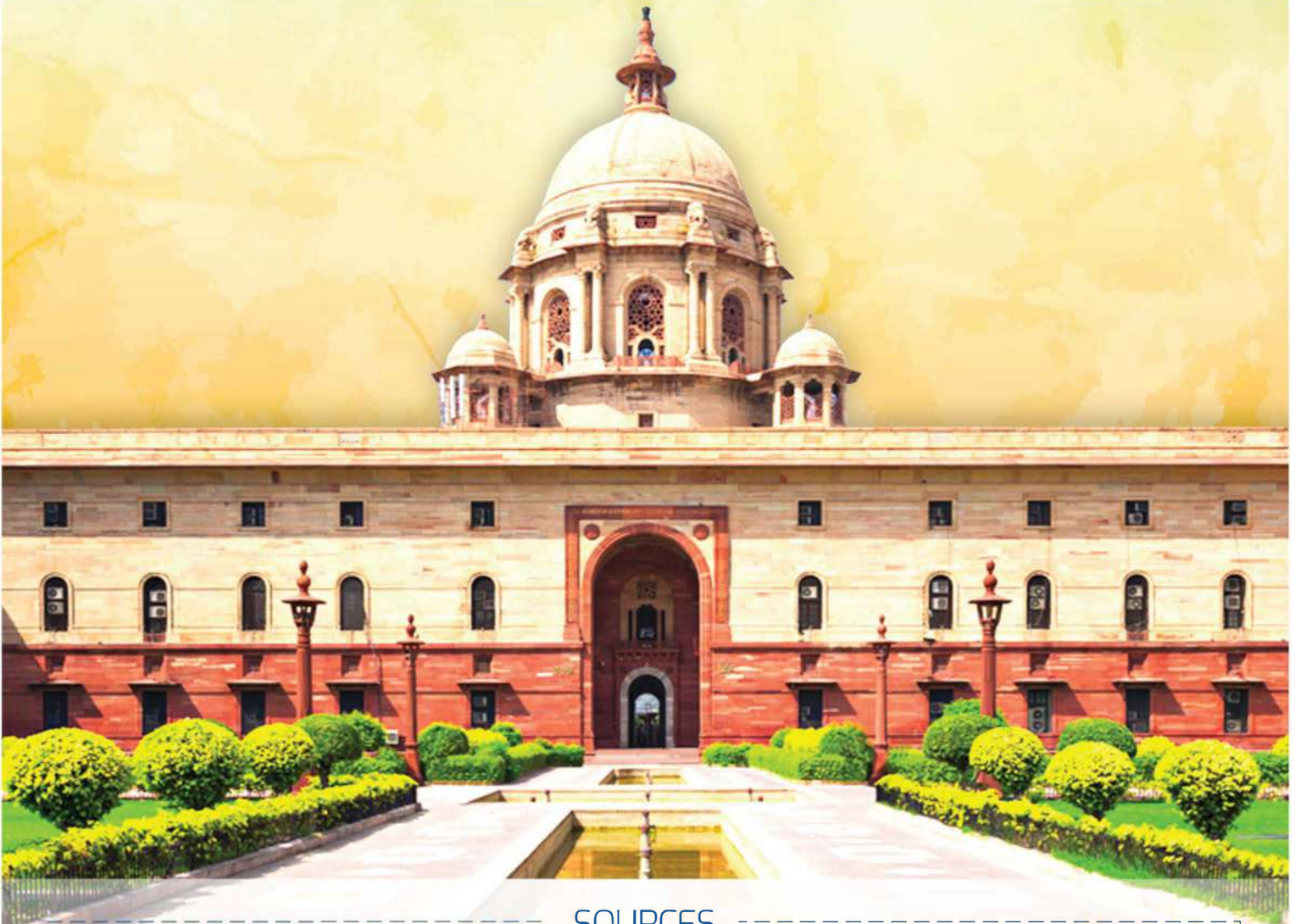




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SOURCES



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GS I

1. Existential Threats Faced by the Panama Canal

Source: **The Hindu**

Context: The decline in water levels of Lake Gatun, the artificial reservoir key to the Panama Canal system's operation, as a result of climate change induced drought, is posing an existential threat to the canal.

Panama Canal:

Location:

- It is an artificial 82-km waterway in Panama that connects the Atlantic Ocean with the Pacific Ocean, cutting across the Isthmus of Panama.
- It was constructed by the US (at a cost of 375 million dollars) and the first ship passed through the canal on August 15, 1914.
- The US government owned and operated the canal until 1999 when the Panamanian government started controlling one of the most important shipping lanes in the world.

Significance:

- **Vital strategic asset:**
 - The US has a vested interest in the secure, efficient, and reliable operation of the canal, as ~72% of transiting ships are either going to or coming from U.S. ports.
 - For the US, the canal's strategic significance encompasses national security, defense capabilities, diplomatic relations, and logistical resilience.
- **Shorter transit routes:**
 - It saves approx. 12,600 km in a trip between New York and San Francisco.
 - Thus, enabling ships to avoid the lengthy and hazardous voyage around Cape Horn at the southern tip of South America.
- **Environmental benefits:** By providing a shortcut, the canal contributes to the reduction of carbon emission and helps mitigate the environmental impact of global maritime transportation.
- **Global supply chain:** The Canal connects 180 maritime routes that reach 1,920 ports in 170 countries, and about 5% of global maritime trade transits through it.



The Panama Canal System's Operation:

- The Panama Canal is not a simple channel of water connecting two larger water bodies.
- This is because the elevation of the Pacific Ocean is slightly higher than the Atlantic.
- This difference means that for a ship entering the canal through the Atlantic, it needs to gain elevation during its journey to the Pacific.



- Hence, the canal works on a highly-engineered system, which uses a system of locks and elevators to lift and drop vessels to the required sea level at either end of the canal.
- The locks are either flooded (to gain elevation) or drained (to lose elevation), and act as water elevators. These locks are serviced using artificial lakes and channels.
- Most of this water is supplied from Lake Gatun (the artificial reservoir key to the Panama Canal system's operation) using the force of gravity (no pumps are needed).

Potential Dangers the Panama Canal Faces from Climate Change:

- The Panama Canal needs massive amounts of fresh water to facilitate the passage of ships. For instance, the passage of a single ship needs more than 50 million gallons (almost 200 million litres) of water.
- While over 36 ships pass through the canal each day on average (Dec 2023), traffic has dropped to as low as 22 ships a day now (that too with a reduced cargo).
- A drought driven by the El Niño meteorological phenomenon has reduced water in the Lake Gatun, causing lengthy and costly disruptions to international trade and supply chains.
- Historically, there has been a rainfall shortage on average once every 20 years due to major El Niño events.
- However, the year 2023 is the 3rd major rainfall deficit (in the last 26 years) and this permanent problem stems from a larger issue of climate change, which threatens humanity.

What Can Be Done to Restore the Panama Canal's Significance?

- Using ocean water to work the system of locks: However, this will increase the salinity of Lake Gatun, which is also the source of drinking water for more than half of Panama's 4.4 million people.
- Creating a second source of water for the canal: Recently, Panama's Supreme Court ordered to build a \$1.6 billion dam across Rio Indio, which will fix the problem for the next 50 years.
- However, the reservoir of the dam will flood the homes of people, predominantly from the lower socio-economic strata.
- They will have to be relocated, and will lose lands and livelihoods that they have had for decades.



GS II

2. International Earth Sciences Olympiad

Source: PIB

Context: Recently, the Indian student team has bagged multiple prestigious medals at the 17th edition of the International Earth Sciences Olympiad (IESO) held in Beijing, China, from August 08-16, 2024.

About International Earth Sciences Olympiad:

- It was established in 2003 at the International Geoscience Education Organization Council Meeting in Calgary, Canada.
- It is an annual competition for secondary school students from across the globe.
- It aims to generate awareness of earth sciences through teamwork, collaboration, exchanging ideas, and competition.
- The overall vision is to generate interest among the young in various fields of earth system sciences, with a focus on promoting awareness and solution-centric discussions around environmental challenges.
- It is one of the most successful student-centric programs facilitated under the REACHOUT (Research, Education, Training and Outreach) scheme of the Ministry of Earth Sciences.
- India has participated in the IESO since 2007 and hosted its 10th edition in Mysore.



India's Initiative

- To encourage the participation of Indian students (of grades 9 to 12), the Ministry of Earth Sciences (MoES) supports the Indian National Earth Science Olympiad (INESO) held in various schools across India.
- The INESO is a national-level prelude to the IESO, organised annually by the Geological Society of India in collaboration with MoES and select educational bodies in the country.
- The topics for assessment for students include geology, meteorology, oceanography, and environmental sciences.
- Top-performing participants from INESO get to represent India at the IESO, which also receives support from the MoES.
- The MoES supports the INESO and IESO as part of the REACHOUT scheme under the PRITHVI (PRITHvi Vigyan) scheme approved by the Union Cabinet in January 2024.
- The scheme's goal is to improve understanding of Earth system sciences through research and development activities and to provide reliable services to the country.



GS III

3. ISRO launches SSLV

Source: The Hindu, Page 06

Context: The Indian Space Research Organisation (ISRO) successfully launched the third and final developmental flight of the Small Satellite Launch Vehicle (SSLV) from the Satish Dhawan Space Centre in Sriharikota.

- The SSLV-D3 placed the Earth observation satellite EOS-08 precisely into orbit. This also marks the completion of ISRO/Department of Space's SSLV Development Project.
- NewSpace India Limited (NSIL), ISRO's commercial arm, and India's private space industry can now produce SSLVs for commercial missions.

Small Satellite Launch Vehicle (SSLV)

- SSLV is the new small satellite launch vehicle developed by ISRO to cater for the launch of small satellites.
- It has a three-stage launch vehicle, having a lift-off weight of about 120 tonnes and is 34 metres in length and 2 metres in diameter.
- It is a 3 stage Launch Vehicle configured with three Solid Propulsion Stages and liquid propulsion-based Velocity Trimming Module (VTM) as a terminal stage.
 - VTM is the last liquid-propellant based stage of the rocket which is used to correct the velocity just before injecting the satellites into orbit.

Uses

- The SSLV missions are useful to launch small-sized satellites weighing anywhere between 10 to 500kg into the Low Earth Orbit.
 - Going by their size and weight, these are typically referred to as mini, micro or nano satellites.
- They are low on cost and intended satellite insertion into orbits takes a shorter flight time.
- SSLV are best suited for commercial and on-demand launches.
- Previously, satellite projects built by college students and private players involved in the space sector have benefitted from SSLV missions.

India's journey towards SSLV

- The first SSLV mission — SSLV-D1 — carrying two satellites, including EOS-02 and AzaadiSat, in August 2022, was a failure.
 - The insertion of the two satellites after their separation took place into a 356 km circular orbit instead of the intended elliptical orbit.
- In its second attempt with the SSLV-D2 in February 2023, ISRO tasted success.
 - The rocket inserted three satellites onboard into the intended 450 km circular orbit following a 15-minute flight.



- SSLV-D3 has been launched recently.

Significance

- **Seamless launch of small satellites**
 - The launch of small satellites has until now been dependent on ‘piggy-back’ rides with big satellite launches on ISRO’s PSLV.
 - Against this backdrop, the SSLV is intended to cater to a market for the launch of small satellites into low earth orbits.
- **Suited for launching multiple microsattellites**
 - SSLV is perfectly suited for launching multiple microsattellites at a time and supports multiple orbital drop-offs.
 - The new launch vehicle has been designed keeping in mind commercial launches of small satellites with a quick turn-around time for the missions.
- **Shift the burden from PSLV**
 - SSLV will shift the burden of commercial launches from Polar Satellite Launch Vehicles (PSLV).
 - The SSLV is likely to cost a fourth of the current PSLV.

SSLV development is complete

- **About the News**
 - ISRO successfully completed the third and final developmental flight of its SSLV, marking the vehicle's readiness for commercial launches and opening the door for industry-led manufacturing through technology transfer.
 - The SSLV-D3 mission was launched from Satish Dhawan Space Centre in Sriharikota.
 - The mission placed two satellites—EOS-08, an earth observation satellite, and SR-0 Demosat—into a 475 km circular low-earth orbit.
- **Manufacturing and launch of SSLV for commercial purposes**
 - ISRO is exploring two routes for the commercial launch of this vehicle. One is through NSIL, which will fund and realise the rockets required for commercial purposes, and the other is through technology transfer, which InSpace will handle.
- **Payloads on SSLV-D3**
 - ISRO's EOS-08, the primary payload of the SSLV-D3 mission, is a 175-kg experimental satellite equipped with three new technologies.
 - The Electro-Optical Infrared Payload (EOIR) captures day and night images in mid-wave and long-wave infrared for various applications like surveillance, disaster and environmental monitoring, and fire detection.
 - The Global Navigation Satellite System-Reflectometry (GNSS-R) payload demonstrates the use of reflected GPS signals for ocean wind analysis, soil moisture assessment, and flood detection.



- Additionally, the SiC UV Dosimeter payload will study UV radiation exposure on the crew module, aiding the Gaganyaan mission preparations.
- **Second spaceport in Kulasekarapattinam**
 - Second rocket launchport of the ISRO is being developed at Kulasekarapattinam in coastal Tamil Nadu's Thoothukudi district.
 - This will be extensively and exclusively used for commercial, on-demand, and small satellite launches in the future.
 - The existing Sriharikota spaceport will handle launches to orbits that require the rocket to fly eastwards.

4. Govt notifies FEMA amendments on cross-border share swaps

Source: The Hindu, Page 15

Context: The Department of Economic Affairs has amended the Foreign Exchange Management (Non-debt Instruments) Rules, 2019, to support the global expansion of Indian companies through cross-border share swaps, mergers, and acquisitions.

Foreign Exchange Management Act (FEMA)

- FEMA came in 1999 as a successor to the Foreign Exchange Regulation Act (FERA) of 1973, with changing economic conditions in a post-liberalisation India.

Objectives

- to facilitate external trade and payments,
- to promote the orderly development and maintenance of foreign exchange market in India, and
- to regulate the transactions related to foreign exchange/currency.

Functions

- The FEMA regulates various aspects of foreign exchange transactions, including acquisition and holding of foreign exchange, payment and settlement of foreign exchange transactions, export and import of currency, and other related activities.
- The act also empowers the RBI to make rules and regulations to carry out the provisions of the act. Violation of the provisions of FEMA can result in penalties and fines.

Foreign Exchange Regulation Act (FERA),1973

Background

- FERA was designed for an era in India marked by a shortage of foreign exchange.
- It was aimed at conserving forex to ensure it was utilised only in the interest of the development of the country.

About

- The act provided the Indian government with extensive powers to regulate foreign exchange transactions and payments in the country.



- This included the power to impose restrictions on the use of foreign exchange, to regulate the flow of foreign exchange, and to prohibit transactions that were deemed to be against the national interest.

Difference between FEMA and FERA

Feature	FERA	FEMA
Introduction	Enacted in 1973	Enacted in 1999
Objective	To regulate foreign exchange transactions and payments	To facilitate external trade and payments, to promote the orderly development and maintenance of foreign exchange market in India, and to regulate the transactions related to foreign exchange
Emphasis	Control and Regulation	Management and Liberalization
Enforcement	More strict and restrictive	More liberal and flexible
Penalty	More severe	More moderate
Penalty Enforcement	Penalties and Fines only	Imprisonment, Penalties and Fines
Approach	Rule-based	Principle-based
Adjudication	Through FERA courts	Through FEMA adjudicating authorities and Appellate Tribunal
Foreign Investment	FERA was seen as a hindrance to foreign investment in India	FEMA seeks to encourage foreign investment in India by simplifying the rules and regulations related to foreign exchange transactions

FEMA amendments on cross-border share swaps

- Union Finance Ministry announced amendments includes mandatory government approvals for investments from countries sharing land borders with India.

Key highlights

The amendments:

- simplify cross-border share swaps,
- standardize definitions like "control," and
- align the treatment of downstream investments by OCI-owned entities with those by NRIs on a non-repatriation basis, encouraging more NRI participation in Indian markets.
 - Non-repatriation refers to the funds that cannot be transferred back to the investor's home country. These funds must remain in India and can only be used within the country.
- Government clearance is now required for any share transfer involving border-sharing countries, regardless of the sector.



- The rules also extend non-FDI status for non-repatriation investments to OCIs and standardize control definitions across laws, impacting foreign portfolio investors (FPIs).
- The amendments follow the Union Budget's push to simplify FDI rules, promote the use of the Indian Rupee in overseas investments, and align the definition of "startup" with updated DPIIT standards.
 - This revised startup definition, which raises the turnover threshold to ₹100 crore and extends the recognition period to 10 years, aims to attract more foreign investment.
- The updates also introduce provisions for equity share swaps, permitting them with government approval.
- These changes are part of efforts to create a more foreign-investor-friendly environment and enhance the ease of doing business in India.
- The amendments also enable FDI in white-label ATMs to enhance financial inclusion.
 - White-label ATMs (WLAs) are ATMs operated by non-bank entities, allowing customers of any bank to withdraw cash and access other banking services.
 - These ATMs do not display the logo of any specific bank and charge fees for transactions.

5. Govt Launches Satellite-based Agricultural Decision Support System

Source: Indian Express, Page 07

Context: The Union government has launched a satellite-based agricultural decision support system to provide farmers with critical data for crop management and productivity enhancement.

Krishi-DSS:

- On August 16, 2024, the Indian government launched the Krishi-Decision Support System (DSS), a pioneering digital geospatial platform aimed at revolutionizing the agricultural sector.
- This platform is designed to assist in various agricultural activities such as:
 - digital crop surveys,
 - precise yield estimation,
 - crop damage assessment,
 - soil mapping,
 - processing weather-related data

Advantages of Krishi-DSS:

- The Krishi-DSS platform represents a significant shift from traditional methods like random sampling and visual assessments, which have been in use since the Mughal period.
 - The new technology-based crop yield estimation system, YES-TECH, will provide more accurate and reliable data, ensuring better decision-making for farmers and stakeholders.
- Comprehensive Data and Accessibility:
 - Krishi-DSS will offer seamless access to a wide array of data, including satellite images, weather forecasts, reservoir levels, groundwater data, and soil health information.



- This data will be displayed on the Krishi Integrated Command and Control Centre (ICCC) at Krishi Bhawan, accessible to users across the country.
- **Support for Agri Stack Implementation:**
 - The launch of Krishi-DSS is a crucial step towards implementing Agri Stack, the Digital Public Infrastructure (DPI) for agriculture, which will cover farmers and their land records.
 - This initiative aligns with Finance Minister Nirmala Sitharaman's announcement in the 2023 Budget, emphasizing the importance of digital crop surveys and the DPI in agriculture.
- **Enhanced Agricultural Practices:**
 - Krishi-DSS will support sustainable agriculture by promoting diverse crop cultivation through crop monitoring and mapping.
 - It will also integrate various data sources to develop farmer-centric solutions, including early disaster warnings and individual advisories.
- **Data Integration and Future Prospects:**
 - The platform will incorporate data from the FASAL 2.0 initiative, covering key crops like paddy, sugarcane, wheat, cotton, soybean, mustard, gram, lentil, and potato.
 - This integration will enhance crop production forecasting, drought monitoring, and crop health assessments, ultimately contributing to better crop insurance solutions.

Conclusion:

Krishi-DSS marks a significant advancement in the use of technology in Indian agriculture, offering a comprehensive and accessible tool for improving farming practices and ensuring better outcomes for farmers across the country.



Editorial, Ideas and Opinions

6. The essence of India's inflation problem

Source: The Hindu, Page 6

Context: The article discusses the implications of the Economic Survey's suggestion to exclude food prices from the RBI's inflation target, arguing that this approach overlooks the significant impact of food inflation on the Indian population.

Economic Survey's Suggestion on Inflation Targeting

- The Economic Survey preceding the Union Budget has suggested that the price of food be excluded from the inflation target of the Reserve Bank of India (RBI).
- This implies a shift from targeting 'headline inflation' to 'core inflation,' which excludes food and fuel prices.
- To understand the implications, two aspects must be recognized: the recent experience with inflation in India and the current policy for inflation control.

Food Price Inflation and Its Impact

- Food price inflation in India has been very high by historical standards, with a year-on-year increase close to 10% in June.
- This trend has been ongoing since 2019, prior to the COVID-19 pandemic and the Ukraine war, indicating domestic factors at play.
- Given that food accounts for a large part of the consumer price index, overall inflation has also been higher.

Current Inflation Control Policy

- Since 2016, the RBI has been mandated to control inflation through variations in the interest rate, known as 'inflation targeting'.
- However, the RBI has missed the targeted 4% inflation rate every year in the past five years, similar to other central banks like the Bank of England and the U.S. Federal Reserve.
- Fluctuations in global food prices have significantly influenced inflation trajectories in these economies.

Justification and Effectiveness of Targeting Core Inflation

- The proposal to exclude food prices from the inflation target is questioned, considering that food constitutes about 50% of household expenditure in India, which is high by international standards.
- Ignoring food price changes in inflation targeting would mean overlooking the most critical aspect affecting a large section of the population.
- The notion that food price fluctuations are 'transitory' is not true for India, as food price inflation has been consistently positive over the past 13 years.



RBI's Ability to Control Core Inflation

- Targeting core inflation is unlikely to make the RBI more successful in controlling inflation.
- Historically, core inflation has rarely stayed within the targeted 4%, and an increase in the RBI's repo rate does not necessarily dampen core inflation; instead, it may cause inflation to rise as firms adjust prices to maintain profits.
- Food price inflation influences core inflation, as rising food prices lead to higher wages, which in turn affect overall production costs.

Supply-Side Solutions and Agricultural Focus

- The real issue lies in the rising price of food, which is central to India's inflation.
- Removing food prices from the inflation target without a plan to control them would leave India vulnerable to rising inflation.
- The solution requires supply-side measures to increase agricultural yield, ensuring that supply meets demand at stable prices as the population and economy grow.
- The Economic Survey's suggestion of income transfers to households as a solution is seen as inadequate, as continuously rising food prices would strain the budget, leaving less for public goods.

Conclusion

- Targeting core inflation by excluding food prices is not a viable solution.
- A comprehensive approach to agricultural production and controlling the price of all goods is essential for maintaining the standard of living and achieving stable inflation in India.



In Brief

7. Krishi-Decision Support System

Source - PIB

Context: Recently, the Union government launched a unique digital geospatial platform called Krishi-Decision Support System (Krishi-DSS).

Krishi-Decision Support System:

It is a first-of-its-kind geospatial platform specifically designed for Indian agriculture.

Features

- It captures minute details from the vast expanse of fields to the smallest soil particle.
- The platform provides seamless access to comprehensive data including satellite images, weather information, reservoir storage, groundwater levels and soil health information, which can be easily accessed from anywhere at any time.
- It'll also give near real-time information on various indicators such as soil moisture, water storage, crop condition, dry spells, etc.
- One nation-one soil information system of Krishi-DSS will give comprehensive soil data with embedded information on soil type, soil pH (potential of hydrogen), soil health, etc.

Significance

- It will enable the government to understand cropping patterns by analysing parcel-level crop maps of different years.
- The feature on drought monitoring in this platform will help the government to stay ahead of drought.
- It will enable the government to accurately identify field-parcel units, which will help in understanding each parcel's unique needs, and cropping patterns, for targeted interventions.
- Soil data will help the government in assessing crop suitability and land capability for implementing soil-water conservation measures, officials said.
- That apart, the ground-truth data library of Krishi-DSS will help in fostering innovation by providing essential resources for different crops to researchers and the industry.
- By integrating data sources available on Krishi-DSS, various farmer-centric solutions — such as right individual advisories to farmers, early disaster warnings like pest attacks, heavy rain, hailstorms, etc. — can be developed.

It is developed jointly by the Ministry of Agriculture and the Department of Space.



8. What is a Solar Cycle?

Source: The Hindu

Context: Astronomers from the Indian Institute of Astrophysics (IIA) have found a new method to predict the amplitude of the upcoming solar cycle.

Solar Cycle:

- Our Sun is a huge ball of electrically charged hot gas.
- This charged gas moves, generating a powerful magnetic field.
- The Sun's magnetic field goes through a cycle called the solar cycle.
- Every 11 years or so, the Sun's magnetic field completely flips. This means that the Sun's north and south poles switch places.
- Then it takes about another 11 years for the Sun's north and south poles to flip back again.
- Thus, the solar cycle is the cycle that the Sun's magnetic field goes through approximately every 11 years.
- The solar cycle affects activity on the surface of the Sun, such as sunspots, which are caused by the Sun's magnetic fields.
- As the magnetic fields change, so does the amount of activity on the Sun's surface.
- One way to track the solar cycle is by counting the number of sunspots.
 - The beginning of a solar cycle is a solar minimum, or when the Sun has the least sunspots.
 - Over time, solar activity—and the number of sunspots—increases.
 - The middle of the solar cycle is the solar maximum, or when the Sun has the most sunspots.
 - As the cycle ends, it fades back to the solar minimum, and then a new cycle begins.
- Giant eruptions on the Sun, such as solar flares and coronal mass ejections, also increase during the solar cycle.
 - These eruptions send powerful bursts of energy and material into space.
 - This activity can have effects on Earth. For example, eruptions can cause lights in the sky, called aurora, or impact radio communications.
 - Extreme eruptions can even affect electricity grids on Earth.



Daily Quiz

Q1. Which of the following statements is/are correct regarding the Panama Canal and the challenges it faces due to climate change?

1. The Panama Canal connects the Atlantic Ocean with the Pacific Ocean through a natural waterway.
2. The Canal's operation relies heavily on fresh water from Lake Gatun, an artificial reservoir.
3. Climate change-induced droughts, including those driven by El Niño, have caused a decline in water levels in Lake Gatun, disrupting the Canal's operations.

Select the correct answer using the code given below:

- A. 1 and 2 only
- B. 2 and 3 only
- C. 1 and 3 only
- D. 1, 2, and 3

Q2. Which of the following countries share a border with Panama, where the Panama Canal is located?

1. Costa Rica
2. Colombia
3. Venezuela
4. Nicaragua

Select the correct answer using the code given below:

- A. 1 and 2 only
- B. 1, 2, and 4 only
- C. 2 and 3 only
- D. 1, 3, and 4 only

Q3. Assertion (A): India supports the participation of its students in the International Earth Sciences Olympiad (IESO) through the Indian National Earth Science Olympiad (INESO).

Reason (R): The Ministry of Earth Sciences (MoES) facilitates the INESO and IESO under the REACHOUT scheme, which is part of the PRITHVI scheme, to promote interest and understanding in Earth system sciences among young students.

- A. Both A and R are true, and R is the correct explanation of A.
- B. Both A and R are true, but R is not the correct explanation of A.
- C. A is true, but R is false.
- D. A is false, but R is true.

Q4. In which year did India first participate in the International Earth Sciences Olympiad (IESO)?

- A. 2003
- B. 2007
- C. 2010
- D. 2014

Q5. Assertion (A): The Small Satellite Launch Vehicle (SSLV) is designed to cater specifically to the launch of small satellites into Low Earth Orbit (LEO).

Reason (R): The SSLV is a low-cost launch vehicle that offers quick turn-around times and is suited for launching multiple microsatellites with multiple orbital drop-offs.

- A. Both A and R are true, and R is the correct explanation of A.



- B. Both A and R are true, but R is not the correct explanation of A.
- C. A is true, but R is false.
- D. A is false, but R is true.

6. Which of the following was the primary payload on ISRO's SSLV-D3 mission?

- A. AzaadiSat
- B. EOS-08
- C. GSAT-30
- D. Cartosat-2F

7. What is one of the key amendments made to the Foreign Exchange Management (Non-debt Instruments) Rules, 2019, as notified by the Department of Economic Affairs in 2024?

- A. Mandatory government approval for all foreign investments
- B. Simplification of cross-border share swaps
- C. Ban on foreign direct investment in Indian startups
- D. Removal of non-repatriation status for OCI-owned entities

8. What is the primary purpose of the Krishi-Decision Support System (Krishi-DSS) launched by the Indian government?

- A. To increase agricultural exports

- B. To provide farmers with critical data for crop management and productivity enhancement
- C. To promote organic farming
- D. To introduce new crop varieties

Q9. Which of the following features is NOT a part of the Krishi-Decision Support System (Krishi-DSS) launched by the Indian government?

- A. Provides near real-time information on soil moisture and crop condition
- B. Offers a one-nation-one soil information system including soil pH and health
- C. Integrates with international agricultural databases for crop suitability assessments
- D. Supports targeted interventions by analyzing parcel-level crop maps of different years

Q10. What is a defining characteristic of the solar cycle?

- A. The Sun's magnetic field flips every 22 years, affecting its surface activity
- B. The solar cycle includes a period of minimal activity followed by increased sunspots and solar flares
- C. Solar cycles are tracked by measuring the Sun's temperature variations over time
- D. The Sun's magnetic poles remain constant during the solar cycle, but its size changes



Solutions

1. Answer: (B) 2 and 3 only

Explanation:

1. The Panama Canal is not a natural waterway; it is an artificial 82-km waterway that was constructed to connect the Atlantic Ocean with the Pacific Ocean. This makes statement 1 incorrect.
2. The operation of the Panama Canal does indeed rely heavily on fresh water from Lake Gatun, which is an artificial reservoir. Statement 2 is correct.
3. Climate change-induced droughts, particularly those driven by El Niño, have indeed caused a decline in water levels in Lake Gatun, leading to disruptions in the Canal's operations. Statement 3 is correct.

Therefore, the correct statements are 2 and 3.

2. Answer: (A) 1 and 2 only

Explanation:

- **Panama** shares its borders with **Costa Rica** to the west and **Colombia** to the southeast.
- **Venezuela** and **Nicaragua** do not share a border with Panama.
- Therefore, the correct countries that border Panama, where the Panama Canal is located, are Costa Rica and Colombia.

3. Answer: (A) Both A and R are true, and R is the correct explanation of A.

Explanation:

- **Assertion (A)** is true because India supports its students' participation in the IESO through the INESO, a national-level prelude to the international competition.
- **Reason (R)** is also true, as the Ministry of Earth Sciences (MoES) indeed facilitates both INESO and IESO under the REACHOUT scheme, part of the PRITHVI scheme, to enhance interest in Earth system sciences.
- Moreover, **R** correctly explains **A** because the support provided by MoES through these schemes is specifically aimed at promoting Earth sciences education among young students, which is why India participates in IESO.

Thus, both statements are true, and the reason correctly explains the assertion.

4. Answer: (B) 2007

Explanation:

India first participated in the International Earth Sciences Olympiad (IESO) in 2007. The IESO is an annual competition that aims to generate interest and awareness among young students in Earth sciences.

5. Answer: (A) Both A and R are true, and R is the correct explanation of A.

Explanation:

- **Assertion (A)** is true because the SSLV is specifically developed by ISRO to launch small satellites into Low Earth Orbit (LEO).



- **Reason (R)** is also true as the SSLV is designed to be cost-effective, has a quick turnaround, and is capable of launching multiple microsattellites at once with the ability to perform multiple orbital drop-offs.
- Moreover, **R** correctly explains **A** because the design features and capabilities of the SSLV directly support its purpose of launching small satellites into LEO efficiently and cost-effectively.

6. **Answer:** (B) EOS-08

Explanation:

The primary payload on ISRO's SSLV-D3 mission was EOS-08, an Earth observation satellite. The SSLV-D3 mission successfully placed EOS-08 and another satellite, SR-0 Demosat, into a 475 km circular low-earth orbit. This marked the completion of the developmental phase of the SSLV, paving the way for its commercial use.

7. **Answer:** (B) Simplification of cross-border share swaps

Explanation: The recent amendments to the Foreign Exchange Management (Non-debt Instruments) Rules, 2019, include the simplification of cross-border share swaps, standardization of definitions such as "control," and aligning the treatment of downstream investments by OCI-owned entities with those by NRIs on a non-repatriation basis. These changes are aimed at facilitating global expansion of Indian companies and creating a more foreign-investor-friendly environment.

8. **Answer:** (B) To provide farmers with critical data for crop management and productivity enhancement

Explanation: The Krishi-Decision Support System (Krishi-DSS) is a satellite-based digital platform aimed at revolutionizing the

agricultural sector by providing farmers with essential data such as satellite images, weather forecasts, soil health information, and more. This information is intended to improve crop management, enhance productivity, and support sustainable agricultural practices. The platform is part of the broader effort to implement Agri Stack and digitize agriculture in India.

9. **Answer:** (C) Integrates with international agricultural databases for crop suitability assessments

Explanation: The Krishi-Decision Support System (Krishi-DSS) is a comprehensive digital geospatial platform designed specifically for Indian agriculture. It provides detailed data on soil health, moisture, crop condition, and drought monitoring, and integrates various data sources to develop farmer-centric solutions. However, the system is focused on domestic agricultural data and does not integrate with international agricultural databases for crop suitability assessments. The other options correctly describe the features and benefits of the Krishi-DSS as outlined in the article.

10. **Answer:** (B) The solar cycle includes a period of minimal activity followed by increased sunspots and solar flares

Explanation: The solar cycle is an approximately 11-year period during which the Sun's magnetic field flips, resulting in a cycle of solar activity. It begins with a solar minimum, where there are few sunspots, and progresses to a solar maximum with a peak in sunspots and solar flares. The cycle then returns to a solar minimum before starting anew. This pattern of activity and its impact on phenomena like sunspots, solar flares, and coronal mass ejections defines the solar cycle. The other options incorrectly describe aspects not related to the typical solar cycle characteristics.





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