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Current Affairs - 14 November 2025

ESCAPEDE MISSION



- The ESCAPEDE (Escape and Plasma Acceleration and Dynamics Explorers) mission is the first coordinated **multi-spacecraft orbital science mission to the Mars**.
- Its twin orbiters known as Blue and Gold which will take **simultaneous observations from different locations around Mars**.
- It is part of NASA's **SIMPLEx** (Small Innovative Missions for Planetary Exploration) program.

This mission has chosen **'launch and loiter'** strategy

- It means the satellites will launch from **Earth toward the Lagrange 2 Point (L2)**, a point in space where the balance of Earth and Sun's gravitational pull ensures that a spacecraft stays put.
- The spacecraft will stay put or loiter at L2 until the apt window for Mars travel opens up, and then it **will move toward Mars in late 2026**.

Objectives of ESCAPEDE Mission:

- It will reveal the planet's **real-time response to space weather** and how the Martian magnetosphere changes over time,
 - These spacecraft will travel to Mars to study the **interaction between solar wind, streams of charged particles from the Sun, and the Martian magnetic field**.
 - Understanding how solar wind strips Mars of its atmosphere is critical for planetary science and future human exploration.
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HYDROGEN VALLEY INNOVATION CLUSTERS



Recently, the Union Minister of State (Independent Charge) for Science and Technology announced that four Hydrogen Valley Innovation Clusters (HVICs) are being developed across the country.

- These are being developed across the country to demonstrate the **full green hydrogen value chain** — from production and storage to transport and utilization.
- **Funding:** Total investment of ₹485 crore.
- The HVIC project is aimed at “building a **local hydrogen ecosystem** by connecting supply and demand across sectors like transport, industry, and energy, while also fostering research, innovation, and skills.
- These clusters **originally conceptualized** by the **Department of Science and Technology**, and now integrated under **National Green Hydrogen Mission (NGHM)**.
- These four Hydrogen Valleys are coming up in **Pune, Jodhpur, Bhubaneswar and Kerala**.

What is Green Hydrogen?

- It is **Hydrogen produced using renewable energy**, such as solar or wind power, instead of fossil fuels.
- **Process:** In this process water is **split into hydrogen and oxygen** through electrolysis, using electricity from solar panels or wind turbines.
- According to standards notified by Government of India, Hydrogen made this way is considered “green” if the total **emissions from the process are very low**, not more than **2 kg of CO₂ equivalent** for every 1 kg of Hydrogen produced.
- Green Hydrogen can **also be produced by converting biomass** into hydrogen, as long as emissions remain below the same limit.



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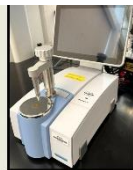
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FOURIER TRANSFORM INFRARED SPECTROSCOPY



Fourier Transform Infrared Spectroscopy

Recently, a report explains how experts use the Fourier Transform Infrared Spectroscopy (FTIR) to analyse post-blast forensic investigations.

- It is also known as FTIR Analysis or FTIR Spectroscopy.
- It is a **powerful analytical tool** for identifying **chemical constituents** and elucidating compound structures in various real-world samples.
- It does this by analyzing the vibrational modes of molecular functional groups.
- **Working:** The FTIR analysis method uses **infrared light** to scan test samples and observe chemical properties.
- It gives information **about molecular vibrations**, provides identification of functional groups and also identifies chemical components, molecules and molecular segments.
- This technique is useful for analyzing the chemical composition of smaller particles, **typically 10 -50 microns**, as well as larger areas on the surface.
- It is a technique used to obtain **an infrared spectrum** of absorption or emission of a **solid, liquid or gas**.

Applications of Fourier Transform Infrared Spectroscopy

- **Industries:** It is an established technique for quality control when evaluating industrially manufactured material.
- **Environment:** It is used for monitoring **air quality**, **testing water quality**, and analyzing soil to address environmental and health concerns caused by increasing pollution levels.
- **Chemical Field:** It is used to **identify organic**, polymeric, and, in some cases, **inorganic materials**.



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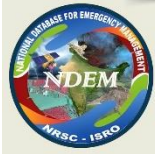
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NATIONAL DATABASE FOR EMERGENCY MANAGEMENT



National Database
for Emergency
Management

Recently, the Ministry of Road Transport and has made it mandatory for all Detailed Project Reports of highway projects to include analysis using the National Database for Emergency

Management (NDEM).

- It is a unique **Geo-portal to disseminate space-based inputs** along with services of forecasting organizations addressing all natural disasters in India.
- It is a **national repository of multi-scale geospatial database** coupled with decision support system tools.
- It is **developed by the Indian Space Research Organisation (ISRO)** under the guidance of the National Disaster Management Authority (NDMA).
- The NDEM portal is **maintained by the National Remote Sensing Centre (NRSC)**.
- NDEM services have been **operationalised since 2013** providing timely information along with disaster specific products for effective decision making.

Key Features of National Database for Emergency Management:

- It provides **multi-temporal satellite data** and thematic layers that help identify areas vulnerable to floods, landslides, earthquakes, and other natural hazards.
- It also offers decision-support tools for **monitoring and managing such hazards**.
- It is a unique and **homogenous database** served for entire country with essential database elements for **addressing emergency/disaster management** in the country.
- It assists the decision makers, disaster management officials of all States/UTs, NDRF/SDRF for preparedness, hazard/risk zonation, **damage assessment and emergency response**.



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INSIDE AMERICA'S BUDGET DEADLOCK AND SHUTDOWN

US President Donald Trump signed a stopgap bill recently, ending the longest government shutdown in US history. A shutdown occurs when the government runs out of funds, forcing federal agencies to halt operations and hurting the economy.

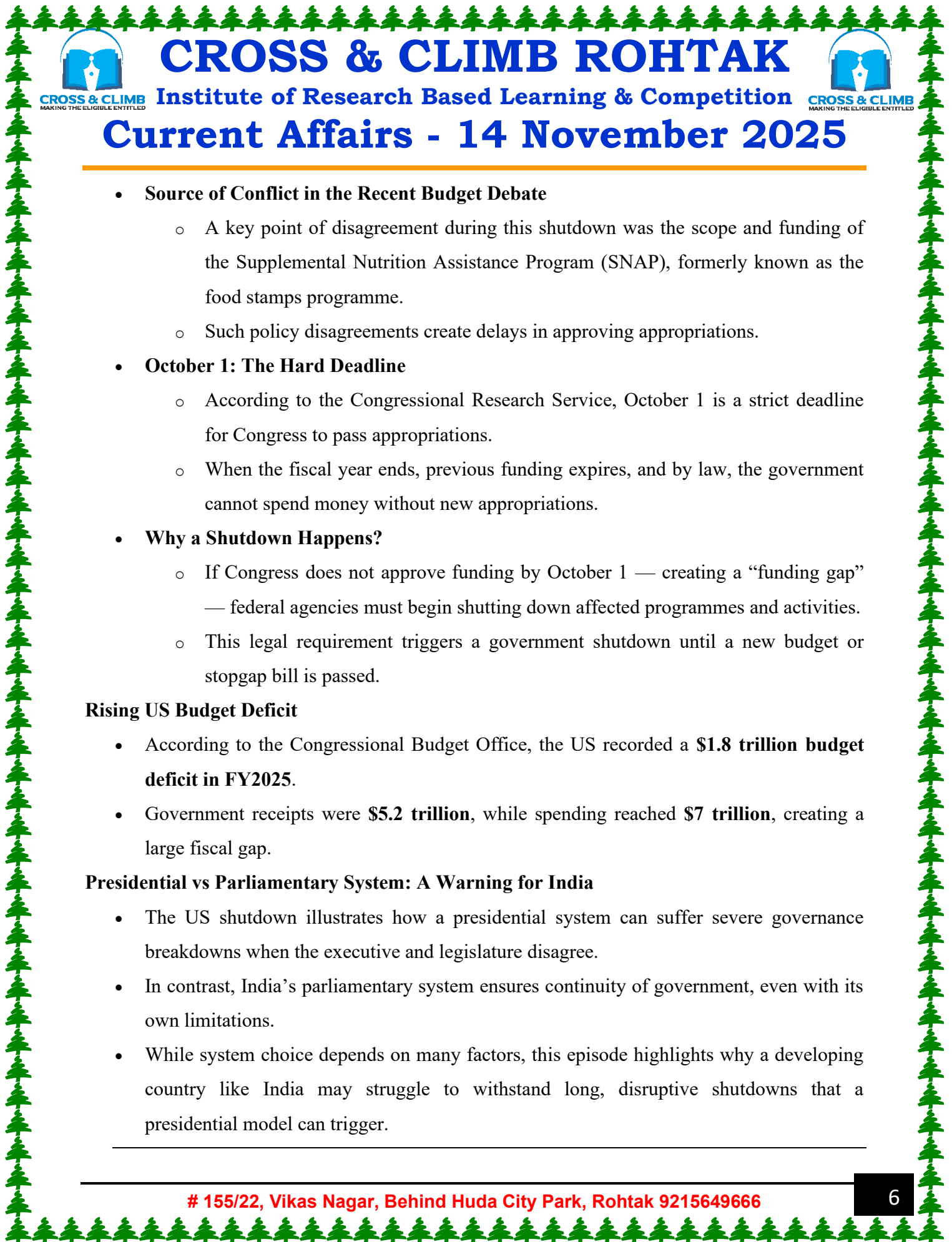
Since the budget system began in 1976, the **US has faced 11 shutdowns**, with the latest lasting 43 days — surpassing the previous record of 34 days during Trump's earlier term.

Why Government Shutdowns Happen in the US but Not in India?

- A US government shutdown occurs not because the country runs out of money, but because the **government loses legislative permission to tax and spend**.
- Unlike India — where the Executive is part of Parliament and a budget failure forces the government to resign — the **US President is separate from Congress**.
- This separation means the President cannot ensure passage of the budget and need not resign if it fails.
- When Congress, divided along party lines, cannot agree on the budget, the federal government shuts down.
- In the recent shutdown, Republicans lacked the 60 Senate votes needed, and the deadlock ended only when eight Democrats supported the resolution.

How the US Budget Cycle Works?

- The US fiscal year runs from **October 1 to September 30**. The shutdown began on October 1 because the Trump administration could not get its budget approved by Congress in time.
- **Budget Preparation Begins in February**
 - The budget process starts much earlier. By the **first Monday of February**, the President must submit the budget proposal to Congress.
 - Both chambers — the House and the Senate — then engage in months of deliberations, debates, and amendments on taxation and spending priorities.
 - These discussions often become contentious.



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- **Source of Conflict in the Recent Budget Debate**
 - A key point of disagreement during this shutdown was the scope and funding of the Supplemental Nutrition Assistance Program (SNAP), formerly known as the food stamps programme.
 - Such policy disagreements create delays in approving appropriations.
- **October 1: The Hard Deadline**
 - According to the Congressional Research Service, October 1 is a strict deadline for Congress to pass appropriations.
 - When the fiscal year ends, previous funding expires, and by law, the government cannot spend money without new appropriations.
- **Why a Shutdown Happens?**
 - If Congress does not approve funding by October 1 — creating a “funding gap” — federal agencies must begin shutting down affected programmes and activities.
 - This legal requirement triggers a government shutdown until a new budget or stopgap bill is passed.

Rising US Budget Deficit

- According to the Congressional Budget Office, the US recorded a **\$1.8 trillion budget deficit in FY2025**.
- Government receipts were **\$5.2 trillion**, while spending reached **\$7 trillion**, creating a large fiscal gap.

Presidential vs Parliamentary System: A Warning for India

- The US shutdown illustrates how a presidential system can suffer severe governance breakdowns when the executive and legislature disagree.
 - In contrast, India’s parliamentary system ensures continuity of government, even with its own limitations.
 - While system choice depends on many factors, this episode highlights why a developing country like India may struggle to withstand long, disruptive shutdowns that a presidential model can trigger.
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NATIONAL MIGRATION SURVEY IN 2026 TO MAP INTERNAL MOBILITY

- Migration in India refers to the movement of people from one place to another within the country for reasons such as **employment, marriage, education, or better living conditions**.
- Migration contributes to **urbanisation, labour market flexibility, and remittance flows**, but also poses challenges like **informal employment, housing shortages, and social security gaps**.

About the National Migration Survey 2026

- The survey will be conducted under the aegis of the **National Sample Survey (NSS)**, which has been India's principal source of household-level socio-economic data since 1950.
- It will cover **almost all states and union territories**, except the **Andaman and Nicobar Islands**, due to logistical constraints.
- The **objective** of the survey is to generate **reliable and up-to-date estimates** of:
 - Migration rates and trends (rural-to-urban, inter-state, and intra-state)
 - Short-term and seasonal migration patterns
 - Reasons for migration (economic, social, educational, or marital)
 - Employment and income profiles of migrants
 - Return migration and its socio-economic effects
 - Impact of migration on household welfare and community development
- MoSPI has already released a **draft questionnaire and concept note** on its website and invited **public feedback and expert comments** by **November 30, 2025**.

Key Features of the 2026 Migration Survey

- **Revised Definitions and Improved Coverage**
 - The upcoming survey introduces updated definitions to capture modern migration trends more accurately.



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- A person will now be classified as a **short-term migrant** if they have stayed away from their usual residence for **15 days to six months** within the last year for employment or job search, a shift from the previous of one to six months.
- **Comprehensive Scope of Data**
 - The questionnaire includes **new questions** designed to assess the broader **impact of migration** on individual's quality of life, such as:
 - Changes in income, healthcare access, and social stability post-migration.
 - Experiences with housing, employment, and local integration.
 - Challenges faced at the destination and the intent to relocate again.
- **Integration with Policy Planning**
 - MoSPI has emphasised that the data will support **evidence-based policymaking** in critical sectors:
 - **Urban Development:** Informing city-level housing, transport, and infrastructure planning.
 - **Employment Generation:** Identifying labour shortages and skill gaps.
 - **Social Protection:** Enhancing portability of welfare benefits for migrant workers.
 - **Regional Development:** Assessing how migration affects remittance flows and rural economies.

Significance of the Migration Survey

- Migration is a vital dimension of India's economic and social landscape. Internal migration contributes to:
 - **Urbanisation and industrial growth** by supplying labour to construction, manufacturing, and services.
 - **Rural resilience** through remittances that support education, healthcare, and household consumption.
 - However, migration also poses challenges such as **informal employment, lack of social security, and urban congestion**. Comprehensive data is essential to address these issues effectively.
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DRAFT SEEDS BILL 2025 - REFORMING INDIA'S SEED REGULATION FRAMEWORK

- The Ministry of Agriculture & Farmers Welfare has released the Draft Seeds Bill 2025 for public comments, **aiming to replace the outdated Seeds Act, 1966 and the Seeds (Control) Order, 1983**. The legislation seeks to **modernise India's seed sector, ensure farmer protection, improve seed quality**, promote innovation and ease of doing business.

Key Features of the Draft Seeds Bill 2025:

- **Ensuring quality and affordability of seeds:**
- **Mandatory registration of seed varieties:**
- **Registration of dealers and distributors:** Every dealer/distributor must obtain a State government registration certificate before any seed-related business activity.
- **Liberalised seed imports:**
 - The Central Government **may permit import of unregistered varieties** for research and trials under regulated conditions.
- **Decriminalisation of minor offences:** Minor and trivial offences are to be decriminalised to enhance Ease of Doing Business.
- **Strict penal provisions for major offences:**
 - **Categories:** Trivial, Minor, Major offences.
 - **Major offences:** Include sale of spurious seeds, sale of non-registered varieties, operating without registration, etc.
 - **Penalties:** Up to Rs 30 lakh fine, imprisonment up to 3 years.
- **Institutional mechanisms:** Establishment of **Central and State Seeds Committees** for policy coordination, regulation, and oversight.
- **Farmers' rights:**
 - Ensures protection from poor-quality seeds. Farmers retain the **right to save, use, exchange** and sell their own varieties (not branded seeds).