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MINISTRY OF SCIENCE AND TECHNOLOGY

MK Yadav Sir

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FOREIGN INSTITUTIONAL INVESTORS

(Syllabus: GS Paper 3 – Economy)

Why has India allowed FIIs to invest in its green bonds?

What are Sovereign Green Bonds? How will investments by Foreign Institutional Investors in green government securities accelerate India's transition to a green economy?

Kunal Shankar

The story so far:

On April 5 the Reserve Bank of India (RBI) green lighted investments in the country's Sovereign Green Bonds (SGrBs) by Foreign Institutional Investors (FIIS) – investors such as insurance companies, pension funds and nation-states' sovereign wealth funds. SGrBs are a kind of government debt that specifically funds projects attempting to accelerate India's transition to a low carbon economy.

How does it help in green transition?

Allowing FIIs to invest in India's green projects widens the pool of capital available to fund the country's ambitious 2070 net zero goals, ensuring 50% of India's energy comes from non-fossil fuel based sources and to reduce the carbon intensity of the nation's economy by 45%, as pledged by Prime Minister Narendra Modi at COP26 in Glasgow 2021.

The RBI had issued SGrBs worth ₹16,000 crore in two tranches in January and February last year with maturities in 2028 and 2033. While in both instances the bonds were oversubscribed, the main participants were domestic financial institutions and banks, narrowing the avenues from where the government could borrow. Moreover, these green Government-Securities (G-Secs) were classified under the Statutory Liquidity Ratio (SLR), a liquidity rate fixed by the RBI that financial institutions must maintain with themselves before they lend to their customers.

SGrBs yield lower interest than conventional G-Secs, and the amount foregone by a bank by investing in them is called a greenium. But central banks and governments the world over are encouraging financial institutions to embrace greeniums to hasten the transition to a greener future. Climate finance experts believe India would gain from allowing FIIs in green G-Secs. They say FIIs are also looking to diversify their pool of green investments, as there is considerable regulatory support particularly in developed countries. And so this is an opportunity for them to invest in India's green g-secs. Ashim Roy, Energy Finance lead at World Resources Institute, India said FIIs might also be looking to gain green credentials when such investments may not be available in their home markets, and because India has successfully addressed greenwashing fears with the Sovereign Green Bonds Framework in late 2022.

What is the green taxonomy gap?

In the 2022-23 Union Budget, Finance Minister Nirmala Sitharaman announced the government's decision to issue SGrBs to accelerate funding government projects such as harnessing offshore wind, grid-scale solar power production, or encouraging the transition to battery operated Electric Vehicles (EVs). But the

How does it help in green transition?

- **Financial Inflow from Foreign Investors**: Allowing FIIs to invest in India's green projects attracts foreign capital, bolstering the nation's financial resources dedicated to sustainability.
- **Expansion of Capital Pool**: This initiative broadens the pool of available capital, facilitating the financing of India's ambitious 2070 net zero goals.
- **Support for Renewable Energy**: With increased funding, India can accelerate the transition towards renewable energy sources, aiming for 50% of its energy to be sourced from non-fossil fuel-based options.
- **Commitment to Carbon Reduction**: Investment influx enables the fulfillment of Prime Minister of India's commitment at COP26 to reduce India's carbon intensity by 45%.

Context: Recently, the Reserve Bank of India (RBI) granted approval for **Foreign Institutional Investors (FIIs)** including insurance companies, pension funds, and sovereign wealth funds of various nations to invest in the country's **Sovereign Green Bonds (SGrBs).**

Foreign Institutional Investors (FIIs)

- **About:** These are institutional investors that invest in assets located in countries different from their own.
- **Importance of FIIs**: FIIs play a vital role in the economy, comprising large entities like investment banks and mutual funds, injecting significant capital into Indian markets.
- **Influence on Market Trends**: The actions of FIIs, such as buying securities, strongly impact market movements, contributing to both upward and downward trends.
- **SEBI's Oversight**: SEBI, the market regulator, oversees more than 1450 registered foreign institutional investors, underscoring their significant presence in the Indian financial landscape.
- **Role in Market Performance:** FIIs serve as both triggers and catalysts for market performance, stimulating investment across various investor classes and fostering growth in financial market trends.

Green Bond:

- Bonds issued by any sovereign entity, inter-governmental groups or alliances and corporates with the aim that the proceeds of the bonds are utilized for **projects classified** as **environmentally sustainable.**

- **First ever green bond:** Issued by the World Bank in 2008.

SPACE TOURISM

(Syllabus GS Paper 3 – Sci and Tech)

INDIA-ORIGIN GOPI THOTAKURA HEADS TO SPACE: WHAT IS SPACE TOURISM?

GOPI THOTAKURA, an entrepreneur and a pilot, is set to become the first person of Indian origin to go to space as a tourist on the NS-25 mission of Blue Origin – a company founded by Jeff Bezos, who is also the founder of Amazon. Thotakura has been selected as one of the six crew members for the mission. The launch date of the mission is yet to be announced.

In recent years, space tourism has grown in popularity. In 2023, the space tourism market was estimated to be worth $848.28 million. It is expected to grow to $27,861.99 million by 2032. However, there are several challenges that may limit the industry's growth.

Gopi Thotakura. *LinkedIn*

What is space tourism?

Space tourism is a form of space travel, which is done for recreational or business purposes. There are two main types of space tourism, sub-orbital and orbital.

The sub-orbital spacecraft takes passengers just beyond the Kármán line – it lies nearly 100 kilometres above our heads and is considered to be the boundary between Earth's atmosphere and outer space. The passengers get to spend a few minutes in outer space and then come back to Earth. The NS-25 mission, which Thotakura is a part of, is a sub-orbital mission.

Orbital spacecraft take passengers much farther than the Kármán line. Usually, passengers can spend from a couple of days to more than a week at an altitude of up to 400 km.

In 2021, Space X's Falcon 9 took four passengers to an altitude of 160 km, where they spent three days orbiting the Earth.

What are the challenges?

Currently, space tourism is expensive. A passenger generally has to pay at least a million dollars to reach outer space. This is mainly because of high manufacturing costs and the cost of fuel.

Studies have found that space tourism may cause environmental damage as rockets emit gaseous and solid chemicals directly into the upper atmosphere.

A 2022 study published in the journal *Earth's Future* found that soot emissions from rocket launches are far more effective at warming the atmosphere compared to other sources.

Safety is also a concern. A total of 676 people have flown into space and 19 of them have died as of November 2023, according to a report by *Astronomy Magazine*. This means that approximately 3% of astronauts died during their space flight which is a high fatality rate. **ENS**

Context: Entrepreneur and pilot **Gopi Thotakura** is set to become the **first Indian** to venture into space as a tourist on the NS-25 mission of Blue Origin.

Space Tourism

- **About**: It is a segment of the aviation industry aimed at providing recreational, leisure, or business travelers the opportunity to experience space travel, as described in 'Air Transport: A Tourism Perspective.'
- **Types**: Space tourism can be categorized into two main types: sub-orbital and orbital.
  - **Sub-orbital Space Tourism**: It involves spacecraft that ascend just beyond the Kármán line, approximately 100 kilometers above Earth's surface. Passengers experience a few minutes of weightlessness before returning to Earth.
  - **Example**: NS-25 mission by Blue Origin's New Shepard spacecraft, as with Thotakura's participation.
  - **Orbital Space Tourism**: It entails spacecraft that travel much further than the Kármán line, allowing passengers to spend days or even weeks in space.
  - **Example**: SpaceX's Falcon 9 mission in September 2021, where four passengers spent three days orbiting Earth at an altitude of 160 km.

Challenges in Space Tourism

- **Cost Barrier**: Space tourism remains prohibitively expensive, with tickets priced at over a million dollars, making it accessible only to a privileged few.
- **Environmental Impact:** Studies indicate that space tourism contributes to environmental damage, primarily through rocket emissions, which release gaseous and solid chemicals into the upper atmosphere.
- **Climate Concerns**: Research from institutions like University College London (UCL), the University of Cambridge, and MIT underscores the significant impact of rocket emissions, particularly soot, on atmospheric warming.
- **Safety Risks**: Despite stringent safety protocols, the history of space travel includes notable fatalities, with approximately 3% of astronauts losing their lives during space flights, as reported by Astronomy Magazine in November 2023.

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VEERANAM LAKE

(Syllabus: GS Paper 1 – Geography)

Another Bengaluru in the making? Chennai's main drinking water source Veeranam lake dries up

Context: After Bengaluru, Chennai residents are facing the worrying prospect of a water crisis as summer heat intensifies Veeranam Lake, one of the city's primary water sources, has already run dry.

Veeranam Lake

- **Location:** Also known as Veeranarayanapuram Lake, is situated 14 km (8.7 mi) SSW of Nattarmangalam in Cuddalore district, Tamil Nadu, South India.
- **Distance from Chennai**: Located approximately 235 km (146 mi) from Chennai, India, Veeranam Lake serves as a water reservoir intended to supply water to Chennai.
- **Drought Situation**: The lake had dried up, rendering it unusable for water supply. To address this, authorities resorted to digging 45 deep borewells around the area and pumping water 235 km (146 mi) to Chennai via a pipeline.
- **Longest Man-made Lake**: With a length of 14 km, Veeranam Lake holds the distinction of being the longest man-made lake globally. It was constructed by ancient people using rudimentary hand tools.
- **Historical Significance**: Built in the Tenth Century during the reign of Greater Cholas, from 907–955 AD, Veeranam Lake spans 16 kilometers (9.9 mi) and was commissioned by Rajaditya Chola, who named it after his father, Parantaka I Chola.
- **Water Sources**: Veeranam Lake receives water from Kollidam via Vadavaru River. Despite its significant size, the lake often remains dry for a considerable part of the year.

LIVEMINT

Front Page

FOREX TRADING PLATFORMS

(Syllabus: GS Paper 3 – Economy)

Decoding RBI's alert on illegal forex platforms

BY GOPIKA GOPAKUMAR

Shaktikanta Das, the governor of the Reserve Bank of India (RBI), has raised concerns over unauthorized forex trading platforms and asked banks to remain alert. What explains this warning? And what's been the experience with regulatory actions so far? *Mint explains:*

1 What are forex trading platforms?

These are platforms where foreign exchange transactions can take place. They are used by corporates and traders to hedge their foreign currency risks. These transactions can be on over-the-counter (OTC) spot or derivatives platforms authorized by the RBI. The other avenue is through RBI-authorized exchange traded currency derivate segments like the BSE, NSE and the Metropolitan Stock Exchange of India. The OTC or inter-bank transactions are undertaken over electronic trading platforms (ETP) such as CCIL's FX CLEAR or Reuters or Bloomberg platforms. They can also be undertaken through authorized brokers.

2 What are the rules on forex trading in India?

Forex trading in India has to be done through a registered Indian forex broker, on ETPs authorised by the RBI or on recognized stock exchanges. According to the central bank, forex trading in India is permissible only in four currency pairs—dollar-rupee, euro-rupee, British pound-rupee and Japanese yen-rupee. These pairs have the Indian rupee (INR) as the base currency. Trading in any other currency pair is illegal and can attract penalties under the Foreign Exchange Management Act (FEMA). Indian citizens are also not allowed to trade foreign currencies overseas, either directly or indirectly.

3 What about unauthorized forex trading platforms?

In November last year, RBI came out with an alert list of 75 entities, which are not authorized to deal in forex or operate ETP for forex transactions. They include OctaFX, Alpari, AnyFX, Ava Trade, Binomo, Exness, Expert , Option, FBS, FinFxPro, Forex.com, Forex Imoney, Foxores, FTMO, FVP Trade, FXPrimus, FXStreet, FXCm, FxNice and HotFores.

4 What's the problem with these platforms?

The problem started during the pandemic when many of these platforms started offering a derivative product called contracts for differences (CFD), which is an arrangement made in financial derivatives trading where the difference in the settlement between the open and closing trade prices is cash-settled. RBI said it had noticed misleading ads offering forex trading facilities on over-the-top platforms and gaming apps. These platforms promise high returns, using features similar to casino games.

5 What has RBI done so far to check this?

In the past two years, RBI has issued several advisories cautioning against unauthorized entities. Now it has come out with an alert list of 75 entities involved in forex transactions on unauthorized platforms. RBI, however, cannot shut them down as they are registered in countries where they are legal. It has been working with banks and the government for stricter measures to ensure banking channels are not misused. The Enforcement Directorate has attached the assets some of these firms like OctaFX.

Context: The governor of the Reserve Bank of India (RBI) has recently raised concerns over unauthorized forex trading platforms and asked banks to remain alert.

Forex Trading Platforms

- **About**: These platforms facilitate foreign exchange transactions, serving as digital arenas for buying and selling currencies.
- **Utilization by**: These platforms are utilized by both corporates and individual traders to manage and mitigate their exposure to foreign currency risks.
- **Types of Transactions**: It can occur through over-the-counter (OTC) spot markets or derivatives platforms, which are duly authorized by regulatory bodies like the RBI.
- **Regulatory Authorization**: Forex transactions are conducted through platforms authorized by the Reserve Bank of India (RBI), ensuring compliance with regulatory standards and guidelines.
- **Exchange-Traded Currency Derivatives**: Another avenue for forex trading is through RBI-authorized exchange-traded currency derivative segments, including major stock exchanges such as BSE, NSE, and the Metropolitan Stock Exchange of India.
- **Role of Authorized Brokers**: Authorized brokers also play a significant role in facilitating forex transactions, ensuring market liquidity and efficient execution.

Forex Trading in India

- **Registered Indian Forex Broker Requirement:** Forex trading in India must be conducted through a registered Indian forex broker.
- **Authorized Electronic Trading Platforms (ETPs)**: Trading in India should occur on ETPs authorized by the Reserve Bank of India (RBI) or recognized stock exchanges.
- **Permissible Currency Pairs**: The RBI permits forex trading in India only for four currency pairs: dollar-rupee, euro-rupee, British pound-rupee, and Japanese yen-rupee.
- **Base Currency Restriction**: These permitted currency pairs have the Indian rupee (INR) as the base currency.
- **Illegal Trading and Penalties**: Trading in any other currency pair is illegal under the Foreign Exchange Management Act (FEMA) and can result in penalties.
- **Restrictions on Indian Citizens**: Indian citizens are prohibited from trading foreign currencies overseas, either directly or indirectly.

ISRAEL'S DEFENCE SYSTEM

(Syllabus: GS Paper 3 – Sci and Tech)

Israel's weapons that thwarted Iran attack

AMRITA NAYAK DUTTA
NEW DELHI, APRIL 16

ISRAEL'S MULTI-layered air defence system intercepted "99 per cent" of a wave of 300 long-range missiles and armed drones launched by Iran on Saturday night in retaliation for the Israeli attack on its embassy premises in Damascus, Syria, earlier this month.

The Israel Defence Forces (IDF) said only a few missiles landed in Israeli territory, causing minimal damage to an airbase in southern Israel and injuring a child.

Israel's air defence system is meant to protect against a range of aerial threats, including aircraft, cruise and ballistic missiles, and unmanned aerial vehicles (UAVs). The air defence systems can target projectiles at the source or when in transit.

Cruise missiles fly at low heights; ballistic missiles follow high parabolic trajectories. Because of their standard parabolic trajectory, ballistic missiles are easier to track compared to cruise missiles, which can fox air defence systems due to their manoeuvrability.

Systems such as Arrow 2 and Arrow 3, David's Sling, Iron Dome, Patriot Advanced Capability-2, and PAC-3 are integrated to work in tandem with advanced fighter aircraft operated by the Israeli air force.

■ The Arrow system, developed in collaboration with the United States, is a family of anti-ballistic missiles that are capable of intercepting long-range missiles in the upper atmosphere. Arrow-3 was employed against long-range missiles launched by Yemen's Iran-backed Houthi militia, according to a report by the *Associated Press*.

■ David's Sling (or Stunner) is Israel's medium-range air defence system, which can intercept cruise missiles, ballistic missiles, and aircraft. It has a range of 300 km, and an advanced phased-array radar for easier detection.

■ The Iron Dome is Israel's indigenous short-range air defence system. According to the manufacturer Rafael, it was first used in combat interception in April 2011. It is "the only multi-mission system in the world that provides a combat-proven solution to defeat Very Short Range (VSHORAD), as well as rocket, artillery and mortar (C-RAM) threats, aircraft, helicopters, UAVs, PGMs, and cruise missiles, for land and naval air defence, operating 24/7, in all weather conditions," the manufacturer says.

IRON DOME TO ARROW: COMPONENTS OF AIR DEFENCE

Israel intercepted 99% of missiles and drones that Iran launched on Saturday night, Israel's military said. None of the 170 drones and 30 cruise missiles entered Israeli territory, though a few of the 110 ballistic missiles that Iran fired did. Israel is at least 1,000 km away from Iran — with Iraq, Syria, and Jordan in between

IRON DOME
For short-range rockets and shells, like the ones fired from Gaza. Developed by Rafael Advanced Defence Systems; world's most successful missile defence system with 90% success rate, according to the company. Operational since 2011. *(right)*

RADAR UNIT detects airborne rocket/shell, transmits data to the control unit.
CONTROL UNIT processes data, assesses the threat, charts interception path.
FIRING UNIT sends missile (with radar, special warhead) to hit incoming rocket.

DAVID'S SLING
Intermediate layer of air defence system, for ballistic and cruise missiles and longer-range rockets. Developed by Rafael Advanced Defence Systems along with American defence contractor Raytheon. Carrier has upto 12 Stunner interceptors, according to the firm. Operational since 2017. *(above)*

SPYDER
Family of multirange mobile air defence systems to defend large areas against aerial attacks by fighter and bomber aircraft, helicopters, cruise missiles, UAVs. All-weather system can be activated within seconds of a target being declared hostile, according to the manufacturer Rafael. *(above)*

ARROW
A mobile system consisting of hypersonic anti-missile interceptors, ground-based 'Green Pine' missile defence radar, early warning radar, and command and launch control centres. Arrow 3 is most modern, longest range interceptor. Range 1,400 miles-plus, altitude 62 miles; meant for targets in the upper atmosphere.

Illustration: Suvajit Dey; Photos: Reuters, Rafael Advanced Defence Systems; Information: AP, Rafael, CSIS

RANGE OF ISRAEL'S AIR DEFENCE MISSILES: FROM 100-2,400 KM

Tel Aviv, Gaza, Israel, Egypt, Syria, Iraq, Jordan, Iran, Tehran, Minimum distance between Iran and Israel 1,000 KM, GULF OF ADEN

SPYDER: ~100 km
IRON DOME: up to ~100 sq km
DAVID'S SLING: between ~40 and ~300 km
ARROW: ~2,400 km

With a 70 kilometre range, the dome has been effective against short-range threats such as rockets launched by Hamas, the Palestinian militant group.

■ The US-made Patriot PAC-2 and PAC-3 are air defence systems that can intercept a range of missiles and target aircraft and drones. They are among the oldest air defence systems, and were used during the First Gulf War in 1991 for intercepting Scud missiles launched by Iraq.

■ American built F-16 and F-35 fighter jets, which are equipped with air-to-air missiles, play a major role in Israel's air defence.

■ Israel is also developing a system called the Iron Beam to intercept incoming threats with laser technology. It is not fully operational yet.

Context: Israel's multi-layered air defense system recently thwarted a major attack, as Iran deployed over 300 armed drones and launched long-range missiles toward the country.

Components of Israel's Defence System

- **Arrow System**
  - The Arrow system consists of anti-ballistic missiles designed for intercepting long-range missiles.
  - Arrow-2, developed in collaboration with the US, intercepts ballistic missiles within the atmosphere.
  - Arrow-3 intercepts missiles outside Earth's atmosphere and was used against Houthi-launched missiles in Yemen.
- **David's Sling**
  - Also known as Stunner, David's Sling is Israel's medium-range air defence system.
  - It intercepts cruise missiles, ballistic missiles, and aircraft within a range of 300 kilometres.
  - Equipped with advanced phased-array radar for improved detection capabilities.
- **Iron Dome**
  - Israel's indigenous short-range air defence system.
  - Intercept rockets, artillery shells, and mortar bombs with a range of 70 kilometres.
  - Effectively counters short-range threats like rockets from Hamas.
- **Patriot PAC-2 and PAC-3**
  - US-made air defence systems deployed by Israel.
  - Intercept a variety of missiles, target aircraft, and drones.
  - Employed since the First Gulf War in 1991 against Scud missiles from Iraq.
- **Fighter Jets**
  - F-16 and F-35 fighter jets are integral to Israel's air defence strategy.
  - Equipped with air-to-air missiles, they play a significant role in protecting airspace.
- **Iron Beam**
  - Israel's ongoing development of an air defence system utilizing laser technology.
  - Designed to intercept incoming threats but not yet fully operational.

THE HINDU Science

LACCADIVE SEA

(Syllabus: GS Paper 1 – Geography)

Three new fish species spotted using tools in the Laccadive Sea

Reports of animals like chimpanzees using straws to draw water and crows fashioning leaves to extract insects from crevices are well known whereas reports of aquatic animals using tools have been less common. This is partly because they are more difficult to observe and a perception that fish are 'less intelligent'

THE GIST

Context: Three new fish species were recently discovered utilizing tools in the Laccadive Sea.

Laccadive Sea

- **About:** It also referred to as the Lakshadweep Sea, is a significant body of water situated in the Indian Ocean region, encompassing several coastal areas of India, the Maldives, and Sri Lanka.
- **Bordering Countries**: The Laccadive Sea borders India, including its Lakshadweep islands, the Maldives, and Sri Lanka.
- **Bordering States**: Positioned southwest of Karnataka, west of Kerala, and south of Tamil Nadu, the Laccadive Sea holds a strategic location in the Indian Ocean.
- **Climate and Marine Life:**
  - **Stable Water Temperature**: This warm sea maintains a stable water temperature throughout the year, contributing to its biodiversity.
  - **Rich Marine Life**: The Laccadive Sea boasts a diverse range of marine species, with the Gulf of Mannar alone accommodating approximately 3,600 species.
- **Major Urban Centers**: Several major cities dot the coastline of the Laccadive Sea, including Mangaluru, Kasaragod, Kannur, Kozhikode, Ponnani, Kochi, Alappuzha, Kollam, Thiruvananthapuram, Tuticorin, Colombo, and Malé.
- **Southern Border**: Kanyakumari, the southernmost tip of peninsular India, also shares its border with the Laccadive Sea, enhancing its geographical significance.

Discovery of Tool-Using Fish in the Laccadive Sea

- **Introduction to the Species:** Three fish species residing in the Laccadive Sea, off the southwest coast of India, exhibit tool-using behavior, as recently uncovered.
- **Tool Usage Behavior**: All three species utilize live or deceased coral structures as anvils, employing them to crack open sea urchin shells to access the edible portions within.
- **Anvil Use Among Fish Species:** Prior observations of anvil use in fish were limited to approximately 18 species worldwide, all within the Labridae family to which the three wrasses belong.

DTE

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MENINGITIS

(Syllabus: GS Paper 3 – Sci and Tech)

Nigeria makes history with rollout of new 5-in-1 meningitis vaccine

Context: Nigeria has taken a historic step in the fight against meningitis, becoming the first country in the world to introduce a new, highly effective vaccine.

Meningitis

- **About**: It is a serious infection or inflammation of the meninges, the three-membrane thin lining over the brain and spinal cord.
- **Cause**: It can be caused by several species of bacteria, viruses, fungi, and parasites.
- **Symptoms**: Neck stiffness, fever, confusion or altered mental status, headaches, nausea, and vomiting. Less frequent symptoms include seizures, coma, and neurological deficits like hearing or vision loss, cognitive impairment, etc.
- **Transmission:** Meningococcus, pneumococcus, and Haemophilus influenzae reside in the human nose and throat and are transmitted through respiratory droplets or throat secretions.
- Group B streptococcus, typically found in the human gut or vagina, can be transmitted from mother to child during childbirth.
- **Vaccination:** The primary prevention method for bacterial meningitis is through vaccination, which is available for Meningococcus, Pneumococcus, and Haemophilus influenzae type b (Hib).

Men5CV Vaccine.

- **Highly Effective Protection**: The Men5CV vaccine, endorsed by the WHO, confers immunity against five meningococcal strains (A, C, W, Y, and X) with a single dose, enhancing its efficacy.
- **Broad Spectrum Coverage**: Unlike previous vaccines limited to strain A, Men5CV offers comprehensive protection against all five major meningitis-causing strains, preventing both meningitis and blood poisoning.
- **Significance for Nigeria**: As one of Africa's 26 hyper-endemic countries for meningitis, Nigeria's adoption of Men5CV aligns with WHO's ambitious target of eradicating meningitis by 2030.
- **Support for WHO's Goals**: Nigeria's initiative supports the overarching goal of the WHO to eliminate meningitis globally, contributing to collective efforts in public health.

DEBRIS-FREE SPACE MISSIONS

(Syllabus: GS Paper 3 – Sci and Tech)

'India aims to attain debris-free space'

Isro chairman S. Somanath on Tuesday announced that India aims to achieve debris-free space missions by 2030. Addressing the 42nd Inter-Agency Space Debris Coordination Committee (IADC) annual meet in Bengaluru, he said Isro has a very clearly laid out plan as far as space exploration and space utilization are concerned for the coming days.

"It is one of the intent or initiative of India to ensure that debris-free space missions are conducted so as to ensure the sustainability of space. I would like to make this initiative a declaration today, possibly this can be discussed and debated in the coming days," Somanath said. "This initiative aims to achieve debris-free space missions by all Indian space actors, governmental and non-governmental, by 2030. India also encourages all state space actors to follow this initiative for long-term sustainability of outer space," he said. PTI

Context: Recently, ISRO Chairman S Somanath announced India's goal of achieving debris-free space missions by 2030.

Debris-Free Space Missions

- **About:** India is committed to ensuring debris-free space missions as part of its broader initiative for sustainable space exploration.
- **Targeted Timeline**: The initiative sets a clear goal of achieving debris-free space missions by all Indian space actors, both governmental and non-governmental, by the year 2030.
- **Global Encouragement**: India extends its encouragement to all state space actors worldwide, urging them to adopt similar measures for the long-term sustainability of outer space.
- **Current Space Assets**: Presently, India has 54 spacecraft operational in orbit, alongside non-functional objects, highlighting the necessity for responsible space management.

Space Debris

- **About**: Space junk or debris consist of spent rocket stages, dead satellites, fragments of space objects and debris resulting from Anti-satellite (ASAT) System (ASAT).
- **Risks**: These particles, which are hurtling through Low Earth Orbit (LEO) at an average speed of 27,000 kph, pose a very real hazard to satellites because even collisions involving centimetre-sized fragments can be fatal.
- **Sources**: All space junk is the result of us launching objects from Earth, and it remains in orbit until it re-enters the atmosphere.
- **Rare collisions**: A Chinese satellite broke up in March 2021 after a collision. Before that, the last satellite to collide and be destroyed by space junk was in 2009.

Initiatives related to Space debris

- **Space Liability Convention (1972):** The treaty says that a launching State shall be absolutely liable to pay compensation for damage caused by its space objects on the surface of the earth or to aircraft, and liable for damage due to its faults in space.
- **JAXA (Japan's Aerospace Exploration Agency) initiative:** JAXA and Astroscale are undertaking a 6 month demonstration project for the first-ever space debris removal mission.
- **Clearspace-1 (European Space Agency):** which is scheduled to launch in 2025, will be the first space mission to eliminate debris from orbit.
- **Project NETRA**: is an initiative by the Indian Space Research Organisation (ISRO) which is an early warning system in space to detect debris and hazards to the Indian satellites.
  - Currently, India gets its information about the space debris from North American Aerospace Defence Command (NORAD), which is an initiative by the U.S. and Canada.

ALL INDIA RADIO

Apr 16

EXERCISE DUSTLIK
(Syllabus: GS Paper 2 – IR)

Indian Army Contingent Departs For India-Uzbekistan Joint Military Exercise DUSTLIK

Context: The Indian Army contingent departed for the 5th edition of India-Uzbekistan joint military Exercise DUSTLIK recently.

Exercise Dustlik

- **About:** It is an annual joint military exercise between the Indian Army and the Uzbekistan Army.
- **Locations**: Conducted alternately in India and Uzbekistan, it aims to strengthen bilateral military ties.
- **Historical Background**: Inaugurated in Uzbekistan in November, the first edition set the precedent for subsequent collaborations.
- **First Edition**: Held at Uzbekistan in November 2019.
- **Recent Edition:** Held in February 2023 in Pithoragarh, showcased the commitment to enhancing military capabilities.
- **Objective**: The primary aim of Exercise Dustlik is to foster military cooperation and enhance combined capabilities.
- **Operational Focus**: The exercise emphasizes joint operations in diverse terrains, including mountainous and semi-urban environments.
- **Key Areas of Emphasis:** It focuses on aspects such as physical fitness, joint planning, tactical drills, and specialized weaponry training.

Uzbekistan

- **About**: It is a landlocked country situated in Central Asia.
- **River Boundaries**: It is primarily positioned between two significant rivers: the Syr Darya (Jaxartes River) in the northeast and the Amu Darya (Oxus River) in the southwest.
- **Bordering Nations:**
  - Kazakhstan to the northwest and north,
  - Kyrgyzstan and Tajikistan to the east and southeast,
  - Afghanistan to the south,
  - Turkmenistan to the southwest.

ECONOMIC TIMES

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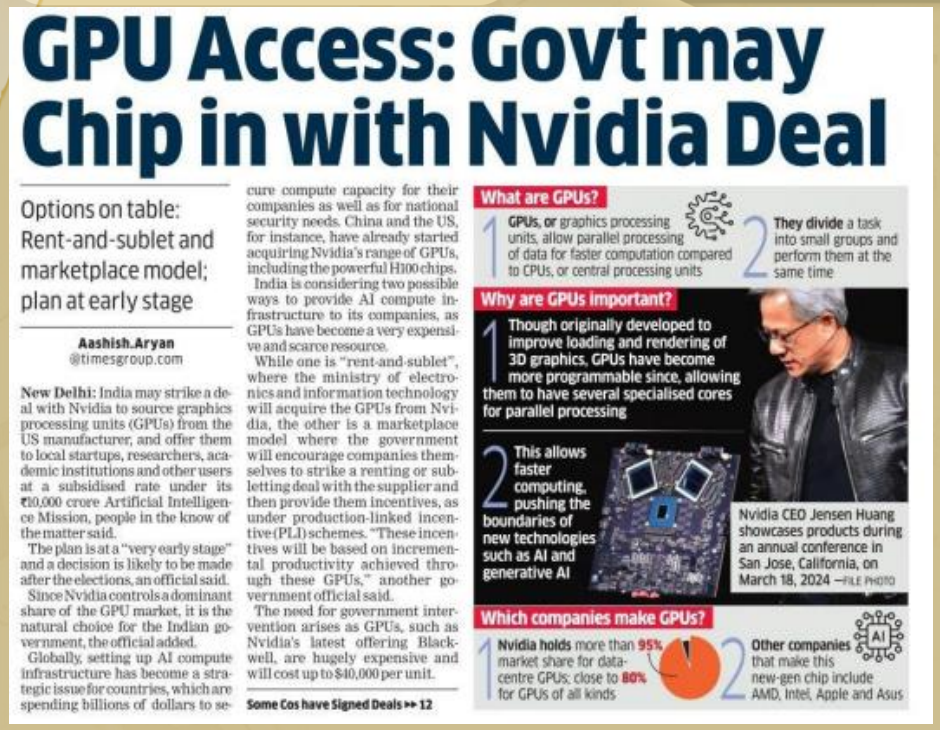
GRAPHICS PROCESSING UNITS

(Syllabus: GS Paper 3 – Sci and Tech)



GPU Access: Govt may Chip in with Nvidia Deal

Options on table: Rent-and-sublet and marketplace model; plan at early stage

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New Delhi: India may strike a deal with Nvidia to source graphics processing units (GPUs) from the US manufacturer, and offer them to local startups, researchers, academic institutions and other users at a subsidised rate under its ₹10,000 crore Artificial Intelligence Mission, people in the know of the matter said.

The plan is at a "very early stage" and a decision is likely to be made after the elections, an official said.

Since Nvidia controls a dominant share of the GPU market, it is the natural choice for the Indian government, the official added.

Globally, setting up AI compute infrastructure has become a strategic issue for countries, which are spending billions of dollars to secure compute capacity for their companies as well as for national security needs. China and the US, for instance, have already started acquiring Nvidia's range of GPUs, including the powerful H100 chips.

India is considering two possible ways to provide AI compute infrastructure to its companies, as GPUs have become a very expensive and scarce resource.

While one is "rent-and-sublet", where the ministry of electronics and information technology will acquire the GPUs from Nvidia, the other is a marketplace model where the government will encourage companies themselves to strike a renting or subletting deal with the supplier and then provide them incentives, as under production-linked incentive (PLI) schemes. "These incentives will be based on incremental productivity achieved through these GPUs," another government official said.

The need for government intervention arises as GPUs, such as Nvidia's latest offering Blackwell, are hugely expensive and will cost up to $40,000 per unit.

Some Cos have Signed Deals ▸▸ 12

What are GPUs?

1 **GPUs,** or graphics processing units, allow parallel processing of data for faster computation compared to CPUs, or central processing units

2 **They divide** a task into small groups and perform them at the same time

Why are GPUs important?

1 Though originally developed to improve loading and rendering of 3D graphics, GPUs have become more programmable since, allowing them to have several specialised cores for parallel processing

2 This allows faster computing, pushing the boundaries of new technologies such as AI and generative AI

Nvidia CEO Jensen Huang showcases products during an annual conference in San Jose, California, on March 18, 2024 —FILE PHOTO

Which companies make GPUs?

1 **Nvidia holds** more than **95%** market share for data-centre GPUs; close to **80%** for GPUs of all kinds

2 **Other companies** that make this new-gen chip include AMD, Intel, Apple and Asus

Context: India recently announced plans to potentially partner with Nvidia, sourcing GPUs to provide subsidized access to local startups, researchers, and academic institutions as part of its ₹10,000 crore Artificial Intelligence Mission.

Graphics Processing Units (GPUs)

- **About:** It is a specialized processor originally designed to accelerate graphics rendering.
- **Parallel Processing Power**: GPUs can process many pieces of data simultaneously, making them useful for machine learning, video editing, and gaming applications.
- **Integration Options**: GPUs may be integrated into the computer's CPU or offered as a discrete hardware unit.
- **Types of GPUs**: GPUs are categorized into two main types: integrated and discrete, each with distinct characteristics and applications.

What Does a GPU Do?

- **Powerhouse of Parallel Processing**: GPUs excel at parallel processing tasks, handling numerous calculations simultaneously, making them ideal for applications demanding high computational power.
- **Cornerstone of Graphics and Video Rendering**: Primarily recognized for their role in rendering graphics and videos, GPUs are pivotal in delivering high-quality visuals and smooth animations in various multimedia applications.
- **Evolving Beyond Gaming**: While initially prominent in gaming, GPUs are increasingly finding utility in diverse fields such as creative production, where they accelerate tasks like video editing and 3D modeling.
- **Catalyst for AI Advancements**: With their ability to handle vast amounts of data in parallel, GPUs have become indispensable in accelerating AI training and inference tasks, powering advancements in machine learning and deep learning algorithms.

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