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TODAY'S ANALYSIS

(02 January 2025)

TOPICS TO BE COVERED

- **ISRO'S SPADEX MISSION**
- **NOROVIRUS**
- **6.21 LAKH APPLICATIONS FOR 1.27 LAKH OPPORTUNITIES UNDER THE PM INTERNSHIP SCHEME**
- **MCQs**

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ISRO'S SPADEX MISSION



- The **Indian Space Research Organisation (ISRO)** achieved a milestone with the successful launch of the **SpaDeX mission** (Space Docking Experiment) on **December 30, 2024**.
- This mission shows India's advancement in **space docking technology**, a crucial capability for future space exploration, particularly for long-term missions, space station assembly, and interplanetary travel.

WHAT IS SPACE DOCKING?

Space Docking involves two spacecraft connecting while in orbit, allowing them to operate together and **perform complex tasks**. This technology is essential for:

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- **Building Space Stations:** Docking is required to assemble and maintain space stations, which are made up of multiple modules docked together in orbit.
- **Interplanetary Missions:** Docking allows multiple spacecraft to combine resources for long-term missions to the Moon, Mars, or other destinations.
- **Payload Transfer:** Docking enables the transfer of large payloads or modules, which cannot be launched in a single spacecraft.

MISSION OVERVIEW

The **SpaDeX mission** is designed to test the first-ever space docking technology developed by India. This marks a major step for ISRO in the global space race, **positioning India alongside the US, Russia, and China as one of the few countries** capable of conducting such intricate operations in space.

- **Launch Vehicle:** The **PSLV-C60** (Polar Satellite Launch Vehicle), ISRO's workhorse rocket, was used for this mission. It was launched from the **Satish Dhawan Space Centre** in **Sriharikota, India**.
- **Primary Objective:** To demonstrate **space docking**, where two satellites will connect and operate together in orbit. This technology is crucial for future missions involving large

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space structures, including the **Bharatiya Antariksh Station (BAS)** and **interplanetary exploration**.

The mission's success lays the foundation for **future space infrastructure** that could revolutionize satellite servicing, space station assembly, and more advanced space exploration projects.

KEY MISSION COMPONENTS

PSLV-C60 Rocket:

- **Launch Vehicle:** The PSLV-C60 is ISRO's **most reliable and versatile rocket** used for deploying satellites into **polar orbits** and **geosynchronous orbits**. It was chosen for this mission due to its track record of successful launches.
- **Satellite Deployment:** The rocket successfully deployed two small satellites into

Lower Earth Orbit (LEO):

- **SDX01 Chaser Satellite:** Designed to approach and dock with the Target satellite.
- **SDX02 Target Satellite:** Equipped with systems for maintaining the correct orbit and distance during the docking process.

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- **Docking Process:**

- The **SDX01 Chaser** satellite will gradually close the distance to the **SDX02 Target** satellite.
- The mission aims to reduce the distance in a step-by-step process, with the final docking taking place at a distance of **3 meters**.
- Over **7-8 days**, the Chaser will reduce the distance incrementally:
 - **5 km → 1.5 km → 500 meters → 225 meters → 15 meters → 3 meters**
- Once docked, both satellites will exchange **electrical power** for a brief period before undocking and continuing on their separate paths.

- **Docking Date:**

- The final docking is scheduled for **January 7, 2025**, which will be a critical demonstration of ISRO's space docking capabilities.

COMPONENTS & TECHNOLOGY OF THE SPADEX MISSION

- **SDX01 Chaser Satellite:**

- **Tracking and Docking:** Equipped with **high-resolution cameras** for visual tracking and docking assistance. The Chaser satellite will gradually approach the Target satellite and attempt to dock.

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- **Docking Mechanism:** It uses sophisticated guidance systems to ensure precise and safe docking.
- **SDX02 Target Satellite:**
 - **Multispectral Payload:** The Target satellite is equipped with instruments to monitor Earth's natural resources, **vegetation**, and **space radiation**.
 - **Propulsion System:** It contains propulsion to maintain an optimal distance and relative motion with the Chaser satellite during the docking procedure.

Docking Process:

- After the two satellites are placed in a **475 km circular orbit**, the docking procedure will **begin with a 20 km separation between the satellites**.
- The Chaser satellite will gradually reduce the distance by **using its thrusters** to counter the relative motion and avoid drifting.
- **After the final docking, electrical power will be transferred between the two satellites before undocking** and continuing separate missions.

SCIENTIFIC & TECHNOLOGICAL INNOVATIONS

- **POEM (PS4 Orbital Experiment Module):**

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- A testing platform for **24 different technologies** contributed by ISRO, Indian startups, and academic institutions.
- These include technologies for **satellite servicing, space sustainability,** and **biological studies.**
- **CROPS (Compact Research Module for Orbital Plant Studies):**
 - Focuses on **plant growth in microgravity**, which is vital for growing food during long-duration space missions.
 - This research can help scientists understand the effects of **microgravity** on plant cells and develop systems for growing food in space.
- **Robotic Arms:**
 - **Debris Capture Arm:** Designed to capture **space debris**, an increasing concern for spacecraft safety and the preservation of the space environment.
 - **Moveable Robotic Arm:** Tested for satellite servicing tasks like **repairing, refueling,** and **maintaining** satellites in orbit.
- **Other Experiments:**
 - **Amity University:** Studying **plant cell behavior** in microgravity to compare how cells behave in space versus on Earth.

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- **RV College of Engineering, Bengaluru:** Studying **gut bacteria growth curves** in space to investigate how microorganisms behave in the absence of gravity.
- **Synthetic Aperture Radar:** Testing radar systems for **Earth observation**, focusing on natural resource monitoring and vegetation mapping.
- **Green Propulsion System:**
 - The mission includes the demonstration of a **green propulsion system** that uses environmentally friendly propellants as opposed to traditional toxic chemicals used in conventional rockets.

FUTURE IMPACT

- **Bharatiya Antariksh Station (BAS):**
 - The **BAS, India's first space station, will consist of multiple modules that need to be docked together in orbit.**
 - The success of the SpaDeX mission is a key step toward ensuring that India can assemble large space structures and operate them safely in orbit.
- **Chandrayaan-4 Mission:**
 - ISRO's **Chandrayaan-4** mission, set to bring **lunar samples** back to Earth, will rely on docking technology to connect modules in space for safe sample transfer and return.

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- **Heavy Payload Missions:**

- Docking allows **multiple spacecraft to combine resources for carrying out complex tasks that would otherwise require too large** a spacecraft to be launched in a single mission.
- This is essential for interplanetary missions, including those targeting **Mars** or **the Moon**.

INDIA'S POSITION IN GLOBAL SPACE EXPLORATION

- **Global Significance:** The successful completion of this docking experiment will make **India the 4th country globally to possess docking technology, joining the ranks of the United States, Russia (formerly the USSR), and China.** This positions ISRO as a leader in space technologies, enhancing its credibility and capabilities in global space initiatives.
- **Technological Leadership:** The **SpaDeX mission** reinforces India's role as a **global technology innovator** in space. It paves the way for **international collaborations** in the areas of satellite servicing, space station construction, and interplanetary exploration.

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- **Private Sector and Research Collaboration:** The SpaDeX mission highlights the growing involvement of **Indian startups** and **academic institutions** in the country's space program. This collaboration will help further drive innovation and technology development within India's growing space industry.



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NOROVIRUS



- In December 2024, A significant **surge in norovirus outbreaks** was observed **across parts of the United States this winter**, with an uptick in cases reported by the **Centers for Disease Control and Prevention (CDC)**.
- As the winter months started, the number of norovirus cases has surged, **notably since early December**, prompting concerns about the spread of this highly contagious **stomach virus**.

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RECENT SURGE

- According to the CDC, there was a notable increase in **norovirus outbreaks** reported during the week of **December 5, 2024**.
- The number of outbreaks surged to **91**, up from **69 outbreaks** the week before, marking a **25% increase**.
- Historically, the first week of December has seen fewer than **65 outbreaks**, making this rise particularly concerning.
- This increase in cases signals that the virus is spreading across the country, especially as outbreaks are common during the winter months, typically peaking between **November and April**.
- **Outbreak Statistics:** On average, the **U.S. sees about 2,500 norovirus outbreaks** annually.
- These outbreaks are most common in **congregate settings** such as **cruise ships, nursing homes, schools, and correctional facilities**, where individuals are in close proximity to one another.

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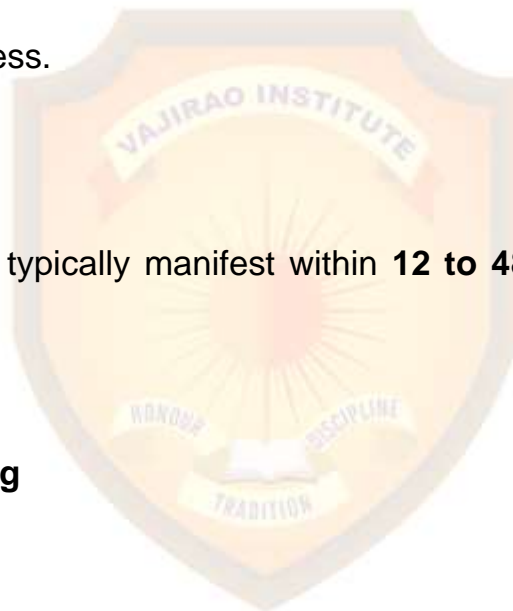
SYMPTOMS OF NOROVIRUS

Norovirus is the leading cause of **foodborne illness** in the **U.S.**, accounting for **approximately 58%** of food-related infections each year, according to **CDC data**. It is **highly contagious**, and **even a small number of viral particles**—sometimes as few as **10**—are enough to cause illness.

Symptoms of Norovirus:

The **symptoms** of norovirus typically manifest within **12 to 48 hours** after exposure to the virus and include:

- **Sudden onset of vomiting**
- **Diarrhea**
- **Nausea**
- **Stomach pain and cramping**
- **Body aches**
- **Headache**
- **Fever**



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In most cases, the illness lasts for **1 to 3 days**, and people typically recover without requiring medical intervention. However, the virus can still lead to **serious health complications** such as dehydration, especially in **vulnerable populations**.

TRANSMISSION

Norovirus is known for its **highly contagious nature**. The virus spreads through several methods:

- **Person-to-person contact:** The virus spreads easily when infected individuals come into close contact with others, such as through shared food, utensils, or close interactions.
- **Contaminated surfaces and objects:** Norovirus can survive on surfaces for days, making it easy to spread through **touching contaminated objects** like doorknobs, countertops, and handrails.
- **Contaminated food or water:** The virus can be transmitted through food and water that has been contaminated by infected individuals.

Outbreaks are particularly common in **closed environments** like **cruise ships, schools, nursing homes, and correctional facilities**, where people are in close quarters and the virus can spread rapidly.

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WHO IS AT RISK?

While norovirus can affect anyone, certain groups are more vulnerable to **severe illness**, particularly those who are prone to **dehydration**:

- **Older adults** (aged 65 and above) are more likely to experience severe dehydration and complications.
- **Young children and infants** are at higher risk for dehydration due to their smaller body size and greater fluid turnover.
- Individuals with **weakened immune systems**, such as those undergoing cancer treatment or with chronic illnesses, are also at higher risk for complications.

The most significant health concern for those infected with norovirus is **dehydration** caused by vomiting and diarrhea, which can lead to **serious health issues** if left untreated.

HOW TO MANAGE SICKNESS?

There is no **specific antiviral treatment** for norovirus, so managing the symptoms involves focusing on **rehydration** to prevent dehydration. The CDC recommends the following:

- **Hydration:**
 - Drink fluids like **water**, **oral rehydration solutions** (ORS), and **clear broths** to replenish lost fluids.

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- Avoid drinks like **coffee, tea, and alcohol**, which can worsen dehydration.
- **Seek medical attention** if symptoms of **severe dehydration** occur. These symptoms include:
 - Decreased urination
 - Dry mouth and throat
 - Dizziness or lightheadedness
 - Fatigue or weakness
 - For children: unusual sleepiness, fussiness, or crying with little or no tears.

If these symptoms are severe, it's important to seek medical care immediately, as dehydration can be life-threatening, especially for children and elderly individuals.

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6.21 LAKH APPLICATIONS FOR 1.27 LAKH OPPORTUNITIES UNDER THE PM INTERNSHIP SCHEME

- The **Prime Minister's Internship Scheme** witnessed an overwhelming response in its pilot phase, with **6.21 lakh applications** received for **1.27 lakh internship opportunities** offered by the Union **Corporate Affairs Ministry**.
- The Ministry, in a release on **December 29, 2024**, confirmed that the selection process for these internships is **ongoing**.
- The scheme was initially announced in the **2024 Union Budget** as part of a broader initiative aimed at enhancing employability and providing young individuals with **real-life business exposure**.
- The **application surge highlights the growing demand among youth for opportunities that will allow them** to gain professional skills and practical experience in top companies.

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OVERVIEW OF PM INTERNSHIP SCHEME

The **Prime Minister's Internship Scheme** was introduced with the goal of providing **internship opportunities** to **one crore youth** over the next **5 years** in the **top 500 companies**. The scheme is designed to offer young people **hands-on exposure** in various business environments across different sectors and professions, significantly boosting their future career prospects.

- **Target Audience:** The **scheme is open to youth across India**, providing opportunities to students and fresh graduates.
- **Internship Duration:** Internships will last for **12 months**, with the possibility of learning in varied roles and industries.

FINANCIAL SUPPORT FOR INTERNS

Interns selected under this scheme will receive financial assistance to support their learning journey:

1. Monthly Stipend:

- **₹5,000 per month** for each intern.
- **₹4,500** of this amount will be provided by the **Union Government**.

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- **₹500** per month will be contributed by the **partner companies** through their **Corporate Social Responsibility (CSR) funds**.

2. **Incidentals Grant:** Interns will also be entitled to a **one-time grant of ₹6,000** to cover incidental expenses upon joining the internship.

LAUNCH & PROGRESS OF THE SCHEME

- **Pilot Phase:** The **Pilot Project** of the scheme, which is targeted to provide **1.25 lakh internship opportunities** in **2024-2025**, was officially launched on **October 3, 2024**.
- **Online Portal:** Internships are being offered through the online platform at **www.pminternship.mca.gov.in**, where the **partner companies** have posted a total of **1.27 lakh internship opportunities**.

Applicant Statistics

- **Applications Received:** As of December 2024, **6.21 lakh applications** have been submitted for the **1.27 lakh opportunities** available in the pilot phase.
- **Registrations:** Approximately **4.87 lakh youths** have completed their **Know Your Customer (KYC)** process and registered on the portal.

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IMPACT & BENEFITS

- **Exposure to Top Companies:** The internship scheme aims to give participants real-world exposure to some of India's **top 500 companies**, enhancing their employability and business acumen.
- **Increased Youth Participation:** The overwhelming number of applications demonstrates the eagerness of youth to participate in **skill-building initiatives that promise valuable industry experience.**
- **Financial Support:** The financial assistance and incidental grant will help reduce the economic burden on interns, encouraging broader participation from various socio-economic backgrounds.

FUTURE PLANS & EXPECTATIONS

- The Prime Minister's Internship Scheme is expected to grow significantly over the next **5 years**, with a target to provide internship opportunities to **one crore youth.**
- This ambitious initiative aligns with the government's broader **skill development** and **employment generation** strategies, aiming to equip youth with the necessary tools for success in the evolving job market.

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- The scheme also emphasizes the importance of **collaboration between the government and corporate entities**, leveraging **Corporate Social Responsibility (CSR)** to create opportunities for young talent.



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MCQs

1. Which of these countries have not developed the Space Docking Technology?

- (A) USA
- (B) Russia
- (C) China
- (D) France

Ans. (D)

2. The Space Docking technology is essential for which of the following?

- 1. Space Stations
- 2. Interplanetary missions
- 3. Sample bring back missions

- (A) Only 1
- (B) Only 1 & 2
- (C) Only 1 & 3
- (D) All of the above

Ans. (D)

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3. Consider the following statements and mark the correct one:

1. The PM Internship scheme aims at providing internship to 1 crore youth in private companies over the next 5 years.
2. The PM internship scheme also aims to bridge the skill gap.

- (A) Only 1
(B) Only 2
(C) Both 1 & 2
(D) Neither 1 nor 2



Ans. (C)

4. Who of the following is not eligible for benefits under PM Internship scheme:

1. Any graduate.
2. Any person whose family income is exceeding Rs. 8 Lakh per annum for FY 24.

- (A) Only 1
(B) Only 2
(C) Both 1 & 2
(D) Neither 1 nor 2

Ans. (B)

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5. How is Norovirus spread from person to person?

1. By eating contaminated food.

2. By coming in close contact with the infected person.

(A) Only 1

(B) Only 2

(C) Both 1 & 2

(D) Neither 1 nor 2

Ans. (C)



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