

Today's Prelims Topics

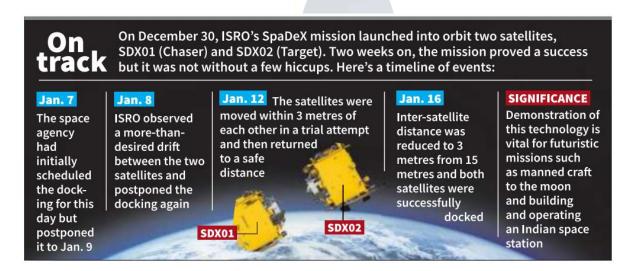
ISRO successfully docked satellites in Space

Context

The Indian Space Research Organisation (ISRO) achieved a major milestone on **January 16, 2025**, by successfully demonstrating the docking of two satellites in space.

What is Space Docking?

- Docking involves:
 - Bringing two fast-moving spacecraft to the same orbit.
 - o Gradually reducing the distance between them.
 - O Joining them manually or autonomously.
- Applications of Docking:
 - Setting up space stations by joining multiple modules in orbit.
 - Transporting crew and supplies to space stations.
 - Enabling missions that require heavy spacecraft, which cannot be launched as a single unit.
- India's successful docking demonstration makes it the **4th country globally,** after USA, Russia and China to achieve this milestone.



About SpaDeX (Space Docking Experiment)

- ISRO's mission aimed at demonstrating in-space docking and undocking of two satellites while in motion.
- It is made up of 2 small spacecraft Chaser & Target. (Launch Vehicle- PSLV C-60)
- Both spacecraft will be launched simultaneously but independently into a 470-km wide circular orbit at 55° inclination & With a local time cycle of about 66 days.
- Stages:
 - o Rendezvous Aligning orbits of 2 spacecraft
 - Docking Connecting 2 spacecraft
 - Undocking Disconnecting the 2 spacecraft.
- Objectives:
 - **Primary Objective Docking Manoeuvre:** The satellites will demonstrate docking (joining) and undocking (separating) while in orbit.



- **Secondary Objective Electric Power Transfer:** Transfer of electric power between docked spacecraft. It is a critical technology for:
 - In-space robotics.
 - Composite spacecraft control.
 - Payload operations post-undocking.

Significance of this achievement - Future Missions

- **Bharatiya Antariksh Station (2035):** India's proposed space station will involve joining five robotic modules in space. The first module is planned for **2028**.
- **Chandrayaan-4**: A lunar mission to collect and return samples from the Moon. Docking will be crucial for assembling the spacecraft in orbit and returning the samples to Earth.
- **Human Lunar Missions (2040)**: Docking technology will be used to assemble and launch heavier spacecraft for human lunar exploration.

Source:

• Indian Express- ISRO Docks SpaDeX Satellites in Space





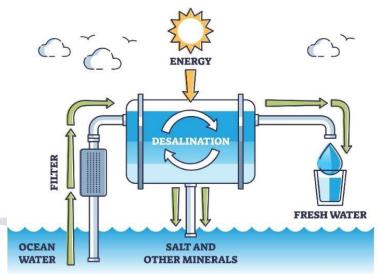
Low Temperature Thermal Desalination

Context

A new low temperature thermal desalination plant is established in **Chetlat Island, Lakshadweep.** It will provide **1.5 Lakh litres** of potable water daily.

About Low Temperature Thermal Desalination (LTTD)

- It is a method of producing drinking water from ocean water by evaporating warm surface water and condensing the vapor with cold deep sea water.
- LTTD is suitable for island territories and can be used in places where freshwater is scarce.
- Advantages:
 - LTTD doesn't require chemical pre- or post-treatment of seawater.
 - LTTD is environment friendly and can be used regardless of weather conditions.
 - Low operational management cost - No effluent treatment required.



Source:

• The Hindu - LTTD plant





Cervical Cancer - HPV Vaccine

Context

Cervical cancer is a significant health concern in India. It is the **3rd most common cancer among women.**

About Cervical Cancer & HPV

- Cervical cancer occurs when abnormal cells grow in the cervix.
- It's caused by a persistent infection with the human papillomavirus (HPV).
- **Cervix**: The site of cervical cancer is the cervix or the cervical wall.
- **HPV Vaccine:** It is the most effective tool to prevent cervical cancer. It offers protection against HPV-related cancers and conditions.
 - **How It Works:** Stimulates the immune system to produce antibodies that neutralize the HPV virus. It is **more effective** if administered **before exposure to the virus**.
- HPV Vaccines approved in India:
 - **Cervavac**: First Indian-developed HPV vaccine. Approved for use in both males and females.
 - Others: Gardasil, Gardasil-9 & Cervarix

Challenges in Vaccination

- Cost: High costs limit accessibility. E.g. Gardasil 9 costs ₹10,850 per dose.
- Awareness: Limited understanding of HPV and vaccine benefits.
- Low Coverage: Currently available only through private practitioners.

Steps to Improve Uptake:

- Inclusion of the vaccine in the national immunisation program.
- Raising awareness about the vaccine's safety and benefits.
- Making vaccines more affordable and accessible.

National Immunisation Programme (NIP)

- It is a public health program that offers free immunizations to children and pregnant women.
- NIP aims to prevent the spread of vaccine-preventable diseases.
- Protects against 12 vaccine-preventable diseases, such as Diphtheria, Pertussis, Tetanus, Polio, Measles, Rubella etc.

Source:

• The Hindu - Costly HPV vaccine



Election Commission's Advisory on AI-Generated Campaign Content

Context

Ahead of the Delhi Assembly poll, the Election Commission has issued a fresh advisory to political parties regarding use of Artificial Intelligence-generated content in their campaigns.

About New Advisory

- All Al-generated content must be prominently labeled with:
 - o Al-Generated
 - o Digitally Enhanced
 - Synthetic Content
- Applicable to all campaign materials, including: Images, Video, Audio and other altered media.
- Purpose:
 - Ensure transparency and responsible campaigning.
 - Help voters make informed decisions by distinguishing genuine content from synthetic content.

Previous Guidelines (2024)

- ECI had issued guidelines to curb deepfake content before the 2024 Lok Sabha elections.
- Political parties were instructed to remove deepfakes within three hours of notification.
- Prohibited use of synthetic media to misinform voters.

Source:

• The Hindu - Parties asked to disclose, label AI content used in poll campaigns





Third Launch Pad at Sriharikota

Context

The Union Cabinet has approved establishment of the 3rd launch pad at Satish Dhawan Space Centre of ISRO at Sriharikota, Andhra Pradesh.

Key Features of the Third Launch Pad

- Universal and Advanced Design:
 - Accommodates NGLVs, Launch Vehicle Mark-3 (LVM3) with semi-cryogenic stages, and other future configurations.
 - Incorporates **horizontal integration of rockets**, a departure from traditional vertical assembly methods.
 - Designed to maximize **industry participation** and leverage ISRO's extensive expertise in launch pad construction.
- Supporting Future Space Missions: Human Spaceflight Missions The launch pad will support Indian-manned spaceflights.
- Backup for Existing Infrastructure:
 - Complements the **First Launch Pad (FLP)** (operational for 30 years, primarily for PSLV launches).
 - Acts as a reserve for the Second Launch Pad (SLP) (in service for nearly 20 years).

Why Sriharikota?

- **Geographic Advantage:** Located close to the **equator**, enabling rockets to take advantage of the **Earth's rotation** for increased velocity, reducing fuel consumption.
 - Ideal for launching satellites into geostationary orbits.
- Coastal Location: Rockets are launched over the Bay of Bengal, ensuring debris falls into uninhabited areas, minimizing risks to human populations.
- **Established Infrastructure:** Home to ISRO's primary launch facility, with extensive technical and logistical support systems already in place.
- Weather Conditions: Favourable weather with relatively stable conditions for year-round launches.

Source:

• The Hindu - third launch pad at Sriharikota



Short-Term Regimen for TB

Context

The Union Health Ministry has recently approved the introduction of a new treatment regimen for multidrug-resistant tuberculosis (BPaL Regimen) in India.

MDR-TB: A Growing Concern

- MDR-TB occurs when TB germs become resistant to **rifampicin and isoniazid**, two major TB drugs.
- Mortality Risk: Carries a 30-40% risk of death.
- Global Burden (2023):
 - o 1,75,923 cases reported to WHO.
 - o India's share: 27% of global MDR-TB cases.
- Causes: Lack of adherence to TB treatment & Misuse of TB drugs through improper regimens.

Issues with Existing TB Treatments

- Drug-Sensitive (DS) TB: Treatment duration is 6 months, involving 4 drugs initially.
- Drug-Resistant (DR) TB:
 - O Longer treatment: 18 months or more.
 - O Higher pill burden: At least five drugs.
 - Severe side effects (hearing loss, depression and menstrual disruptions).

Shorter Regimens: The BPaL Regimen

- Components: Bedaquiline, Pretomanid Linezolid (BPaL), Duration 6 months.
- Advantages:
 - Reduced treatment duration.
 - Improved adherence due to lower pill burden.
 - Decreased economic burden on patients.

Tuberculosis (TB)

- It is a bacterial infection spread through inhaling tiny droplets from the coughs or sneezes of an infected person.
 - TB is caused by a bacterium called **Mycobacterium tuberculosis**, belonging to the Mycobacteriaceae family.
- **Transmission:** TB spreads from person to person through the air.
- Types:
 - o **Pulmonary TB**: Affects the lungs
 - o Extra-Pulmonary TB: Affects other organs.
- TB is a treatable and curable disease.
- Treatment:
 - Vaccine: Currently, Bacille Calmette-Guérin (BCG) is the only licensed vaccine available for the prevention of TB.
 - O Major drugs (4): Isoniazid (INH), Rifampicin, Pyrazinamide & Ethambutol.
- TB Elimination Targets:
 - India National TB Elimination Programme (NTEP) to eliminate TB by 2025.
 - Globally End TB Strategy of WHO to eliminate TB by 2030.

Source:

• The Hindu - Long overdue, short-term regimen for TB



Centre approves establishment of 8th Pay Commission

Context

Constitution of 8th Pay Commission has been approved by the Union government to address the long-standing demands of employees and trade unions for wage and pension revisions

About Pay Commission

- It is a body established by the Central Government to **review and recommend changes** to the salary, allowances and pension structures of central government employees and pensioners.
- Constitution & Composition: Department of Expenditure (Ministry of Finance).
- Aim of Pay Commission:
 - To ensure fair compensation for government employees.
 - Recommend formulas for revising Dearness Allowance (DA) and Dearness Relief (DR) to offset inflation impacts.

Previous Pay Commissions

- Since 1947, seven Pay Commissions have been constituted:
 - The 7th pay commission was implemented in 2016 and is set to complete its term in 2026.
 - Chairman of 7th Pay Commission: Justice Ashok Kumar Mathur.

Source:

• The Hindu - PM approves constitution of Eighth Pay Commission





Probability of 'megaquake' in Japan in the next 30 years

Context

A Japanese government panel has raised the probability of a "megaquake" occurring in the next 30 years to **75-82%**, up from the previous estimate of **74-81%**.

About Megaquake

- Earthquakes with a magnitude greater than 8 are classified as Megaquakes.
- Megaquakes are also known as megathrust earthquakes. They can cause tsunamis and significant damage
- Mechanism of Megaquakes:
 - The plates move against each other and become stuck, accumulating vast amounts of energy.
 - When the plates break free, the energy release causes massive earthquakes.



- The Nankai Trough is an 800-kilometer undersea trench parallel to Japan's Pacific coast.
- It marks the boundary where the Philippine Sea tectonic plate subducts beneath the continental plate that Japan rests on.
- Location: It runs from Shizuoka, west of Tokyo, to the southern tip of Kyushu Island.
- It is an **Underwater Subduction Zone**.
 - O **Subduction Zone** is a spot where two of the planet's tectonic plates collide and one dives, or subducts beneath the other.

Source:

• The Hindu - Megaquake in Japan





Fast Track Immigration – Trusted Traveller Programme

Context

The Union Home Minister has inaugurated the Fast Track Immigration – Trusted Traveller Programme at Mumbai, Chennai, Kolkata, Bengaluru, Hyderabad, Cochin and Ahmedabad airports.

About Fast Track Immigration – Trusted Traveller Programme (FTI-TTP)



- It is an advanced immigration clearance system designed to reduce wait times for international travelers by utilizing automated e-gates.
- Implementing Ministry & Agency: Union Home Ministry through Bureau of Immigration.
- It was first launched in June 2024 at Delhi's IGI Airport.
- Implementation Two phases:
 - 1st Phase: Indian citizens and Overseas Citizens of India (OCI) cardholders are covered.
 - 2nd Phase: Foreign travellers will be covered.
- How FTI-TTP works:
 - Passengers register on the FTI-TTP portal and complete verification by uploading necessary documents.
 - After approval, a **whitelist of 'Trusted Travellers'** is generated.
 - On arriving at the airport, they scan their boarding pass and passport at e-gates.
 - O Biometrics are authenticated, and upon successful validation, the e-gates open automatically, granting immigration clearance.
- Validity: Registration is valid until the passport expires or for five years, whichever is earlier. Source:
- Indian Express FTI-TTP



QS Future Skills Index 2025

Context

India has ranked 25th overall in the QS World Future Skills Index 2025.

About Report & Key Highlights

 It is a global ranking system that evaluates countries' readiness to meet evolving job market demands through skill development, education and economic transformation.

• Overall Ranking:

- India was ranked 25th among all countries, placing it in the "future skills contender" category.
- USA, UK, Germany,
 Australia and Canada were categorized as "future skills pioneers."

INDIA Indicator Skills Fit Academic Future Economic	
Indicator Skills Fit Academic Future Economic	
Readiness of Work Transformation	Overall
Score 59.1 89.9 99.1 58.3	76.6

Strengths Highlighted in the Report

- Future of Work (2nd Rank): (first rank US)
 - The category evaluates how well job markets are prepared for jobs of tomorrow.
- Economic Capacity (Full Marks):
 - India scored 100/100 in economic capacity, indicating a strong base for future economic transformation.

Challenges Identified

- Skills Fit (59.1):
 - India scored the lowest among the top 30 countries in this parameter.
 - A **critical skills gap** in the workforce has been identified, indicating a mismatch between education and employer needs.
- Economic Transformation (58.3):
 - Although India achieved full marks for economic capacity, it scored poorly in futureoriented innovation in sustainability, with a score of 15.6/100.
- Higher Education Gaps:
 - o India's higher education system is struggling to adapt to rapidly evolving employer demands
 - Large gaps exist in fostering an **entrepreneurial and innovative mindset** among graduates.

Recommendations for Improvement

- Higher Education Reforms:
 - Universities need to embed **creativity, problem-solving, and entrepreneurial thinking** into curricula.
 - Stronger collaborations between academia and industry are necessary to align education with workforce demands.
- Focus on Sustainability and Innovation:
 - Investment in **future-oriented innovation in sustainability** is critical to improving India's global standing.



• Skill Development:

- O Address the skills gap by prioritizing **relevant skill training** for both students and the existing workforce.
- Promote **entrepreneurship and innovation** to meet global economic trends.

Source:

• Indian Express - QS future skills report

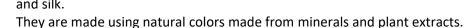




News in Shorts

Pichwai Paintings

- Pichwai paintings are a traditional Indian art form that depict the life of Lord Krishna. They are known for their vibrant colors, intricate designs, and spiritual themes.
- Origin: Nathdwara town in Rajasthan, India over 400 years ago. (17th century)
- Pichwai paintings are used as backdrops for Hindu deities in temples, especially for Lord Krishna.
- They are an essential part of **Pushti Marg worship.**
- Materials used:
 - Pichwai paintings are traditionally made on cloth, but can also be made on paper, canvas and silk





• The Hindu - Hues of Devotion

Blue Origin launches rocket on maiden test flight

- Blue Origin's New Glenn Rocket Successfully Completes First Test Flight.
- Blue origin is a private company founded by Jeff Benzos in 2000.
- Launch site: Cape Canaveral Space Force Station, Florida (USA)
- Objective of Mission: To place the Blue Ring Pathfinder test satellite into orbit and land rocket's booster onto a drone ship in the Atlantic Ocean.
- Setback: The first-stage booster failed to land on a barge in the Atlantic Ocean as planned.

Private Rockets - India

- Vikram-S SkyRoot Aerospace: India's first privately developed rocket, it was launched in 2022.
- AgniKul Cosmos: 1st private launchpad and mission control centre in India

Source:

• The Hindu - Blue Origin





Editorial Summary

Impact Of Indian Rupee Weakening

Context

The Indian rupee recently registered a sharp devaluation with respect to the dollar after remaining stable for over two years or so.

Exchange Rate Regimes

- **Nominal Exchange Rate:** The nominal exchange rate is the price of one unit of a foreign currency in terms of the domestic currency.
 - Example: If 1 USD = ₹85, then the nominal exchange rate is ₹85 per USD.
 - O It depends on:
 - **Demand and supply** of foreign currency in the forex market.
 - Central bank's intervention in the foreign exchange market.
- Real Exchange Rate (RER): The real exchange rate measures the relative price of domestic goods in terms of foreign goods, adjusting for price levels in both countries.

Formula:
$$RER = \left(\frac{Nominal\ Exchange\ Rate \times Foreign\ Price\ Level}{Domestic\ Price\ Level}\right)$$

- O It depends on:
 - Nominal exchange rate.
 - Inflation or price levels in domestic and foreign economies.
- Fixed Exchange Rate Regime
 - The central bank fixes the currency's value against a foreign currency or a basket of currencies.
 - To maintain this, it buys or sells foreign reserves to meet demand-supply mismatches.
 - Example: Bretton Woods System (1944–1971).
- Floating Exchange Rate Regime
 - The value of the currency is determined by market forces (demand and supply).
 - The central bank does not intervene actively in the forex market.
 - Example: USD, EUR under free-market regimes.
- Managed-Floating Exchange Rate Regime
 - A hybrid system where the central bank intervenes occasionally to stabilize the currency and prevent extreme fluctuations.
 - o India follows this regime.

India's Exchange Rate Policy

- Post-1991 Reforms: India adopted a managed-floating exchange rate post-liberalization, allowing the rupee's value to be influenced by demand and supply, with occasional RBI intervention.
- Current Trends
 - During excess demand: RBI sells foreign exchange reserves and allows some depreciation.
 - During excess supply: RBI buys foreign reserves but resists nominal appreciation to protect export competitiveness.



Recent Policies

- **2010s:** Managed-float with asymmetry in response. Depreciation occurred with capital outflows, but appreciation was limited during capital inflows.
- Post-COVID: RBI leaned toward a fixed-like exchange rate to prevent sharp depreciation, using reserves to stabilize the currency.

Structural Constraints in the Indian Economy

- Divergence Between Nominal and Real Exchange Rates: Since 2019, nominal depreciation has not translated to a real depreciation because of rising domestic prices.
 - Inflation in India offsets the competitiveness gained from nominal depreciation.
- Rising Markup Costs: Domestic firms increased markups, pushing up prices and limiting export competitiveness.
- **Dependence on Imports:** High import dependency for crude oil and raw materials escalates costs when the rupee depreciates.
- Persistent Current Account Deficit (CAD): Lower net exports and higher crude oil imports contribute to CAD, increasing foreign currency demand.

Implications of Exchange Rate Devaluation

Positive Effects

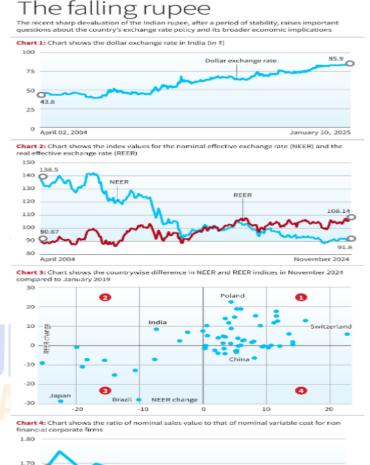
- Boost to Net Exports: Depreciation makes domestic goods cheaper internationally, potentially improving trade balance.
- Economic Growth: Improved exports can drive higher production and employment.

Negative Effects

- **Inflationary Pressures**: Depreciation raises the cost of imported goods, increasing domestic inflation.
- Lower Real Incomes: Higher inflation reduces purchasing power, impacting households and consumption.
- **Cost Escalation for Firms**: Rising costs of imported raw materials reduce profit margins or raise consumer prices.

Policy Recommendations

• **RBI's Role:** Consistent communication about its exchange rate policy to reduce uncertainty.





- A balanced intervention strategy to manage inflation and competitiveness.
- **Structural Reforms:** Reduce import dependency by boosting domestic production (e.g., Make in India).
 - O Promote export-oriented industries to address the trade imbalance.
- **Inflation Control:** Address inflation by controlling domestic price rises through fiscal and monetary policies.
- **Exchange Rate Framework:** Evaluate the suitability of the current managed-float regime and consider adopting more explicit strategies to ensure stability and growth.

Source: The Hindu: The impacts of rupee weakening





Long Working Hours

Context

Recently L&T Chairperson SN Subrahmanyan suggested that employees should work 90 hours a week.

What are the Arguments in Favour of Long Working Hours?

- Work as Worship: The idea that work is worship (Karmayoga) has deep roots in Indian culture, reflected in sayings like "Karm Hi Puja Hai" and ideals from texts like the Bhagavad Gita.
 - People should enjoy their work and immerse themselves in it, finding joy in achieving their goals rather than treating work as a burden.
- **Economic Necessity:** India, with its large population of poor, requires diligent work to transform into a global manufacturing hub. Hard work is essential for raising living standards and eradicating poverty.
 - Reduced working hours may lead to economic losses and missed opportunities for growth, particularly in a developing nation like India.
- Role Models of Tireless Work: Examples like Prime Minister Narendra Modi, who works
 tirelessly without taking vacations, are cited as ideals to inspire people to focus on productivity
 and nation-building.
 - Historical figures like Swami Vivekananda emphasized relentless effort to achieve goals, reinforcing the ethos of hard work over leisure.
- Family-like Work Culture: Organizations like Larsen & Toubro (L&T) are highlighted for fostering a family-like work atmosphere, where employees willingly dedicate themselves to challenging tasks, achieving extraordinary outcomes.
- Avoidance of Vacation Culture: The "vacation craze" is criticized as a colonial hangover and a blind imitation of Western cultures.
 - o India's work culture, rooted in traditional values, does not prioritize frequent breaks but instead emphasizes fulfilling duties and responsibilities.
- Reality of the Workforce: Many in the unorganized sector, like vegetable vendors, already work long hours to make ends meet. Suggesting reduced working hours could undermine their dignity and portray their efforts as futile.
 - O A hard-working ethos is seen as necessary until the economy reaches a level where poverty is eliminated, allowing for adjustments in work-life balance.

What are the Arguments Against Long Working Hours?

- **Gender Inequity and Domestic Work Disparity**: Indian women perform **10 times more unpaid domestic chores** than men, creating a stark gender gap in work distribution.
 - Long working hours for men exacerbate this inequality, as they contribute little to household responsibilities, leaving women burdened with both unpaid domestic work and, in many cases, paid jobs.
 - o The "mommy track" phenomenon forces one parent, typically the woman, to compromise career progression to manage domestic duties, reinforcing the gender wage gap.
- **Diminished Productivity and Worker Burnout:** Excessive work hours don't necessarily lead to higher productivity.
 - Many informal sector workers log long hours under precarious conditions without substantial gains in output or benefits.
 - Rest and recuperation are essential for optimal performance, much like recharging gadgets; overworking leads to diminishing returns on effort and efficiency.
- **Exploitation in Corporate Structures:** Disparities in compensation highlight the exploitation of workers putting in long hours.



- E.g., while managerial salaries rose significantly (20.38%), worker salaries saw only marginal growth (1.74%).
- O This inequity in rewards breeds dissatisfaction and undermines the morale of workers.
- **Negative Impact on Work-Life Balance:** Long hours deprive employees of personal and family time, undermining relationships and quality of life.
 - O Without work-life balance, employees are at risk of burnout, mental health issues, and strained familial ties.
- **Reinforcement of Social Inequality:** "Greedy" jobs with long hours disproportionately benefit individuals who can afford to sacrifice personal time, often men.
 - O This dynamic stunts women's career progression and widens existing gender disparities in professional success and pay.
- **Cultural and Economic Misalignment:** Glorifying long hours perpetuates a toxic work culture that prioritizes exhaustion over sustainability.
 - A balanced approach to work fosters a thriving workforce that can sustain productivity without compromising health, well-being, or equity.

Source: Indian Express: Agree/Disagree- Long Working Hours

