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16th - 31st MARCH, 2021



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1 Project Mausam

Project Mausam has now been extended up to 31st March 2023.

What is Project Mausam?

- Project 'Mausam' is a **Ministry of Culture project** to explore the multi-faceted Indian Ocean 'world' – collating **archaeological** and **historical research** to document the diversity of cultural, commercial, and religious interactions in the Indian Ocean.
- It was launched in the 38th Session of World Heritage Committee meeting which was held at Doha in June, 2014.
- **Nodal Agency:** Indira Gandhi National Centre for the Arts (**IGNCA**)
- **Associate bodies:** Archeological Survey of India and National Museum

Aims & Objectives

- The main objective of the project is to inscribe places and sites identified under Project Mausam as **trans-national nominations** for inscriptions on **UNESCO's World Heritage List**.

Progress so far

- Indian Missions in the 39 countries have approached local authorities and several countries including the following, have nominated their resource persons for the Project Mausam: -
 - Bangladesh, Cambodia, Saudi Arabia, Thailand, Indonesia, Oman, Qatar, Singapore, Malaysia, The Islamic republic of Iran, UAE, Myanmar, Philippines and Jordan.
- It is proposed to prepare two transnational nominations namely;
 - Routes followed by the **Cholas** in the **Southeast Asia region**
 - Spread of **Buddhism** through land and sea routes in the **South and Southeast Asian region** (those countries that are a part of Project Mausam)

2 Visit of Prime Minister of India to Bangladesh

At the invitation of Prime Minister H.E. Sheikh Hasina, Indian Prime Minister Narendra Modi visited Bangladesh.

Occasion of visit:

This visit is in connection with the commemoration of three epochal events –

- **Mujib Borsho**, the birth centenary of **Sheikh Mujibur Rahman**
- **50 years** of the establishment of diplomatic ties between India and Bangladesh
- **50 years** of Bangladesh's war of liberation

Bangladesh War of Liberation

- ▶ **Vijay Diwas** is observed on 16th December every year to mark India's victory over Pakistan in the 1971 war.
- ▶ The Government of India decided on **3rd December 1971**, that India would go to war with Pakistan to save Bengali Muslims and Hindus.
- ▶ This war was fought between India and Pakistan for **13 days**.
- ▶ On **16th December 1971**, the chief of the Pakistani forces with 93,000 soldiers had surrendered unconditionally to the allied forces consisting of the Indian Army and MuktiBahini in Dhaka.
- ▶ **Mukti Bahini** refers to the armed organizations that fought against the Pakistan Army during the Bangladesh Liberation War. It was a guerrilla resistance movement.
- ▶ Bangladesh was born on this day. Hence, Bangladesh celebrates its **independence day (Bijoy Dibos)** on 16th December every year.

Important Outcomes of the Visit:

- Bangladesh reiterated its long-pending request for concluding the interim agreement on the sharing of the waters of the **Teesta River**.
- Stressed the need for predictability of trade policies, regulations, and procedures and the need for removal of **non-tariff barriers**.
- Bangladesh reiterated its eagerness to partner in the ongoing initiative of the **India – Myanmar - Thailand trilateral highway** project.
- Bangladesh thanked the Government of India for giving 3.2 million doses of Oxford Astra Zeneca **Covishield vaccine** made in India.
- Bangladesh reiterated the request for 1.3 km Innocent Passage through river route along with **River Padma**, on humanitarian grounds.
- India has offered a **USD 500 million lines of credit** for **defense imports** from India into Bangladesh and thus requested for early operationalization of this defense Line of Credit.

3

India-Finland Virtual Summit

Indian Prime Minister Narendra Modi and Prime Minister of the Republic of Finland H.E. Ms.Sanna Marin held India-Finland Virtual Summit and discussed the entire gamut of regional and multilateral issues.

Important Issues discussed during Summit:

- Both leaders noted that the close relations between India and Finland were based on shared values of **democracy, rule of law, equality, freedom of speech, and respect for human rights**.
- They reaffirmed their strong commitment to work for **multilateralism, a rules-based international order, sustainable development**, and combating **climate change**.
- The two leaders expressed their desire to further expand the relationship across sectors such as emerging technologies including **Artificial Intelligence, 5G/6G, and quantum computing**.
- Prime Minister Modi appreciated Finland's leading role in clean and **green technologies**. He also

suggested enhanced cooperation in the areas like renewable and **bio-energy, sustainability, edu-tech, pharma, and digitization**.

- The leaders exchanged views on regional and global issues, including the **India-EU partnership**, cooperation in the **Arctic region, WTO, and UN reforms**. Both sides noted the potential for India and Finland to cooperate in undertaking developmental activities in **Africa**.



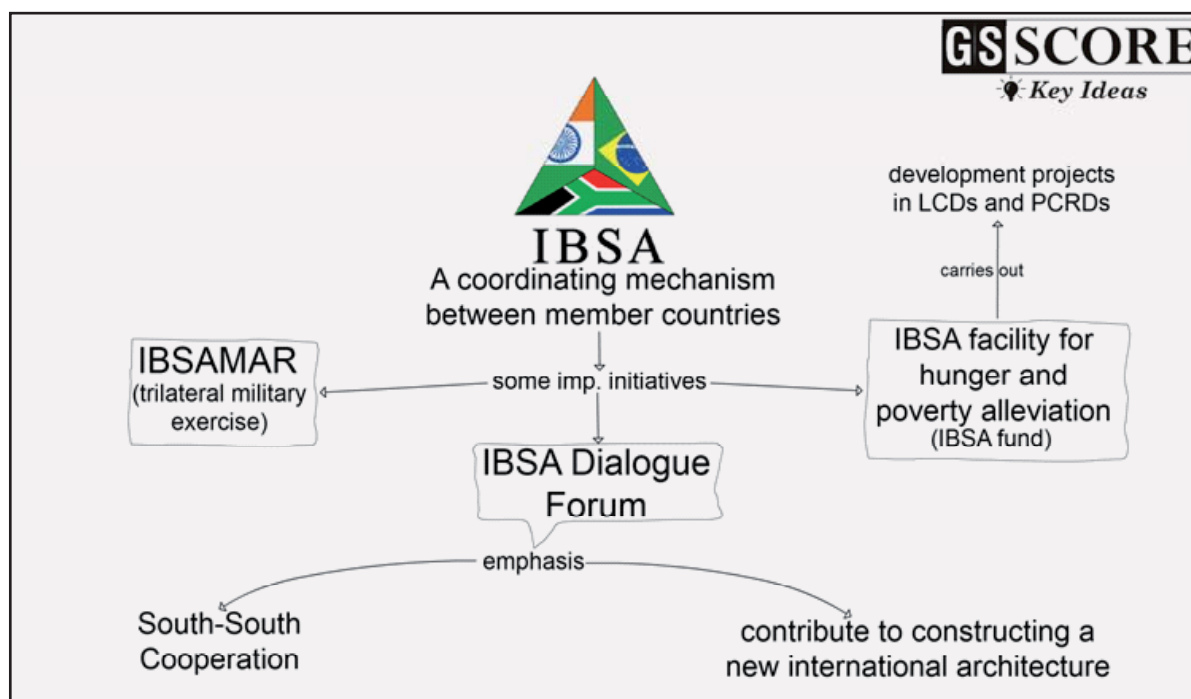
4

India-Brazil-South Africa Dialogue Forum (IBSA)

The Sixth India-Brazil-South Africa (IBSA) Women's Forum meeting was held virtually.

Important Issues discussed during Summit:

- In the backdrop of a **global pandemic** that has disrupted the lives of millions across the world in many ways, still, the year has seen that the rights of women and girls gaining prominence, universality with more urgency than ever before.
- During the consultation, the Forum discussed key issues that contribute towards the **transformation of women's lives**; by highlighting initiatives, policies, and best practices for a gender-inclusive economy.
- The Forum emphasized the necessity to **raise a voice on various multilateral** for a highlight the development priorities of the associate countries and emphasized how gender equality makes sound economic sense.



The India-Brazil-South Africa (IBSA)

- ▶ The grouping was formalized and named the IBSA Dialogue Forum when the Foreign Ministers of the three countries met in Brasilia (Brazil) in 2003 and issued the **Brasilia Declaration**.
- ▶ Trilateral Cooperation Forum is a unique platform which brings together India, Brazil and South Africa, three large democracies and major economies from three different continents.
- ▶ All three partners are developing pluralistic, multi-cultural, multi-ethnic, multi-lingual and multi-religious nations.
- ▶ IBSA is committed to inclusive sustainable development, in pursuit of the well-being for their citizens and those from the other developing nations.
- ▶ The principles, norms and values underpinning the **IBSA Dialogue** Forum are participatory democracy, respect for human rights, the Rule of Law and the strengthening of multilateralism.
- ▶ IBSA lays efforts in the **South-South cooperation** beyond the conventional areas of exchange of experts and training.

5

Coalition for Disaster resilient Infrastructure (CDRI)

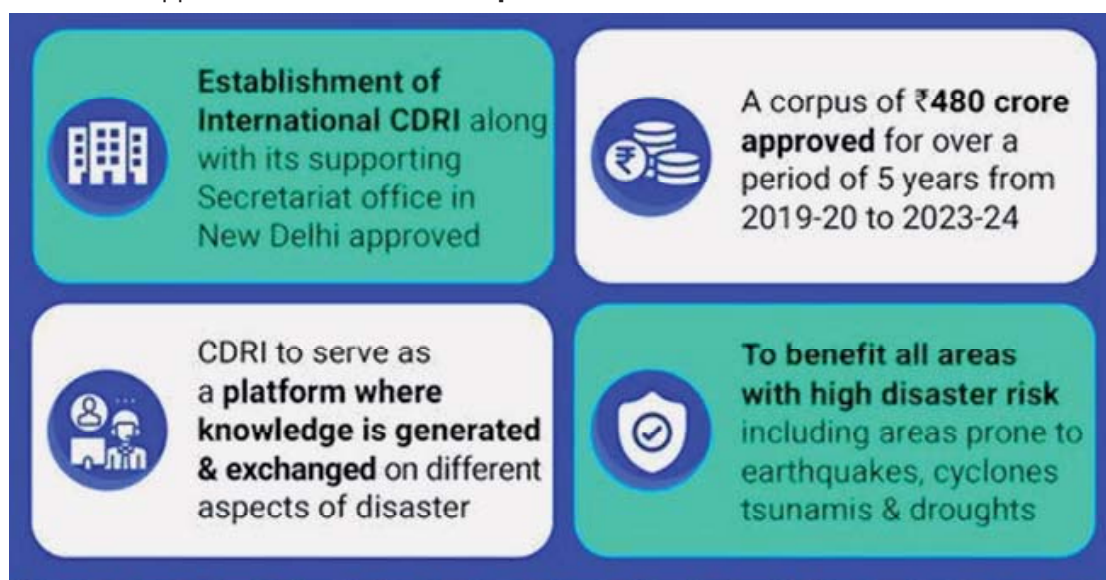
Recently, the Prime Minister addressed the opening ceremony of the International Conference on Disaster Resilient Infrastructure (ICDRI) through video conference.

About the Role and Functioning of CRDAI:

- ICDRI is the annual international conference of the Coalition for Disaster Resilient Infrastructure (CDRI) in partnership with member countries, organizations, and institutions to strengthen the

global discourse on disaster and **climate-resilient infrastructure**.

- The Coalition for Disaster Resilient Infrastructure (CDRI) is a **multi-stakeholder global partnership** of national governments, UN agencies and programs, multilateral development banks and financing mechanisms, the private sector, and knowledge institutions.
- It aims to promote the resilience of new and existing infrastructure systems to climate and disaster risks in support of **sustainable development**.



6 India-US Launched Artificial Intelligence (USIAI) Initiative

Indo-U.S. Science and Technology Forum's U.S. India Artificial Intelligence (USIAI) Initiative launched recently.

About the initiative

- Indo-U.S. Science and Technology Forum's (IUSSTF) USIAI Initiative focuses on **AI cooperation** in critical areas that are priorities for both countries.
- Over the next year, IUSSTF will conduct a series of **roundtables** and **workshops** to prepare **White Papers** that identify domain-specific opportunities for R&D in healthcare, smart cities, materials, agriculture, energy, and manufacturing.

Indo-U.S. Science and Technology Forum's (IUSSTF)

- IUSSTF is a bilateral organization funded by the Department of Science and Technology (DST), the Government of India, and the US Department of State.

Importance of USIAI initiative:

- **Facilitating AI innovation:** USIAI will serve as a platform to discuss opportunities, challenges, and barriers for bilateral AI R&D collaboration, enable **AI innovation**, help share ideas for developing an AI workforce, and recommend modes and mechanisms for catalyzing partnerships.

- **Addressing the challenges:** The U.S.-India AI Initiative will enable us to address the challenges of developing an **AI workforce**.

7

Gandhi Peace Prize

Recently, the Gandhi Peace Prize is declared for the years 2019 and 2020.

What is Gandhi Peace Prize Award?

- Gandhi Peace Prize is an annual award instituted by the Government of India since 1995, the 125th Birth Anniversary commemoration year of Mahatma Gandhi.
- The award is open to all persons regardless of nationality, race, language, caste, creed, or sex.
- The award carries an amount of Rs. 1 crore, a citation, a plaque, and an exquisite traditional handicraft/ handloom item.

Gandhi Peace Prize 2019:

- The Gandhi Peace Prize for the year 2019 is being conferred on **(Late) His Majesty Sultan Qaboos bin Said Al Said of Oman**.
- **His Majesty Sultan Qaboos** was a visionary leader whose twin policy of moderation and mediation in addressing international issues won him praise and respect across the globe.
 - H.M. Sultan Qaboos was the architect of the special ties between India and Oman.
 - Under his leadership, India and Oman became strategic partners, and our mutually beneficial, comprehensive partnership strengthened and scaled newer heights.

Gandhi Peace Prize 2020:

- The Gandhi Peace Prize for the year 2020 is being conferred on Bangabandhu Sheikh Mujibur Rahman.
- Bangabandhu was a champion of human rights and freedom and is a hero to Indians as well.
- Bangabandhu has laid a strong foundation for the partnership, progress, and prosperity of both countries over the last decade.
- As Bangladesh celebrates Mujib Borsho, India is honored to be commemorating his legacy jointly with the Government of Bangladesh and its people

Bangabandhu Sheikh Mujibur Rahman

- Popularly referred to as "Bangabandhu" or the 'friend of Bangladesh', Sheikh Mujibur Rahman was one of the tallest leaders of Bangladesh.
- Sheikh Mujibur Rahman's birth anniversary is celebrated as the **National Children's Day** in the country.
- Sheikh Mujibur Rahman was born on March 17, 1920.
- He is considered as the "architect of independent Bangladesh" and the 'father of Bangladesh'.
- In 1949, he joined the Awami League, a political party which advocated greater autonomy for East Pakistan.

- Rahman played an important role in the six-point movement and the Anti-Ayub movement.
- In 1970, his party secured an absolute majority in the Pakistani general elections
- The election results were not honoured, leading to a bloody civil war, and Sheikh Mujib declared Bangladesh's independence from Pakistan on March 26, 1971.
- India under then Prime Minister Indira Gandhi provided full support to Rahman and Bangladesh's independence movement, resulting in the creation of a sovereign government at Dhaka in January 1971.

8 Blockage of Suez Canal

A Four-point plan has been chalked out by the Logistics Division, Department of Commerce, and Government of India to deal with the situation arising from the blockage of the Suez Canal.

Important Components of the Plan to overcome the Suez crisis:

- **Prioritization of cargo:** FIEO, MPEDA, and APEDA will jointly identify cargo particularly perishable cargo for priority movement and work with the shipping lines for the same.
- **Freight Rates:** CSLA assured that the freight rates as per existing contracts will be honored. A request has been made to the shipping lines to maintain stability in freight rates during the period of this crisis.
- **Advisory to Ports:** Ministry of Ports, Shipping and waterway assured to issue an advisory to the ports to gear up arrangements and ensure efficient handling during the forthcoming busy period.
- **Re-routing decisions:** Shipping lines were advised through CSLA to explore the option of re-routing of ships via the Cape of Good Hope. It was pointed that such re-routing usually takes 15 additional days.



Blockage in the canal

- A 224,000-tonne container ship named 'Ever Given' was grounded in the Suez Canal on March 23, completely blocking the traffic along the waterway and delaying a number of ships carrying cargo ranging from oil to consumer goods.
- Blockage of the Suez Canal is seriously hitting global trade.



- This route is used for Indian exports/imports worth USD 200 billion to/from North America, South America, and Europe.
- It includes petroleum goods, organic chemicals, iron and steel, automobile, machinery, textiles and carpets, handicrafts including furniture, leather goods, etc.
- Over 200 vessels are waiting on the North and South sides of the Suez Canal and about 60 vessels are getting added to the queue daily.

Suez Canal

- **Total length:** 193 km
- **Commissioned in:** 1869
- The Suez Canal is an artificial sea-level waterway in Egypt, connecting the Mediterranean Sea to the Red Sea and providing the shortest sea **link between Asia and Europe**.
- The canal provides a direct route between the North Atlantic and northern Indian Oceans.
- **Connecting Ports:** It extends from the northern terminus of **Port Said** to the Southern end of **Port Tewfik** at the **city of Suez**.
- It is the shortest sea link between Asia and Europe since 1869. The longest canal with no locks is one of the busiest trade routes.

9

INDO-UZBEKISTAN FIELD TRAINING EXERCISE 'DUSTLIK'

The second edition of the Indo-Uzbekistan Joint Field Training Exercise, EXERCISE DUSTLIK-II culminated.

Details of Exercise:

- In the joint exercise which began on 10 Mar 2021, training was focused on Counter Insurgency / Counter-Terrorism operations in urban scenarios as well as sharing of expertise on **Skills at Arms**.
- The exercise also provided an opportunity to troops of both Armies to foster everlasting **professional** and **social bonding**.
- After intense military training, the joint exercise concluded with both Armies exhibiting their combat power and dominance over the terrorist groups during the **Validation Exercise**.
- The closing ceremony showcased the immense talent with a unique traditional touch of both nations.
- The **bonhomie, esprit-de-corps**, and goodwill generated during the exercise will go a long way in the future strengthening the bonds between the armed forces of both countries.

10

Indian and US Special Forces VAJRA PRAHAR 2021

The 11th edition of Indo-US Joint Special Forces Exercise VAJRA PRAHAR 2021 was conducted at Special Forces Training School located at Bakloh, HP.

Details of Exercise:

- The joint exercise by the Special Forces of both the countries is conducted alternatively between India and the United States to share the best practices and experiences in areas such as joint mission planning and operational tactics.
- Bilateral military exercises and defense exchanges are an important facet of deepening bilateral defense cooperation between friendly countries.
- During such events, the armies of participating nations jointly train, plan and execute a series of operations for neutralization of threats of varied nature with a common aim of countering threats of international terrorism through mutual training and jointness.

Other Some Exercises:

Exercise Name	Participant Nations
Sampriti	India & Bangladesh
Mitra Shakti	India & Sri Lanka
Maitree Exercise	India & Thailand
Vajra Prahar	India & US
Yudh Abhyas	India & US
Nomadic Elephant	India & Mangolia
Garuda Shakti	India & Indonesia
Shakti Excersie	India & France
Dharma Guardian	India & Japan
Surya Kiran	India & Nepal
Hand in Hand Excersie	India & China

11

'Buldhana Pattern' for Water Conservation

NITI Aayog has prepared draft guidelines according to the successful implementation of the water conservation pilot project in the Buldhana district of Maharashtra state.

Details of the Buldhana Pattern:

- NITI Aayog guidelines include:
 - Sourcing earth for improvement/construction of national highways, state roads, and railways
 - Water conservation works through desiltation/ deepening of water bodies
- Ministry of Road Transport & Highways conveyed that the contractors/construction agencies responsible for the construction of National Highways should excavate the earth as per their project requirements from such identified water bodies/areas at no cost to the village panchayats

- Similarly, the panchayats/water conservation departments of the states should not charge any amount from the agencies for the earth so excavated.
- Through this arrangement, gram panchayats/farmers will gain by having a pond/water body dug in their land at no cost which will help in the restoration of such water bodies while the construction agency would get the material for embankments for its road building and road expansion projects free of cost.

The Project

- Buldhana, which receives scanty rainfall, was selected for the project- 'Water conservation and groundwater recharge'.
- Under the project, personnel of the National Highways Authority of India (NHAI), along with the teams of PWD engineers deputed with them, extracted soil from rivers, nullahs, village tanks, minor/medium irrigation projects in the vicinity of national highways, thereby increasing the storage capacity of these water bodies.
- A total of 5,510 TCM (thousand cubic meters) storage capacity was created, benefiting around 152 villages in the district.

Recent Government initiatives for Water Conservation

- Establishment of Ministry of Jal Shakti
- Jal Shakti Abhiyan
- Jal Jeevan Mission
- The Composite Water Management Index

12

Budget Session of Parliament adjourns sine die

The Budget Session, 2021 of Parliament has been adjourned sine die on.

Highlights of the Session:

- The Session saw productivity of approx. 114% in Lok Sabha and 90% in Rajya Sabha.
- During this Session, a total of 20 Bills (17 in Lok Sabha and 03 in Rajya Sabha) were introduced. 18 Bills were passed by Lok Sabha and 19 Bills were passed by Rajya Sabha. The total number of Bills passed by both Houses of Parliament is 18.

Important passed Bills

• Economic sector/ease of doing business measures

- The **Mines and Minerals** (Developments and Regulation) Amendment Bill, 2021 proposes to develop the mining sector to its full potential for faster economic growth.
- The **Insurance** (Amendment) Bill, 2021 aims to achieve the objective of the Government's FDI policy by raising the limit of foreign investment in Indian insurance companies from the existing 49 per cent to 74 per cent and allowing foreign ownership and control with safeguards.
- The **Arbitration and Conciliation** (Amendment) Bill, 2021 addresses the concerns raised by stakeholders after the enactment of the Arbitration and Conciliation (Amendment) Act, 2019.

- The **National Bank for Financing Infrastructure and Development** Bill, 2021 proposes to establish the National Bank for Financing Infrastructure and Development to support the development of long-term non-recourse infrastructure financing in India.
- The **Major Port Authorities Bill**, 2021 aims to provide greater autonomy, flexibility to the Major Ports and to professionalize their governance by repealing the Major Port Trusts Act, 1963.

• Health sector

- The **Medical Termination of Pregnancy (Amendment)** Bill, 2021 increases the upper gestational limit for termination of pregnancy and strengthens access of women to comprehensive abortion care without compromising the service and quality of safe abortion.
- The **National Commission for Allied and Healthcare Professions** Bill, 2021 seeks to provide for regulation and maintenance of standards of education and services by allied and healthcare professionals, assessment of institutions, maintenance of a Central Register and State Register, and creation of a system to improve access, research and development and adoption of latest scientific advancement and connected.

• Social justice reforms

- The **Constitution (Scheduled Castes) Order (Amendment)** Bill, 2021 amends the Constitution (Scheduled Castes) Order, 1950 in respect of the State of Tamil Nadu.
- The **National Capital Territory of Delhi Laws (Special Provisions) Second (Amendment)** Bill, 2021 will extend the Act, 2011 for a further period of three years from 01.01.2021 to 31.12.2023.
- The **Government of National Capital Territory of Delhi (Amendment)** Bill, 2021 will promote harmonious relations between the legislature and the executive of the National Capital Territory of Delhi.

Budget Session	Monsoon Session	Winter Session
<ul style="list-style-type: none"> • It is conducted from January to April. • The session witnesses the introduction of Budget by FM. 	<ul style="list-style-type: none"> • It is conducted from July to September. • This session is dedicated for discussions on matters of public interest. 	<ul style="list-style-type: none"> • It is conducted from December to January • This is the shortest session.

Adjournment

- An adjournment suspends the work in a sitting for a specified time, which may be hours, days, or weeks. In this case, the time of reassembly is specified.
- An adjournment only terminates a sitting and not a session of the House.
- The power of adjournment lies with the presiding officer of the House.

Adjournment Sine Die

- Adjournment sine die means terminating a sitting of Parliament for an indefinite period. In other words, when the House is adjourned without naming a day for reassembly, it is called adjournment sine die.

- ▶ The power of adjournment sine dies lies with the presiding officer of the House.
- ▶ Note: The presiding officer of a House can call a sitting of the House before the date or time to which it has been adjourned or at any time after the House has been adjourned sine die.

Prorogation

- ▶ Prorogation means the termination of a session of the House by an order made by the President under article 85(2) (a) of the Constitution. Prorogation terminates both the sitting and session of the House.
- ▶ Usually, within a few days after the House is adjourned sine die by the presiding officer, the President issues a notification for the prorogation of the session. However, the President can also prorogue the House while in session.
- ▶ Note: All pending notices (other than those for introducing bills) lapse on prorogation and fresh notices have to be given for the next session.

Dissolution

- ▶ Dissolution ends the very life of the existing House, and a new House is constituted after general elections are held.
- ▶ Rajya Sabha, being a permanent House, is not subject to dissolution. Only the Lok Sabha is subject to dissolution.
- ▶ The dissolution of the Lok Sabha may take place in either of two ways:
 - Automatic dissolution: On the expiry of its tenure – five years or the terms as extended during a national emergency.
 - Order of President: If President is authorized by CoM, he can dissolve Lok Sabha, even before the end of the term. He may also dissolve Lok Sabha if CoM loses confidence and no party is able to form the government. Once the Lok Sabha is dissolved before the completion of its normal tenure, the dissolution is irrevocable.

Note: When the Lok Sabha is dissolved, all business including bills, motions, resolutions, notices, petitions, and so on pending before it or its committees lapse.

13

Mission Karmayogi

Recently, the “National Programme for Civil Services Capacity Building” (NPCSCB) has been approved by the Government providing the Institutional Framework for civil service capacity building.

About the Program

- The approved framework for the program includes a **special purpose vehicle (SPV)** for owning and operating the digital assets and the technological platform for online training of civil servants along with the formation of a coordination unit headed by the cabinet secretary.
- The new framework will include the **Prime Minister’s Public Human Resources (HR) Council and Capacity Building Commission**.

- Under the NPCSCB program, the PM-led HR Council will approve and monitor civil service capacity building plans and the Commission will assist the PM Public Human Resources council in approving the annual capacity building plans.
- The Commission will also exercise functional supervision over all Central Training Institutions dealing with civil services capacity building besides suggesting policy interventions required in the areas of HR management and capacity building to the Union government.

iGOT- Karmayogi Platform

- The program will be delivered by setting up an **'Integrated Government Online Training-iGOT Karmayogi Platform'**.
- It will help to undertake data analytics in respect of data emit provided by **'iGOT- Karmayogi'** pertaining to various aspects of capacity building, content creation, user feedback, and mapping of competencies and identify areas for policy reforms.
- **The iGOT-Karmayogi** platform will provide scale and state-of-the-art infrastructure to augment the capacities of over two crore officials in India.

Objectives of the Karmayogi program:

- To provide strategic direction to civil service reforms and capacity building
- Preparation of annual capacity building plans
- To strengthen functional supervision over training institutions
- To provide a digital learning platform providing best in class learning content
- To improve the availability of a trained workforce for effective citizen-centric delivery
- To enable data-driven decisions for training personnel management
- To achieve increased transparency and accountability in governance



14

Integrated Scheme for Development of Silk Industry

The Government of India through the Central Silk Board has been implementing a Central Sector Scheme “Silk Samagra” during the years 2017-18 to 2020-21.

What is Silk Samagra?

- Silk Samagra is an **Integrated Scheme for Development of Silk Industry (ISDSI)**. It works for the overall development of the Silk Industry in the Country.
- **Objective:** To scale up production by improving the quality and productivity
- **Focus area:** It focuses to empower downtrodden, poor & backward families through various activities of sericulture in the country.

Central Silk Board

- The Central Silk Board is a **statutory body**.
- It functions under the administrative control of the **Ministry of Textiles**, Government of India.

Impact of the Scheme

- During the last five years, the raw silk production in the country has shown an increasing trend due to the implementation of the “Silk Samagra” scheme along with other initiatives of the Government.
- Under the **Tribal Sub Plan (TSP) of the “Silk Samagra”** scheme, separate funds are being earmarked by the Government specifically to support tribal stakeholders involved in the silk value chain.

Silk Production in India:

- There are five major types of silk of commercial importance, obtained from different species of silkworms.
 - These are **Mulberry, Oak Tasar & Tropical Tasar, Muga and Eri**.
- Except for mulberry, other **non-mulberry varieties of silks** are **wild silks**, known as **vanya silks**.
- India has the unique distinction of producing all these commercial varieties of silk.
- South India is the leading silk producing area of the country and is also known for its famous silk weaving enclaves like **Kancheepuram, Dharmavaram, Arni**, etc.

15

Possible origin of winds from black hole accretion discs probed

Scientists have tracked the possible origin of winds from black hole accretion discs and how it is driven by the disc of diffused swirling materials around the black hole called an accretion disc.

How winds origin from black hole?

- As gas and dust fall toward a black hole, they form a disk around it.
- As material piles up in the disk, it heats up to temperatures in excess of millions of degrees.
- A fraction of this infalling matter is ejected in the form of winds.

Significance of such winds

- By blowing dense gas from the **galactic nucleus** and by halting inward flows from the galactic halo, the winds play a vital role in shaping the evolution of the black hole host galaxy.
- Hence the mechanism of generation of these winds and what drives them has intrigued scientists for a long as it helps them explore **host galaxies**.

The research was led by **Aryabhata Research Institute of observational sciences (ARIES)**, an autonomous institute under the Department of Science and Technology (DST), Government of India, in collaboration with scientists from other institutions.

16 Artificial Photosynthesis

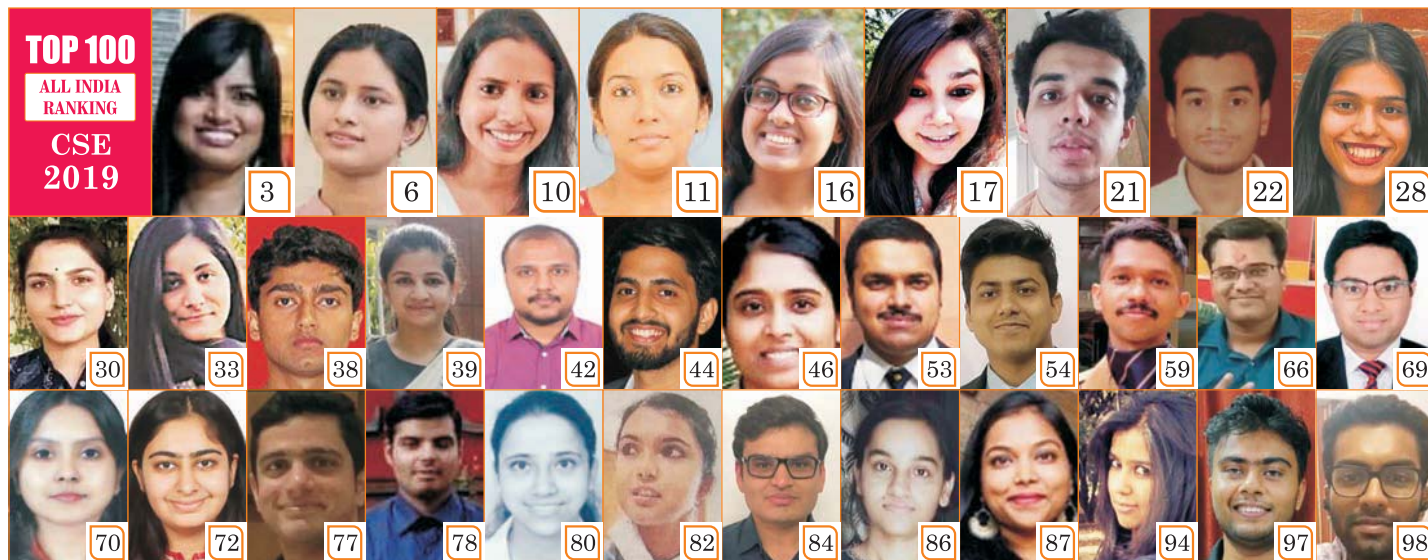
In a positive development, scientists have found a way to mimic nature's process of reducing carbon dioxide in the atmosphere — photosynthesis — to capture excess atmospheric carbon dioxide.

What is this 'artificial' process?

- This artificial photosynthesis (AP) harnesses **solar energy** and converts the captured **carbon dioxide** to **carbon monoxide (CO)**, which can be used as a fuel for **internal combustion** engines.
- In artificial photosynthesis (AP), scientists are essentially conducting the same fundamental process in natural photosynthesis but with simpler **nanosstructures**. However, there are plenty of hurdles to overcome as a successful catalyst to carry out AP.
- The developed catalyst exhibited excellent visible-light-driven CO₂ reduction to CO with more than 99% selectivity.
- The catalyst also oxidizes water to produce oxygen (O₂).
- The photocatalytic assembly, when assessed for CO₂ reduction under direct sunlight in a water medium without any additives, showed superior performance of CO production.
- Being heterogeneous, the integrated catalytic assembly can be reused for several catalytic cycles without losing its activity.

Photosensitiser and Photocatalytic

- ▶ The scientists have immobilized a **photosensitiser** — a chemical called **ruthenium bipyridyl complex [Ru(bpy)₂Cl₂]** — and a catalytic part — **rhenium carbonyl complex [Re(CO)₅Cl]** — inside the nano-space of a metal-organic framework for artificial photosynthesis.
- ▶ The close proximity of these molecular entities in the confined nano-space results in good carbon dioxide uptake.



SUCCESS IS A PRACTICE WE DO!

