepreneurship could create over 30 million new women-owned enterprises and 150 to 170 million.

9. Charaideo Maidams **

- In the 46th session of the World Heritage Committee of UNESCO which is to be held in New Delhi, it is expected that the Ahom-era Charaideo Maidam of Assam will get the much-anticipated tag of 'World Heritage Site'.
- Maidams are the **burial mounds** of the **Ahom royalty and aristocracy**.
- The word maidam is derived from the **Tai word Phrang Mai -Dam or Mai -tam**.
 - Phrang means to put into the grave or bury and dam means the spirit of death.
- Comparable to the pyramids of Egypt, the maidams **represent** mound **burial tradition** of the **Tai Ahom** community in Assam.
- While **Charaideo** exclusively **contains maidams of Ahom royals, maidams of aristocrats and chiefs** can be found **scattered** across Eastern Assam, in the region between the towns of Jorhat and Dibrugarh.
- After the 18th century, the Ahom rulers adopted the Hindu method of cremation

and began entombing the cremated bones and ashes in a Maidam at Charaideo.

- Maidam basically comprises a massive underground vault with one or more chambers having domical superstructure.
- The **height of a maidam indicates** the **power** and **stature** of the person buried inside.
- Currently, there is **no World Heritage Site** in the **category of cultural heritage** in the **northeast**.

10. Blue Line

- The UN recently expressed deep concern at the increase in the intensity of exchanges of fire across the Blue Line.
- "Blue line" is the **border between Israel and Lebanon**.
- It was **set by the United Nations in 2000** after Israel withdrew its military from southern Lebanon.
- The line **runs** from the **Mediterranean Sea** in the west to the **Golan Heights** in the east and is marked by **blue barrels**.



District At A Glance

Kokrajhar

Geography of Kokrajhar

- Kokrajhar is one of the **western** most **district of Assam** and is the **gateway to Northeast** India.
 - It is a part of the **Bodoland Territorial Region, an autonomous territory in Assam.**
- **Geographical Area:** 3,165.44 sq.km
- **Population Density:** 280 per Sq.Km.
- **Sub-Divisions:** Kokrajhar Sadar, Gossaigaon, Parbatjhora
- **Revenue Circle:** Kokrajhar, Dotma, Bhowragur, Gossaigaon, Bagribari
- The district is situated in a **humid subtropical climate** that is characteristic of the **lower Brahmaputra Valley of Assam.**
- Kokrajhar town is the **headquarter** of **Bodoland Territorial Council (BTC).**
 - **BTC** was created on **10th February, 2003** comprising four districts viz. **Kokrajhar, Chirang, Baska, Udalguri.**
- **District Boundaries:**
 - **North-** Bhutan (length 88Kms)
 - **East-** Chirang district
 - **West-** West Bengal
 - **South-** Dhubri district
 - **South East-** Bongaigaon
- The district is located on the **north bank** of the mighty **Brahmaputra.**

- Other important rivers of the district are **Champamati, Gaurang, Tipkai, Saralbhanga** and the **Sonkosh.**
- The northern part of the district is characterized by the foothills of the **Bhutan Himalayas**, while the southern part consists of **flat plains.**

History of Kokrajhar

- Kokrajhar was originally a part of the undivided Goalpara district.
- In 1957 it was carved out as a Civil Sub-division from the then Dhubri Sub-division of Goalpara district.
- In **1983** the Kokrajhar Sub-Division was **upgraded** into **Kokrajhar district.**

Places of Interest

- **Raimona National Park:** It is spread across Gossaigaon and Kokrajhar subdivisions of Kokrajhar district. It was declared to be a National Park on 5 June 2021. Asian elephants, gaur or Indian "bison" and golden langur, all of which have large populations in the area.
- **Chakrashila Wildlife Sanctuary:** The sanctuary is also extended into the Dhubri district. It is best known as the second protected habitat in India for the endangered golden langur. The sanctuary has two wetlands named Dheer Beel and Diplai Beel on either side.
- **Mahamaya Temple of Bogribari:** It is located in the district Kokrajhar. It is regarded as the greatest Shakti Peethas for Hindu pilgrims in Lower Assam, India.

Q. Locate the neighboring districts and country surrounding **Kokrajhar district** in the given map.



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