

# GS ANALYST

## MONTHLY CURRENT AFFAIRS MAGAZINE

- ✓ Coverage of Monthly topics for GS Paper 1, 2, 3 & 4
- ✓ Key Concepts & Prelims Specific Topics
- ✓ Questions for Answer Writing Practice

### MAINS

- ☐ D-Day: The Turning Point of World War II
- ☐ Maharashtra's Water Crisis
- ☐ U.S. Navy's Conflict with Houthi Rebels in Yemen
- ☐ Sri Lanka's Malayala Tamils
- ☐ BRICS Expansion
- ☐ New Anti-Cheating Law Operationalised
- ☐ First Past the Post System (FPTP) VS Proportional Representation (PR)
- ☐ India's Agricultural Subsidies
- ☐ Global Debt Crisis
- ☐ Role of Heat
- ☐ Harnessing India's Rooftop Solar Potential
- ☐ China's Offensive Air Capabilities along LAC
- ☐ Heatwaves: A Missing Disaster in India's Law

### QUICK BYTES

- ☐ Kashmir's White Gold
- ☐ Shree Jagannath Temple
- ☐ China-Pakistan Economic Corridor (CPEC)
- ☐ Indus Water Treaty
- ☐ RoDTEP (Remission of Duties and Taxes on Export Products)
- ☐ Indian Army Introduces "Vidyut Rakshak"
- ☐ Tele MANAS Cell for Armed Forces
- ☐ Digital Payments Intelligence Platform
- ☐ e-Rupee
- ☐ External Commercial Borrowings (ECBs)
- ☐ ISRO's Aditya-L1 Spacecraft Captures Solar Activity
- ☐ Underwater Acoustic Waves
- ☐ Changing Rivers in Alaska

### CONTEMPORARY ISSUE BASED ESSAY

THE FUTURE OF DEMOCRACY IN THE AGE OF SOCIAL MEDIA

## DISCLAIMER

**T**he current affairs articles are segregated from prelims and mains perspective, such separation is maintained in terms of structure of articles. Mains articles have more focus on analysis and prelims articles have more focus on facts.

However, this doesn't mean that Mains articles don't cover facts and PT articles can't have analysis. You are suggested to read all of them for all stages of examination.

# CONTENT

JUNE, 2024

## SECTION - A (ESSAY)

- ☐ The Future of Democracy in the Age of Social Media .....01

## SECTION - B (MAINS)

### SOCIETY (GS-I)

- ☐ Women in Corporate Roles in India.....04

### HISTORY (GS-I)

- ☐ The Six-Day War .....04
- ☐ D-Day: The Turning Point of World War II.... 05

### GEOGRAPHY (GS-I)

- ☐ Maharashtra's Water Crisis.....06
- ☐ Onset of La Nina.....06

### INTERNATIONAL RELATIONS (GS-II)

- ☐ G7 Summit.....07
- ☐ S. Navy's Conflict with Houthi Rebels in Yemen .....08
- ☐ The Plight of Indian Nationals as Mercenaries .....09
- ☐ Imperative for UNSC Reform.....09
- ☐ Sri Lanka's Malaiyaha Tamils.....10
- ☐ Unrest in New Caledonia .....11
- ☐ BRICS Expansion .....12

### POLITY & GOVERNANCE (GS-II)

- ☐ Government to Establish Mediation Council of India .....12
- ☐ Nagaland Civic Polls.....13
- ☐ Bail in Money Laundering Cases and the 'Twin Test' under PMLA .....14
- ☐ Lok Adalat.....15
- ☐ Verification of EVM Burnt Memory in 2024 Elections .....15
- ☐ Enemy Agents Ordinance.....16
- ☐ National Emergency .....16

- ☐ New Anti-Cheating Law Operationalised.....17
- ☐ Special Category Status.....18
- ☐ The demand for 'Bhil Pradesh'.....19
- ☐ First Past the Post System (FPTP) Vs Proportional Representation (PR) .....19
- ☐ NOTA Votes .....20
- ☐ UGC Policy shift for Higher Education.....21
- ☐ Financial Hardship in TB Treatment Programme .....22
- ☐ The Tobacco Epidemic .....23
- ☐ Insolvency & Bankruptcy Code (IBC) .....24
- ☐ Addressing Poor Electricity Supply for Farmers .....25
- ☐ Amendments to IHR 2005 .....26

### ECONOMY (GS-III)

- ☐ India's Agricultural Subsidies .....27
- ☐ India's Informal Economy.....28
- ☐ India's Competitiveness in Global Market.....29
- ☐ 2023 Statistical Review of World Energy.....29
- ☐ India inclusion in JP Morgan EM Bond index .....30
- ☐ India's MSP Programme.....31
- ☐ PLI Scheme.....32
- ☐ Dollar-based System with no real "Alternative" .....32
- ☐ Global Debt Crisis.....33
- ☐ Social Protection in Low-Income Nations.... 34

### ENVIRONMENT (GS-III)

- ☐ The global fight over Climate Finance.....35
- ☐ 2024 Hindu Kush Himalayas Snow Update .....35

# GS SCORE

An Institute for Civil Services

“ You Decide **Your SCORE.**  
Toppers **Do It Better!** ”

## COURSES for IAS 2025-26



**GS  
FOUNDATION**



**MAINS  
CLASSES**



**OPTIONAL  
FOUNDATION**



**TEST  
SERIES**

- POL. SCIENCE
- ANTHROPOLOGY
- SOCIOLOGY
- LAW
- HISTORY
- GEOGRAPHY
- PUB. AD.

- PRELIMS TEST SERIES
- MAINS TEST SERIES
- INTEGRATED TEST SERIES
- OPTIONAL TEST SERIES



I am grateful to GS SCORE for providing guidance to me and many more aspirants. I practiced a lot with GS SCORE.

AISHWARYAM PRAJAPATI (AIR-10, CSE 2023)



I am truly grateful to GS SCORE for their guidance. They offered genuine mentorship.

MEDHA ANAND (AIR 13, CSE 2023)

Access

**400+**  
**TOPPER'S  
COPIES**



Scan QR Code  
to get the copies

Only **SCORE** Matters!

- IASSCOREofficial
- gsscoreofficial
- gsscoreofficial iasscore
- gsscoreofficial
- gsscoreofficial/

For Information, Contact

**8448496262**

Website:

<https://iasscore.in/>



• Role of Heat.....	37	• China's Offensive Air Capabilities.....	45
• IISc develop method to cleanse groundwater contamination.....	37	• Modified Newtonian Dynamics (MOND).....	46
• Harnessing India's Rooftop Solar Potential.....	38	• Miniaturised Satellite.....	47
• Radioactive Rhino Horns.....	39	• China's First Samples from Moon's Far Side.....	48
• Deep-Sea Mining.....	40	• 'Multi-omics' enhances diagnosis.....	49
• Uttar Pradesh leads in compressed biogas potential.....	42	• Chandrayaan-4.....	49
• Climate Hell.....	43		
• NGT's Suo Motu Case on Tree Cover Loss.....	44		
<b>SCIENCE &amp; TECHNOLOGY (GS-III)</b>		<b>DISASTER MANAGEMENT (GS-III)</b>	
• The Dark Web.....	45	• Heatwaves: A Missing Disaster in India's Law.....	50
		• Flood Management.....	50
		• Kavach Anti-Collision System.....	51

## SECTION - C (QUICK BYTES)

### GEOGRAPHY

• World's Largest Astronomy Camera.....	53
• Kazakh Steppe.....	54
• Latin America.....	55
• Kashmir's White Gold.....	55
• Westerlies to trigger Rains.....	55

### HISTORY

• Nalanda University.....	56
---------------------------	----

### ART & CULTURE

• Srinagar recognised as 'World Craft City'.....	56
• Buddha's Relics.....	57
• Shree Jagannath Temple.....	58
• Satnami Sect.....	58

### INTERNATIONAL RELATIONS

• Red Flag Exercise and RIMPAC Exercise.....	59
• G7 Summit.....	59
• China-Pakistan Economic Corridor (CPEC).....	60
• International Criminal Court (ICC).....	60
• Indus Water Treaty.....	60

### POLITY & GOVERNANCE

• Leader of Opposition (LoP).....	61
• RoDTEP (Remission of Duties and Taxes on Export Products).....	61
• Pradhan Mantri Bharatiya Janaushadhi Pariyojana (PMBJP).....	61

• Pradhan Mantri Kisan Samman Nidhi (PM-KISAN) Scheme.....	62
• Central Council of Ministers.....	63
• Tax Devolution.....	63
• Indian Army Introduces "Vidyut Rakshak".....	63
• National Forensic Infrastructure Enhancement Scheme.....	64
• Anamika Rajeev becomes Navy's First Woman Chopper Pilot.....	64
• Tele MANAS Cell for Armed Forces.....	64

### ECONOMY

• India's Consumer Price Inflation.....	65
• Digital Payments Intelligence Platform.....	65
• India Trade Deficit Widens.....	66
• OPEC+ extends oil output cuts.....	66
• Alternate Investment Funds (AIFs).....	66
• Front-Running in Financial Markets.....	66
• e-Rupee.....	67
• RBI's Income & Expenditure.....	67
• India's Gold Reserves.....	67
• Preston Curve.....	68
• China's Offshore Listing Challenges.....	69
• External Commercial Borrowings (ECBs).....	69

### ENVIRONMENT

• Air Pollution Crisis.....	70
• Rising Nitrous Oxide Emissions.....	70
• Catastrophic Bleaching in Lizard Island.....	70

# ANSWER WRITING & MENTORSHIP PROGRAMME

**1**

ACHIEVE YOUR FOUNDATION  
of ANSWER WRITING SKILL *in* **3 Months**

## SAMARTH

**ANSWER WRITING PROGRAMME**



**2**

## GS MAINS Q&A

COMPLETE GS MAINS & ESSAY

*through*

CONCEPT CLASSES  
**300+ HRS.**

MENTORSHIP  
Group & One on One  
Discussion

ANSWER WRITING  
**80+ TESTS**



## OPTIONAL Q&A

A Mini-Foundation *cum* Test Series Programme

**100+**  
HOURS

CONCEPT  
CLASSES &  
MENTORSHIP

**300+**  
QUESTIONS

COVERING  
OPTIONAL  
SYLLABUS



**POLITICAL SCIENCE**



**HISTORY**



**SOCIOLOGY**



**GEOGRAPHY**



**LAW**



**ANTHROPOLOGY**



**PUBLIC ADMINISTRATION**



**8448496262**



**iasscore.in**



▪ Pink Flamingo .....	71	▪ Portable Optical Atomic Clocks .....	83
▪ Discovery of Limbless Amphibian in Kaziranga National Park.....	71	▪ International Year of Quantum.....	84
▪ Iberian Lynx (Lynx pardinus).....	72	▪ Initiative on Critical and Emerging Technologies (iCET) .....	84
▪ Atlantic Bluefin Tuna (Thunnus thynnus) .....	72	▪ SIPRI Yearbook 2024 .....	85
▪ Greater One-Horned Rhino (Rhinoceros Unicornis) .....	73	▪ Streptococcal Toxic Shock Syndrome (STSS) .....	85
▪ Underwater Acoustic Waves .....	74	▪ Donanemab, new Alzheimer's drug .....	86
▪ 2024 Environment Performance Index (EPI) .....	74	▪ Inflammatory Bowel Disease (IBD).....	86
▪ Nord Stream Leaks.....	74	▪ Pakistan Reports Fifth Polio Case.....	87
▪ Protecting the Western Ghats .....	75	▪ PraVaHa.....	87
▪ Changing Rivers in Alaska.....	76	▪ China's Chang'e-6 Mission .....	88
▪ "Painting with Light" Project on Air Pollution .....	76	▪ White Phosphorus.....	88
▪ Canopy Bridges for India's Only Ape .....	77	▪ 1000 Days in Space.....	89
▪ Global Soil Partnership.....	78	▪ Discovery of Earliest-known Galaxy by JWST .....	89

## SCIENCE & TECHNOLOGY

▪ Breakthrough in Nipah Virus Research .....	79	▪ Agnibaan SOrTeD.....	91
▪ Global Navigation Satellite System (GNSS)-based Tolling .....	80	▪ ESA's EarthCARE Mission.....	92
▪ Discovery of frost atop Mars' Volcanoes .....	80	▪ ICMR's Initiative for Sickle Cell Disease .....	93
▪ ISRO's Aditya-L1 Spacecraft Captures Solar Activity .....	82	▪ Paediatric inflammatory Bowel Disease .....	93
▪ SpaceX's Starship Test Flight.....	83	▪ Plutonium 240.....	94
		▪ Green-Beard Genes .....	94





# IMP

## INTENSIVE MAINS PROGRAMME

**COMPLETE  
GS MAINS READINESS**  
(GS PAPER  
1, 2, 3, 4 & ESSAY)  
*in*

# 4 MONTHS

₹  
**COURSE FEE**  
₹ 38,000 +GST

Scan  
QR Code  
for  
Batch  
Details



## IAS MAINS 2025

1. Intensive & in-depth classes covering GS Paper 1,2,3,4 & Essay
2. Daily Answer Writing for effective Retention & Articulation
3. Critical Thinking & Analytical Skill Development to excel in Mains
4. Classes on Ethics, Case Studies and Essay Writing
5. Comprehensive Mains Test Series of 21 Tests: (12 Sectional + 5 Essay + 4 Mock)
6. Personalised Mentorship to track individual progress
7. Mains Previous Year Questions Practice Module with detailed Discussion
8. 120+Hr Mains Updation Classes after Prelims
9. Advance Study Material

📞 8448496262



[iasScore.in](http://iasScore.in)



## SECTION -A

# ESSAY

## THE FUTURE OF DEMOCRACY IN THE AGE OF SOCIAL MEDIA

In the 21st century, social media has emerged as a powerful tool that profoundly influences various aspects of daily life, including politics and democracy. With platforms like Facebook, Twitter, Instagram, and TikTok, individuals and organizations now have unprecedented access to information and the ability to connect with a global audience instantaneously. This revolution has reshaped democratic processes, offering both significant opportunities and considerable challenges. As we navigate this complex landscape, it is crucial to understand the implications of social media on democracy, its potential benefits, and the inherent threats it poses.

### Opportunities for Democracy

- Social media has democratized information dissemination, making it easier for people to access diverse perspectives and engage in political discourse. Historically, media control was often concentrated in the hands of a few, typically those with significant financial resources. Today, social media platforms empower ordinary citizens to voice their opinions, share information, and mobilize for causes they care about. This democratization of communication can enhance transparency and accountability in governance. For instance, grassroots movements and citizen journalism have gained traction, allowing for real-time reporting of events and issues that might otherwise go unnoticed.
- Moreover, social media facilitates greater political participation. Online petitions, advocacy campaigns, and

digital rallies enable individuals to engage in political processes without traditional barriers. During the Arab Spring, social media played a crucial role in organizing protests and mobilizing international support. Similarly, movements like #MeToo and #BlackLivesMatter have utilized social media to amplify voices of marginalized groups and challenge systemic injustices. In this sense, social media can be a catalyst for social change and political activism, fostering a more inclusive and participatory democratic environment.

### Threats to Democracy

- Despite its potential, social media also presents significant risks to democratic processes. One of the most pressing concerns is the spread of misinformation and fake news. The rapid and widespread nature of social media allows false information to proliferate quickly, undermining public trust in democratic institutions and processes. Research has shown that misinformation spreads faster and more widely than accurate information, which can distort public perception and influence election outcomes. For example, during the 2016 U.S. presidential election, the dissemination of false news stories on social media was linked to significant shifts in voter sentiment and behavior.
- Additionally, social media platforms are susceptible to manipulation and interference by malicious actors. State-sponsored disinformation campaigns and foreign interference have become increasingly common, as seen

in the Russian interference in the 2016 U.S. elections. These tactics aim to sow discord, polarize public opinion, and undermine the integrity of democratic processes. The algorithm-driven nature of social media can exacerbate these issues by creating echo chambers, where users are only exposed to information that reinforces their existing beliefs, leading to increased polarization and diminished public discourse.

- Another critical issue is the concentration of power among a few dominant tech companies that control social media platforms. These corporations wield significant influence over what information is visible and how it is presented, often with limited transparency or accountability. This concentration of power can stifle dissent, manipulate public opinion, and infringe on privacy rights. The lack of effective regulation and oversight raises concerns about the potential abuse of this power and its impact on democratic principles.

### Balancing Opportunities and Threats

- Addressing the challenges posed by social media while harnessing its potential benefits requires a multifaceted approach. First and foremost, there must be a concerted effort to improve digital literacy among the public. Educating individuals on how to critically evaluate information, identify misinformation, and engage responsibly online is essential for fostering a healthy democratic environment. Schools, governments, and organizations should collaborate to develop comprehensive digital literacy programs that equip citizens with the skills needed to navigate the complexities of social media.
- Furthermore, there is a need for greater regulation and accountability for social media platforms. Governments

and regulatory bodies must establish clear guidelines for combating misinformation, protecting user privacy, and ensuring fair practices. This includes enforcing transparency in how algorithms operate, promoting diversity of content, and addressing the concentration of power among tech giants. While regulation must be carefully balanced to avoid stifling innovation and free expression, targeted measures can help mitigate the negative impacts of social media on democracy.

- In addition, social media companies themselves must take responsibility for their role in the democratic process. Platforms should implement robust mechanisms for detecting and combating misinformation, promote fact-checking initiatives, and support independent oversight. Collaborating with experts, researchers, and civil society organizations can help develop effective strategies for addressing the challenges posed by social media.
- The future of democracy in the age of social media is characterized by a complex interplay of opportunities and threats. Social media has the potential to enhance democratic participation, amplify marginalized voices, and foster transparency. However, it also poses significant risks, including the spread of misinformation, manipulation by malicious actors, and the concentration of power among tech companies. Navigating this landscape requires a thoughtful and balanced approach that includes improving digital literacy, implementing effective regulations, and encouraging responsible practices by social media platforms. By addressing these challenges and leveraging the benefits of social media, we can work towards a more inclusive, informed, and resilient democratic society.



# GS SCORE

An Institute for Civil Services

# IAS 2025

# INTEGRATED TEST SERIES & MENTORSHIP PROGRAMME for PRELIMS & MAINS through

**350<sup>+</sup>** HRS.  
CONCEPT BUILDING

**3000<sup>+</sup>**  
MCQs

**650<sup>+</sup>**  
MAINS QUESTIONS



## INTEGRATED PREPARATION

Especially designed Integrated Test Series that synchronize the syllabus of both Prelims & Mains.



## CONCEPT BUILDING

Informative Classes on all subjects to enhance understanding and conceptual clarity of subjects.



## TESTS

Assessment-based learning modules comprising 96 Tests (45 Prelims Tests & 51 Mains Tests)



## MENTORSHIP

Mentorship through exhaustive Study Planner & Engaging Test discussion and personalised Feedback.



## STUDY MATERIAL

Crisp Value Addition Notes for Contemporary Issues, PYQs and Worksheets

*More than just a Test Series*

PROGRAMME FEE

₹ **32,500 +GST**

FOR MORE DETAILS

Scan the QR Code

 **8448496262**  **iasscore.in**



## SECTION - B

## MAINS ISSUES

## WOMEN IN CORPORATE ROLES IN INDIA

## CONTEXT

The representation of women in corporate roles in India has long been below 30% and has shown signs of stagnation or even decline in the post-pandemic years. This trend is highlighted in a report by LinkedIn titled "Women in Leadership in Corporate India."

## Sector-Wise Representation

The report provides data on the representation of women in leadership roles across various sectors:

- **Highest Representation:** Education (30%) and Government Administration (29%) have the highest representation of women in leadership roles.
- **Moderate Representation:** Technology, Information, and Media, and Financial Services sectors have a moderate female representation in leadership at 19%.
- **Lowest Representation:** Construction, Oil, Gas, and Mining, and Utilities sectors have the lowest female representation in leadership at 11%, followed by Wholesale and Manufacturing at 12%, and Accommodation and Food Services at 15%.

## Factors Contributing to Decline

- **Reduction in hybrid or work-from-home roles** has suppressed the growth of female participation in the corporate labor market.
- Women still face significant obstacles in reaching leadership roles due to **bias, societal norms, and structural barriers**.

- Structural barriers such as **lack of access to education, limited professional networks, and inadequate support systems** for working mothers also play significant roles.

## Suggestions for Improvement

- **Skills-First Approach to Hiring:** This approach focuses on hiring based on skills rather than gendered assumptions about a prospective employee's capabilities.
- **Mentorship and Networking Opportunities:** Providing mentorship and networking opportunities can help women advance in their careers.
- **Shared Parental Leave:** Implementing shared parental leave can support women in balancing work and family responsibilities.

## UPSC PYQ

- Q: What are the continued challenges for women in India against time and space? (2019)**
- Q: Male membership needs to be encouraged in order to make women's organization free from gender bias. Comment. (2013)**

## THE SIX-DAY WAR

## CONTEXT

Fifty-seven years have passed since the Six-Day War, fought between Israel and its Arab neighbours between June 5 and June 10, 1967.

## Key-details of the War

- **Roots of the Conflict:** The Six-Day War, fought between Israel and its Arab neighbors in June 1967, stemmed



from long-standing tensions over territorial and water disputes.

- ▶ The establishment of Israel led to a refugee crisis among Palestinian Arabs, fueling animosity with neighboring Arab states, particularly Egypt under President Nasser.
- **Outbreak of the War:** The conflict was triggered by Egypt's naval blockade of the **Straits of Tiran**, vital for Israeli commerce.
  - ▶ Israel, feeling threatened, launched a pre-emptive strike against **Egyptian airfields** on June 5, 1967.
  - ▶ This swiftly escalated into a full-scale war as **Jordan and Syria joined the conflict**.
- **Israeli Victory and Consequences:** Israel emerged victorious, gaining control of significant territories, including the **Sinai Peninsula, Gaza, the Golan Heights, the West Bank, and East Jerusalem**.
  - ▶ The defeat humiliated the Arab nations and established Israel's dominance in the region.
  - ▶ The war also spurred Palestinian nationalism and led to the formation of the PLO.
- **Long-Term Implications:** The Six-Day War reshaped the geopolitical landscape of the Middle East and fueled ongoing tensions.
  - ▶ Israel's occupation of **East Jerusalem, the West Bank, and Gaza** remains a contentious issue, with the fate of Palestinian refugees from the conflict unresolved.
  - ▶ Subsequent conflicts, like the **1973 Yom Kippur War**, reflect attempts to reverse the Arab losses of the Six-Day War.

## D-DAY: THE TURNING POINT OF WORLD WAR II

### CONTEXT

June 6, 2024, marks the **80th anniversary of D-Day**, the pivotal moment in **World War II** when Allied forces launched the **largest amphibious invasion** in history, marking the beginning of the **end for Nazi Germany**.

### The Invasion:

- On June 6, 1944, Allied troops from various countries, including the **United States, the United Kingdom, and Canada**, stormed five stretches of the Normandy coastline, codenamed **Utah, Omaha, Gold, Juno, and Sword beaches**.
- **Allied Forces and Participation:** Over two million troops were stationed in the UK for the invasion, with significant contributions from **American, British, and Canadian forces**. Troops from other Allied nations, including **Australia, Belgium, France, and Poland**, also played vital roles in **Operation Overlord**.
- **Challenges and Losses:** While some landings were successful, particularly at Utah and Gold beaches, others faced significant challenges. Omaha Beach, in particular,

witnessed heavy casualties due to strong currents and fierce German resistance. Thousands of Allied troops lost their lives on D-Day, with estimates of German casualties ranging from 4,000 to 9,000.

- **German Defense and Reaction:** Germany's response to **Operation Overlord** was hindered by poor weather conditions, strategic misinformation, and the diversionary tactics of Operation Fortitude. Despite their efforts, German coastal defenses were eventually overwhelmed by Allied advances.
- **Legacy and Impact:** D-Day marked a turning point in World War II, paving the way for the **liberation of France** and the eventual **defeat of Nazi Germany**. The successful invasion allowed the Allies to gain a foothold in **northwest Europe** and accelerate their advance towards victory.



### FACT BOX

#### World War II (1939-1945)

##### Factors Responsible for World War II:

- ▶ **Treaty of Versailles:** harsh conditions imposed on Germany after World War I led to resentment and economic hardship
- ▶ **Rise of Fascism and Nazism:** Dictatorial regimes in Germany (under Hitler) and Italy (under Mussolini) sought expansionist policies.
- ▶ **Economic Turmoil:** The Great Depression exacerbated tensions and weakened international cooperation.

##### Participating Countries:

- ▶ **Axis Powers:** Germany, Italy, Japan (later joined by others like Hungary, Romania, and Bulgaria).
- ▶ **Allied Powers:** United States, United Kingdom, Soviet Union (after being invaded by Germany in 1941), China, France (after its liberation). **India (as a part of the Allied Nations)**, sent over two and a half million soldiers to fight under **British command** against the Axis powers.

##### Important Locations:

- ▶ **Europe:** Major battles were fought in France (Normandy, Battle of the Bulge), Germany (Berlin), Italy (Anzio, Monte Cassino), and Eastern Europe (Stalingrad).
- ▶ **Pacific Theater:** Significant battles occurred in Pearl Harbor, Midway, Guadalcanal, Iwo Jima, and Okinawa.
- ▶ **North Africa:** Key battles were fought in El Alamein and Tobruk.

### Outcome:

- ▶ **Allied Victory:** The Allies emerged victorious, leading to the defeat of Nazi Germany and Fascist Italy in Europe, and Imperial Japan in the Pacific.
- ▶ **Formation of the United Nations:** The war led to the creation of the United Nations, aimed at preventing future conflicts through international cooperation.
- ▶ **Cold War:** Tensions between the Soviet Union and Western Allies escalated, leading to the Cold War, characterized by ideological and political rivalries.
- ▶ **Decolonization:** The war hastened the decline of European colonial empires, leading to the independence movements in Asia and Africa.

## UPSC PYQ

**Q: To what extent can Germany be held responsible for causing the two World Wars? Discuss critically. (2015)**

## MAHARASHTRA'S WATER CRISIS

### CONTEXT:

Maharashtra, particularly the Marathwada region, is facing a severe water crisis due to deficient monsoons, exacerbated by geographical, agricultural, and policy factors.

### Reason Behind the Situation

- **Rain-shadow Effect:** Marathwada receives limited rainfall due to its position in the rain-shadow region of the Western Ghats. Moist winds lose most of their moisture after crossing the Ghats, leaving the area much drier.
- **Climate Change:** Studies indicate an increasing trend in drought severity and frequency in central Maharashtra, worsening the water crisis.
- **Water-intensive Agriculture:** Sugarcane cultivation, requiring 1,500-2,500 mm of water, is a major contributor to the water scarcity. Despite recommendations to ban sugarcane in low-rainfall areas, its cultivation has increased due to government support.
- **Soil and Topography:** The predominantly clayey black soil in Marathwada has a low infiltration rate, leading to poor groundwater recharge and high surface runoff.

### Required Measures

- **Supply-side Solutions:** Implementing watershed management practices like building water-conserving structures (contour trenches, earthen bunds) and desilting water bodies can help manage available resources.
- **Demand-side Solutions:** Promoting water-efficient irrigation techniques, cultivating drought-resistant crops,

and diversifying livelihoods can reduce water demand.

- **Policy Shifts:** Encouraging the cultivation of high-value, low-water-using crops and relocating sugarcane production to water-rich states can alleviate the water crisis.
- **Government Intervention:** Strengthening policies and providing targeted support to the most affected regions can enhance water resilience.



## FACT BOX

### Rain Shadow Effect

- The rain shadow effect is a weather phenomenon that occurs near mountain ranges.
- Wet weather systems prevail on one side of a mountain, and it enjoys much rainfall and even snow, but the other side gets little or no precipitation and becomes a desert.

## ONSET OF LA NINA

### CONTEXT:

El Nino, the weather phenomenon known for contributing to record-high temperatures in 2023, has recently subsided. This transition paves the way for the onset of La Nina, a cooling phase. However, scientists caution that in the CONTEXT of human-induced climate change, the cooling effect of La Nina may be minimal.

### El Nino:

- El Nino occurs every two to seven years and lasts nine to 12 months.
- It weakens trade winds across the tropical Pacific, leading to warmer ocean temperatures.
- This warming alters rainfall patterns and wind patterns globally, impacting weather conditions.
- El Nino years are often among the warmest on record due to the release of energy into the atmosphere.
- It typically results in drier conditions in southeast Asia, Australia, and parts of Africa, and wetter conditions in the Horn of Africa and the southern United States.

### Neutral Period:

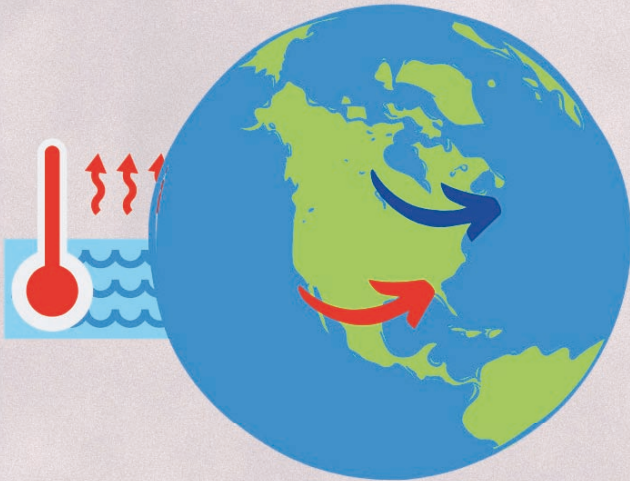
- ▶ After El Nino dissipates, a neutral period ensues before La Nina begins.
- ▶ The neutral period may continue to experience above-normal temperatures as the global atmospheric circulation adjusts.
- ▶ Neutral conditions are forecasted to persist through July, with equatorial regions experiencing near-to-below normal temperatures.

# El Niño and La Niña

El Niño and La Niña are Pacific Ocean climate patterns that affect weather globally.

## El Niño

warm water, weak trade winds



## La Niña

cool water, strong trade winds

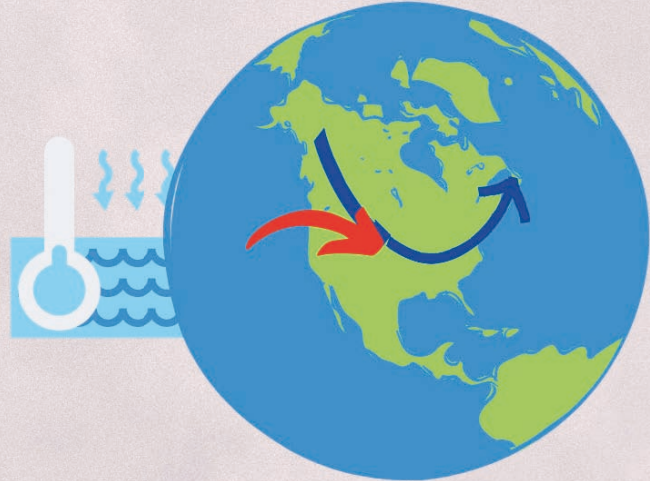


FIGURE NO. 01

### La Niña:

- La Niña follows El Niño and lasts one to three years.
- It causes cooling of the eastern Pacific Ocean, leading to opposite effects on global weather compared to El Niño.
- La Niña brings wetter conditions to parts of Australia, southeast Asia, and Africa, while causing dry conditions in parts of South America.
- It can contribute to more severe Atlantic hurricanes.
- Despite La Niña's cooling effect, global temperatures are expected to remain high due to ongoing climate change.

2: El Niño has an adverse effect on the south-west monsoon of India, but La Niña has no effect on the monsoon climate.

Which of the statement/s given above is/are correct?

- (a) 1 Only
- (b) 2 Only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

**Solution: (d)**

### UPSC PYQ

**Q: Most of the unusual climatic happenings are explained as an outcome of the El-Niño effect. Do you agree? (2014)**

**Q: La Niña is suspected to have caused recent floods in Australia. How is La Niña different from El Niño? (2011)**

- 1: La Niña is characterised by unusually cold ocean temperature in the equatorial Indian Ocean whereas El Niño is characterised by unusually warm ocean temperature in the equatorial Pacific Ocean.

## G7 SUMMIT

### CONTEXT

The recent G7 Summit, attended by Prime Minister Narendra Modi, concluded with a commitment to promote infrastructure initiatives like the **India-Mid3dle East-Europe Economic Corridor (IMEC)**. This commitment was part of the G7's efforts to enhance global infrastructure and investment under the **Partnership for Global Infrastructure and Investment (PGII)**.

### How countries are seeing IMEC as a 'significant initiative'?

- The IMEC is highlighted as a significant initiative aimed at creating **extensive road, railroad, and shipping networks** connecting **Saudi Arabia, India, the United States, and Europe**.



- It aims to foster economic integration across Asia, the Middle East, and Western countries.
- The G7's endorsement of the IMEC underscores its potential as a transformative project. It aligns with broader initiatives such as the EU Global Gateway and initiatives like the Great Green Wall Initiative and the **Mattei Plan for Africa**, emphasizing sustainable and inclusive development.
- **Comparison with BRI:** Unlike the BRI, which has faced criticism for lack of transparency and respect for national sovereignty, the IMEC is positioned as a collaborative effort among like-minded nations to enhance their strategic influence through transparent and mutually beneficial infrastructure development.

### Other key-highlights of the Summit:

- **G7 on China:** G7 leaders promised to address what they called harmful business practices by China. They focused on China's economic influence and what they see as unfair markets in areas like electric vehicles, steel, and renewable energy.
- **Ukraine-Russia:** The G7 countries reached a preliminary agreement to offer Ukraine \$50 billion in loans supported by interest earned from frozen Russian assets.
- **Other issues:** The leaders discussed other major issues such as war in Gaza, Iran, situation in Red Sea, climate change, gender equality.

### Why Global Influence of International Organisations is in Decline?

- The current international system, established in the aftermath of **World War II**, was designed primarily by a specific set of states to promote peace and stability globally. However, its effectiveness in addressing contemporary challenges is increasingly questioned.
- Conflicts like the **Ukraine-Russia war and ongoing issues in the Middle East** underscore the inability of international actors to effectively resolve regional conflicts.
- International organisations are experiencing a decline in global influence because:
  - ▶ They have failed to adapt to the realities of a multipolar world emerging in the 21st century.
  - ▶ The dominance of a few superpowers and their political agendas has marginalized the voices and concerns of other nations, undermining the credibility and effectiveness of these organisations.

There is an urgent call for leading international organisations to take proactive steps in reshaping the global system to meet contemporary challenges.

## U.S. NAVY'S CONFLICT WITH HOUTHİ REBELS IN YEMEN

### CONTEXT:

For decades, the U.S. Navy prepared for potential conflicts with major global powers like the **Soviet Union, Russia, and China**. However, its current focus has shifted unexpectedly to combating Houthi rebels, an Iran-backed group based in Yemen. This conflict has become the most intense ongoing naval battle the Navy has faced since World War II.

### How could Houthi attacks affect the global economy?

- **Disruption of Trade:** The attacks have resulted in significant disruptions to shipping in the **Red Sea** directly affecting global trade flows, particularly those relying on the efficient passage through the **Suez Canal**.
- **Impact on Energy Transit:** Approximately 12 percent of seaborne oil and 8 percent of liquefied natural gas (LNG) pass through the Suez Canal, making any disruption in the Red Sea a critical concern for global energy markets.
- **Alternative Shipping Routes:** Due to the risks associated with the Red Sea route, some commercial ships have opted to circumnavigate the **Horn of Africa** instead. However, this alternative route entails additional costs estimated at approximately USD 1 million in extra fuel expenses for a round trip.
- **Economic Costs:** The shift away from the Red Sea route has financial implications beyond fuel costs. Insurance premiums for ships navigating through the Red Sea have surged nearly tenfold since the onset of Houthi attacks, reflecting heightened risks and uncertainties associated with this route.

### Red Sea Route

- **Geographical Location:** The Red Sea is located between **northeastern Africa (mainly Egypt, Sudan, and Eritrea)** and the **Arabian Peninsula (Saudi Arabia and Yemen)**.
- It connects to the **Mediterranean Sea via the Suez Canal** to the north and the **Indian Ocean via the Bab el-Mandeb strait** to the south.
- **Dimensions:** It is approximately 2,250 kilometers (1,400 miles) long, with a maximum width of about 355 kilometers (220 miles).
- The sea's average depth is 490 meters (1,608 feet), with its deepest point reaching around 3,040 meters (9,970 feet) in the central Suakin Trough.
- **Strategic Importance:** The Red Sea is a vital maritime route for international trade, linking Europe and Asia.
  - ▶ It serves as a key transit route for shipping between the **Mediterranean Sea** and the Indian Ocean, including the Suez Canal, which facilitates one of the shortest sea routes between Asia and Europe.





FIGURE NO. 02

## THE PLIGHT OF INDIAN NATIONALS AS MERCENARIES

### CONTEXT

In a tragic revelation, the **Ministry of External Affairs (MEA)** recently acknowledged the deaths of two Indian nationals recruited by the Russian Army amidst the ongoing conflict in Ukraine. These incidents highlight a growing trend where Indians, lured by promises of lucrative salaries and Russian citizenship, have become ensnared in labor trafficking rackets.

### Who are Mercenaries?

- Mercenaries are individuals who are recruited to participate in armed conflicts by a party to the conflict that is not their own state.
- They are motivated primarily by personal gain or financial reward rather than by ideological, national, or other similar considerations.
- Under **international humanitarian law (IHL)**, specifically **Article 47 of Additional Protocol I to the Geneva Conventions**, mercenaries are defined by several criteria:
  - ▶ They are specially recruited locally or abroad.
  - ▶ They directly participate in hostilities.
  - ▶ Their motivation for participating in hostilities is primarily personal gain.
  - ▶ They are promised or paid material compensation substantially exceeding that given to combatants of similar ranks and functions.
  - ▶ They are neither nationals nor residents of a party to the conflict.
  - ▶ They are not members of the armed forces of a party to the conflict.
- Mercenaries, if captured, **do not qualify for prisoner-of-war status** and may face prosecution for acts committed during the conflict.

### Why the trend is on rise?

- The landscape of mercenary activities has evolved with the rise of **Private Military Companies (PMSCs)**, which perform roles ranging from combat operations to logistical support.
- Unlike mercenaries, PMSCs operate under loosely defined legal frameworks, often relying on domestic laws rather than international conventions.

## IMPERATIVE FOR UNSC REFORM

### CONTEXT

**Denmark, Greece, Pakistan, Panama, and Somalia** have been recently elected to serve on the U.N. Security Council for two-year terms. In recent times, countries are advocating for reforms within the UNSC to ensure equitable representation and effectiveness in addressing global security challenges.

### Key-highlights

- The Security Council consists of 15 members, including five permanent members with veto power and ten non-permanent members elected for two-year terms.
- **Selection Process:** Members are chosen through a voting process where nominees from regional groupings are voted on by all 193 U.N. member states.
- **Regional Representation:** This year's selections include **Somalia for Africa, Pakistan for Asia-Pacific, Panama for Latin America and the Caribbean, and Denmark and Greece** for two Western seats.

### Why UNSC requires "reforms"?

- The formation of the UN Security Council, comprising five permanent members — China, France, Russia, the United Kingdom, and the United States — occurred nearly eight decades ago.

- ▶ At that time, the global landscape comprised approximately 50 independent nations.
- ▶ Despite the significant increase in the number of sovereign states to around 193 today, the control over UNSC membership has remained concentrated in the hands of the original five permanent members.
- **India's Efforts:** India, alongside Japan, Germany, and Egypt, has actively advocated for UNSC reform. The proposal put forth by this coalition seeks to address the imbalance in representation and enhance the Council's effectiveness.
- **Challenges Faced:** Obtaining consensus for UNSC reform has proven challenging. While some nations have expressed support, others have been hesitant or resistant to change. Overcoming these hurdles necessitates concerted efforts and strategic diplomacy.

### About UNSC

- The United Nations Security Council (UNSC) has primary responsibility for the maintenance of international peace and security.
- It has 15 Members, and each Member has one vote.
  - ▶ **Permanent Members (P5):** The United States, China, France, Russia, and the United Kingdom are the five permanent members with veto power. Any of these members can block a resolution.
  - ▶ **Non-Permanent Members (10):** The Security Council also has ten elected members who serve two-year terms without veto power. These members are chosen through a two-thirds vote by the UN General Assembly.
- **Presidency Rotation:** The presidency of the Security Council rotates monthly. This ensures that non-permanent members have some influence on the agenda.
- **Selection Criteria:** Eligibility for membership is based on contributions to international peace and security. This often includes financial or troop contributions to peacekeeping operations or leadership on regional security issues.
- **Regional Representation:** Seats on the Security Council are allocated based on regional groups established in 1965. Each regional group has specific electoral norms.
- **Regional groups include the**
  - ▶ African Group (3 seats)
  - ▶ Asia-Pacific Group (2 seats)
  - ▶ Eastern European Group (1 seat)
  - ▶ Latin American and Caribbean Group (2 seats)
  - ▶ Western European and Others Group (WEOG) (2 seats)

## SRI LANKA'S MALAIYAHA TAMILS

### CONTEXT

In a recent development, an international tribunal composed of former judges from the region expressed shock at the harsh realities faced by **Malaiyaha Tamil community**, Sri Lanka's tea and rubber plantation workers.

### Who are Malaiyaha Tamil community?

- The community originally brought from India to work in Sri Lanka's plantation sector over 200 years ago.
- The Malaiyaha Tamils live in upcountry Sri Lanka.
- The community is a distinct ethnic group, constituting the fourth largest population on the island nation — following the Sinhalese, the 'Sri Lankan' Tamils, and the Muslim community.
- They're one of the poorest communities in the country — underpaid and overworked.
- **Economic Contribution:** Despite their significant contribution to Sri Lanka's tea industry, with tea exports fetching approximately \$1.3 billion annually, these workers receive meagre wages that barely meet their basic needs.

### Discrimination faced by the Malaiyaha Tamil community

- **Ethnic discrimination:** They continue to face discrimination based on their ethnic origin.
- **No land rights:** The community continues to be denied land rights, further exacerbating their socio-economic marginalization and perpetuating cycles of poverty.
- **Labour Exploitation:** The workers, primarily women, are subjected to exploitative working conditions, including low wages tied to demanding daily targets of tea leaf plucking, regardless of weather conditions or safety concerns.
- **Living Conditions:** These workers endure inhumane and degrading living conditions in colonial-era line room accommodations, where multiple individuals often share cramped spaces with poor sanitation facilities.



### FACT BOX

#### Important Pacts

- **Sirima-Shastri Pact:** Signed in 1964 between prime ministers Lal Bahadur Shastri and Sirimavo Bandaranike, the pact repatriated at least half a million Indian-origin Tamils to India. But those who remained behind in Sri Lanka had to struggle for rights up until 2003, granted tenuous citizenship in 1977.
- **Other similar pact:** Sirima-Indira pact (1974)

## UNREST IN NEW CALEDONIA

### CONTEXT

Recently, widespread protests and riots erupted in **New Caledonia**, a French territory in the South Pacific, following the **French parliament's decision to amend the electoral reform**. This decision sparked outrage among the indigenous Kanak community, leading to tensions and unrest in the region.

### Background (History of the Archipelago):

- New Caledonia, once inhabited primarily by **Kanaks**, became a French territory in 1853.
- Over time, **increased migration from France** led to a shift in demographics, with **Kanaks becoming a minority**.
- This demographic change, coupled with **socio-economic disparities and political marginalization**, fueled the emergence of an independence movement, represented by the FLNKS, in the 1960s.

### Tensions and Agreements:

- ▶ Tensions between Kanaks and loyalists escalated in the 1980s, culminating in the signing of the

**Matignon agreements in 1988** and the **Nouméa Accord in 1998**.

- ▶ These agreements aimed to **transfer powers from Paris** to local authorities and included provisions for three referendums to decide on the territory's independence.

### What are the recent developments pertaining to Kanaks?

- Despite the referendums in 2018 and 2020 favoring continued ties with France, Kanaks continue to push for independence.
- The French parliament's decision to amend the electoral reform further marginalized the Kanak community, leading to their opposition and unrest in the region.

### Kanak Demands for Independence

- ▶ Post-World War II, the Kanaks experienced socio-economic exploitation under what they term "**settler colonialism**."
- ▶ Despite promises to address social inequalities and enhance political participation, Kanaks still face high poverty rates compared to non-Kanak residents.
- ▶ The proposed electoral reforms are viewed as an attempt to stifle Kanak aspirations for independence.



FIGURE NO. 03

### About New Caledonia

- New Caledonia is a French overseas territory situated in the southwest Pacific
- New Caledonia, with its population of approximately 270,000 people, boasts a diverse demographic makeup.
- Indigenous Kanak form 44% of the populace, followed by 34% Europeans, predominantly French, alongside other minority groups like Wallisian and Tahitians.
- Notably, Nouméa, the capital, accommodates more than a third of the island's inhabitants.

(see figure no.3 on previous page)

## BRICS EXPANSION

### CONTEXT

India participated in the recent **Brics Foreign Ministers' Meeting in Nizhny Novgorod, Russia**, marking the first meeting since the **expansion of Brics in 2023**. The expansion saw **Egypt, Ethiopia, Iran, Saudi Arabia, and the UAE** joining **Brazil, Russia, India, China, and South Africa** as full-fledged members. Russia assumed the chairmanship of Brics on January 1, 2024.

### BRICS and its Expansion:

- **Origins and Objectives:** The term BRIC was coined in 2001, but formalized as a bloc in 2009 by **Brazil, Russia, India, and China**, later joined by **South Africa** in 2010.
  - ▶ Initially an **economic forum**, BRICS aims to create **a fairer international order and reform the multilateral system**.
- **Expansion Dynamics:** After 13 years, BRICS expanded in 2023, admitting **Egypt, Ethiopia, Iran, Saudi Arabia, and the UAE**.

### Impact of Expansion:

- The BRICS group now comprises almost:
  - ▶ 46 per cent of the world's population (with China and India alone accounting for 86 per cent of BRICS)
  - ▶ 36 per cent of global GDP (of which China alone accounts for 65 per cent of BRICS)
  - ▶ 25 per cent of world trade, measured in terms of exports.
- This enlargement added USD 2.6 trillion to the group's GDP, reaching USD 28.5 trillion collectively and covering **28.1% of global output**.
- The expansion enhanced **BRICS' economic and geostrategic reach**, doubling its **oil production capacity** and accounting for **25% of global exports**.
- It also strengthened control over rare earth minerals and projected significant GDP growth for new members by 2050.

### Impact and Challenges of BRICS Expansion:

- **Economic Influence:** Despite BRICS' economic significance, G7 countries still dominate global GDP, accounting for 43.2%. However, forecasts suggest a shift in economic power towards BRICS, especially with the significant growth projected for new members like Egypt and Ethiopia.
- **Geopolitical Significance:** BRICS seeks to challenge the **Western-centric global order** by establishing institutions like the New Development Bank. While it aims to reduce dependence on Western-led institutions, challenges remain in implementing a common BRICS currency and dethroning the US dollar.
- **Challenges and Limitations:** BRICS faces challenges such as **overreliance on China's economy, limiting leverage and equality within the group**. Bilateral power dynamics between China and India pose complexities, with China's larger economy overshadowing India's influence within BRICS.

### India's Interests in BRICS:

- **Policy Framework:** India's approach to BRICS reflects its policy of **"multi-alignment"**, akin to its historical stance of **"non-alignment"** during the **East-West conflict**. This allows India to engage with multiple geopolitical centers rather than aligning strictly with one.
- **Counterweight to Russia and China:** Within BRICS, India seeks to **balance the influence of dominant powers like Russia and China**. It aims to represent a **counterweight to these nations**, particularly in the context of **global South politics**, where India competes with China for influence among developing countries.
- **Bridge Builder to the West:** India's role in BRICS also involves acting as a bridge builder to the West. As a member of the **Quadrilateral Security Dialogue (Quad)**, India collaborates closely with the **USA, Japan, and Australia** to counter China's growing influence in the Indo-Pacific region.



### FACT BOX

#### New Development Bank (NDB)

- **Established in:** 2014 by the BRICS group.
- **Headquarters:** Shanghai, China
- It is a **multilateral bank** focused on **financing infrastructure projects and sustainable development**.
- So far, it has financed 96 projects worth \$33 billion.

## GOVERNMENT TO ESTABLISH MEDIATION COUNCIL OF INDIA



**CONTEXT**

The Indian government plans to set up the Mediation Council of India (MCI) by the end of this year to improve out-of-court dispute resolution and enhance ease of doing business.

**What is Mediation?**

- Mediation is when a mediator is appointed to help disputing parties reach an agreement outside the court.
- The Mediation Act which was passed last year mandates that mediation proceedings have to be completed within 180 days from starting. The MCI will be formed under this act.
- People currently opt for mediation only when mandated by the law, as in the case of the Commercial Court Act, 2015, which mandates parties to try mediation before entering courts,
- **Why does India need mediation?** India’s rank in the World Bank’s now-discontinued Doing Business Report was 63 out of 190 countries in 2020. India was ranked 163 in enforcing contracts, 154 in registering property, and 136 in starting a business.

**Potential Benefits and Challenges**

- **Corporate preference:** Mediation may become a preferred method for dispute resolution, especially for businesses.
- **Online mediation growth:** Formation of MCI expected to boost the momentum of online dispute resolution (ODR) services.
- **Implementation challenges:** Success will depend on effective execution and acceptance by stakeholders.

**Types of alternative dispute resolution in India :**

In India, various types of Alternative Dispute Resolution (ADR) mechanisms are employed to resolve disputes outside of traditional court litigation. Some of the prominent types of ADR in India include:

- **Arbitration:** Arbitration involves the resolution of disputes by one or more arbitrators appointed by the parties. The decision of the arbitrator(s), known as the arbitral award, is binding on the parties. Arbitration in India is governed by the Arbitration and Conciliation Act, 1996.
- **Mediation:** Mediation is a voluntary and confidential process in which a neutral third party, the mediator, assists the disputing parties in reaching a mutually acceptable resolution. The mediator facilitates communication and negotiation between the parties but does not impose a decision.
- **Conciliation:** Conciliation is similar to mediation but involves a more active role by the conciliator, who may suggest solutions and make recommendations for resolving the dispute. Like mediation, conciliation is also a voluntary process.

- **Negotiation:** Negotiation is a direct discussion between the parties involved in the dispute, often facilitated by their legal representatives or advisors. The parties attempt to reach a mutually satisfactory settlement without the involvement of a neutral third party.
- **Lok Adalat:** Lok Adalat, or People’s Court, is an informal dispute resolution mechanism in which retired judges, social activists, or legal professionals act as conciliators to settle disputes outside the formal court system. Lok Adalats emphasize conciliation and compromise.
- **Online Dispute Resolution (ODR):** ODR involves the use of technology, such as online platforms and video conferencing, to facilitate the resolution of disputes. ODR mechanisms aim to make dispute resolution more accessible, efficient, and cost-effective.
- **Fast Track Arbitration:** Fast track arbitration is a specialized form of arbitration designed to expedite the resolution of disputes, particularly commercial disputes. It involves streamlined procedures and time-bound processes to ensure quicker outcomes.
- **Expert Determination:** Expert determination involves the appointment of a neutral expert to resolve specific technical or factual issues in a dispute. The expert’s decision is binding on the parties and is often used in disputes involving complex technical matters.
- **Adjudication:** Adjudication involves the appointment of a neutral adjudicator to make a binding decision on a dispute, typically within a fixed timeframe. Adjudication is commonly used in construction and infrastructure projects to resolve disputes quickly.



**FACT BOX**

- Q: “The Central Administrative Tribunal which was established for redressing the grievances of public servants has failed to achieve its objective.” Critically examine. (2018)
- Q: Critically examine the Supreme Court’s judgment on the constitutionality of the National Judicial Appointments Commission Act, 2014 with reference to the appointment of judges of higher judiciary in India. (2017)

**NAGALAND CIVIC POLLS**

**CONTEXT**

After two decades, Nagaland is set to vote in civic polls with 33% reservation for women, marking a significant step towards gender representation in the state’s urban local bodies (ULBs).

## Key Highlights

- **Reservation for Women:** This is the first time Nagaland's civic polls will implement a 33% reservation for women.
- **Affected Areas:** Elections will be conducted in 10 out of 16 districts. Six eastern districts are not participating due to the influence of the Eastern Nagaland People's Organisation (ENPO).
- **Municipal and Town Councils:** Nagaland has three municipal councils—Dimapur, Kohima, and Mokokchung—and 36 town councils. Specific wards in these councils are reserved for women.

## Background:

- **Legal Battle:** Nagaland resisted implementing 33% reservation for women in municipalities and town councils, mandated by **Article 243 T (3)** of the Constitution.
  - ▶ **Naga Mothers Association and People's Union for Civil Liberties (PUCL)** fought a 15-year legal battle to **enforce the constitutional provision**.
- **Obstacles:** Nagaland's government and prominent sections of **Naga society** opposed reservation, citing **cultural customs and constitutional provisions**.
  - ▶ The tribal bodies argued that women have traditionally not been part of decision-making bodies in **Naga customs**.
  - ▶ According to them, allowing reservation for women would violate special provisions granted to the state under **Article 371A of the Constitution**.



### FACT BOX

#### Article 371A of the Constitution

The provision states that "no Act of Parliament would apply under the Legislative Assembly of Nagaland by a resolution decides in respect of Naga customary laws and procedures, administration of civil and criminal justice, ownership and transfer of land, land and social practices".

### UPSC PYQ

- Q:** Discuss the significance of the 73rd and 74th Constitutional Amendments in empowering women's participation in local governance. (2019)
- Q:** "The reservation of seats for women in the institutions of local self-government has had a limited impact on the patriarchal character of the Indian political process." Comment. (2019)
- Q:** Discuss the role of women in achieving Sustainable Development Goals by 2030. (2018)

## BAIL IN MONEY LAUNDERING CASES AND THE 'TWIN TEST' UNDER PMLA

### CONTEXT

A trial court recently granted bail to Delhi Chief Minister Arvind Kejriwal, who is facing charges under the **Prevention of Money Laundering Act (PMLA)**. However, the Delhi High Court stayed this order, highlighting the legal complexities surrounding bail in money laundering cases and the 'twin test' mandated by the PMLA.

### Key Highlights of the Issue

- **Provision under PMLA:** Section 45 of the PMLA makes bail an exception rather than the rule. It mandates hearing the public prosecutor in all bail applications and requires the court to apply the 'twin test' when the prosecutor opposes bail.
- **The Twin Test:** The two conditions under the 'twin test' are:
  - ▶ Reasonable grounds for believing that the accused is not guilty.
  - ▶ The accused is not likely to commit any offence while on bail.
- **Legal Challenges:** The 'twin test' has faced several legal challenges, including its constitutional validity and its stringent nature compared to other laws.

### Reasons behind the Strict Bail Provisions

- **Severity of the Offence:** Money laundering is considered a severe offence, often involving influential, intelligent, and resourceful individuals who commit the crime with premeditation, making detection and evidence gathering challenging.
- **Government's Argument:** The government argues that the stringent bail conditions are necessary due to the sophisticated methods used in money laundering, which can pose a significant threat to national security and financial systems.
- **Judicial Precedents:** The Supreme Court has upheld the stringent bail conditions, emphasizing the need to apply the 'twin test' rigorously to prevent misuse of bail provisions in serious offences like money laundering.

### Impact of the 'Twin Test' on Judicial Proceedings

- **Prolonged Incarceration:** The strict application of the 'twin test' often results in prolonged incarceration of the accused, as proving innocence before the trial is challenging.
- **Judicial Discretion:** The mandatory application of the 'twin test' limits judicial discretion in granting bail, leading to debates on the balance between individual rights and societal interests.
- **Impact on Legal Strategy:** Defense strategies in money laundering cases must account for the rigorous requirements of the 'twin test,' often focusing on disproving the allegations at the bail stage itself.



**FACT BOX**

**Important Judgments:**

- **Supreme Court's view:** In its "*Vijay Madanlal Choudhary v. Union of India*", the Supreme Court upheld various provisions of the PMLA which relate to the **powers of arrest, attachment, search, and seizure conferred upon the ED.**
  - ▶ The court was of the opinion that all the provisions under PMLA have a reasonable nexus with the objects sought to be achieved by the **Act to prevent money-laundering** effectively.
- In **P. Chidambaram v. Directorate of Enforcement (2019)**, the Supreme Court rejected a prayer for anticipatory bail with respect to an offence of money laundering and proceeded to grant custody to the ED.
  - ▶ The court reasoned that in a case of money laundering which involves many stages of placement and layering of funds, a '**systematic and analysed**' investigation is required which would be frustrated if pre-arrest bail is granted.

**Enforcement Directorate (ED):**

- Directorate of Enforcement is a **Multi-Disciplinary Organization** mandated with the task of enforcing the provisions of **two special fiscal laws – Foreign Exchange Management Act, 1999 (FEMA) and Prevention of Money Laundering Act, 2002 (PMLA).**
- Whenever any offence is registered by a local police station, which has generated proceeds of crime **over and above Rs 1 crore**, the ED steps in.
- As per the Prevention of Money Laundering Act, the ED got its power to investigate under **Sections 48** (authorities under act) and **49** (appointment and powers of authorities and other officers).

**UPSC PYQ**

**Q:** The jurisdiction of the Central Bureau of Investigation (CBI) regarding lodging an FIR and conducting probe within a particular state is being questioned by various States. However, the power of States to withhold consent to the CBI is not absolute. Explain with special reference to the federal character of India. (2021)

**LOK ADALAT**

**CONTEXT**

The Supreme Court of India has announced a **special Lok Adalat** scheduled for the upcoming months, marking the **75th year of its establishment.**

**Reason behind SC's Decision**

- The Supreme Court is committed to enhancing accessible and efficient justice delivery for all segments of society. The special Lok Adalat is part of efforts to expedite the resolution of pending cases.
- This initiative aims to resolve pending cases through amicable settlements.
- At the end of 2023, the Supreme Court was saddled with 80,439 pending cases. The government is a litigant in more than 70% of all admitted matters before the Supreme Court.

**About Lok Adalat and Its Role**

- Lok-Adalat is a system of alternative dispute resolution developed in India. It is an integral part of India's judicial system, focusing on alternative dispute resolution outside formal court proceedings.
- **Aim:** to facilitate quick settlements while saving time, costs, and energy for both litigants and judges. The process emphasizes negotiation and compromise in an informal setting.
- Lok Adalats derive their authority from **Article 39A of the Constitution of India**, which mandates the state to ensure that the legal system promotes justice on the basis of equal opportunity.
- These adalats operate under the **Legal Services Authorities Act, 1987**, providing a **statutory status.**
- **National Legal Services Authority (NALSA)** and other legal service institutions conduct Lok Adalat.
- Lok Adalat can make awards/decisions, which are deemed to be a decree of a civil court and is final and binding on all the parties concerned.
- All Lok Adalats function under the aegis of NALSA, which is headed by its executive chairman, the second senior-most judge of the Supreme Court. The chief justice of India is a Patron-in-Chief of the NALSA.

**VERIFICATION OF EVM BURNT MEMORY IN 2024 ELECTIONS**

**CONTEXT**

For the first time, 11 candidates from the 2024 Lok Sabha and state Assembly elections have requested verification of the burnt memory in **the Ballot Units (BUs), Control Units (CUs), and Voter Verified Paper Audit Trail (VVPAT) units of electronic voting machines (EVMs).**

**ECI's role in safeguarding electoral credibility**

- This request underscores a broader controversy surrounding EVMs and the Election Commission of India's (ECI) role in safeguarding electoral credibility.
- The primary challenge facing the Election Commission is ensuring the trustworthiness of the electoral process amid growing skepticism about EVMs.

- Critics argue that EVMs are vulnerable to tampering or malfunction, potentially compromising the fairness of elections. Such concerns have sparked debates and calls for stringent measures to enhance transparency and accountability in the voting mechanism.

### About Election Commission

- The Election Commission is a body established under Article 324 of the Constitution.
- It is vested with the authority of superintendence, direction, and control of elections for the conduct of elections to Parliament, State Legislatures and the offices of the President and the Vice-President.

### Constitutional Provisions:

- **Part XV (Article 324-329)** of the Indian Constitution: It deals with elections and establishes a commission for these matters.
- **Article 324:** Superintendence, direction and control of elections to be vested in an Election Commission.
- **Article 325:** No person to be ineligible for inclusion in, or to claim to be included in a special, electoral roll on grounds of religion, race, caste or sex.
- **Article 326:** Elections to the House of the People and to the Legislative Assemblies of States to be based on adult suffrage.
- **Article 327:** Power of Parliament to make provision with respect to elections to Legislatures.
- **Article 328:** Power of Legislature of a State to make provision with respect to elections to such Legislature.
- **Article 329:** Bar to interference by courts in electoral matters.

## UPSC PYQ

- Q:** In the light of recent controversy regarding the use of Electronic Voting Machines (EVM), what are the challenges before the Election Commission of India to ensure the trustworthiness of elections in India? (2018)

## ENEMY AGENTS ORDINANCE

### CONTEXT

In Jammu & Kashmir, the efficacy and ethical implications of laws like the Enemy Agents Ordinance, its application remains a critical aspect of security policies. This ordinance, known for its severity, is being highlighted amid ongoing security concerns and legal frameworks in the erstwhile state.

## What is the Enemy Agents Ordinance?

- The Enemy Agents Ordinance traces its origins back to 1917, during the **Dogra rule** in Jammu and Kashmir. Initially termed an 'ordinance,' it was designed to address threats posed by those aiding enemies or engaging in activities detrimental to Indian military operations.
  - **Legal Framework and Amendments:** Over time, the ordinance evolved and was incorporated into Jammu and Kashmir's legal system post-Partition. Despite subsequent legislative changes, it retained its status as a stringent law, with provisions allowing for severe penalties such as life imprisonment or even death sentences.
  - **Changes Post-Article 370 Repeal:** In 2019, with the abrogation of Article 370, significant legal reforms took place in Jammu and Kashmir. While some local laws were retained, others were replaced by Indian statutes. However, laws like the Enemy Agents Ordinance and the Public Safety Act continued to be enforced.
  - **Trial and Legal Procedures:** Trials under the Enemy Agents Ordinance are presided over by specially appointed judges.
    - ▶ The accused often face restrictions, including limited access to legal defense unless permitted by the court.
    - ▶ Moreover, the ordinance prohibits disclosure of case details without government authorization, reinforcing its stringent nature.
- ### Historical Cases and Controversies
- ▶ The ordinance has been controversial, with numerous Kashmiris, including prominent figures like Maqbool Bhat, being tried and convicted under its provisions.
  - ▶ The lack of appeal provisions and the finality of judicial decisions have sparked debates regarding human rights and legal transparency.

## NATIONAL EMERGENCY

### CONTEXT

June 25th, 2024 marks the 50th anniversary of the Emergency, a pivotal moment in Indian history when fundamental rights were suspended and political dissent suppressed. This article explores the context, reasons, aftermath, and constitutional provisions related to the Emergency in India.

### Reason behind Proclaiming Emergency

- Indira Gandhi, the Prime Minister, faced mounting challenges in the early 1970s, including allegations of electoral malpractice.
- Following a court verdict in June 1975 that found her **guilty of electoral malpractice**, she faced disqualification from holding any elected office.
- Citing "internal disturbances," President Fakhruddin Ali Ahmed, under **Article 352 of the Constitution**, declared Emergency on June 25, 1975.



- This decision aimed to curb protests, strikes, and stabilize a nation grappling with economic strain post-war with Pakistan.
- India has witnessed the proclamation of National Emergency three times:
  - ▶ **1962 Indo-China War:** The first instance was in 1962 during the Indo-China War.
  - ▶ **1971 Indo-Pakistan War:** The second instance was in 1971 during the Indo-Pakistan War.
  - ▶ **1975 Internal Disturbance:** The third instance was in 1975, proclaimed by President Fakhruddin Ali Ahmed under advice from Prime Minister Indira Gandhi.

**During the Emergency**

- The Emergency period from 1975 to 1977 witnessed unprecedented curtailment of civil liberties:
  - ▶ **Suspension of Fundamental Rights:** Freedom of speech, assembly, and movement were suspended.
  - ▶ **Media Censorship:** Strict censorship was imposed on the press.
  - ▶ **Political Leaders Detained:** Opposition leaders and activists were arrested.

**Constitutional Provisions: Emergency Types and Legal Framework**

The Indian Constitution provides for three types of emergencies under Articles 352 to 360:

Type of Emergency	Proclamation Basis	Duration & Approval
<b>National Emergency</b>	Threat from war, external aggression, or armed rebellion	Initial proclamation needs parliamentary approval within one month; extendable indefinitely with six-month intervals.
<b>State Emergency (President's Rule)</b>	Failure of constitutional machinery in a state	Proclamation must be approved by both Houses of Parliament within two months; extendable up to three years with six-month intervals.
<b>Financial Emergency</b>	Threat to financial stability or credit of India	Proclamation by the President; does not require parliamentary approval to continue indefinitely.

**Landmark Cases: Judicial Interpretation of Emergency Provisions**

- **Makhan Singh Vs. State of Punjab:** This case dealt with the suspension of Article 19 during a National Emergency. The court held that the detention of the petitioner was legal and valid as it was done under a law which was protected by Article 359(1).
- **A.D.M. Jabalpur Vs. Shivkant Shukla:** This case is one of the most controversial decisions in the history of the Indian judiciary. The Supreme Court held that during the period of Emergency, a person's right to not be unlawfully detained (Article 21) can be suspended.
- **S.R. Bommai Vs Union of India:** This case is a landmark in the history of the Indian Constitution. The Supreme Court laid down the paradigm and limitations within which Article 356 was to operate. It held that the power under Article 356 is a conditioned power and it can be used only when the conditions specified in the Article are existent.

**NEW ANTI-CHEATING LAW OPERATIONALISED**

**CONTEXT**

The recent operationalisation of **The Public Examinations (Prevention of Unfair Means) Act, 2024** marks a significant step in India's efforts to curb cheating in public examinations.

**What is The Public Examinations (Prevention of Unfair Means) Act, 2024?**

- Passed by Parliament earlier this year, the Act aims to enhance the integrity of public exams by implementing stringent measures against unfair practices.

**Key Provisions and Rules**

- ▶ **Framework for Computer-Based Tests (CBT):** The Act outlines comprehensive guidelines for conducting Computer-Based Tests (CBT).
  - ◆ This includes every aspect from candidate registration and allocation of test centers to the secure distribution of question papers and the evaluation process.
  - ◆ The **National Recruitment Agency**, in consultation with stakeholders, will establish norms covering both physical and digital infrastructure requirements for CBT centers. These norms are crucial in ensuring standardized procedures across various examination bodies.
- ▶ **Appointment of Centre Coordinators:** Under the new rules, **Centre Coordinators for Public Examinations** will be appointed from a pool of serving or retired officials from central and state government bodies, public sector undertakings, and other designated organizations.

- ◆ Their role involves overseeing the coordination of exam activities and ensuring strict adherence to prescribed norms and guidelines at examination centers nationwide.
- ▶ **Defining Unfair Means:** Section 3 of the Act specifies actions that constitute the use of unfair means in public examinations.
  - ◆ These include **leaking question papers, tampering with answer sheets, and creating fake examination centers or websites to deceive candidates.** The rules mandate stringent reporting mechanisms and actions against perpetrators to ensure swift and decisive handling of incidents.

## Coverage of Public Examinations:

The Act defines 'public examinations' broadly to encompass tests conducted by designated authorities such as:

- **Union Public Service Commission** (i.e., for civil service entrance exams)
- **Staff Selection Commission** (i.e., for posts in union ministries and subordinate offices)
- **Railway Recruitment Boards** (i.e., for certain kinds of jobs in the Indian Railways)
- **Institute of Banking Personnel Selection** (i.e., for all public sector banks, except State Bank of India)
- **National Testing Agency** (i.e., for entrance exams for admission to higher educational institutions)
- Additionally, **ministries, departments, and their offices** responsible for staff recruitment are also included under its purview.

## SPECIAL CATEGORY STATUS

### CONTEXT

After the recent Lok Sabha Election 2024, Bihar, Andhra Pradesh are demanding special category status for their respective states. However, the Fourteenth Finance Commission removed the concept of special category status from states, and since then, the Centre has largely discouraged calls for special category status in recent years.

### What is Special Category Status?

- Special Category Status (SCS) is a classification granted by the Centre to certain states in India to aid in their development.
- It is based on specific geographical and socio-economic disadvantages. The scheme was introduced in 1969 following recommendations from the Fifth Finance Commission.
- **Criteria for Granting SCS:** Before granting SCS to a state, five factors are considered:
  - ▶ Hilly and difficult terrain
  - ▶ Low population density and/or significant tribal population

### SPECIAL CATEGORY STATUS: WHAT IT MEANS...

*Such states have greater leeway in getting funds and grants from the Centre*

These are mostly small states, with low population density and/or large tribal population

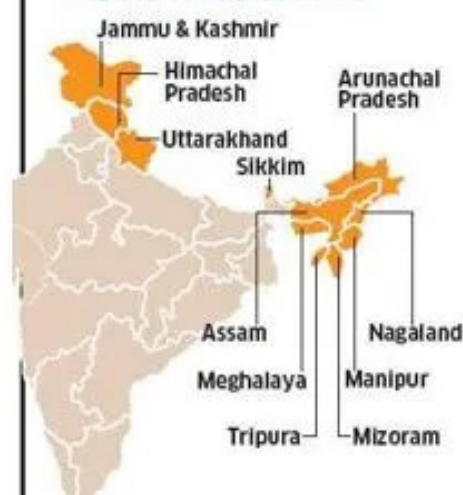
**Located in hilly or difficult terrain**

Are backward economically and infrastructurally

**Are located strategically along international borders**

Have a low resource base and are unable to generate enough resources on their own for development

*Currently there are 11 special category states*



### AND THE BENEFITS

All states get Central funds as a mix of loans and grants. For special category states, the mix is

**90% grant and 10% loan**

For non-special category states, the mix is

**30% loans and 70% grants**

When allocating money to states, funds are first given to special category states and then to the rest

- ▶ Strategic location along international borders
- ▶ Economic and infrastructural backwardness
- ▶ Non-viable nature of state finances
- Currently, 11 states in India have been granted SCS, including Arunachal Pradesh, Assam, Himachal Pradesh, Jammu and Kashmir, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, and Uttarakhand.

**Benefits of SCS:**

- ▶ States with SCS receive funding from centrally sponsored schemes in a more favorable ratio of 90:10 (Centre), compared to general category states. For Non-Special Category Status, the Normal Central Assistance was calculated as 30% grant and 70% loan.
- ▶ They are provided Special Plan Assistance for projects of special importance to the state.
- ▶ Unspent funds do not lapse at the end of the financial year.
- ▶ They also enjoy other benefits such as tax concessions.

**Why Bihar is Demanding SCS?**

- Bihar is demanding SCS due to its low per capita net state domestic product and high poverty rates.
- Its per capita income is among the lowest in the country, and a significant portion of its population is multidimensionally poor according to the National Family Health Survey 5.

**Why Andhra Pradesh is Demanding SCS:**

- Andhra Pradesh is seeking SCS primarily because of the revenue loss it experienced after the 2014 bifurcation of the state, which led to the formation of Telangana.

**THE DEMAND FOR ‘BHIL PRADESH’**

**Context**

The demand for ‘Bhil Pradesh’, the idea of creating a new state for the **Bhil tribal community** from parts of Gujarat and three nearby states, has reared its head once again.

**What is Bhil Pradesh?**

- Bhil Pradesh is a proposed state aimed at addressing the socio-economic and cultural needs of the Bhil tribal community.
- It would include areas with significant Bhil populations across **Rajasthan, Madhya Pradesh, Gujarat, and Maharashtra.**
- The Bhils are demanding to carve out a separate state based on Article 244 (1) of the Constitution of India.

**Why is it demanded?**

- Historically, the Bhils have faced marginalization and socio-economic challenges. Despite their rich cultural heritage, they often feel neglected in the development plans of the states they inhabit.
- The demand for Bhil Pradesh stems from the desire to have more focused attention on their needs and development.
- This demand was first raised by **Govind Guru**, a **Bhil social reformer** and spiritual leader, after the tragic event of the **Mangarh massacre** in 1913.
- The government has implemented various measures like the Tribal Sub-Plan, Forest Rights Act, and reservation policies to address tribal issues, but the Bhils still feel the need for a separate state to ensure their voices are heard and their unique challenges are adequately addressed.



**FACT BOX**

**Who are the Bhils?**

- The Bhils are one of **India’s oldest and second-largest tribal groups**, known for their expertise in archery.
- The name “Bhil” likely originated from a **Dravidian word** meaning bow and arrow. The community is also known as the “Dhanush Purush of India” for having an excellent knowledge of Dhanush (
- They predominantly reside in states like **Rajasthan, Gujarat, Madhya Pradesh, and Maharashtra**, with some migrating for job opportunities.

**Government Initiatives:**

- ▶ Tribal Sub-Plan
- ▶ Forest Rights Act
- ▶ NREGA
- ▶ ICDS
- ▶ Mid-Day Meal Scheme
- ▶ Panchayat Extension to Scheduled Areas (PESA) Act, 1996 (allows and ensures tribal self-rule for people living in scheduled areas).
- **Constitutional Measures:** Protection of tribal interests through the **Fifth Schedule under Article 244(1) of the Constitution.**

**FIRST PAST THE POST SYSTEM (FPTP) VS PROPORTIONAL REPRESENTATION (PR)**

**Context**

In the recent Lok Sabha Elections, the NDA emerged as the leading alliance, forming the government with a majority of



seats. However, the Opposition bloc also had a significant presence in the Parliament. Despite their collective vote share, other regional parties and independents didn't win many seats.

## What is FPTP?

- **First Past the Post System (FPTP)** is a voting system used in India for Lok Sabha and Legislative Assembly elections.
- It is also known as the simple majority system.
- In this system, the candidate with the most votes in a constituency wins, regardless of whether they have a majority.

## Advantages of FPTP:

- ▶ Simple and feasible, suitable for a large country like India.
- ▶ Provides stability to the government as the winning party/coalition can have a majority in the legislature without winning a majority of votes.

## Issues with FPTP:

- ▶ May lead to over or **under-representation of political parties** compared to their vote share.
- ▶ In some cases, a party with a minority of votes can still win a majority of seats.

## Alternatives to FPTP:

- ▶ Proportional Representation (PR) system ensures representation of parties based on their vote share.
- ▶ **Mixed Member Proportional Representation (MMPR)** combines FPTP with proportional representation, providing stability and proportionate representation.
- ▶ In the commonly used '**party list PR**' system, voters vote for a political party, not specific candidates. Parties are then allocated seats in legislative bodies based on their overall vote share. There's usually a minimum threshold (around 3-5% of the vote) for a party to qualify for seats.
- ▶ **Implementation in India:** If implemented in India, PR would ideally operate at each State/Union Territory level due to the federal nature of the country.
- ▶ **International Practices:** Some countries like Germany and New Zealand use MMPR, ensuring both stability and proportionate representation.

## NOTA VOTES

### Context

The percentage of votes recorded under NOTA (None of the Above) dipped nationally in the 2024 Lok Sabha elections compared to 2019, while Northeastern India exhibited a different trend.

## Key-highlights

- The overall percentage of NOTA votes in India in 2024 was 0.99%, down from 1.06% in 2019.
- In the Northeast, the NOTA votes increased from an average of 0.71% in 2019 to 0.81% in 2024.
- Assam, a state in the Northeast, recorded the highest number of NOTA votes in three constituencies won by Bharatiya Janata Party (BJP) candidates: Dibrugarh (32,255), Kaziranga (24,431), and Darrang-Udalguri (23,204).

## Reason behind the Situation

- **Discontent with Candidates:** The increase in NOTA votes in the Northeast indicates voter dissatisfaction with the available candidates. Frequent party-switching by MLAs in the region has led to a lack of trust.
- **Perceived Inefficacy:** Voters may perceive their elected leaders as ineffective in fulfilling development promises, prompting a preference for NOTA as a form of protest.

## Impact of NOTA

- **Signal to Political Parties:** A higher NOTA count serves as a signal to political parties about the electorate's dissatisfaction, compelling them to field better candidates.
- **Political Accountability:** It promotes accountability as parties are forced to introspect and address the reasons behind voter discontent.



### FACT BOX

#### Right to Reject

- The '**right to Reject**' was first proposed by the **Law Commission in its 170th Report in 1999**.
- Similarly, the Election Commission endorsed 'Right to Reject', first in 2001, under Mr. James Lyngdoh (the then CEC), and then in 2004 under Mr. TS Krishnamurthy (the then CEC), in its **Proposed Electoral Reforms**.
- Likewise, '**Background Paper on Electoral Reforms**', prepared by the Ministry of Law in 2010, proposed that if a certain percentage of the vote is negative, then the election result should be nullified and a new election should be held.
- **SC on 'right to reject':** If the right to vote is a statutory right, then the right to reject a candidate is a fundamental right of speech and expression under the Constitution.

**What is NOTA?**

- NOTA, or "None of the Above", is the option that enables the voter to officially register a vote of rejection for all candidates who are contesting.
- If a voter chooses to press NOTA it indicates that the voter has not chosen to vote for any of the party.
- The main objective of the 'NOTA' option is to enable electors who do not wish to vote for any of the candidates to exercise their right to reject without violation of the secrecy of their decision.
- The voter must be eligible to register a vote of rejection if they feel that the contesting candidates do not deserve to be voted for.
- The **Right to vote** granted to all citizens must allow the vote of disapproval.

**UGC POLICY SHIFT FOR HIGHER EDUCATION**

**Context**

The University Grants Commission (UGC) has made a big change in policy: **now, colleges can admit students twice a year, starting next year.** This move brings Indian universities in line with global norms, which could lead to better connections with other countries and more student exchanges. To achieve the goals of **Vision 2047**, India needs to start with strong short-term plans right away.

**Current State of India's Higher Education System:**

- **Student Population:** India has 25% of the world's students.
- **Institution Numbers:** With over 58,000 higher education institutions, India has the world's second-largest higher education system. In 2021-22 alone, nearly 2,400 new institutions were added.
- **Enrollment:** There's been a 4.5% increase in student enrollment compared to the previous year, totaling 4.33 crores.
- **Gender Enrollment:** The Gross Enrollment Ratio (GER) for females has been higher than males since 2018-19, thanks to various government schemes empowering women. The National Education Policy (NEP) 2020 aims to raise the GER to 50% by 2035, a 40% increase from current levels.
- **Teacher Ratio:** The pupil-teacher ratio (PTR) in universities and colleges remains at 24:1.
- **National Education Policy (NEP) 2020:** The government launched NEP 2020 to address various educational challenges. However, its implementation faces hurdles due to existing complexities and institutional hesitancy.

**Government Initiatives for Higher Education in India:**

- **National Education Policy (NEP) 2020:** Launched in 2020, NEP aims to revamp the education system, focusing on holistic development, flexibility, and multidisciplinary learning.
- **Swayam:** An online platform offering free courses from school to postgraduate level, launched to promote digital learning and increase access to quality education.
- **SWAYAM PRABHA:** A group of 32 DTH channels transmitting high-quality educational content, aimed at reaching remote areas and disadvantaged groups.
- **Education Quality Upgradation and Inclusion Program (EQUIP):** Aims to enhance access, inclusion, quality, excellence, and employability in higher education.
- **Technical Education Quality Improvement Programme (TEQIP):** Aims to improve the quality of technical education through long-term projects implemented in phases.
- **Institute of Eminence (IoE) Scheme:** Empowers higher educational institutions to become world-class teaching and research institutions.
- **Rashtriya Uchcharat Shiksha Abhiyan (RUSA):** A Centrally Sponsored Scheme aimed at providing strategic funding to eligible state higher educational institutions.
- **Prime Minister's Research Fellows (PMRF) Scheme:** Designed to improve research quality in higher educational institutions by attracting top talent into research.
- **Scheme for Promotion of Academic and Research Collaboration (SPARC):** Facilitates academic and research collaborations between Indian institutions and top institutions worldwide.
- **e-PG Pathshala:** Provides high-quality, interactive e-content across various subjects under the National Mission on Education through ICT (NME-ICT).

**Surveys and Rankings:**

- ▶ National Institutional Ranking Framework (NIRF)
- ▶ All India Survey on Higher Education (AISHE)

**Vocational Education:**

- ▶ National Apprenticeship Training Scheme (NATS)
- ▶ Scheme for Higher Education Youth in Apprenticeship and Skills (SHREYAS)



## FACT BOX

### Regulation of Higher Education

- The **42nd Amendment to the Constitution in 1976** shifted Education to the Concurrent List.
- The **University Grants Commission (UGC)** regulates higher education in India, **All India Council for Technical Education, Medical Council of India, Bar Council of India (BCI)**, and other statutory bodies specific to different fields of study.
- These regulatory bodies set standards, provide accreditation and ensure quality in higher education.

## FINANCIAL HARDSHIP IN TB TREATMENT PROGRAMME

### Context

A recent survey sheds light on the significant financial challenges faced by TB patients in India. The survey, encompassing 1,482 TB patients across four states, reveals alarming levels of **economic hardship** resulting from delays in diagnosis and the long course of TB treatment.

### Key-findings of the Study

- **Financial Strain:** TB patients experience the severe financial strain, with delays in diagnosis and loss of income during treatment contributing to substantial economic burdens.
- **Catastrophic Costs:** Between 30% to 61% of study participants faced catastrophic costs, defined as **out-of-pocket expenses** exceeding 20% of pre-TB annual household income. These costs pose a significant threat to the financial stability of TB-affected households.
- **Pre-Diagnosis Delay:** Over half of the participants faced catastrophic costs even before commencing TB treatment due to delays in diagnosis. The average delay of seven to nine weeks from symptom onset to treatment initiation significantly contributed to financial burdens.
- **Recommendations:** The survey recommends
  - ▶ intensifying private sector engagement
  - ▶ improving rapid diagnosis
  - ▶ implementing community awareness campaigns
  - ▶ expanding health insurance coverage for pre-treatment expenses
  - ▶ safeguarding TB patients from income loss

### How 'cost' is a determining factor in TB treatment?

- TB treatment in India often imposes a significant financial burden on patients and their families due to various factors, including medical expenses, loss of income, and

associated costs.

- **Patients face a range of other recurring costs including the costs of accommodation, transport to healthcare facilities and consu** energy transition.
- **Self-reliance:** With concerted efforts and strategic investments, the nation is well-positioned to achieve its goal of Aatmanirbhar Bharat (self-reliant India) while spearheading the global fight against climate change.

### India's position in Ammonia market

- India is positioning itself as a key player in the renewable ammonia market.
- India's ambition to produce 5 million metric tons (mt) of renewable hydrogen by 2030 and secure a 10 per cent share of the global trade by that time underscores its commitment to renewable energy.
- **Challenges:** While India boasts nearly 100 renewable or low-carbon hydrogen projects with a combined capacity of 7.85 million mt, the challenge lies in finding a market for its renewable ammonia.
- **Advantages for India:** Despite these challenges, India's renewable hydrogen/ammonia is expected to remain competitive globally due to its cost advantages.
  - ▶ **National Green Hydrogen Mission 2023** waives interstate transmission charges for renewable energy and offers substantial subsidies, plays a pivotal role in driving down production costs.
  - ▶ **India's renewable energy sector** benefits from various incentives, including cheap power, subsidies, low-cost loans, and readily available land, provided by federal and state governments.
  - ▶ India enjoys a significant transport cost advantage over the **Middle East in supplying to North Asia**, further enhancing its competitiveness.

### What is the 'SIGHT Programme'?

- SIGHT Programme is a subcomponent of National Green Hydrogen Mission under Ministry of New & Renewable Energy (MNRE)
- This program aims to propel India towards self-reliance in clean energy through the production of Green Hydrogen and its derivatives.
- **Implemented by: Solar Energy Corporation of India (SECI)**

Under the SIGHT Programme, MNRE has already allocated 4.12 lakh Metric Tonnes (MT)/annum of Green Hydrogen production capacity and 1.5 GW/ annum of Electrolyzer manufacturing capacity.





**FACT BOX**

**Green Hydrogen**

- Green Hydrogen is produced through the **electrolysis of water** using **renewable energy** sources such as **solar or wind power**.
- Unlike conventional hydrogen production methods that rely on fossil fuels, Green Hydrogen emits zero greenhouse gases, making it an environmentally sustainable alternative.

**Green Ammonia**

- Ammonia is a compound comprised of nitrogen and hydrogen, commonly used in fertilizer production.
- Green Ammonia** is produced using Green Hydrogen instead of hydrogen derived from fossil fuels, thus significantly reducing carbon emissions.

**National Green Hydrogen Mission:**

- Launched in:** 2023
- Implemented by:** Ministry of New & Renewable Energy (MNRE)
- National Green Hydrogen Mission is a visionary initiative with a significant financial outlay.

- With the objective of fostering self-reliance and driving clean energy transition, this mission aims to reduce India’s dependence on fossil fuel imports while positioning the country as a global leader in Green Hydrogen technology. By promoting innovation and investment in renewable energy, the mission sets the stage for a greener, more sustainable future.

**THE TOBACCO EPIDEMIC**

**Context**

May 31st marks **World No Tobacco Day**, WHO’s global campaign to raise awareness about the dangers of tobacco use and advocate for effective policies to reduce consumption. This year’s theme, **“Protecting Children from Tobacco Industry Interference,”** underscores the critical need to safeguard people from the manipulative tactics of the tobacco industry.

**The Impact of Tobacco**

- Tobacco is the leading preventable cause of disease and death worldwide.
- Health:** In India, nearly 26 crore people consume tobacco, and over 60 lakh people employed in the tobacco industry are at risk of health issues due to skin absorption of tobacco.

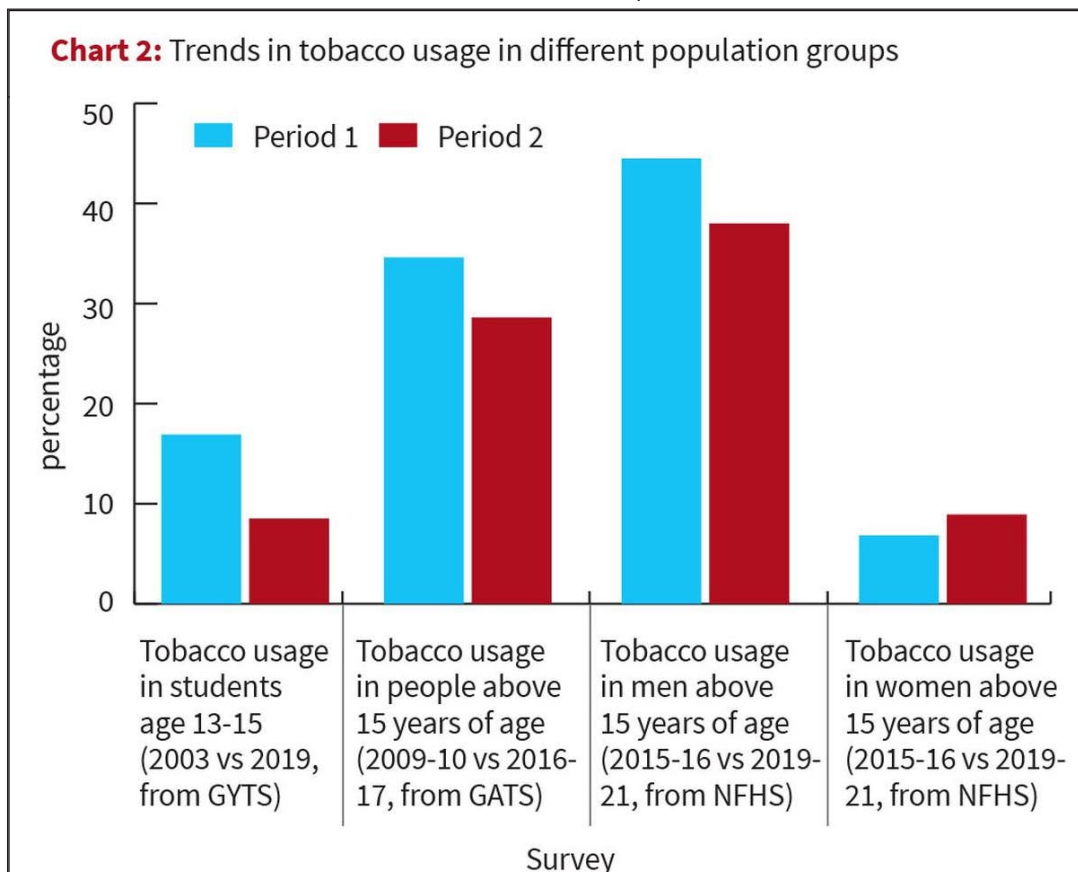


FIGURE: 04

- **Environmental Cost:** Beyond human health, tobacco cultivation depletes **soil nutrients, requiring more fertilizers and causing deforestation**. Processing 1 kg of tobacco requires 5.4 kg of wood.
- **Economic Costs:** A 2021 study estimated that tobacco's health impacts cost India over Rs 1.7 lakh crore in 2017-2018, compared to the Union Budget's health allocation of Rs 48,000 crore that year.
  - ▶ Cleaning up tobacco waste costs an additional Rs 6,367 crore annually. These figures exclude the environmental costs of soil erosion and deforestation.
  - ▶ Annually, tobacco production and consumption generate around 1.7 lakh tonnes of waste.
- **Child labour:** Indian *bidis* feature on the US's 2022 List of Goods Produced by Child Labor or Forced Labor.

### Awareness and Control Programs

- India is a signatory to the **WHO's Framework Convention on Tobacco Control (FCTC)** since 2005.
- **The Cigarettes and Other Tobacco Products Act (COTPA) 2003** regulates tobacco production, advertisement, and consumption.
- **The National Tobacco Control Program (NTCP)**, launched in 2007, aims to enforce COTPA and FCTC, raise awareness about tobacco harms, and support cessation efforts. Tobacco taxation is also used to control consumption.
- India banned **foreign direct investment (FDI)** in tobacco manufacturing in 2010.



#### FACT BOX

##### Prevalence in India

- India remains the **world's second largest consumer, producer and exporter of tobacco**.
- Smoking prevalence in India is **10.7%**. However, the most popular form of tobacco in India is **smokeless tobacco (SLT)**, with use prevalence of 21.4%.
- India has the second highest number of oral cancer cases globally, accounting for a third of the total.
- More than 90% of India's oral cancer cases are caused by tobacco use and of these, more than half are caused by SLT.

## INSOLVENCY & BANKRUPTCY CODE (IBC)

### Context

Since the introduction of the **Insolvency and Bankruptcy Code (IBC) in 2016**, creditors have successfully recovered Rs 3.36 trillion from defaulting corporations. This marks a significant improvement over the previous **Board for Industrial and Financial Reconstruction (BIFR) regime**.

### Key Accomplishments

- **Rescue of Distressed Companies:** The IBC has facilitated the rescue of 3,171 distressed companies between 2016 and March 2024. It has also helped in the efficient shutdown of unviable businesses.
  - ▶ The recovery under IBC represents around one-third of the amounts claimed by creditors and 162% of the liquidation value of the assets.
- **Resolution of the Twin Balance Sheet Problem:** The IBC has been instrumental in addressing the twin balance sheet problem, where banks were stressed, and firms were overleveraged due to liberal lending practices following the global financial crisis of 2008-09.
- **Reduction in Non-Performing Assets (NPAs):** Post-reform, the gross non-performing assets ratio of banks has decreased to a multi-year low of 3%, and the net non-performing assets ratio (excluding provisions for potential losses) has dropped to 0.7% as of December 2023.
  - ▶ It has helped in tackling a major development challenge for the government—the twin balance sheet problem – when banks are stressed and firms are overleveraged, due to liberal lending practices meant to boost economic growth after the global financial crisis of 2008-09.

### What is IBC?

- Insolvency and Bankruptcy Code (IBC) is India's bankruptcy law.
- The IBC consolidates the existing framework by creating a **single law for insolvency and bankruptcy**.
- **Prime objective:** to rescue corporate debtors in distress. The IBC specifies a time-bound insolvency resolution process, including any litigation, which must be completed within 330 days. The primary objective of the IBC is to rescue corporate debtors in distress swiftly.
- Previously, the process of winding up companies was regulated by the **Companies Act, 1956**, under court supervision, leading to **undue delays**.
- With the enforcement of the IBC, the winding-up procedure is now under the supervision of the **National Company Law Tribunal (NCLT)**. This ensures prompt action at the early stage of debt default, resulting in an optimal recovery rate.
- After the reform, the gross non-performing assets ratio of banks dipped to a multi-year low of 3% and the net non-performing assets ratio (which excludes the provisions set aside for covering potential losses) to 0.7% as of December 2023.



#### FACT BOX

##### About Non-Performing Assets (NPAs)

- The Reserve Bank of India (RBI) defines Non-Performing Assets (NPAs) as loans or advances that are overdue for more than 90 days.

**Types of NPAs**

- ▶ **Sub-Standard Assets:** These are NPAs that have been overdue for less than or equal to 12 months.
- ▶ **Doubtful Assets:** These are NPAs that have been overdue for more than 12 months.
- ▶ **Loss Assets:** These are assets that are considered "uncollectible" and have little value, though some recovery may still be possible. These assets have not yet been fully written off by the bank.

**About National Company Law Tribunal (NCLT)**

- **Formed:** 2016
- NCLT is a **quasi-judicial body** in India. It was constituted under section 408 of the Companies Act, 2013.
- It has the authority to adjudicate issues related to Indian companies. This includes:
  - ▶ Proceedings related to arbitration.
  - ▶ Compromise and arrangements.
  - ▶ Reconstructions and winding up of companies.
  - ▶ Insolvency resolution processes for companies.
  - ▶ Insolvency resolution for limited liability partnerships under the Insolvency and Bankruptcy Code, 2016.

**UPSC PYQ**

**Q: Consider the following statements: (2018)**

**Non-performing assets (NPAs) decline in value when-**

- 1: Demand revives in the economy
- 2: Capacity utilisation increases
- 3: Capacity utilisation, through substantive, is yet optimal
- 4: Capacity utilisation decreases consequently upon merger of unit.

Which of the above statements are correct?

- (a) 1, 3 and 4 only                      (b) 1, 2 and 4 only  
 (c) 1, 2 and 3 only                      (d) 1, 2, 3, 4

**Solution: (c)**

**ADDRESSING POOR ELECTRICITY SUPPLY FOR FARMERS**

**Context**

The Centre for Energy, Environment and People (CEEP) organized a dialogue called '**Vidyut Samvad**' to discuss the

systemic issues of poor electricity supply faced by farmers in Rajasthan. The panel suggested establishing a **farmers' cooperative-based distribution model** under the **Electricity Act, 2003**, to address regulatory accountability and improve electricity supply. The role of **solar and energy-efficient pumps** for irrigation was also emphasized as a potential solution.

**Issues faced by Farmers**

- The farmers suffers from the inadequate electricity supply, with only four hours of power against the mandated six hours, causing voltage fluctuations that damage irrigation motors and transformers.
- This results in crop losses and increased farming costs, posing a significant concern for farmers.

**Current State of Power Sector**

- India is the **third-largest producer and consumer** of electricity worldwide, with an installed power capacity of 429.96 GW as of January 31, 2024.
- As of January 31, 2024, India's installed renewable energy capacity (including hydro) stood at 182.05 GW, representing 42.3% of the overall installed power capacity. As of January 31, 2024, Solar energy contributed 72.31 GW, followed by 44.95 GW from wind power, 10.26 GW from biomass, 4.99 GW from small hydropower, 0.58 from waste to energy, and 46.93 GW from hydropower.
- The non-hydro renewable energy capacity addition stood at 15.27 GW in FY23, up from 14.07 GW in FY22.

**Overview of India's Electricity Sector:**

- India ranks as the **world's third-largest producer and consumer of electricity**.
- By January 31, 2024, India had an installed power capacity of 429.96 GW.
- **Renewable Energy Capacity:** As of January 31, 2024, India's renewable energy capacity (including hydro) reached 182.05 GW, accounting for 42.3% of the total installed power capacity.
  - ▶ Solar energy contributed the most with 72.31 GW, followed by
    - ◆ wind power with 44.95 GW
    - ◆ biomass with 10.26 GW
    - ◆ small hydropower with 4.99 GW
    - ◆ waste to energy with 0.58 GW
    - ◆ hydropower with 46.93 GW
- **Capacity Addition:** In the fiscal year 2022-23, non-hydro renewable energy capacity increased by 15.27 GW, compared to 14.07 GW in the previous fiscal year (2021-22).





## FACT BOX

### The Electricity Act, 2003

- The Electricity Act, 2003 aims to foster growth and development in the electricity sector by reducing government involvement in regulation.
- **Objectives:** The Act seeks to create a liberal framework for the power sector's development.
- **Establishment of Regulatory Commissions:**
  - ▶ The Act sets up Electricity Regulatory Commissions at both central (CERC) and state levels (SERCs).
  - ▶ Their functions include regulating tariffs, issuing licenses for transmission and distribution, and resolving disputes.
- Central Electricity Regulatory Commission (CERC):
  - ▶ CERC is India's power sector regulator.
  - ▶ Its goals are to promote competition, efficiency, and economy in bulk power markets, improve supply quality, and advise the government on addressing demand-supply gaps.
  - ▶ CERC operates as a statutory body with quasi-judicial authority under the Electricity Act, 2003.
- **Offences under the Act:** Theft of electricity, tampering with electric meters, and theft of electric lines and materials.

### Government Schemes for Power Sector:

- **Pradhan Mantri Sahaj Bijli Har Ghar Yojana (SAUBHAGYA):** To achieve universal household electrification by providing last mile connectivity and electricity connections
- **Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY):** It was launched in 2014 to improve the quality and reliability of power supply in rural areas.
- **Restructured Distribution Sector Scheme (RDSS):** It was launched to enhance the efficiency of power distribution, the government has implemented initiatives.
- **Ujwal Discom Assurance Yojana (UDAY) Scheme:** To ensure the availability of affordable and accessible 24x7 power supply to all citizens.
- **100% FDI** allowed in the power sector has boosted FDI inflow in this sector.
- **Other Schemes:**
  - ▶ Deen Dayal Upadhyay Gram Jyoti Yojana (DDUGJY)
  - ▶ Integrated Power Development Scheme (IPDS)
  - ▶ PM-Surya Ghar: Muft Bijli Yojana

## UPSC PYQ

**Q:** Which one of the following is a purpose of 'UDAY', a scheme of the Government? (2016)

- (a) Providing technical and financial assistance to start-up entrepreneurs in the field of renewable sources of energy
- (b) Providing electricity to every household in the country by 2018
- (c) Replacing the coal-based power plants with natural gas, nuclear, solar, wind and tidal power plants over a period of time
- (d) Providing for financial turnaround and revival of power distribution companies

**Solution:** (d)

## AMENDMENTS TO IHR 2005

### Context:

In a landmark development, the **77th World Health Assembly** recently approved a series of amendments to the **International Health Regulations (IHR 2005)**, responding to lessons learned from the Covid-19 pandemic. These amendments aim to enhance countries' readiness to tackle **Public Health Emergencies of International Concern (PHEIC) and Pandemic Emergencies (PE)**.

### The Amendments:

- **Need:** The amendments were prompted by the challenges faced during the Covid-19 pandemic, highlighting the need for a more robust global health security framework.
- The amendments focus on improving countries' preparedness and response capabilities during health emergencies.

### They include provisions for

- ▶ equitable access to health products during emergencies
- ▶ mobilization of financial resources to support developing countries in strengthening their core capacities under the IHR (2005)

### Significance:

- ▶ The adoption of these amendments marks a significant step towards enhancing **global health security** and promoting equity in pandemic response efforts.
- ▶ India played a constructive role in the negotiations, contributing to the crafting of an instrument that prioritizes equity and enables developing countries to respond effectively to health emergencies.

### What is Global Health Security?

- Global health security focuses on **preventing, detecting, and responding to infectious disease threats** that can easily spread across borders.

- **Major Risks:** Globalization and advancements in medicine have introduced new risks to health security:
  - **Emergence and Spread of Infectious Diseases:** Diseases like the novel coronavirus identified in 2019 can quickly spread across continents.
  - **Globalization of Trade and Travel:** Faster trade and travel allow diseases to spread more rapidly.
  - **Rise of Drug-Resistant Pathogens:** Antibiotic-resistant bacteria, such as E. coli, pose a significant threat.
  - **Risk of Pathogen Release:** There's a risk of intentional or accidental release of dangerous pathogens.
- **Role of IHR:** IHR play a crucial role in global health security by providing a framework for countries to prevent, detect, and respond to international health threats. They promote collaboration and information sharing among countries, strengthening the global response to infectious diseases and other health emergencies.

- Currently, the IHR has **196 State Parties**, including all **194 WHO Member States**, as well as **Liechtenstein** and the **Holy See**.
- India is **signatory** to the International Health Regulations -2005.

**UPSC PYQ**

**Q: Critically examine the role of WHO in providing global health security during the Covid-19 pandemic. (2020)**

**Is India's Healthcare Ready for Future Pandemics?**

- **Current Status:** India's **Global Health Security Index** score dropped from 43.6 in 2019 to 42.8 in 2021, lower than some other countries like **Japan, Brazil, and Russia**. However, India is actively taking steps to improve its readiness.

**Initiatives Taken:**

- **PRET Initiative:** India launched the **Preparedness and Resilience for Emerging Threats (PRET) initiative** to develop a **National Pandemic Preparedness Plan for Respiratory Viruses**, offering guidance for integrated planning.
- **One Health Approach:** One Health is an interdisciplinary approach recognizing the link between human, animal, and environmental health. India is implementing One Health through various initiatives:
  - ◆ Pradhan Mantri Ayushman Bharat Health Infrastructure Mission (PM-ABHIM)
  - ◆ National Institute for One Health
  - ◆ Establishment of a network for genomic surveillance
  - ◆ Ayushman Bharat Digital Health Mission



**FACT BOX**

**About International Health Regulations (IHR)**

- International Health Regulations (IHR) were initially adopted by the World Health Assembly in 1969 and last revised in 2005.
- They serve to enhance global efforts in managing public health events while minimizing disruptions to travel and trade.

**INDIA'S AGRICULTURAL SUBSIDIES**

**Context**

Several member countries of the **World Trade Organization (WTO)** are questioning India over its **50% increase in support to farmers in 2022-23**. India's allocation for **public stockholding for food security** has also come under scrutiny, especially with a **21% increase from the previous year**.

**India's Subsidies for Low-Income Farmers:**

- India reported a significant increase in subsidies for **"low-income or resource-poor" farmers**, reaching \$48.1 billion in 2022-23, a 50% rise from the previous year.
- The subsidies cover various inputs like **irrigation, fertilizers, and electricity**, benefiting nearly all farm holdings in India according to the Agricultural Census.
- WTO's member countries have been seeking a cut in India's **de minimis** entitlement under the **WTO's Agreement on Agriculture (AoA)**.

**Importance of Indian Farm Subsidies:**

- India's farm subsidies are vital for its marginal farmers and ensure food security for millions. The demand for a cut in subsidies by developed countries seems unjust considering their lifeline status for Indian farmers.
- **Agricultural Realities in Developing Nations:** Developing countries have a **higher number of people engaged in agriculture**, with the sector contributing significantly to their GDP. Moreover, the majority of farmers in these nations are low-income or resource-poor, necessitating government support.
- **Disparity in Total Domestic Support:** Developed countries offer significantly higher total domestic support to their farmers compared to developing nations like India. For instance, while the US provides \$61,286 per farmer, India's support stands at just \$282.

- **AMS Entitlement and Discrimination:** Developed countries benefit from the Aggregate Measurement of Support (AMS) entitlement, allowing them to offer higher support. In contrast, developing countries face policy constraints due to restricted entitlements, leading to unfair trade practices.
- **Addressing Unfairness in Trade:** India invoked the **WTO peace clause** after exceeding the ceiling for farm support, highlighting the challenges faced by developing nations.



## FACT BOX

### What is WTO Agreement?

- The **Agreement on Agriculture** is being implemented through the formation of the World Trade Organisation (WTO) in 1995.
- According to the **WTO's Agreement on Agriculture**, member countries are to reduce the support they provide their respective agriculture sectors in a bid to create a **level playing field across the world**.
- However, one of the exemptions from these reduction commitments for developing countries is the subsidy provided to **low-income and resource-poor farmers** in these countries.
- It is in this exempt category that India has seen the 50 percent jump in the subsidy it provided, and which drew the questions of the other WTO member countries.

### Government Subsidies for Farmers:

- **Seeds:** Implemented through **Sub-Mission on Seeds & Planting Materials (SMSP)** to promote quality seed production. Financial assistance provided for distributing foundation/certified seeds at subsidized rates.
- **Mechanization & Technology: Sub Mission on Agricultural Mechanization (SMAM)** focuses on inclusive growth in mechanization.
- **Irrigation:** Pradhan Mantri Krishi Sinchai Yojana (PMKSY)
- **Godowns:** Agricultural Marketing Infrastructure (AMI) scheme
- **Fertilizer:** Urea provided at subsidized rates to farmers, with the difference between production cost and market price subsidized by the government.
  - ▶ **Nutrient Based Subsidy Policy** implemented for **Phosphatic and Potassic (P&K) fertilizers**, providing fixed subsidies based on nutrient content.
- **Other Subsidized Schemes:** National Food Security Mission (NFSM), Mission for Integrated Development of Horticulture (MIDH), Rashtriya Krishi Vikas Yojana (RKVY), and Paramparagat Krishi Vikas Yojana (PKVY)

## UPSC PYQ

- Q: What are the direct and indirect subsidies provided to farm sector in India? Discuss the issues raised by the World Trade Organization (WTO) in relation to agricultural subsidies. (2023)**
- Q: WTO is an important international institution where decisions taken affect countries in a profound manner. What is the mandate of WTO and how binding are their decisions? Critically analyse India's stand on the latest round of talks on Food security. [2014]**

## INDIA'S INFORMAL ECONOMY

### Context:

Recent findings from the **National Sample Survey Organisation's Annual Survey of Unincorporated Sector Enterprises (ASUSE) for 2021-22 and 2022-23** have shed light on **India's informal sector**, crucial for policy formulation and economic planning.

### Key Findings from ASUSE:

- **Employment Trends:** The informal sector in India, represented by unincorporated enterprises, employed 109.6 million workers as of October 2022-September 2023. This figure, although an increase from pandemic lows, remains below pre-pandemic levels.
- **Enterprise Statistics:** The number of unincorporated enterprises grew to 65.04 million by October 2022-September 2023, up from approximately 63 million in the previous period (July 2015-June 2016).
  - ▶ Economic shocks such as **demonetisation, GST implementation, and COVID-19** have hindered sector growth and employment recovery.
- **Economic Inequality:** Despite employing two-thirds of the workforce, this sector contributes only **one-fourth of India's GVA**.
- **Economic Resilience and Growth:** Despite challenges, the gross value added (GVA) by these enterprises increased to Rs 15.42 trillion during October 2022-September 2023, up from Rs 13.4 trillion in April 2021-March 2022.



## FACT BOX

### About Annual Survey of Unincorporated Sector Enterprises (ASUSE)

- **Released by:** Ministry of Statistics and Programme Implementation (MoSPI)
- **Conducted by:** National Sample Survey Office (NSSO).

- It is conducted to gain comprehensive and reliable data on the unincorporated sector firm
- ASUSE focuses on measuring economic and operational characteristics of unincorporated non-agricultural establishments in manufacturing, trade, and other services (excluding construction).
- Previously conducted at five-year intervals, ASUSE surveys are now being carried out annually to provide more timely and relevant data.
- Sector Breakdown:** The survey covers manufacturing, trade, and other services but excludes construction

- While the PLI wasn't explicitly designed for exports, its impact on domestic industries has indirectly contributed to enhanced global competitiveness.
- Free Trade Agreements (FTAs)** play a pivotal role in facilitating exports, going beyond the reduction of tariff barriers.
  - India has FTA with Sri Lanka, Bhutan, Thailand, Singapore, Malaysia, Korea, Japan, Australia, UAE, Mauritius and ASEAN (Association of Southeast Asian Nations).
- Foreign direct investment (FDI)** plays a vital role in enhancing a country's integration into Global Value Chains (GVC).
- National Policy on Electronics (NPE) 2019:** This policy envisions India as the global epicenter for Electronic System Design and Manufacturing (ESDM).

## INDIA'S COMPETITIVENESS IN GLOBAL MARKET

### Context:

Indian industry is urging the government to reconsider restrictions on Chinese Foreign Direct Investment (FDI) and high import tariffs on electronics components, arguing that these measures hinder **India's competitiveness in the global electronics market.**

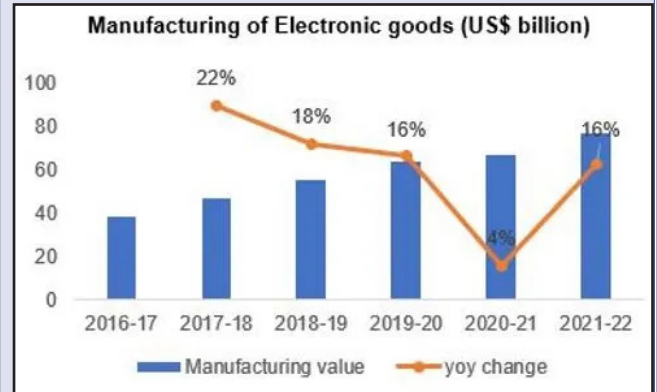
### How India's trade policy affect 'competitiveness'?

- India's trade policy has focused on **relatively high tariff and low non-tariff measures** compared to comparator economies.
- Both tariffs and non-tariff measures in India have become more restrictive in recent years.
- These restrictive trade policies introduce inefficiency in domestic production, thus affecting competitiveness, which in turn, adversely affects exports and imports.
- The 2020 measure has outlived its utility and needs review with adequate safeguards.
- Current restrictions send a message of non-friendly investment climate, hurting component ecosystem development.
  - Global Competitiveness:** High import duties make Indian electronic goods uncompetitive compared to Vietnam and China.
  - Localization Impact:** Tariffs haven't boosted local production of critical inputs as intended.
  - Tariff Rationalization:** Industry suggests bringing majority of tariff lines to 5% or lower to enhance competitiveness.

### Role of government policies is fostering competitiveness

- Production-Linked Incentive (PLI):** Government policies, especially the **Production-Linked Incentive (PLI)**, have played a significant role in fostering competitiveness and attracting investments.

### Electronic Systems Sector in India



- Electronic exports have become the 5th largest export commodity group as of Mar 2024.
- Strong pillars:** Electronics manufacturing services (EMS), it consists of services such as designing, manufacturing, testing, distributing, and servicing electronic components and assemblies for OEMs.
- Challenges:** India depends on imports from China, South Korea, Vietnam, and other East and Southeast Asian countries for electronic components like semiconductor devices, printed circuit boards (PCBs), etc.

## 2023 STATISTICAL REVIEW OF WORLD ENERGY

### Context

The recently released **Energy Institute's Statistical Review of World Energy** shows that energy emissions rose by 2% in 2023, surpassing 40 gigatonnes of CO<sub>2</sub> equivalent for the first time.

### Global Energy Consumption & Emissions

- Overall Increase:** Global primary energy demand reached a record **620 Exajoules (EJ)**, marking a **2%**



**increase from 2022** despite efforts to reduce fossil fuel dependency. Emissions intensified within the fossil fuels category, driven by rising oil and coal use alongside stable gas emissions.

▶ 1EJ is equivalent to about 170mn barrels of oil.

- **Fossil Fuel Dominance:** Fossil fuels constituted **81.5% of the global energy mix**, despite a slight decrease from the previous year.
- **Regional Shifts:** In Europe, fossil fuel use dropped below 70% for the first time since the industrial revolution.

### ◦ Renewable Energy Growth

- ▶ **Record High:** Renewable energy generation (excluding hydro) surged by 13% to a new high of 4,748 terawatt-hours (TWh).
- ▶ **Increased Share:** Renewables now account for 8% of the global energy mix excluding hydro, up from 7.5% in 2022.

### ◦ Oil Consumption and Production

- ▶ **Historic Milestone:** Global oil consumption exceeded 100 million barrels per day (bpd) for the first time.
- ▶ **Supply Dynamics: Non-OPEC+ producers**, notably the U.S., drove oil supply growth with a 9% increase in output.

### ◦ Natural Gas and LNG

- ▶ **Stability in Production:** Global gas production and consumption remained stable, with LNG supply rising by nearly 2%.
- ▶ **Leadership Shift:** The U.S. surpassed Qatar as the leading global LNG supplier.

### ◦ Coal Consumption

- ▶ **Continued Growth:** Coal consumption hit a new high of 164 EJ, driven by increases in China and India.
- ▶ **Regional Comparison:** India's use of fossil fuels climbed 8 per cent, with its coal consumption overtaking the combined use in North America and Europe for the first time.



#### FACT BOX

#### India's Energy Demand and Infrastructure:

- India is the world's third-largest energy consumer. Electricity accounts for 34 per cent of India's total GHG emissions.
- The country has achieved an installed capacity exceeding 400 GW, leveraging a mix of traditional fuels like **coal, oil, and gas**, alongside renewables such as **solar, wind, biomass, and hydroelectric power**.

### ◦ India's Climate Commitments

- ▶ Net Zero by 2070
- ▶ India aims to reduce its emission intensity by at least 45% from 2005 levels by 2030.
- ▶ At least 50% of the country's total electricity will come from renewable sources by 2030.
- As of May 2024, Renewable energy sources, including large hydropower, have a combined installed capacity of 193.57 GW.

### ◦ Installed capacity for Renewables:

- ▶ **Wind power:** 46.42 GW
- ▶ **Solar Power:** 84.27 GW
- ▶ **Biomass/Co-generation:** 10.35 GW
- ▶ **Small Hydro Power:** 5 GW
- ▶ **Waste To Energy:** 0.59 GW
- ▶ **Large Hydro:** 46.92 GW

### ◦ India's initiatives:

- ▶ **Electric Mobility and Vehicle Scrapping Policy**
- ▶ **Green Hydrogen Production**
- ▶ **Transportation Revolution**
- ▶ **Electric Vehicles (EVs)**
- ▶ **Ethanol Blending in Petrol**
- ▶ 100% FDI is allowed for renewable energy generation and distribution projects subject to provisions of **The Electricity Act 2003**.

#### UPSC PYQ

**Q:** The question of India's Energy Security constitutes the most important part of India's economic progress. Analyze India's energy policy cooperation with West Asian Countries. [2016]

**Q:** Give an account of the current status and the targets to be achieved pertaining to renewable energy sources in the country. Discuss in brief the importance of the National Programme on Light Emitting Diodes (LEDs). (2016)

**Q:** Clean energy is the order of the day.' Describe briefly India's changing policy towards climate change in various international for in the context of geopolitics. [2022]

## INDIA INCLUSION IN JP MORGAN EM BOND INDEX

#### Context:

India's journey towards inclusion in the **JPMorgan Emerging Market Bond Index** marks a significant milestone in global

finance. The decision, slated to be completed by March 2025, will integrate **Indian Government Bonds (IGBs)** into the index, mirroring similar caps set for **China, Indonesia, and Mexico**. This move is poised to unlock substantial foreign investments and reshape India's bond market dynamics.

### What is a bond market index?

- A bond index is used to measure the value of a section of the bond market.
- It can be defined by specific characteristics such as **maturity or credit rating to capture a narrower slice of the market**.
- Just like an equity index, a bond index is made up from the prices of selected bonds, which are a lot more fluid and often harder to value than equities.
- **Key global bond market indices:** Bloomberg Aggregate Bond Index, the Merrill Lynch Domestic Master, JP Morgan Bond Index, FTSE Bond Index, and the Citigroup US Broad Investment-Grade Bond Index

### What is the JP Morgan bond index?

- It is a US dollar denominated, investment-grade index spanning asset classes from developed to emerging markets.
- The JPM GABI extends the US index to also include multi-currency, investment-grade instruments.
- **The JP Morgan Emerging Market Bond Index (EMBI)** was formed in the early 1990s after the issuance of the first Brady bond.
  - ▶ More recently, JP Morgan led investors towards higher yielding local rates by launching the Government Bond Index-Emerging Markets (GBI-EM) series and the Corporate Emerging Markets Bond Index (CEMBI) series.
  - ▶ These have become the new standard for local market and corporate EM benchmarks, respectively.
- This index has three sub-variants:
  - ▶ **The Emerging Markets Bond Index Plus (EMBI+)** tracks total returns for traded external debt instruments in the emerging market.
  - ▶ **The JP Morgan Emerging Markets Bond Index Global** tracks total returns for traded external debt instruments in the emerging markets, and is an expanded version of the JPMorgan EMBI+.
  - ▶ **The JP Morgan Emerging Markets Bond Global Diversified Index.**

## INDIA'S MSP PROGRAMME

### Context

The Union Cabinet recently announced MSP for 14 Kharif season crops. This includes important crops like **paddy, ragi, bajra, jowar, maize, and cotton**.

### What is MSP?

- MSP stands for Minimum Support Price. It is the price at which the government buys crops from farmers, ensuring them a stable income and protecting them from market fluctuations.
- MSP was introduced in 1965 to safeguard farmers' interests.
- **Role of CACP:** The **Commission for Agricultural Costs and Prices (CACP)** recommends MSP based on factors like production costs, demand-supply dynamics, and market prices.
- **Government Decision:** The **Cabinet Committee on Economic Affairs**, chaired by the Prime Minister, makes the final decision on MSP after considering CACP's recommendations.

### Purpose of MSP

- ▶ **Income Security:** MSP guarantees farmers a minimum price for their produce, ensuring stable income.
- ▶ **Price Stability:** It stabilizes prices in the market by setting a floor price below which market prices are not allowed to fall.



### FACT BOX

#### About CACP

- **Established in:** 1965
- Commission for Agricultural Costs & Prices (CACP) is an attached office of the **Ministry of Agriculture and Farmers Welfare, Government of India**
- CACP recommends MSPs of 23 commodities, which comprise
  - ▶ **7 cereals** (paddy, wheat, maize, sorghum, pearl millet, barley and ragi)
  - ▶ **5 pulses** (gram, tur, moong, urad, lentil)
  - ▶ **7 oilseeds** (groundnut, rapeseed-mustard, soyabean, seasmum, sunflower, safflower, nigerseed)
  - ▶ **4 commercial crops** (copra, sugarcane, cotton and raw jute)

#### Types of Crops

India's agriculture is broadly divided into two seasons: Kharif and Rabi.

- **Kharif Crops:** These are sown in the monsoon season (June to September) and harvested in autumn. Examples include paddy, ragi, bajra, jowar, maize, and cotton.
- **Rabi Crops:** These are sown in winter (October to March) and harvested in spring. Examples include wheat, barley, gram, and mustard.

### UPSC PYQ

**Q: What do you mean by Minimum Support Price (MSP)? How will MSP rescue the farmers from the low-income trap? (2018)**

**Q: Consider the following statements: (2020)**

- 1: In the case of all cereals, pulses, and oil seeds, the procurement at Minimum Support price (MSP) is unlimited in any State/UT of India.
- 2: In the case of cereals and pulses, the MSP is fixed in any State/UT at a level to which the market price will never rise.

Which of the statements given above is/are correct?

- (a) 1 only                      (b) 2 only  
(c) Both 1 and 2              (d) Neither 1 nor 2

**Solution: (d)**

**Q: Consider the following statements: (2023)**

- 1: The Government of India provides Minimum Support Price for niger (*Guizotia abyssinica*) seeds.
- 2: Niger is cultivated as a Kharif crop.
- 3: Some tribal people in India use niger seed oil for cooking.

How many of the above statements are correct?

- (a) Only one                      (b) Only two  
(c) All three                      (d) None

**Solution: (c)**

## PLI SCHEME

### Context

The PLI scheme is expected to attract investments of Rs 3-4 lakh crore in the next four years and generate 2 lakh jobs as large projects in sectors, including **semiconductor and pharmaceutical intermediaries**, are expected to take off.

### What is the role of PLI Scheme in Indian Economy?

- Production Linked Incentive scheme (PLI) has become a crucial part of the vision of making India a \$ 5 trillion economy. In the post-pandemic scenario, PLI is proving to be a huge catalyst in creating 'AatmaNirbhar Bharat'.
- The scheme currently targets 14 sectors of strategic and economic importance for India's economic growth.
- The 14 sectors are: (i) Mobile Manufacturing and Specified Electronic Components, (ii) Critical Key Starting Materials/Drug Intermediaries & Active Pharmaceutical Ingredients, (iii) Manufacturing of Medical Devices (iv) Automobiles and Auto Components, (v) Pharmaceuticals

Drugs, (vi) Specialty Steel, (vii) Telecom & Networking Products, (viii) Electronic/Technology Products, (ix) White Goods (ACs and LEDs), (x) Food Products, (xi) Textile Products: MMF segment and technical textiles, (xii) High efficiency solar PV modules, (xiii) Advanced Chemistry Cell (ACC) Battery, and (xiv) Drones and Drone Components.

- The purpose of the PLI Schemes is to
  - ▶ attract investments in key sectors and cutting-edge technology
  - ▶ ensure efficiency and bring economies of size and scale in the manufacturing sector
  - ▶ make Indian companies and manufacturers globally competitive
- These schemes have the potential of significantly boosting production, employment and economic growth over the next five years or so.

### UPSC PYQ

**Q: Consider, the following statements : (2023)**

**1: Statement-I :** India accounts for 3.2% of global export of goods.

**2: Statement-II :** Many local companies and some foreign companies operating in India have taken advantage of India's 'Production-linked Incentive' scheme.

**Which one of the following is correct in respect of the above statements?**

- (a) Both Statement-I and Statement-II are correct and Statement-II is the correct explanation for Statement-I
- (b) Both Statement-I and Statement-II are correct and Statement-II is not the correct explanation for Statement-I
- (c) Statement-I is correct but Statement-II is incorrect
- (d) Statement-I is incorrect but Statement-II is correct

**Solution: (d)**

## DOLLAR-BASED SYSTEM WITH NO REAL "ALTERNATIVE"

### Context

The stability and dominance of the **United States dollar (USD)** in the global economy have been subjects of much debate and speculation since the **Bretton Woods Conference in 1944**. Despite numerous events (Nixon Shock, the rise of the euro, and China's economic ascent) and predictions of its downfall over the years, the USD continues to reign as the world's primary reserve currency.

## What factors contribute to USD's continued dominance?

- **Strong economy:** The U.S. economy's size, depth of capital markets, and trusted financial institutions contribute to the USD's continued dominance.
- **Holding significant portion:** Unlike previous reserve currencies, the USD occupies a unique position in international commerce, accounting for a significant portion of **foreign reserve holdings** and facilitating the majority of **foreign exchange** transactions worldwide.
- **Trusted asset:** Its stability and liquidity make it a trusted asset for countries and consumers globally.
- **No significant alternative:** While emerging technologies and multilateral financial arrangements may test the USD's supremacy, significant alternatives have yet to emerge.

## Challenges to Dollar Dominance:

- Despite its resilience, the USD faces challenges from rival currencies and geopolitical tensions.
- Efforts to de-dollarize trade and investment, coupled with technological advancements, pose incremental threats to the USD's hegemony.
- While rivals and partners alike seek to challenge the USD's hegemony, significant barriers, including trust, liquidity, and infrastructure, limit the emergence of viable alternatives. However, evolving geopolitical dynamics and technological innovations may gradually erode the USD's dominance over time.

## India's Pursuit of De-dollarisation: Economic Implications

- India, as a BRICS member, is challenging traditional financial systems through de-dollarisation efforts.
- **Shift in Trade Dynamics:** Increased trade in local currencies, like the Indian Rupee, grants India more control over monetary policy and shields it from external shocks.
- **Monetary Policy Autonomy:** Reduced reliance on the U.S. dollar empowers India to set independent monetary policies, enhancing economic stability.
- **Enhanced Trade Relations:** Trade in local currencies fosters stronger economic ties, streamlines transactions, and reduces costs.
- **Strengthened Indian Rupee:** De-dollarisation can lead to a stronger rupee, boosting purchasing power and reducing inflationary pressures.
- **Economic Independence:** By diversifying away from the dollar, India reduces vulnerability to U.S.-led sanctions, enhancing economic independence.

## GLOBAL DEBT CRISIS

### Context

The world is facing a major debt crisis, hindering progress towards achieving the **Sustainable Development Goals (SDGs)** by 2030. Global debt, including loans taken by households, businesses, and governments, has soared to USD 315 trillion in 2024, three times the global GDP, as per a UN Report.

### Key Points:

**Report Title:** *A world of debt 2024: A growing burden to global prosperity*

- **Unmanageable Debt Levels:** The amount of debt per person would be around USD 39,000 if divided among the world's population. Debt servicing, especially **interest payments**, consumes a significant portion of revenues, limiting funds available for crucial sectors like health and education.
- **Types of Debt:** Household debt is at USD 59.1 trillion, business debt at USD 164.5 trillion, and public debt at USD 91.4 trillion. This level of debt is comparable to historical highs seen during events like the Napoleonic Wars.
- **Changing Aid Dynamics:** Development aid has decreased, with concessional loans replacing aid, adding to developing countries' debt burden. Additionally, support to reduce debt among developing countries has declined significantly.
- In 2023, developing nations paid USD 847 billion in net interest, a 26% increase from 2021. They borrowed internationally at rates two to four times higher than the U.S. and six to 12 times higher than Germany.

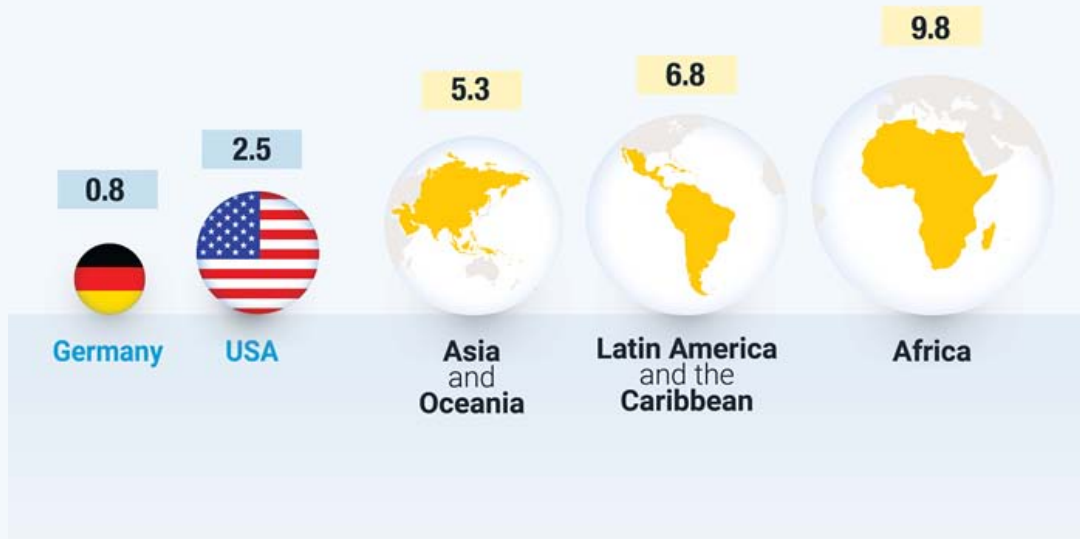
### What are the impacts?

- **Risks and Consequences:** Countries risk defaulting on debt if they can't repay it, leading to budget cuts in vital development programs.
  - ▶ **For example,** African countries are spending a significant portion of government funds on debt interest payments, impacting education and health spending.
- **Impact on Development:** High public debt restricts spending on development sectors, particularly in developing and poor countries. Developing countries, which account for 30% of global debt, are experiencing a faster rate of debt growth compared to developed nations.
- **Impact on SDGs:** High debt levels are a major obstacle to achieving SDGs, as countries struggle to allocate resources towards sustainable development initiatives.



## Borrowing costs of developing countries are higher than those of developed ones

Bond yields of developing and developed countries (2020-2024)



Source: UN GCRG - technical team calculations, based on Refinitiv data.

Note: Illustrative comparison of the average JPM EMBI Global Diversified USD bond yields per region with the 10-year bond yields of Germany and the United States from January 2020 to May 2024.

FIGURE: 05

## SOCIAL PROTECTION IN LOW-INCOME NATIONS

### Context:

The **International Labour Organization (ILO)** has identified a significant financial challenge for **low- and middle-income countries** to achieve **universal social protection**. According to a working paper by the ILO, an additional **\$1.4 trillion per year** is needed globally to provide universal access to essential social protection guarantees, including support for children, persons with severe disabilities, mothers of newborns, older persons, unemployed, and essential health care.

### Key-highlights of ILO's Working Paper

- Among all regions, **Africa faces the most substantial challenge** in reaching universal social protection coverage. The financing gap for low-income countries is particularly stark, amounting to more than half (52.3%) of their annual **gross domestic product (GDP)**, underscoring the immense financial burden these countries face.
- The ILO document presents detailed estimates of the funding required at global, regional, and national levels. It emphasizes the critical need for international solidarity to bridge these financing gaps, highlighting that many

low-income countries cannot achieve these goals without significant external support.

- The ILO paper underscores a formidable financial challenge in achieving universal social protection, especially for low-income countries.
- Astonishingly, these nations face a funding gap that exceeds half of their annual GDP—52.3%. This stark reality highlights an urgent need: only through international solidarity and cooperation can this immense gap be bridged, ensuring that essential social protections become a global reality.

Here is a table summarizing the distribution of funds needed for universal social protection and the basis for calculating the financing gaps for child benefits and old-age pensions:

Category	Percentage of Total Funds Needed	Basis for Calculation
Essential Health Care	60.1%	-
Child Benefits	17.8%	Individuals aged 0 to 14 not receiving any child benefits

Old-age Pensions	8.3%	Individuals aged 65 and up not receiving any old-age pension
Disability Benefits	7.1%	-
Unemployment Benefits	5.2%	-
Maternity Benefits	1.5%	-

**Global and Regional Financing Gaps**

- **Overall Gap:** The overall financing gap for universal social protection in low- and middle-income countries is 3.3% of GDP per year. This gap comprises 2% of GDP for essential health care and 1.3% for key social protection cash benefits (covering children, persons with severe disabilities, mothers of newborns, older persons, and the unemployed).
- **Regional Disparities:**
  - ▶ **Africa:** Faces the most significant challenge with a financing gap of 17.6% of the region’s annual GDP. This high percentage reflects severe financial constraints and substantial needs in the continent.
  - ▶ **Arab States:** The financing gap stands at 11.4% of GDP, indicating significant financial hurdles in achieving universal coverage.
  - ▶ **Latin America and the Caribbean:** The gap is relatively lower at 2.7% of GDP, suggesting more manageable, yet still significant, financial challenges.
  - ▶ **Asia and the Pacific:** With a gap of 2% of GDP, this region faces moderate financial needs for universal social protection.
  - ▶ **Europe and Central Asia:** The lowest among the regions, the financing gap here is 1.9% of GDP, indicating relatively better financial capacity to address social protection needs.



**FACT BOX**

**What is Universal social protection?**

- Universal social protection refers to a comprehensive system that ensures all individuals have access to essential social protection throughout their lives, regardless of their circumstances. This concept aims to provide a safety net that covers various risks and life stages, such as childhood, working age, and old age, ensuring that everyone can maintain a basic standard of living and dignity.

**UPSC PYQ**

**Q:** It is argued that the strategy of inclusive growth is intended to meet the objectives of inclusiveness and sustainability together. Comment on this statement. (2019)

**THE GLOBAL FIGHT OVER CLIMATE FINANCE**

**Context**

The upcoming U.N. COP29 climate summit in November is gearing up to address crucial issues regarding global climate finance. With nearly 200 countries in attendance, discussions are underway to establish a new global funding goal to combat climate change.

**What is Climate Finance?**

- Climate finance refers to financial support provided by wealthier nations to help developing countries invest in projects aimed at reducing greenhouse gas emissions and adapting to the impacts of climate change.
- This funding is crucial for developing nations to implement sustainable initiatives and cope with extreme weather events.

**The Need for a New Goal:**

- The current goal, set in 2009, pledged \$100 billion annually from 2020 to 2025 for climate finance.
- However, due to worsening climate change and insufficient clean energy investments in developing nations, estimates for required funds have skyrocketed.
- Reports suggest that \$2.4 trillion per year will be needed by 2030 to meet climate goals and protect vulnerable societies.
- **Proposed Funding Targets:** Ahead of COP29, various proposals have been put forward regarding the new funding goal.
  - ▶ **The Arab group** suggests \$1.1 trillion annually, with a significant portion coming directly from developed countries.
  - ▶ Similarly, **India, African nations, and small island states** advocate for over \$1 trillion annually, with differing views on funding sources.

**2024 HINDU KUSH HIMALAYAS SNOW UPDATE**

**Context**

The **Hindu Kush Himalaya (HKH) region**, spanning eight countries including India, is renowned as the “water towers of Asia” due to its crucial role in providing water to millions through major river systems like the Ganga, Brahmaputra, and Indus. However, recent report (**2024 ICIMOD Report**) indicate alarming trends in **snow persistence**, impacting water availability and ecosystems across the region.

## What is Snow Persistence?

- Snow persistence refers to the duration snow remains on the ground. In the HKH region, snowmelt from these mountains constitutes a significant source of water, contributing up to 23% of the annual runoff to the region's major river basins.
- This meltwater is crucial for sustaining agriculture, ecosystems, and human settlements downstream.

## Key Findings from the 2024 ICIMOD Report

- The 2024 update from the **International Centre for Integrated Mountain Development (ICIMOD)** highlighted record-low snow persistence in the **Ganga, Brahmaputra, and Indus river basins**.
- Specifically, the Ganga basin saw its lowest snow persistence in 22 years, significantly below historical averages.

## Causes of Lower Snow Persistence

- ▶ **Weak western disturbances**, which bring precipitation to the HKH region during winter
- ▶ **Climate change-induced alterations** in **global weather patterns**, including fluctuating **La Niña–El Niño** conditions, exacerbated this trend
- ▶ **High sea-surface temperatures** disrupted the typical patterns of western disturbances, leading to decreased winter precipitation and snowfall in the mountains.

## Impact on Water Security

- ▶ The decline in snow persistence threatens water availability in the region. For instance, snowmelt contributes a substantial portion of water to the Ganga (10.3%), Brahmaputra (13.2%), and Indus (up to 40%) river basins.
- ▶ Reduced snowmelt could potentially lead to water stress, affecting agriculture, hydropower generation, and overall socio-economic stability in downstream areas.

## India's Vulnerability

- India, with its vast territories encompassing parts of the **Ganga, Brahmaputra, and Indus basins**, faces significant implications from declining snow persistence.
- The meltwater from these basins supports agriculture and sustains livelihoods for millions of people.
- Lower snowmelt volumes could amplify water scarcity issues, particularly during dry seasons and periods of reduced rainfall.



### FACT BOX

#### Hindu Kush Himalaya (HKH) Region

- Stretches over 3500 kilometres and across eight countries – **Afghanistan, Bangladesh, Bhutan, China, India, Nepal, Myanmar and Pakistan**



FIGURE: 06

- The region is the world’s most important ‘water tower’, being the source of ten of Asia’s largest rivers as well as the largest volume of ice and snow outside of the Arctic and Antarctica.
- **Major rivers:** It is the source of ten large Asian river systems – the Amu Darya, Indus, Ganges, Brahmaputra (Yarlungtsanpo), Irrawaddy, Salween (Nu), Mekong (Lancang), Yangtse (Jinsha), Yellow River (Huanghe), and Tarim (Dayan)
- **India’s area:** Entire territory of 11 mountain states (Assam, Uttarakhand, Himachal Pradesh, Manipur, Jammu & Kashmir (Indian administered area), Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, Arunachal Pradesh), & Darjeeling district of West Bengal state

(see figure no. 06)

## ROLE OF HEAT

### Context:

Heat, a **fundamental force** present since the universe’s inception, has profoundly impacted human history and modern technologies. From the steam-powered engines of the **Industrial Revolution** to contemporary concerns about global warming, heat’s significance cannot be overstated.

### What is Heat?

- Heat is a **fundamental aspect** of the universe, existing since its birth and intertwined with its eventual demise.
- At its core, heat is the average kinetic energy of particles within an object, influencing temperature changes when bodies at different temperatures interact.

### Applications of Heat:

- Heat plays a pivotal role in various technologies, from **steam-powered engines** of the **Industrial Revolution** to modern-day **thermal and nuclear power plants and air conditioning systems**.
- Heat can be converted into mechanical energy, driving engines like **internal combustion engines (ICEs) and steam engines**, or used to generate electricity in thermal power plants.
- Heat’s influence extends beyond technology, impacting areas like **metallurgy, chemical reactions, and even meteorology**.
- **Heating, ventilation, and air-conditioning (HVAC) systems** rely on heat transfer principles to regulate indoor temperatures, with increasing calls for equitable access to cooling in warmer regions.

### What is heat’s relationship with work?

- Heat and work share the **same physical dimensions**, but not all heat can be converted into work efficiently due to energy losses.

- The **concept of entropy** is closely related to the loss of “useful heat,” where energy is dissipated in processes like **friction**, reducing the system’s ability to perform work effectively.

## IISC DEVELOP METHOD TO CLEANSE GROUNDWATER CONTAMINATION

### Context

In a breakthrough effort to tackle the pressing issue of arsenic contamination in groundwater, researchers at the **Indian Institute of Science (IISc)** have devised a pioneering three-step process. This method not only effectively removes heavy metal pollutants like arsenic but also ensures their safe disposal, preventing them from re-entering the environment.

### Key-highlights

- Scientists have developed a patent-pending technique aimed at addressing the critical aspect of **sustainable waste management** in **water purification**.
- The three-step method effectively eliminates heavy metal contaminants like arsenic from groundwater, ensuring the production of safe drinking water.
- The innovative process not only **eliminates arsenic** efficiently but also ensures environmentally friendly disposal of the removed pollutants.
- **The Problem: Arsenic and fluoride contamination** in groundwater is a significant concern across India, with numerous districts exceeding permissible limits set by regulatory bodies like the **Bureau of Indian Standards and the World Health Organization**.
  - These contaminants pose severe health risks to both humans and animals.
  - Traditional methods of water purification often neglect the crucial step of disposing of removed contaminants safely, leading to potential recontamination.

### Factors contributing to contamination:

- **Naturally Occurring Contaminants:** Fluoride, arsenic, nitrate, iron, and heavy metals naturally exist in certain geological formations, affecting water quality.
- **Industrial Activities:** Untreated or poorly treated industrial effluents discharged into water bodies contaminate surface and groundwater sources.
- **Agricultural Activities:** Excessive use of pesticides, fertilizers, and agrochemicals in agriculture leads to water contamination over time.
- **Sanitation Practices:** Inadequate sanitation facilities and open defecation, especially in rural areas, contribute to water source contamination.
- **Geogenic Processes:** Geogenic processes, such as those causing uranium contamination, can occur naturally, exacerbated by groundwater overexploitation.
- **Improper Waste Disposal:** Improper disposal of biowaste contaminates groundwater and surface water, increasing the risk of waterborne diseases.



## Impact of Groundwater Contamination

- Public Health Risks: Consumption of contaminated groundwater can lead to various health issues, including gastrointestinal disorders, neurological problems, skeletal deformities, and even cancer.
- Common Contaminants and Health Impacts:**
  - Arsenic:** Chronic exposure can lead to black foot disease and poses significant health risks.
  - Fluoride:** High fluoride intake causes neuromuscular disorders, dental deformities, and skeletal fluorosis.
  - Nitrates:** Excessive nitrate levels in water can result in methemoglobinemia and blue baby syndrome.
  - Uranium:** Elevated uranium levels in drinking water can cause kidney toxicity.
  - Radon:** Presence of radioactive radon in groundwater poses risks of lung cancer.
- Economic Burden:** Treating water-related illnesses imposes significant healthcare costs on individuals and communities. Productivity losses due to sickness also impact economic development.
- Environmental Degradation:** Contaminated groundwater affects ecosystems, harming aquatic life and disrupting biodiversity. It can also degrade soil quality and impair agricultural productivity.
- Social Inequities:** Communities reliant on contaminated groundwater often face socio-economic challenges, including limited access to safe drinking water, reduced educational opportunities, and compromised livelihoods.
- Long-Term Consequences:** Groundwater contamination can persist for decades or even centuries, posing ongoing risks to human health and the environment. Remediation efforts may require substantial time, resources, and technological interventions.



### FACT BOX

#### Water Governance

- Water being a **State subject**, initiatives on water management, including its quality is primarily **States's responsibility**.
- The **Central Pollution Control Board (CPCB)**, along with **State Pollution Control Boards/Pollution Control Committees (SPCBs/PCCs)**, enforces laws like the **Water (Prevention & Control) Act, 1974**, and the **Environment (Protection) Act, 1986** to manage water pollution.

#### Government Initiatives related to water management and conservation:

- Atal Bhujal Yojana
- Jal Shakti Abhiyan

- Aquifer Mapping and Management Programme (NAQUIM)
- Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)
- Water (Prevention and Control of Pollution) Amendment Bill, 2024

### UPSC PYQ

**Q: Which of the following can be found as pollutants in the drinking water in some parts of India? (2013)**

- Arsenic
- Sorbitol
- Fluoride
- Formaldehyde
- Uranium

Select the correct answer using the codes given below.

- (a) 1 and 3 only    (b) 2, 4 and 5 only  
(c) 1, 3 and 5 only    (d) 1, 2, 3, 4 and 5

**Solution: (c)**

**Q: The effective management of land and water resources will drastically reduce the human miseries. Explain. [2016]**

## HARNESSING INDIA'S ROOFTOP SOLAR POTENTIAL

### Context:

India's installed rooftop solar (RTS) capacity has seen significant growth, with a record increase of 2.99 GW in 2023-2024. As of March 31, the total installed RTS capacity in India was 11.87 GW. This growth underscores the need for a sustained push to harness India's vast RTS potential to meet the rising energy demands.

### Key Highlights of the RTS Programme

- Jawaharlal Nehru National Solar Mission:** Launched in January 2010, aiming to produce 20 GW of solar energy by 2022, later revised to 100 GW with a 40 GW RTS component.
- Current Status:** As of December 2022, India had installed 7.5 GW of RTS capacity, extending the 40 GW target to 2026. The overall RTS potential is approximately 796 GW.
- Future Targets:** To achieve 500 GW of renewable energy by 2030, with 280 GW from solar, RTS must contribute around 100 GW.

### State-wise Performance

- **Gujarat:** Leading with an installed RTS capacity of 3,456 MW, attributed to quick approval processes, a large number of installers, and high consumer awareness.
- **Maharashtra:** Following with 2,072 MW, driven by robust policies and a conducive regulatory environment.
- **Rajasthan:** Boasts the highest RTS potential (1,154 MW) due to its land area and high solar irradiance, supported by streamlined approvals and financial incentives.
- **Other States:** Kerala, Tamil Nadu, and Karnataka have also performed well, while Uttar Pradesh, Bihar, and Jharkhand face challenges like bureaucratic hurdles and lack of infrastructure.

### Challenges and Solutions

- **Economic Viability:** Government subsidies and low-cost financing options are crucial. Increasing the number of financial institutions offering RTS loans can make these systems more accessible.
- **Technological Advancements:** Promoting R&D in solar technology, energy storage solutions, and smart-grid infrastructure can reduce costs and improve system reliability.
- **Skill Development:** Training programs like 'Suryamitra' can build a skilled workforce to support the growing RTS sector.
- **Regulatory Framework:** Updating net-metering regulations, grid-integration standards, and building codes is essential to address emerging challenges and facilitate smooth implementation.

#### PM Surya Ghar: Muft Bijli Yojana scheme

- **PM Surya Ghar: Muft Bijli Yojana** is a government scheme that aims to provide free electricity to households in India.
- **Financial assistance:** The scheme provides a **Central Financial Assistance** of 60 percent of system cost for 2 kW systems and 40 percent of additional system cost for systems between 2 to 3 kW capacity.
- **Beneficiaries of scheme** will get free electricity of up to 300 units per month. It could result in savings of Rs 15,000-18,000 annually for households that install rooftop solar systems.
- **National Portal:** Households will apply for subsidy through the National Portal and will be able to select a suitable vendor for installing rooftop solar.
- **Model village:** Under the scheme, 'A Model Solar Village' will be developed in each district of the country to act as a role model for adoption of rooftop solar in rural areas.

## RADIOACTIVE RHINO HORNS

### Context:

South African scientists have initiated a pioneering project 'Rhisotope' to inject radioactive material into live rhino horns, aiming to deter poaching by making the horns easier to detect at border posts.

### Key Highlights of the Initiative

- **Project Name:** Rhisotope project
- **Goal:** to deter poachers who kill the animals for their horns
- **Method:** Injection of low-dose radioactive material into rhino horns
- **Detection:** Radioactive material detectable by radiation detectors at international borders
- **Duration:** Radioactive material expected to last 5 years on the horn
- **Reasons Behind Rhino Poaching**
- **Demand in Asian Markets:** Rhino horns used in traditional medicine
- **High Black Market Value:** Horn prices rival gold and cocaine by weight
- **Poverty and Unemployment:** Drives local involvement in poaching
- **Weak Law Enforcement:** Inadequate anti-poaching measures in some areas

### Impact of Rhino Poaching

- ▶ **Population Decline:** 499 rhinos killed in South Africa in 2023, an 11% increase from 2022
- ▶ **Ecosystem Imbalance:** Rhinos play a crucial role in maintaining savanna ecosystems
- ▶ **Economic Losses:** Affects wildlife tourism and local economies
- ▶ **International Relations:** Strains between source and demand countries

Potential Benefits	Concerns and Limitations
<ul style="list-style-type: none"> <li>◦ <b>Enhanced Detection:</b> Easier identification of smuggled horns at borders</li> <li>◦ <b>Deterrence:</b> May discourage poachers and traders</li> <li>◦ <b>Non-invasive:</b> Low-dose radiation doesn't harm rhinos or the environment</li> <li>◦ <b>Cost-effective:</b> Lasts longer than dehorning methods</li> </ul>	<ul style="list-style-type: none"> <li>◦ <b>Health Risks:</b> Potential long-term effects on rhinos need further study</li> <li>◦ <b>Environmental Impact:</b> Possible unforeseen consequences in ecosystems</li> <li>◦ <b>Adaptation by Poachers:</b> Risk of criminals developing countermeasures</li> <li>◦ <b>Ethical Considerations:</b> Debate over manipulating wildlife for conservation</li> </ul>

## DEEP-SEA MINING

### Context

Deep-sea mining has emerged as a **contentious issue** garnering global attention due to its potential impact on marine ecosystems and its role in meeting the growing demand for critical minerals essential for modern technology.

### What exactly is deep-sea mining?

- Deep-sea mining involves extracting mineral deposits from seabeds deeper than 200 meters below the ocean surface.
- These areas cover about 65% of the Earth's surface and host diverse ecosystems and geological features, including mountains, canyons, and hydrothermal vents like those in the **Mariana Trench**.  
(see figure no. 07)
- **Targeted Commodity:** Miners target critical minerals such as nickel, copper, cobalt, and manganese.
  - ▶ These minerals are essential for modern technologies like **smartphones, solar panels, and electric vehicles**.
  - ▶ They are found in **polymetallic nodules, seafloor massive sulphide deposits, and cobalt-rich ferromanganese crusts**.
- **Coastal state rights:** Countries have the rights to explore and exploit the natural resources of the seabed and subsoil within their **territorial sea and exclusive economic zone (EEZ)**, which normally extends **200 nautical miles beyond a nation's territorial sea**.
- Nations can claim rights over even more seabed on the continental shelf under **certain circumstances**.
  - ▶ **Norway and the Cook Islands** are among the nations actively pursuing mining in the waters under their control.

(see figure no. 08)

### How might deep-sea mining affect the ocean?

- Mining could harm deep-sea habitats and species like octopuses and sponges by destroying their homes.
- Removing hydrothermal vents and crusts on seamounts would disrupt thriving animal communities.
- Sediment plumes from mining might be toxic and could smother downstream ecosystems, while noise and light pollution could disturb deep-sea creatures adapted to extreme conditions.

### What is the International Seabed Authority?

- The **International Seabed Authority (ISA)**, based in **Jamaica**, regulates mineral exploitation in international waters under the **UN Convention on the Law of the Sea**.
- It has issued exploration contracts for areas like the **Clarion-Clipperton Zone** in the Pacific Ocean but is still developing regulations for deep-sea mining.
- Pressure is mounting to finalize these rules amid debates over environmental impacts and the equitable use of ocean resources.



### FACT BOX

#### Territorial Sea:

- The territorial sea extends outward from a coastal state's baseline (usually the low-water line along its coast) to a maximum of 12 nautical miles (nm) or approximately 22.2 kilometers.
- **Rights of coastal state:** Within this zone, the coastal state exercises full sovereignty, including the right to regulate and enforce laws regarding customs, immigration, and pollution.

## Deep-sea mineral deposits and the metals they contain



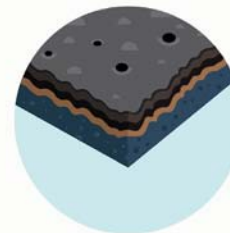
### Polymetallic nodules

Source of nickel, cobalt, copper and manganese



### Polymetallic sulphides

Copper, lead, zinc, gold and silver



### Cobalt-rich crust

Cobalt, vanadium, molybdenum, platinum and tellurium

FIGURE: 07

# How minerals could be mined from the seabed

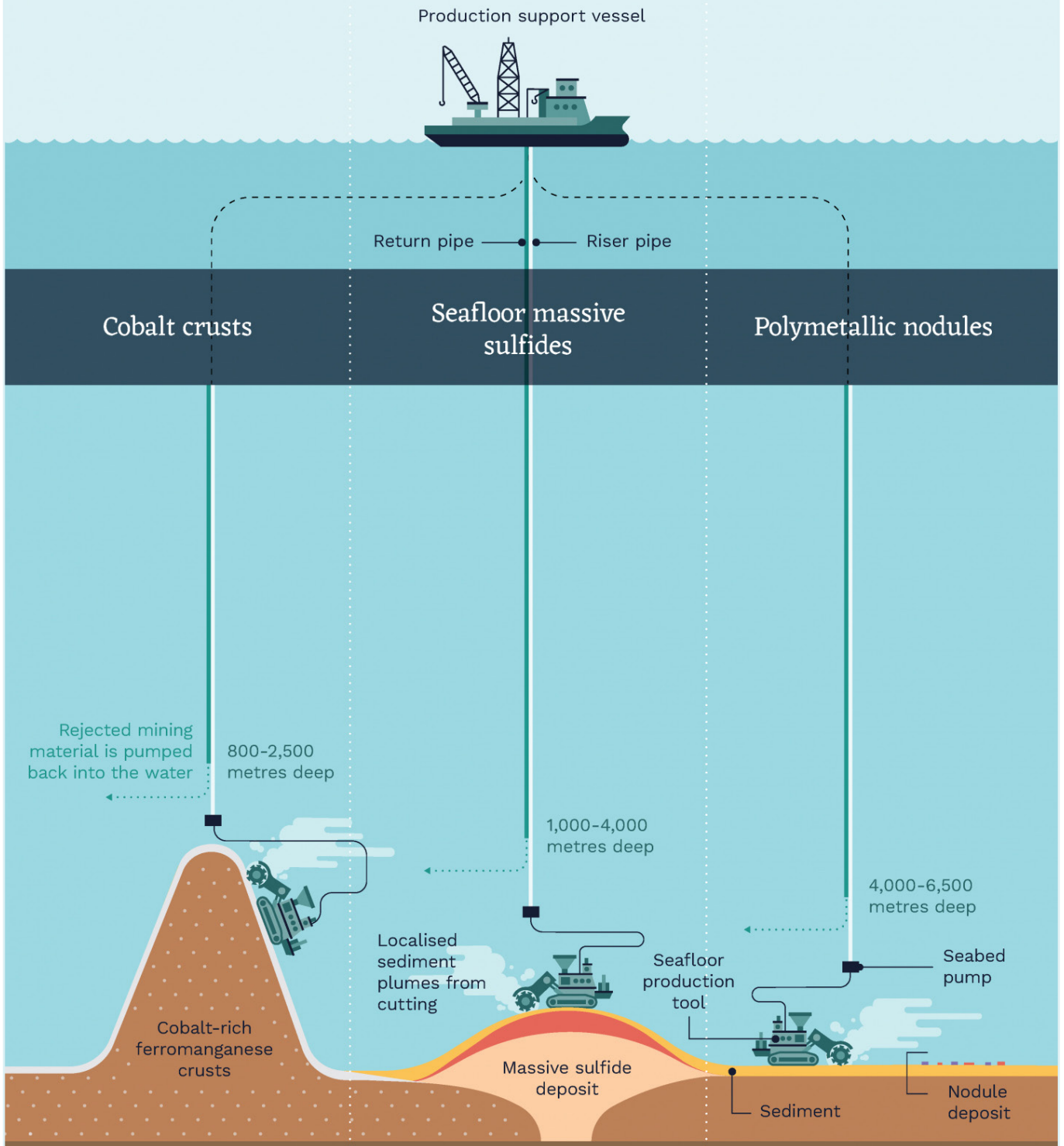


FIGURE: 08



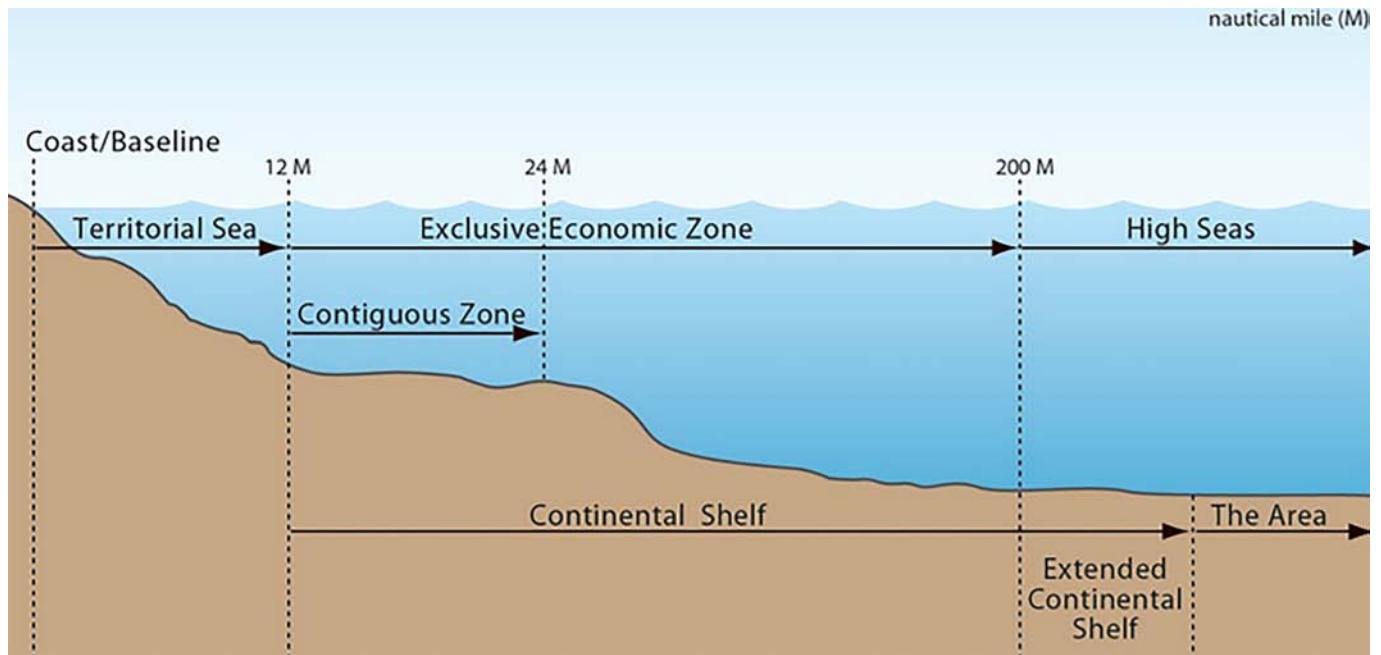


FIGURE: 09

### Exclusive Economic Zone (EEZ):

- The EEZ extends beyond the territorial sea to a maximum of **200 nautical miles (370.4 kilometers)** from the baseline, or to the edge of the continental margin where it extends beyond this distance.
- **Rights of coastal state:** Sovereign rights for the purpose of exploring, exploiting, conserving, and managing natural resources, both living (fisheries) and non-living (oil, gas, minerals).

(see figure no. 09)

## UTTAR PRADESH LEADS IN COMPRESSED BIOGAS POTENTIAL

### Context:

Uttar Pradesh holds a remarkable position in India's renewable energy landscape, with the potential to generate 24 percent of the nation's compressed biogas (CBG), according to a report by the Delhi-based think tank Centre for Science and Environment (CSE).

### Key-highlights of the Symposium

- ▶ **CBG Potential:** Uttar Pradesh could potentially install 1,000 CBG projects from the 5,000 plants envisioned nationwide under the Sustainable Alternative Towards Affordable Transportation scheme.
- ▶ **Feedstock Availability:** Western UP, particularly Muzaffarnagar, Meerut, Saharanpur, Bijnor, Bulandshahar, and Aligarh, is rich in feedstock availability and houses the majority of the state's functional and upcoming CBG plants.
- ▶ **Supportive Policies:** Uttar Pradesh has an ambitious

bioenergy policy, allocating Rs 750 crore (2022-27) for CBG, while providing subsidies, land for lease, and other incentives.

### Reason behind UP's significant growth

- **Potential and Policies:** Uttar Pradesh's significant potential for CBG production is supported by its bioenergy policy, which includes financial incentives and infrastructural support.
- **Feedstock Abundance:** The state's agricultural and industrial landscape offers abundant feedstock, essential for CBG production.
- **Strategic Location:** Proximity to feedstock sources and existing CBG plants facilitates the state's leadership in this sector.



### FACT BOX

#### Bio-gas

- ▶ Bio-gas is produced naturally through a process of anaerobic decomposition from waste / bio-mass sources like agriculture residue, cattle dung, sugarcane press mud, municipal solid waste, sewage treatment plant waste, etc.
- ▶ After purification, Bio-Gas is compressed and called CBG, which has pure methane content of over 95%.

#### Compressed Bio-Gas

- Compressed Bio-Gas is exactly similar to the commercially available natural gas in its composition and energy potential.
- With calorific value (~52,000 KJ/kg) and other

- properties similar to CNG, Compressed Bio-Gas can be used as an **alternative, renewable automotive fuel**.
- Compressed Bio-Gas can be produced from various bio-mass/waste sources, including **agricultural residue, municipal solid waste, sugarcane press mud, distillery spent wash, cattle dung and sewage treatment plant waste**.
  - ▶ The other **waste streams, i.e, rotten potatoes from cold storages, rotten vegetables, dairy plants, chicken/poultry litter, food waste, horticulture waste, forestry residues and treated organic waste** from industrial effluent treatment plants (ETPs) etc.

## CLIMATE HELL

### Context

The recent report by the European Union’s climate change monitoring service indicates a worrying trend: each of the past 12 months has been the warmest on record. This sustained rise in temperatures, culminating in a 12-month average of 1.63 degrees Celsius above pre-industrial levels, calls for urgent action to avert “climate hell”.

### What is climate change?

- Climate change is not just a natural science problem. It is a social, economic, geopolitical, and national security problem, besides being an ethical and justice issue.
- Over the last decade, the world was on average around 1.2C warmer than during the late 19th Century.
- It has now been confirmed that global warming exceeded 1.5C across the 12 month period between February 2023 and January 2024. That followed 2023 being declared the warmest year on record.
- The temperature increase was driven by human-caused climate change and boosted by the natural El Niño weather phenomenon.

### Effects of climate change

- more frequent and intense extreme weather, such as heatwaves and heavy rainfall
- rapid melting of glaciers and ice sheets, contributing to sea-level rise
- huge declines in Arctic sea-ice
- Economic crisis, Affected global health, Migration
- Rising Temperatures, Shifting Rainfall Patterns, Thawing Permafrost
- Impact on Ecosystems (disrupting biodiversity and ecological balance)
- Human Health Impacts
- Ocean Acidification (endangering marine life and ecosystems)
- Food System Disruption
- Threat to Animals (habitat loss, altered migration patterns, and changing ecosystems)

### India’s Measures to combat climate change

- **Solar Alliance (ISA):** Launched in 2015, ISA is a collaboration between solar energy-rich countries to promote solar energy use and reduce reliance on fossil fuels.
- **One Sun, One World, One Grid (OSOWOG) Project:** Proposed by Prime Minister Narendra Modi, OSOWOG aims to create a global solar power grid to provide energy to 140 countries.
- **Swachh Bharat Mission:** Launched by Prime Minister Modi, this initiative aims to achieve cleanliness and sanitation in Indian towns and villages, including building over 100 million toilets.
- **COP26 Glasgow Summit Commitments:** India is committed to-
  - ▶ achieving net zero emissions by 2070



### AT A GLOBAL TIPPING POINT

- 2023 was **1.43°C warmer** than the 1850 to 1900 average
- Of this, **1.13°C** came from human activity
- **8%** was caused by El Niño and other weather events
- Increased fossil fuel burning can cause Earth to get warmer by **1.5°C in 4.5 years**
- **Reduction of sulphur pollution** was cancelled out by Canadian wildfires

### 1.5°C target limit may be surpassed by 2028: WMO

The UN weather agency is predicting an 80 per cent chance that average global temperatures will surpass the 1.5°C target within the next five years. The World Meteorological Organisation (WMO) said Wednesday that the global mean near-surface temperature for each year from 2024 to 2028 is expected to range between 1.1 and 1.9°C hotter than at the start of the industrial era. There’s nearly a one-in-two chance — 47 per cent — that the average global temperatures over that entire five-year span could top 1.5°C. **AP/PTI**

FIGURE: 11

- ▶ meeting 50% of energy needs from renewables by 2030
- ▶ reducing carbon emissions by one billion tonnes by 2030
- ▶ reaching 500 GW of non-fossil energy capacity by 2030
- ▶ reducing carbon intensity by 45% by 2030

### India's Role in International Climate Diplomacy:

- India provides leadership to other emerging markets and developing economies, demonstrated through initiatives like the **International Solar Alliance, One Sun One World One Grid, and the Coalition for Disaster Resilient Infrastructure (CDRI)**.
- India's approach to achieving **global net zero emissions** is guided by the principle of Common but Differentiated Responsibilities, advocating for developed countries and international financial institutions to finance the clean transition of the developing world.
- As part of the **Like-Minded Developing Countries (LMDC)**, India advocates for greater control over how finance is used for adaptation and mitigation, aiming to prevent future loss and damage.

## NGT'S SUO MOTU CASE ON TREE COVER LOSS

### Context:

India has lost 2.33 million hectares of tree cover between 2000 and 2023, with significant loss in northeastern states. The **National Green Tribunal (NGT)** took *suo motu* cognizance of this issue and summoned government departments for explanation.

### Key-highlights

- India lost 2.33 million hectares of tree cover from 2000 to 2023, slightly larger than Meghalaya.
- About 18% of this loss (414,000 hectares) happened in primary forests.
- Northeast India bore 60% of this loss, with **Assam, Mizoram, Arunachal Pradesh, Nagaland, and Manipur** losing significant tree cover.
- Between 2013 and 2023, 95% of the tree cover loss occurred in natural forests.
- 2016, 2017, and 2023 were the worst years, with 1.75 million, 1.44 million, and 1.89 million hectares lost, respectively.

State	Tree cover loss (hectares)
Assam	3,24,000
Mizoram	3,12,000
Arunachal Pradesh	2,62,000
Nagaland	2,59,000
Manipur	2,40,000

- This loss emitted 51.0 million tons of carbon dioxide equivalent annually, totaling 1.12 gigatons from 2000 to 2023.
- The tree cover loss across the country has emitted a huge amount of carbon into the atmosphere – exactly what India is trying to prevent as per its **Nationally Determined Contributions** as submitted to the **United Nations under the Paris Agreement**.
- Here's a list of how much area of tree over these states lost:

### NGT's Action:

- NGT noted the violation of environmental laws and summoned key government bodies to explain the tree cover loss.
- Notices were issued to the **Central Pollution Control Board, Ministry of Environment and Forest, and the Survey of India**.
- The loss of tree cover is a violation of the **Forest Conservation Act (1980), or FCA**. While the FCA is one of India's most important legislations that protects forest cover in India, the union government has drastically diluted several provisions of the Act recently.
- The newly **amended Act** would take away the protection afforded to forest lands such as **deemed forests and community forests** (that are not officially recorded as forests) and open them up to human activities under the garb of "national security" and "defence" purposes.
- NGT highlights violations of the Forest Conservation Act, 1980, amidst recent amendments.
- **Contradictions in ISFR and GFW data:** NGT raises concerns over **discrepancies between official forest surveys and data from Global Forest Watch (GFW)**.

FSI's ISFR Report	Global Forest Watch (GFW)
India's forest and tree cover has increased by 2,261 sq. km (around 2.26 lakh hectares) since the last assessment in 2019.	18 per cent (4,14,000 hectares) of the total 2.33 million hectares of tree cover loss occurred in humid primary forests in the country.



<p>There is a decline in forest cover in the country's hill and tribal districts as well as across the northeastern states</p>	<p>There is tree cover loss in northeast India</p>
--	--

**UPSC PYQ**

**Q: Use of internet and social media by non-state actors for subversive activities is a major security concern. How have these been misused in the recent past? Suggest effective guidelines to curb the above threat. (2016)**

## THE DARK WEB

**Context**

The recent arrest by the **Enforcement Directorate (ED)** of a resident of Uttarakhand under the **Prevention of Money Laundering Act** sheds light on the pervasive nature of **illicit activities thriving on the Dark Web**. This underscores the international scope of criminal operations facilitated by the anonymity of online platforms.

### What is the Dark Web?

- The Dark Web refers to online content accessible only through specialized software or configurations on overlay networks.
- It's a part of the deep web, which search engines don't index, making it less visible to regular internet users.
- **Anonymity and Encryption:** Dark net users' identities and locations are mostly unknown due to layers of security and encryption. This anonymity makes tracing individuals challenging for law enforcement agencies.

### Legality in India:

- Accessing the dark web is legal in India, as it falls under the **constitutional right to access the internet (Article 21)**.
- However, the lack of stringent laws governing cyberspace poses unique challenges.

### Illegal Activities on the Dark Web:

- ▶ **Child pornography** is a severe offense under **Section 67(B) of the Information Technology Act, 2000**, and **Section 14 and 15B of the POCSO Act, 2012**.
- ▶ **Human Trafficking:** The Indian Penal Code addresses offenses related to trafficking and sexual exploitation of minors. **Sections 372 and 373** prohibit the buying and selling of girls for prostitution, a form of human trafficking.
- ▶ **Selling and purchasing weapons and drugs** on the dark web are illegal. **Section 24 of the Narcotics Drugs and Psychotropic Substances Act, 1985**, imposes punishment for drug trafficking, even if conducted externally.

## CHINA'S OFFENSIVE AIR CAPABILITIES ALONG LAC

**Context**

New satellite imagery reveals China's deployment of **J-20 stealth fighters** to **Shigatse airfield**, near the Sikkim border.

### How China is using its airbases?

- China uses its airbases on the **Tibetan Plateau** strategically. These bases feature long runways, essential because high-altitude takeoffs reduce fighter payload capabilities. This advantage isn't shared by the Indian Air Force, whose bases are mostly in lower-altitude plains.
- Satellite images of **Shigatse Airport** reveal a significant presence of fighters, drones, refuelers, and early warning aircraft.
- These bases typically house various military assets like fighter jets, helicopters, and drones capable of launching air attacks and reconnaissance missions into neighboring areas.

### China's Air Power Expansion:

- ▶ Shigatse airfield, close to the Sikkim border, hosts several J-20s, indicating China's strategic move.
- ▶ China strengthens air power in Tibet and border areas with new bases and upgraded infrastructure.
- ▶ **Deployment includes** J-20 and H-6 bombers, enhancing border defense.

### Indian Response:

- India enhances airbases and deploys **S-400 missile system** for defense.
- S-400's effectiveness questioned after being targeted in Ukraine conflict. Both China and India use the S-400 system, despite its vulnerabilities.

**FACT BOX**

### About Shigatse Airfield

- Shigatse is the second largest city in Tibet. It is located at an altitude of 12,408 feet.
- Shigatse airfield has a dual-use airport for civil and military use.





FIGURE: 06

- The airport, located around 150 kilometers north of India's frontier with Tibet, has a runway stretching 5,000 meters. It is the third longest runway in the world.
- **Hasimara Air Base:** Hosts the Indian Air Force's second squadron of **Rafale fighter aircraft** tasked with defending the Himalayan frontier over Eastern India.

### J-20 Overview:

- China's most advanced fighter, the J-20, is operational since 2017.
- It is capable of air superiority with advanced sensors and long-range missiles.
- It operates within a networked force with drones and electronic platforms.

### About S-400 Missile System

- The S-400 Triumf is a mobile medium- and long-range air defense system developed in the 1990s and deployed in 2007.
- It uses four different missiles (48N6E3, 40N6, 9M96E, 9M96E2) to destroy airborne threats, including legacy S-300 missiles.
- Considered equivalent to the **US Patriot system**, it's the top Russian air defense system.

(see figure no. 6 below)

## UPSC PYQ

**Q: How is S-400 air defence system technically superior to any other system presently available in the world? (2021)**

## MODIFIED NEWTONIAN DYNAMICS (MOND)

### Context

In the realm of **astrophysics**, Scientists are puzzled by how galaxies move. They spin faster than expected based on normal gravity rules or they do not align with predictions based on **Newton's laws of gravity** when applied to visible matter. Galaxies rotate at **velocities** far exceeding what Newtonian physics anticipates, suggesting the presence of additional, unseen mass. To explain this, they came up with **dark matter**, an invisible substance. Another idea is **MOND**, a tweak to gravity's rules.

### Dark Matter vs. MOND

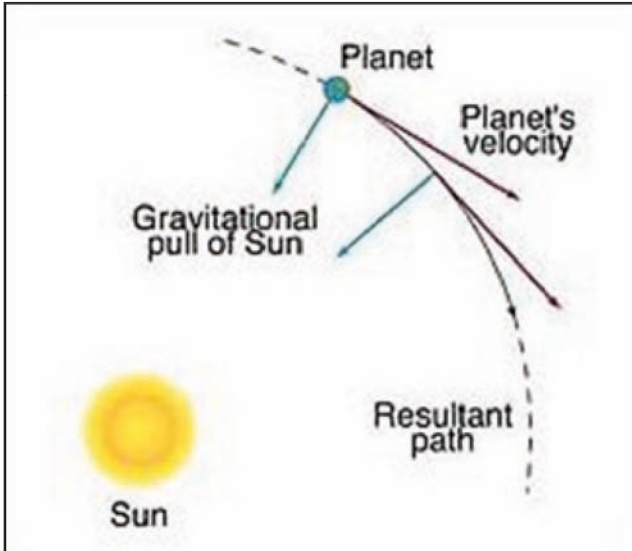
#### Dark Matter Theory

- ▶ It says invisible stuff called dark matter holds galaxies together. Even though it's successful, we haven't seen dark matter directly.
- ▶ Dark matter serves as a theoretical solution to the discrepancy in galactic rotation rates. It proposes the existence of invisible mass that provides the necessary gravitational pull to prevent galaxies from flying apart.
- ▶ Despite its success in explaining various astrophysical phenomena, dark matter remains elusive, with no direct observational evidence.

#### MOND Theory

- ▶ Modified Newtonian Dynamics (MOND), proposed by Mordehai Milgrom, is an alternative theory to explain galactic dynamics. It suggests a modification of gravity's behavior at low accelerations, particularly at the edges of galaxies.
- ▶ It suggests gravity works differently in weak places like galaxy edges.

- ▶ **Testing MOND:** The **Cassini mission**, orbiting Saturn, provided an opportunity to test MOND's predictions through precise measurements of Saturn's orbit. However, analysis of Cassini's data did not reveal the expected deviations, reinforcing the efficacy of Newtonian physics in explaining Saturn's orbit.



**Which of the above is/are the predictions/predictions of Albert Einstein's General Theory of Relativity, often discussed in the media?**

- (a) 1 and 2 only
- (b) 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

**Solution: (d)**

**Q:** The known forces of nature can be divided into four classes, viz. gravity, electromagnetism, weak nuclear force and strong nuclear force. With reference to them, which one of the following statements is not correct? (2013)

- (a) Gravity is the strongest of the four
- (b) Electromagnetism acts only on particles with an electric charge
- (c) Weak nuclear force causes radioactivity
- (d) Strong nuclear force holds protons and neutrons inside the nucleus of an atom

**Solution: (a)**

## MINIATURISED SATELLITE

### Context:

The Defence Ministry has signed its 350th contract under the Innovations for Defence Excellence (iDEX) initiative with SpacePixxel Technologies for developing a miniaturised satellite.

### What is a miniaturized satellite?

- A miniaturized satellite, often referred to as a "CubeSat," is a type of small satellite characterized by its compact size and standardized design.
- These satellites are typically built using cubic units known as "U" which measure 10x10x10 centimeters (1U).
- CubeSats can be scaled up to larger sizes such as **2U, 3U, 6U, or even 12U**, depending on mission requirements.

### Strategic Advantages

- ▶ **Faster deployment:** Miniaturised satellites allow for quicker and more economical deployment of space assets.
- ▶ **Scalability and adaptability:** The modular design enables easy customization and scaling of capabilities as per mission requirements.
- ▶ **Reduced environmental impact:** Smaller satellites generally have a lower environmental footprint compared to larger counterparts.



### FACT BOX

#### Newton's Law of Universal Gravitation:

- It says that every object in the universe attracts every other object with a force. This force depends on two things:
  - ▶ the masses of the objects
  - ▶ the distance between them
- Every object pulls on every other object with a force. This force is called gravity.
- It applies to everything from falling apples to the orbits of celestial bodies like the Moon around the Earth.

#### Dark Matter:

- Dark matter is an invisible substance proposed to explain the discrepancy in galactic rotation rates. It provides the additional gravity needed to prevent galaxies from flying apart.

### UPSC PYQ

**Q:** Consider the following phenomena: (2018)

- 1: Light is affected by gravity.
- 2: The Universe is constantly expanding.
- 3: Matter warps its surrounding spacetime.

### iDEX

- iDEX was launched by the Department of Defence Production in 2018.
- The Defence Innovation Organisation (DIO) oversees the implementation of iDEX.

- It aims at engaging Industries including MSMEs, start-ups, individual innovators, R&D institutes & academia for defence technology to be made and fostered in India.
- It will provide them grants/funding and other support to carry out R&D which has good potential for future adoption for Indian defence and aerospace needs.
- iDEX aims to create an ecosystem to foster innovation and technology development in defence and aerospace.

### Defence Innovation Organization (DIO)

- DIO is a 'not for profit' company registered under Section 8 of the Companies Act 2013.
- Its two founding members are Hindustan Aeronautics Limited (HAL) & Bharat Electronics Limited (BEL) - Defence Public Sector Undertakings (DPSUs).
- HAL and BEL are navratna companies.

## CHINA'S FIRST SAMPLES FROM MOON'S FAR SIDE

### Context:

China has become the first country to successfully collect and return samples from the far side of the Moon, marking

a significant milestone in lunar exploration and space technology.

### Key Highlights

- Chang'e-6 mission landed on the Moon's far side and collected from the South Pole-Aitken Basin.
- The samples include 2.5-million-year-old volcanic rock and other material that scientists hope will answer questions about differences between the moon's two sides.
- The samples are expected to answer one of the most fundamental scientific questions in lunar science research:
  - What geologic activity is responsible for the differences between the two sides?

### Why Far Side of the Moon is difficult to catch?

- The far side of the Moon is the side **not visible from Earth**, a result of a phenomenon called "tidal locking."
- In contrast, the near side, which constitutes 60% of the Moon's surface, is always visible from Earth.
- This side isn't actually dark**; it receives ample sunlight and experiences lunar day and night cycles, just like the near side.
- Differences:** Despite being lesser-known, the **far side of the Moon** is distinct from the near side in appearance and geological features.

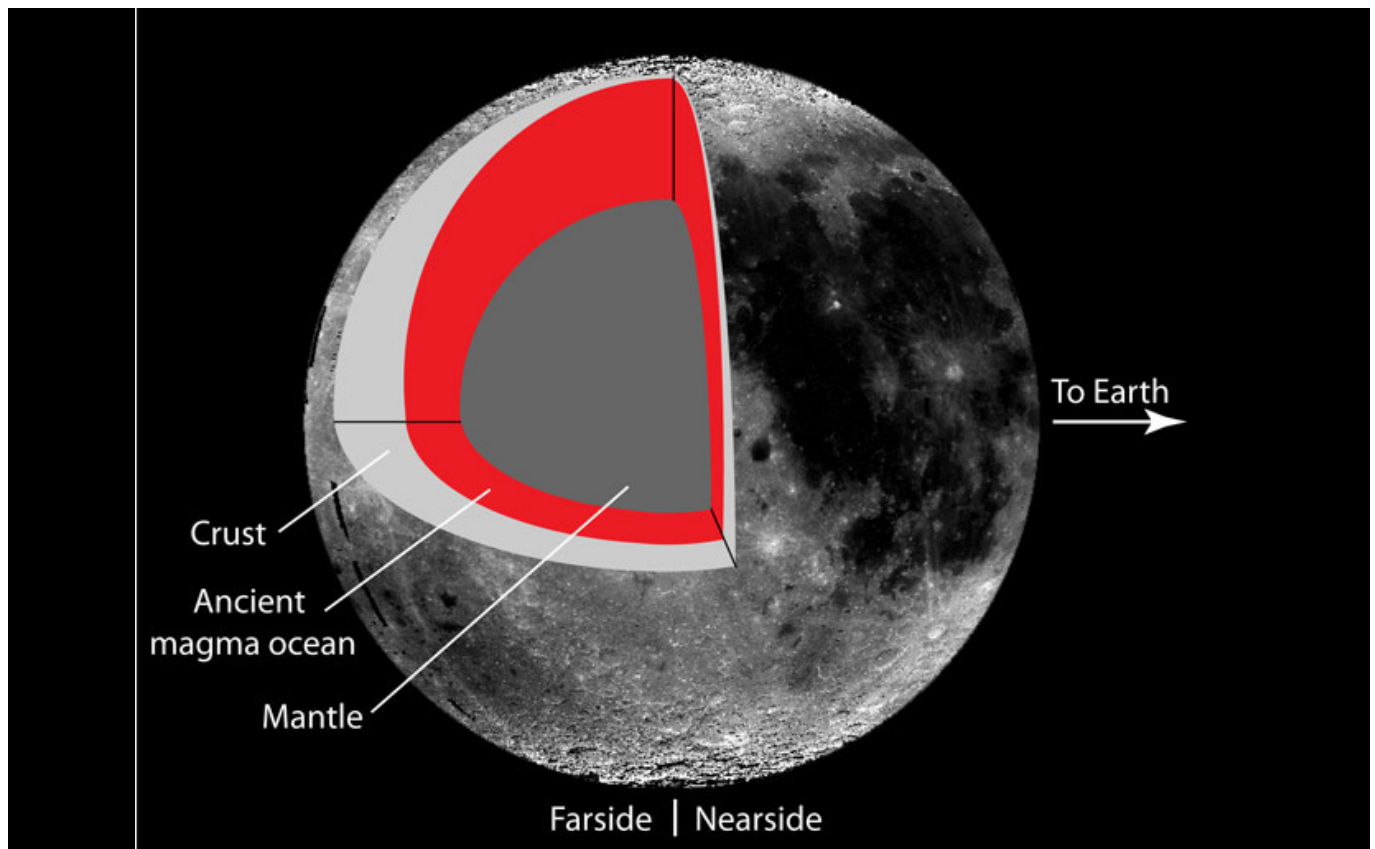


FIGURE: 12



- **Day and Night:** A lunar day lasts over 29 Earth days, while a lunar night is roughly two weeks long. This extended cycle is due to the Moon’s rotation around its axis and its orbit around Earth, resulting in the same side always facing our planet.
- **Exploration:** Throughout history, human exploration has focused on the near side, with several lunar expeditions visiting its familiar terrain. However, recent missions, like China’s Chang’e-6, are pioneering efforts to explore and understand the mysteries of the far side.

## ‘MULTI-OMICS’ ENHANCES DIAGNOSIS

### Context

Recent advances in ‘multi-omics’ approaches have significantly enhanced the diagnosis and treatment of diseases like tuberculosis (TB) and cancers in India. This transformation has been driven by innovations in genomics and the rapid development of health infrastructure, particularly due to the COVID-19 pandemic.

### What is Multi-omics?

- Multi-omics is a powerful predictive and diagnostic approach, which helps to understand a complex, heterogeneous disease like cancer.
- It brings together multiple complex ‘omics’ datasets, which machine learning and AI can translate into meaningful biological insights.

### Recent Significant Transformation (Multi-omics Integration)

- **Genome India:** This project has completed sequencing 10,000 genomes from 99 ethnic groups to develop a reference genome for Indian people, aiding in the creation of low-cost diagnostics and research tools.
- **IndiGen:** The Council for Scientific and Industrial Research (CSIR) sequenced genomes of 1,008 individuals to analyze genetic diseases, develop affordable screening methods, and optimize treatments.
- **Multi-omics Approach:** Combining genomics with other extensive datasets on proteins (proteomics), gene expression (transcriptomics), and chemical changes regulating gene expression (epigenomics) to tackle diseases more effectively.

### Disease-specific Applications

- **Tuberculosis:** The Indian Tuberculosis Genomic Surveillance Consortium (InTGS) is sequencing 32,000 TB clinical strains to map genetic diversity, correlate mutations with drug resistance, and develop a sequence-based method for determining drug resistance. This effort includes collecting clinical samples and metadata, isolating genetic material, and conducting whole-genome sequencing.
- **Cancers:** The Indian Cancer Genome Consortium (ICGC-India) aims to identify population-specific genetic variations linked to cancer risk and treatment response. This initiative is part of a broader effort to facilitate

personalized medicine and develop targeted therapies based on genetic profiling.

## Rare Genetic Disorders and Antimicrobial Resistance

- **Mission PRaGeD:** This initiative focuses on raising awareness, performing genetic diagnoses, discovering new genes or variants, providing counseling, and developing new therapies for rare genetic diseases affecting children in India. It incorporates data from the IndiGen project and uses next-generation sequencing to manage rare diseases.
- **Antimicrobial Resistance:** Genomics and metagenomics help predict antibiotic resistance profiles without culturing bacteria, aiding in the judicious use of antibiotics. This is particularly valuable for slow-growing pathogens like the tuberculosis bacterium, allowing clinicians to make informed treatment decisions.



### FACT BOX

#### What is the human genome?

- The human genome is the entire set of 23 large **deoxyribonucleic acid (DNA)** residing in the nucleus of every cell of each human body.
- It carries the complete genetic information responsible for the development and functioning of the organism.
- **Base:** The DNA consists of a double-stranded molecule built up by four bases –
  - ▶ adenine (A)
  - ▶ cytosine (C)
  - ▶ guanine (G)
  - ▶ thymine (T)
- Every base on one strand pairs with a complementary base on the other strand (A with T and C with G).
- In all, the genome is made up of approximately 3.05 billion such base pairs.

## CHANDRAYAAN-4

### Context:

The Indian Space Research Organisation (ISRO) is preparing for its ambitious Chandrayaan-4 mission, aiming to bring back samples from the Moon. This mission involves unique challenges and innovative strategies, including assembling spacecraft parts in space.

### What is Chandrayaan-4?

- Chandrayaan-4 will be launched in multiple parts due to the spacecraft’s size exceeding the carrying capacity of ISRO’s most powerful rocket. The components will be assembled in space before heading to the Moon.



- This approach is similar to the construction of the International Space Station.
- It will be the **first time a lunar mission adopts this method**, potentially setting a new precedent in space exploration. ISRO is developing new docking capabilities to join spacecraft parts in both Earth and Moon orbits.
- Chandrayaan-4 is expected to be beyond the carrying capacity of even the most powerful rocket that ISRO currently has.

### Technological Marvel and Testing

- **Spadex Mission:** To test the docking capabilities required for Chandrayaan-4, ISRO will conduct a mission called Spadex later this year. This mission will demonstrate in-space docking, a crucial step for the success of Chandrayaan-4.
- **Configuration and Capabilities:** The configuration involves developing technologies to dock modules in space, which will be essential for future complex missions. A detailed study and internal review of the Chandrayaan-4 mission are complete, and cost estimates will soon be submitted for government approval.

### Future Missions and Space Station Plans

- **Vision 2047:** ISRO's long-term vision includes plans for India's own space station by 2035 and sending humans to the Moon by 2040. The future Bharatiya Antariksh Station (BAS) will also be assembled in space through multiple launches.
- **Next Generation Launch Vehicle (NGLV):** ISRO is developing the NGLV, a heavy rocket with an upgraded design to handle larger missions. A new launch complex is being created to accommodate this 4,000-ton rocket, essential for future missions.

## HEATWAVES: A MISSING DISASTER IN INDIA'S LAW

### Context

North India is grappling with its longest heatwave. Despite the severity, heatwaves remain excluded from the Disaster Management Act, 2005. The absence of heatwaves as a recognized disaster under the Act deprives states of accessing disaster response funds for relief efforts and mitigation measures.

### What is Disaster Management Act?

- The Disaster Management Act, 2005, was enacted to address catastrophes arising from natural or man-made causes.
- It established the National Disaster Management Authority (NDMA) and State Disaster Management Authorities (SDMAs) to oversee disaster response at different levels.
- The Act includes provisions for funds such as the National Disaster Response Fund (NDRF) and the State Disaster Response Fund (SDRF).

### What are 'notified disasters'?

- Notified disasters, as per the Act, are catastrophic events beyond the coping capacity of communities, leading to substantial loss of life, property, or damage to the environment.
- These include cold waves, cyclones, earthquakes, floods, and others. States can access funds like the NDRF and SDRF for relief and recovery efforts.
- Heatwaves, although increasingly common due to global warming and urbanization, were not initially considered a disaster when the Act was enacted in 2005. With 23 vulnerable states and growing risks of heat-related illnesses, there's a pressing need to address heatwaves in disaster management.
- Despite demands from state governments, the 15th Finance Commission did not include heatwaves as a notified disaster, citing the existing list covering state needs adequately.
  - ▶ However, states like Haryana, Uttar Pradesh, Odisha, and Kerala have designated heatwaves as **local disasters**, allowing them to access funds for relief efforts.

## FLOOD MANAGEMENT

### Context:

The Indian Space Research Organisation (ISRO) has extended support to mitigate flood risks associated with the Mullaperiyar and Idukki dams in Kerala by providing **space-based inputs** related to **high-resolution terrain data** for the researchers to engage in **flood modelling** and assess **probable inundation** by identifying potential flood risks.

### India's Vulnerability to Floods:

- India faces significant flood risks due to its geographic diversity, monsoon rains, and changing climate patterns.
- Over 40 million hectares of land are prone to flooding, affecting states like Assam, Bihar, Odisha, Uttar Pradesh, and West Bengal.
- **Causes:** Factors like deforestation, rapid urbanization, and poor agricultural practices exacerbate flood severity in certain regions.
  - ▶ Poor town planning, unauthorized and illegal construction, and inadequate urban infrastructure expose Indian cities to flooding.
- **Impact:** Loss of human lives, displacement, destruction of crops, and damage to property and other physical infrastructures.
- **Role of Satellite Technology:** Satellites, operated by agencies like the Indian Space Research Organisation (ISRO), are pivotal in managing and mitigating flood disasters across India.

### ISRO's role in Disaster Management

ISRO plays a crucial role in disaster management through its satellite-based applications. These tools aid in monitoring, predicting, and mitigating various natural disasters across India.

- **Flood Management:** ISRO provides real-time flood mapping and inundation maps to agencies like **National Disaster Management Authority (NDMA)** and State Relief Commissioners. This helps in timely evacuation and relief operations during floods.
- **Glacial Lake Outburst Floods (GLOFs):** ISRO monitors glacial lakes using satellite data to assess potential risks of GLOFs. This helps in understanding and mitigating flood risks in the Himalayan region.
- **Terrain Mapping:** High-resolution terrain data from satellites assist in flood modelling and identifying vulnerable areas prone to inundation, such as around dams like Mullaperiyar and Idukki in Kerala.
- **Information Dissemination:** ISRO uses platforms like **Bhuvan** and **National Database for Emergency Management (NDEM)** to disseminate critical information to disaster management authorities. This includes flood maps, weather forecasts, and disaster impact assessments.
- **Telemedicine and Tele-education:** ISRO's satellites support telemedicine projects, connecting remote healthcare centers with urban hospitals for medical consultations. Similarly, tele-education initiatives like **EDUSAT** provide educational resources to rural areas.
- **Meteorological Services:** ISRO satellites contribute to weather forecasting and monitoring through collaboration with the **India Meteorological Department (IMD)**. This aids in predicting cyclones and other severe weather events.

## KAVACH ANTI-COLLISION SYSTEM

### Context:

A recent tragic incident in West Bengal highlighted the **urgency of enhancing railway safety in India**. A collision between a goods train and the Kanchanjunga Express resulted in 15 deaths and over 60 injuries, prompting renewed focus on safety measures like the **Kavach anti-collision system**.

### Reasons Behind Rail Accidents in India

- **Derailments:** Occur when train carriages derail due to track defects, mechanical failures, or human error.
- **Collisions:** Involve two or more trains colliding due to signalling errors, miscommunication, or operational failures.
- **Explosions/Fires:** Result from incidents such as electrical faults, arson, or gas leaks on trains or at railway stations.
- **People Falling from Trains/Colliding with People on Tracks:** Include accidents where individuals fall from moving trains or are hit while crossing or walking along railway tracks.
- **Other Causes:** Encompass accidents not falling into the above categories, often due to unforeseen events like bridge collapses, landslides, or natural disasters. This category also includes accidents with unknown causes.

## Top Technologies Ensuring Safety of Indian Railways

- **LHB Coaches:** Introduced in 1999, LHB (Linke Hofmann Busch) coaches replace older ICF coaches. They feature anti-telescopic designs that prevent secondary accidents in case of a collision. LHB coaches are safer and can operate at speeds exceeding 160 kmph.
- **Block Proving Axle Counter (BPAC):** BPAC is a train detection system that ensures only one train occupies a track section at a time. It uses sensors at axles to accurately detect train presence and direction, crucial for safe railway signaling.
- **Auxiliary Warning System (AWS):** AWS, or Automatic Train Protection, monitors train speeds according to signal indications. It restricts speeds to ensure safety: 15 kmph for red signals, 38 kmph for yellow, and up to 70 kmph for green or double yellow signals.
- **Self-Propelled Ultrasonic Rail Testing (SPURT):** SPURT cars use ultrasonic technology to detect internal rail flaws, conducting real-time testing twice yearly on busy routes like New Delhi – Howrah and New Delhi – Mumbai Central. This technology enhances track maintenance efficiency, covering up to 80-120 km of track per day.

## What is Kavach Anti-Collision System?

- **Developed by:** Research Designs & Standards Organisation (RDSO)
- The Kavach automatic train protection (ATP) system is India's indigenous automatic train protection system.
- It is a technology with **Safety Integrity Level 4 (SIL-4) certification**.
- It aims to prevent collisions through features such as automatic brake application during emergencies, real-time communication, and warning systems for foggy conditions.

## Key Features of Kavach:

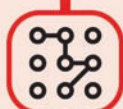
- ▶ Uses RFID and radio frequency technologies along tracks and in locomotives.
- ▶ Alerts operators to Signal Passed at Danger (SPAD) situations and potential collisions.
- ▶ Enhances safety with direct locomotive-to-locomotive communication and automated responses to critical situations.
- **Implementation Status:** As of early 2024, Kavach covers 1,465 route kilometres and 139 locomotives, mainly in the South Central Railway network. Plans include expanding coverage on major corridors like Delhi-Mumbai and Delhi-Howrah, spanning approximately 3,000 route kilometres.
- **Other Safety Initiatives:**
  - ▶ India's rail modernization efforts also focus on upgrading signaling systems and enhancing safety measures nationwide.
  - ▶ Significant investments are directed towards improving infrastructure and operational efficiency to mitigate accidents and ensure passenger safety.

**IAS  
2025**

# PRELIMS TEST SERIES 2025

**4600+  
QUESTIONS**

**PRELIMS  
PRACTICE  
PROGRAMME  
(PPP)**



Tests as per **Changing  
Pattern** of the **UPSC  
Prelims**



**Concept & Essential Skills  
Building** through Tests  
and their Discussion



**Level-wise Questions** for  
gradual improvement &  
exam readiness



**One-on-one mentorship**  
for Personalised Guidance



**Emphasis on both Static &  
Current Events** as per the  
evolving format



**PROGRAMME FEE**  
₹ 8,500 (+GST)

**TOTAL 68 TESTS**

**33**

**SUB SECTIONAL  
TESTS**  
50 QUESTIONS

**12**

**SECTIONAL TESTS  
(GS & CSAT)**  
100 & 50 QUESTIONS

**07**

**CURRENT AFFAIRS  
TESTS**  
100 QUESTIONS

**16**

**MOCK TESTS TESTS  
(GS & CSAT)**  
100 & 80 QUESTIONS



**8448496262**



**iascore.in**



## SECTION -C

# QUICK BYTES

### WORLD'S LARGEST ASTRONOMY CAMERA

#### CONTEXT

Chile is all set to install the largest digital camera for astronomy (resolution above 3.2 gigapixels), on the edge of Atacama desert.

#### Key Details:

- **Location:** Cerro Pachón in the Coquimbo region, Chile.
- **Camera:** It's massive, weighing almost three tons, with a resolution of over 3.2 gigapixels.
- **Purpose:** The camera is part of a decade-long exploration to study **dark energy, dark matter**, and potential **asteroid collisions**.
- **Data:** It will generate 20 terabytes of data nightly, creating a 15 petabyte database over the decade.
- **Aim:** Understand how the universe began and its future development.
- **Operator:** The observatory is managed by AURA, a consortium of U.S. and international institutions.
- **Location Choice:** Chile's Atacama Desert offers clear skies, ideal for astronomy. Chile hosts much of the world's investment in astronomy due to the clear skies of its Atacama Desert, the driest desert on earth.



#### FACT BOX

##### About Atacama Desert

- **Atacama Desert** is a 600-mile-long (1,000 kilometers) plateau in northern Chile, near **Peru, Bolivia, and Argentina**.



Figure No. 1

- **Climate:** It's the driest nonpolar desert globally and receives less rainfall than polar deserts.
- **Geography:** Surrounded by the **Andes Mountains and the Chilean Coastal Range**, which block moisture, creating a harsh environment for plants.



- **Vegetation:** The lack of water and nutrients makes it difficult for plants to survive, earning it the nickname “**death zone for vegetation.**”
- **Sodium Nitrate:** It contains the world’s largest reserve of sodium nitrate, a valuable mineral.

- It supports a variety of wildlife, including **saiga antelopes, wild horses, and various bird species.**
- Historically, it has been home to nomadic tribes such as the **Kazakhs**, who have relied on herding livestock for their livelihoods.

## KAZAKH STEPPE

### CONTEXT

Przewalski horses, brought from Prague, took their first steps in the **Kazakh steppe**, their natural habitat. This is the beginning of a plan to release 40 of these **endangered horses** into the wild in Kazakhstan over the next five years.

### About Kazakh Steppe

- The Kazakh Steppe, also known as the **Great Plains of Central Asia**, is a vast grassland region in northern Kazakhstan and adjacent parts of Russia.
  - ▶ **Steppe** is a plain without trees. It is a type of grassland biome.
- It’s characterized by vast, open expanses of grasslands with few trees, making it ideal for **nomadic pastoralism.**
- This steppe is one of the largest dry grassland areas in the world, covering an area of over 800,000 square kilometers.
- It has a **continental climate** with hot summers and cold winters.



### FACT BOX

#### Przewalski Horses

- Przewalski horses are known as one of the last breeds of wild horses in the world.
- They are the only true wild horses alive today.
- There are approximately 2,000 Przewalski horses worldwide, with most found in China and Mongolia. Some also reside in France, Russia, and even in the wild in the Chernobyl exclusion zone between Belarus and Ukraine.
- After the **Chernobyl disaster** in April 1986, 30 Przewalski horses were introduced to the area in 1998.
- Since then, the population has thrived, with the current number reaching 210.

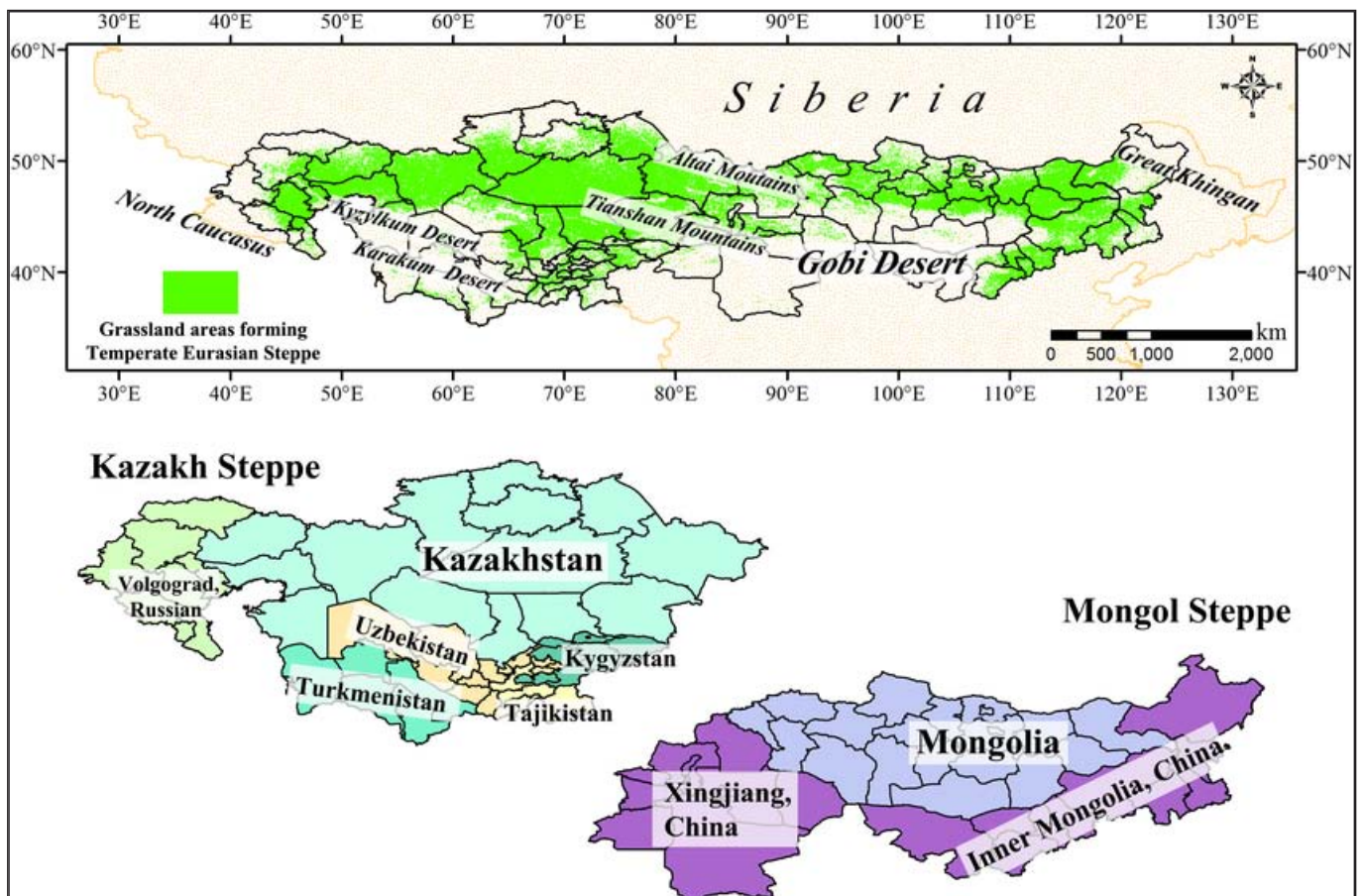


Figure No. 2

## LATIN AMERICA

### CONTEXT:

Peru became the first latin American country to adopt the UPI based digital payment platform.

### About:

- Latin America is composed of 20 countries.
  - ▶ **In North America:** Mexico.
  - ▶ **In Central America:** Costa Rica, Cuba, Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Nicaragua, and Panama.
  - ▶ **In South America:** Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay, and Venezuela.

## KASHMIR'S WHITE GOLD

### CONTEXT

Last year, the Geological Survey of India (GSI), announced that it had established lithium reserve of 5.9 MT in Jammu & Kashmir's Reasi district, putting India among the top 10 countries with such reserves. However, private companies have been reluctant to bid.

### About Lithium:

- Lithium (Li) is a **non-ferrous metal** and is one of the key components in EV batteries.
- It's a silvery-white metal with a delicate texture.

- It is the lightest metal and the lightest solid element under normal circumstances.
- It must be kept in mineral oil since it is very reactive and combustible.
- It is both an alkali and a rare metal.
- **Application:** Rechargeable batteries for mobile phones, laptops, digital cameras and electric vehicles. Lithium is also used in some non-rechargeable batteries for things like heart pacemakers, toys and clocks.

## WESTERLIES TO TRIGGER RAINS

### CONTEXT

Under the influence of **strong westerly winds** along the Kerala coast, the State is likely to experience widespread rainfall.

### Air Circulation Pattern

- The **equatorial regions of Earth** receive more heat from the Sun compared to other parts of the world. This results in differences in air temperature, density, and pressure, which cause air to move, **creating wind**.
- This movement of air is part of the **general circulation of the atmosphere**, which plays a crucial role in **transporting heat from the equatorial regions to the poles and returning cooler air to the tropics**.
- Due to Earth's rotation, winds do not travel directly from high-pressure to low-pressure areas.

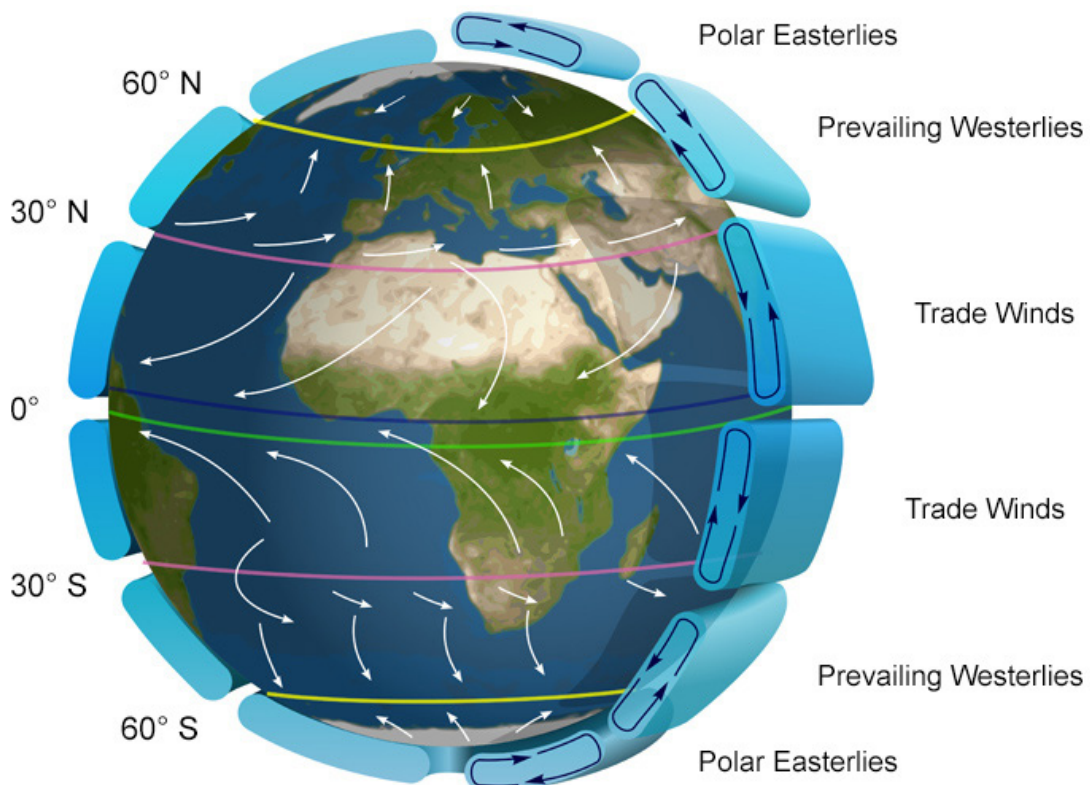


Figure No. 3

- The **Coriolis force** influences the direction of the wind, causing it to deflect to the right in the northern hemisphere and to the left in the southern hemisphere.
- There are **six major air circulation patterns**, three in each hemisphere. Each one of them rules roughly 30 degrees of latitude, like wind belts around the Earth.
  - ▶ **Polar Easterlies:** These winds form between 90 degrees (the North and South Poles) and 60 degrees latitude. Cold air at the poles moves towards 60 degrees, where it heats up, expands, rises, and then cycles back in a **counterclockwise loop**.
  - ▶ **Trade Winds:** These winds occur between the Equator (0 degrees) and 30 degrees latitude in both hemispheres. Warm air at the Equator rises, moves towards 30 degrees, cools down, and sinks, creating a **consistent wind pattern**.
  - ▶ **Prevailing Westerlies:** These winds form between 30 degrees and 60 degrees latitude in both hemispheres. Air trapped between these latitudes forms a new convection current, moving in a **clockwise direction**.
- Founded 1600 years ago, Nalanda is recognized as the **world's first residential university**, pre-dating Oxford and Bologna by over 500 years.
- **Curriculum:** The university offered a diverse range of subjects including Buddhist scriptures, philosophy, mathematics, logic, astronomy, and medicine.
- Regarded as the **second-oldest university** in the world after **Takshashila**, it served as a residential campus and existed for **800 years**.
- **Decline:** Nalanda began its decline during the late Pala period but faced devastation during Bakhtiyar Khilji's invasion around 1200 CE. The library, housing millions of manuscripts, was famously burned for three months.
- **Historical Travellers:** Accounts from Chinese travelers like **Hiuen-Tsang and I-Tsing** provide detailed insights into the university's academic and cultural richness.
- **UN Heritage Site:** The ruins of Nalanda were recognized as a UNESCO World Heritage Site in 2016, underscoring its global historical significance.

(Figure no. 3 on previous page)



## FACT BOX

### Jet Stream

- The collision between the **Polar Easterlies (high-pressure air)** and the **Prevailing Westerlies (lower pressure air)** forms a **fast, powerful wind** that moves from the west to the east - the Jet Stream.
- The Jet Stream moves in a **swirl pattern** and changes on a daily basis.
- It is responsible for the **transportation of weather systems**.



## FACT BOX

### Takshila

- **Founded in:** 5th-6th century BCE.
- The world's first University was established in Takshila or Taxila or Takshashila (now in Pakistan).
- This centre of learning was an important Vedic/Hindu and Buddhist center of learning.
- Chinese travellers like **Fa Hian (Faxain) and Huien Tsang (XuanZang)** also speak of Takshila in their writings.
- Takshashila is perhaps best known because of its association with Chanakya (Chanakya's famous treatise **ArthaShastra** is said to have been written in Takshashila).

## NALANDA UNIVERSITY

### CONTEXT

The Prime Minister, Shri Narendra Modi inaugurated the new campus of Nalanda University at Rajgir, Bihar. The University is conceived as a collaboration between India and **East Asia Summit (EAS) countries**. The University has a deep connection with history. The original Nalanda University, established around 1600 years ago, is considered to be amongst the first residential universities in the world. The ruins of Nalanda were declared as a UN Heritage Site in 2016.

### Key-facts regarding Nalanda University:

- Nalanda University holds a significant place in the history of education, serving as one of the oldest residential universities globally.
- **Establishment:** It was established around 427 CE by **Gupta Emperor Kumaragupta I**. Later, it also received patronage from **Harshavardhana and the Pala rulers**.

## SRINAGAR RECOGNISED AS 'WORLD CRAFT CITY'

### CONTEXT

Srinagar has earned global acclaim as the **fourth Indian city** to be designated a **'World Craft City'** by the **World Craft Council (WCC)**. This prestigious recognition comes three years **after Srinagar joined the UNESCO Creative City Network** for its rich traditions in crafts and folk arts.

### Craft Forms Thriving in Srinagar

- The recognition highlights Srinagar's diverse array of traditional crafts, which contribute significantly to its cultural identity and local economy.
- Here are some of the prominent craft forms celebrated in Srinagar and its suburbs:



Craft Form	Description
<b>Papier-mâché</b>	Intricate art of creating decorative objects using paper pulp and painted motifs.
<b>Walnut Wood Carving</b>	Exquisite woodwork known for its detailed carvings and traditional designs.
<b>Carpets</b>	Hand-knotted carpets renowned for their intricate patterns and craftsmanship.
<b>Sozni Embroidery</b>	Fine needlework characterized by delicate thread embroidery, often on fabrics like silk and wool.
<b>Pashmina and Kani Shawls</b>	Luxurious textiles woven from fine Pashmina wool and adorned with intricate Kani weaving patterns.

**World Craft City Designation**

- The World Craft City (WCC) initiative, launched in 2014 by the **World Crafts Council AISBL**, aims to recognize the cultural, economic, and social contributions of local crafts worldwide.
- India now boasts four cities under this prestigious designation, including **Jaipur, Mysore, Mamallapuram, and now, Srinagar**.
  - **Jaipur** (Kundan Jadai (Gem setting), Meenakari Jewellery, Lac based craft, Gotta Patti Work)
  - **Mysuru** (Kinnal paintings, Sandalwood carvings, Rosewood Inlay)
  - **Mamallapuram** (Stone Carving continuing since Pallava dynasty)
  - AND now Srinagar

**About the World Craft Council (WCC International)**

- The World Craft Council (WCC) International, established in 1964 by Kamaladevi Chattopadhyay and Aileen Osborn Webb, operates as a non-profit, non-governmental organization registered in Belgium.
- It is affiliated with UNESCO and organized into five regional branches, fostering global fellowship among craftspeople and promoting economic development through craft-related activities.

**BUDDHA’S RELICS**

**CONTEXT:**

The division of assets between **Telangana and Andhra Pradesh** has sparked debate over cultural heritage and historical artifacts, including **relics of Gautama Buddha**,

housed in museums across Hyderabad. This division aims to distribute antiquities based on their origin and acquisition timelines, amidst concerns about preserving historical integrity and regional identity.

**What are relics (Sariras)?**

- The Maha Parivirvana (passing away) of the Buddha took place in 544 B.C. at Kusinara in the country of the Mallas. After his death, his funeral relics, including bodily remains like tooth, bones, and hair, were collected and divided into eight shares among different communities.
- His funeral relics were collected and divided into eight shares to be distributed among them:
  - Ajathsatrus of Magadha
  - Vaishali’s Licchavis
  - the Sakyas of Kapilavastu
  - Housing in Kushinagar
  - Alakappa Bullies
  - Mallas of Pava
  - the Colossians of Ramagrama once
  - Brahmana of Vethadipa

**Type of Relics:**

- **Corporeal Relics (Saririras):** Actual bodily remains of the Buddha, such as teeth and bones.
- **Utilitarian Relics (Paribhogika):** Objects that belonged to the Buddha during his life, such as his alms bowl, robes, and staff.
- **Teachings Relics (Dharma):** Objects associated with the Buddha’s teachings, like sutras and mantras.
- **Commemorative Objects (Uddesika):** Symbols like Buddha images and footprints that serve as reminders of his life and teachings.
- **Ashoka’s Role:** Emperor Ashoka (c. 268 to 232 B.C.), ruler of the Maurya Dynasty, played a pivotal role in spreading Buddhism beyond India, sending missionaries to various parts of Asia including Sri Lanka, Central Asia, and Southeast Asia.
  - According to Ashokavadana, Ashoka had relics of Buddha placed on 84,000 stupas made up of Yakshas (usually gentle natural spirits).



**FACT BOX**

**About Buddhism**

- Siddhartha Gautama, the founder of Buddhism, was born in 563 BCE. He passed away in 483 BCE (*Mahaparinirvana*) at the age of 80 in Kushinagar, Uttar Pradesh.
- **Reason behind emergence of Buddhism:** Buddhism arose as an alternative to the ritualistic and sacrificial practices prevalent in the Vedic tradition.



- **Four Noble Truths:** The core teachings of Buddhism are encapsulated in the Four Noble Truths:
  - ▶ **Suffering (Dukkha):** Life is characterized by suffering and dissatisfaction.
  - ▶ **Cause of Suffering (Samudaya):** Craving and attachment lead to suffering.
  - ▶ **Cessation of Suffering (Nirodha):** Suffering can be ended, leading to Nirvana.
  - ▶ **Path to the Cessation of Suffering (Magga):** The Eightfold Path provides a way to achieve Nirvana.
- **Schools of Buddhism:** Buddhism is broadly divided into two main schools:
  - ▶ **Theravada (Hinayana):** Emphasizes individual liberation and the original teachings of the Buddha.
  - ▶ **Mahayana:** Focuses on compassion and the potential for all beings to attain Buddhahood.
- **Vajrayana:** A smaller school known for its esoteric practices and found primarily in Tibetan Buddhism.

## SHREE JAGANNATH TEMPLE

### CONTEXT

The **12th-century Shree Jagannath temple** in Puri has opened all four gates.

### About Shree Jagannath Temple:

- The Shree Jagannath temple, also known as Srimandir, is located in Puri, Odisha.
- Built during the rule of **Anantavarman Chodaganga Deva** of the **Ganga dynasty**, it covers an area of 10.734 acres.
- The temple is enclosed by two walls: **Meghanada Prachira (outer wall)** and **Kuruma Prachir (inner enclosure)**.

### Four Gates of the Temple:

- ▶ **Singha Dwara (Lion's Gate):** Located in the east, it is the main entrance. Traditionally believed to grant 'mokshya' (liberation) to devotees.
- ▶ **Vyaghra Dwara (Tiger Gate):** Found in the west, symbolizes 'dharma' (duty and righteousness).
- ▶ **Hasti Dwara (Elephant Gate):** Positioned in the north, signifies prosperity.
- ▶ **Aswa Dwara (Horse Gate):** Situated in the south, represents 'kama' (desire), with entry requiring detachment from lustful feelings.

### Significance of Each Gate:

- ▶ Each gate is associated with specific rituals and beliefs:
  - ◆ The south gate is used by the Puri Gajapati (Maharaja of Puri) during certain rituals. Seers and saints traditionally enter through the south gate.

- ◆ Sacred logs (Daru) for crafting new idols enter through the north gate (Uttara Dwara).
- ◆ Servitors typically use the west gate (Paschima Dwara) for temple duties.

## SATNAMI SECT

### CONTEXT

The Satnami sect has recently made headlines due to their protest against the government in Chhattisgarh regarding the desecration of **Jaitkham**, a **sacred religious site** located in the Baloda Bazar district.

### Who are the Satnamis?

- The Satnamis are a predominantly Scheduled Caste sect living mainly in Chhattisgarh and parts of Madhya Pradesh.
- Guru Ghasidas, an **18th-century saint** is revered as the spiritual leader of the Chhattisgarh Satnamis.
- Furthermore, the Satnamis find their roots in the teachings of Kabir, a **15th-century Bhakti poet** who advocated for the worship of an immanent, formless Absolute.
- **1657:** A mendicant named Birbhan, inspired by the teachings of Kabir, founded a Satnami community in Narnaul in present-day Haryana in 1657. Initially, most Satnamis belonged to an "untouchable" caste engaged in leatherwork.

### Features:

- ▶ They rejected ritual and superstition
- ▶ They forbid caste distinctions within their community.
- ▶ Displaying sympathy towards the poor and skepticism towards authority and wealth



### FACT BOX

#### Guru Ghasidas (1756-1836)

- Guru Ghasidas was born in Chhattisgarh in an untouchable family. Ghasidas was born in a socio-political milieu of misrule, loot and plunder.
- He was a great social reformer and philosopher in Chhattisgarh.
- The Satnam Panth (sect) is said to be based on these principles formulated by Ghasidas.

#### Kabir Das (1440-1518)

- Kabir Das, a revered Indian saint and mystical poet, lived during the 15th and 16th centuries. His teachings have left a profound impact on Indian spirituality.

- **Philosophy of Oneness with God:** Kabir emphasized the **concept of unity with God** and saw karma as the true path to enlightenment. His teachings influenced people’s attitudes towards kindness and righteousness.
- **Fusion of Hindu Bhakti and Muslim Sufi Beliefs** Kabir’s love for God transcended religious boundaries, merging Hindu Bhakti and Muslim Sufi beliefs. He sought to unite Hindus and Muslims through a universal spiritual path.
- According to Kabir, every life is influenced by two spiritual truths: Jivatma (individual soul) and Paramatma (universal soul). He believed that **moksha**, or liberation, occurs through the merging of these two heavenly truths.
- **Literary Contributions:** Kabir Das authored 72 works, including Kabir Bijak, Kabir Bani, and Anurag Sagar. His literary contributions continue to inspire spiritual seekers across generations.

## RED FLAG EXERCISE AND RIMPAC EXERCISE

### CONTEXT

Indian military prowess was on display as the **Indian Air Force (IAF)** and the **Indian Navy** joined multinational war games hosted by their U.S. counterparts.

### IAF’s Participation in Red Flag Exercise:

- Red Flag is a **two-week training exercise** focused on advanced aerial combat, aiming to integrate aircrew in a multinational environment.
- It simulates realistic and challenging combat scenarios, bringing together aircrew and equipment from different nations and services.
- **Objectives:** to enhance combat readiness and interoperability among international participants. By replicating realistic combat situations, it creates a comprehensive learning environment for aircrew.
- **Locations:** Red Flag exercises take place at two main locations:
  - **Nellis Air Force Base in Nevada:** organized by the United States Air Force Warfare Center (USAFWC)
  - **Eielson Air Force Base in Alaska:** managed by the Pacific Air Forces (PACAF).
- **Red Flag-Alaska (RF-A):** RF-A is a series of field training exercises directed by the Pacific Air Forces commander. It involves U.S. and partner nation forces, focusing on enhancing their combat capabilities in the Pacific region.

### Indian Navy’s Participation in RIMPAC Exercise:

- **Began in:** 1971
- RIMPAC is the world’s **largest international maritime warfare exercise**. It is a **biennial international military exercise** hosted by the Commander of the United States Pacific Fleet.

- **RIMPAC 2024** marks the **29th installment** of this renowned international maritime exercise.
- **Key Features:** RIMPAC combines force capabilities within a dynamic maritime setting, showcasing enduring interoperability across a wide range of military operations.
- **Theme for RIMPAC 2024:** *“Partners: Integrated and Prepared”*
- The Indian Navy deployed the indigenous stealth frigate **INS Shivalik** for **Ex RIMPAC (Rim of the Pacific)**, scheduled in Hawaii from June 25 to August 2.
- The INS Shivalik, on a mission in the South China Sea and Pacific Ocean, departed to participate in the **Japan-India maritime exercise JIMEX-24** before heading to **RIMPAC-24**.
- This deployment aims to enhance interoperability with the **Japan Maritime Self-Defense Force (JMSDF), U.S. Navy**, and other partner navies.

## G7 SUMMIT

### CONTEXT

Prime Minister Narendra Modi is poised to participate in the annual G7 summit held in Italy. The summit holds significant importance in addressing pressing global issues, particularly amidst ongoing geopolitical tensions such as the Ukraine conflict.

### About the G7 Summit:

- **Founded: 1975**
- The G7 is an intergovernmental political and economic forum of industrialized democracies.
- **Composition:** United States, the United Kingdom, France, Italy, Germany, Canada, and Japan. **European Union (EU) is a “nonenumerated” member.**
- It is **not a formal institution** with a charter and a secretariat. The presidency rotates annually among member states.
- Currently presided over by Italy, the G7 aims to tackle global challenges while upholding the principles of the rules-based international system.
- **Agenda and Focus:** At the upcoming summit, a primary focus will be addressing the
  - Ukraine conflict
  - ongoing Middle East crisis and its implications for the global agenda



### FACT BOX

#### Alternatives of G7

- **BRICS:** BRICS expansion saw **Egypt, Ethiopia, Iran, Saudi Arabia, and the UAE** joining **Brazil, Russia, India, China, and South Africa** as full-fledged members. Now, the group comprises 36 per cent of global GDP (of which China alone accounts for 65 per cent of BRICS). However, G7 countries still dominate global GDP, accounting for 43.2%.

- **G20:** Many analysts believe that the power and prestige of the Group of Twenty (G20), a forum for finance ministers and central bank governors from nineteen of the world's largest countries, the EU, and the African Union (AU), has surpassed that of the G7. The G20 members represent around 85% of the global GDP, over 75% of the global trade.

## CHINA-PAKISTAN ECONOMIC CORRIDOR (CPEC)

### CONTEXT

Pakistan's Prime Minister Shehbaz Sharif is visiting China because China is Pakistan's biggest ally, and they're expected to announce the second phase of the China-Pakistan Economic Corridor (CPEC).

### What is the CPEC and why is it significant?

- The CPEC is a \$62-billion project started in 2015 by China to invest in infrastructure projects in Pakistan.
- **Objective:** to connect China's Xinjiang region with Pakistan's Gwadar and Karachi ports.
- It is part of **China's Belt and Road Initiative (BRI)**.
- It's important because it helps China expand its influence and gives it direct access to the Indian Ocean through Pakistan.
- **First phase of CPEC:** In the first phase, some power projects and transport projects were completed, but progress has been slow overall, with many projects not yet started or completed.

## INTERNATIONAL CRIMINAL COURT (ICC)

### CONTEXT:

The International Criminal Court issued arrest warrants for Sergei Shoigu, the former Russian defence minister, and leading Russian general Valery Gerasimov on Tuesday for alleged crimes committed during Russia's invasion of Ukraine.

### About:

- ICC is the world's first permanent international criminal court.
- It is governed by an international treaty called '**The Rome Statute**'.
- ICC is not a UN organization but it has a cooperation agreement with the United Nations.
- **Headquarters:** The Hague, the Netherlands.
- **Jurisdiction:** The Rome Statute, grants the ICC jurisdiction over four main crimes:

### ▫ The crime of Genocide

- **Crimes against Humanity**
- **War crimes**
- **Crime of Aggression**
- **Membership:** Most countries on Earth – 123 of them – are parties to the treaty, but there are very large and notable exceptions, including Russia, India and the US. And, for that matter, Ukraine.
- Ukraine also is not a member of the international court, but it has granted it jurisdiction over its territory

### Rome Statute

- The Rome Statute, a multilateral treaty, is the foundation and governing document of the **International Criminal Court (ICC)**.
- The Rome Statute of the International Criminal Court is an agreement that led to the formation of the International Criminal Court (ICC).

### Crime of Aggression

- The crime of aggression is broadly defined as the **invasion of, or attempt to gain political and military control over, another sovereign state**. While the ICC is the world's permanent war crimes court, it cannot prosecute aggression.

## INDUS WATER TREATY

### CONTEXT:

Demands are on rise to revisit the Indus Water Treaty.

### About

- The six-decade-old treaty governs the sharing of waters of six rivers in the Indus system between the two countries.
- **Main Rivers:** Indus River, Jhelum, Chenab, Ravi, Beas, and Sutlej.
- The basin is mainly shared by **India and Pakistan** with a small share of **China and Afghanistan**.
- Under the treaty signed between **India and Pakistan in 1960**, all the waters of
  - **Eastern rivers**, namely **Ravi, Sutlej, and Beas (Eastern Rivers)** were allocated to India for exclusive use
  - **Western rivers - Indus, Jhelum, and Chenab** were allocated to Pakistan except **for specified domestic, non-consumptive, and agricultural use** permitted to India as provided in the Treaty.
- India has also been given the **right to generate hydroelectricity** through **run-of-the-river (RoR)** projects on the Western Rivers which, subject to **specific criteria** for design and operation is unrestricted.

**River Indus:**

- The Indus is a trans-boundary river of Asia and a trans-Himalayan river of South and Central Asia.
- The 3,120 km (1,940 mi) river rises in mountain springs northeast of Mount Kailash in Western Tibet, flows northwest through the disputed region of Kashmir, bends sharply to the left after the Nanga Parbat massif, and flows south-by-southwest through Pakistan, before emptying into the Arabian Sea near the port city of Karachi.

- It is formed to **replace the existing MEIS (Merchandise Exports from India Scheme)**.
- The scheme will ensure that the exporters **receive the refunds** on the embedded taxes and duties previously non-recoverable.
- The scheme was brought about with the **intention to boost exports** which were relatively poor in volume previously.

**Key Features of the Scheme**

- **Refund of the previously non-refundable duties and taxes:** Mandi tax, VAT, Coal cess, Central Excise duty on fuel etc. will now be refunded under this particular scheme. All the items under the MEIS and the RoSTCL (Rebate of State and Central Taxes and Levies) are now under the purview of the RoDTEP Scheme.
- **Automated system of credit:** The refund will be issued in the form of transferable electronic scrips. These duty credits will be maintained and tracked through an electronic ledger.
- **Quick verification through digitisation:** Through the introduction of the digital platform, the clearance happens at a much faster rate. Verification of the records of the exporters will be done with the help of an IT-based risk management system to ensure speed and accuracy of transaction processing.
- **Multi-sector scheme:** Under RoDTEP, all sectors, including the textiles sector, are covered, so as to ensure uniformity across all areas.

**LEADER OF OPPOSITION (LOP)**

**CONTEXT**

Congress leader Rahul Gandhi was officially recognised as the **Leader of Opposition (LoP)** in the 18th Lok Sabha.

**What is the role of Leader of Opposition (LoP)?**

- A Leader of Opposition is the PM-in-waiting.
- The LoP holds an important position in a parliamentary democracy.
- He is a part of the high-level committee that selects the
  - Chief Election Commissioners
  - heads of central agencies like the CBI and ED.
  - Lokpal
  - Chief Vigilance Commissioner
  - National Human Rights Commission chairperson.
- **LoP is a "shadow Prime Minister":** According to the 'Practice and Procedure of Parliament', a manual published by the Lok Sabha Secretariat, as a shadow Prime Minister, the LoP has to be prepared to "take up the responsibility of forming a government if his party secures a majority at an election or if the government resigns or is defeated."
- The position — both in Lok Sabha and Rajya Sabha — has statutory recognition. The LoP is given salary and certain other facilities and amenities as mandated by **The Salary and Allowances of Leaders of Opposition in Parliament Act, 1977.**

**RODTEP (REMISSION OF DUTIES AND TAXES ON EXPORT PRODUCTS)**

**CONTEXT:**

Centre has notified the rates and guidelines for **Remission of Duties and Taxes on Exported Products (RoDTEP) export incentive scheme.**

**About**

- RoDTEP stands for **Remission of Duties and Taxes on Export Products.**

**PRADHAN MANTRI BHARATIYA JANAUSHADHI PARIYOJANA (PMBJP)**

**CONTEXT:**

Following Mauritius' successful adoption (first country to adopt the **Jan Aushadhi Scheme**) of India's 'Jan Aushadhi Scheme', Nepal has approached India to establish Jan Aushadhi Kendras in its country. This move aims to provide Nepalese citizens with access to low-cost, high-quality generic medicines manufactured in India.

**About the Scheme:**

- **Pradhan Mantri Bharatiya Janaushadhi Pariyojana (PMBJP)** is a **flagship scheme** of the Indian government, aimed at making quality generic medicines available at affordable prices.
- This is achieved through dedicated outlets called **Pradhan Mantri Bharatiya Janaushadhi Kendras (PMBJK)**.
- Currently, India boasts over 10,000 PMBJKs across the country, serving as vital hubs for dispensing affordable medicines to the public.
- **Aim:** to reduce **out-of-pocket expenditure** for consumers/patients by offering quality medicines and surgical items at affordable prices.
- By popularizing generic medicines, the scheme seeks to address the financial burden associated with healthcare and promote access to essential drugs for all segments of society.



- **Implementing Agency:** The scheme is executed by the **Pharmaceuticals and Medical Devices Bureau of India**, an autonomous society under the **Department of Pharmaceuticals**.
  - ▶ Through its extensive network of PMBJKs, the scheme ensures the availability of a wide range of generic medicines, catering to diverse healthcare needs across India.

## PRADHAN MANTRI KISAN SAMMAN NIDHI (PM-KISAN) SCHEME

### CONTEXT

Prime Minister Narendra Modi has approved the disbursement of the **17th installment of PM-Kisan Nidhi**, benefiting approximately 9.3 crore farmers with an estimated distribution of around Rs 20,000 crore.

### Overview of PM-KISAN Scheme:

- **Started in:** 2019
- **Objective:** to provide income support to all landholder farmer families across India.
- Under **Pradhan Mantri Kisan Samman Nidhi (PM-KISAN) Scheme**, eligible farmer families receive a financial benefit of Rs. 6,000 per year, provided in three installments of Rs. 2,000 each.
- Implemented as a Central Sector Scheme, PM-KISAN receives 100% financial support from the Central government.
- The financial assistance is directly transferred to the beneficiaries' bank accounts.
- **Implemented by:** Ministry of Agriculture and Farmers Welfare
- **PM-KISAN Mobile App:** Developed and designed by the National Informatics Centre in collaboration with the Ministry of Electronics and Information Technology

### Major schemes in Agriculture

Central Sector Schemes	
<b>Pradhan Mantri Kisan MaanDhan Yojana (PM-KMY)</b>	<ul style="list-style-type: none"> <li>◦ <b>Launched:</b> 2019</li> <li>◦ <b>Aim:</b> providing security to vulnerable farmer families.</li> <li>◦ It operates as a contributory scheme, where small and marginal farmers (SMFs) can opt to become members by paying monthly subscriptions to the Pension Fund, with matching contributions from the Central Government.</li> <li>◦ <b>Life Insurance Corporation (LIC)</b> serves as the pension fund manager for PMKMY.</li> </ul>

<b>Pradhan Mantri Fasal Bima Yojana (PMFBY)</b>	<ul style="list-style-type: none"> <li>◦ <b>Launched in:</b> 2016</li> <li>◦ <b>Objective:</b> To provide a straightforward and cost-effective crop insurance solution.</li> <li>◦ <b>Coverage and Purpose:</b> The scheme aims to offer comprehensive risk protection for crops, safeguarding farmers against all non-preventable natural risks from pre-sowing to post-harvest stages.</li> </ul>
<b>Agriculture Infrastructure Fund (AIF)</b>	<ul style="list-style-type: none"> <li>◦ It was launched as part of the Aatmanirbhar Bharat Package.</li> <li>◦ <b>Objective:</b> to address existing infrastructure gaps and stimulate investment in agricultural infrastructure.</li> <li>◦ <b>Project Eligibility and Benefits:</b> <ul style="list-style-type: none"> <li>▶ Each entity can avail the scheme's benefits for up to 25 projects located in different LGD codes.</li> <li>▶ Eligible beneficiaries include a wide range of stakeholders such as farmers, agri-entrepreneurs, start-ups, cooperative societies, self-help groups, joint liability groups, and various other entities involved in agriculture and related activities.</li> </ul> </li> </ul>
<b>National beekeeping and Honey Mission (NBHM)</b>	<ul style="list-style-type: none"> <li>◦ <b>Launched in:</b> 2020 under Atma Nirbhar Bharat Abhiyan</li> <li>◦ <b>Objective:</b> overall promotion and development of scientific beekeeping &amp; to achieve the goal of "Sweet Revolution".</li> </ul>
<b>Modified Interest Subvention Scheme (MISS)</b>	<ul style="list-style-type: none"> <li>◦ ISS offers concessional short-term agricultural loans to farmers engaged in crop husbandry and allied activities such as animal husbandry, dairying, and fisheries.</li> </ul>

### Centrally Sponsored Schemes

- Rastriya Krishi Vikas Yojana Detailed Project Report based schemes (RKVY- DPR)
- Soil Health Card (SHC)
- Rainfed Area Development (RAD)
- Per Drop More Crop (PDMC)
- Micro Irrigation Fund (MIF)
- Paramparagat Krishi Vikas Yojana (PKVY)
- Sub-Mission on Agriculture Mechanization (SMAM)
- Agro-forestry
- National Food Security Mission (NFSM)
- Mission for Integrated Development of Horticulture (MIDH)
- National Bamboo Mission (NBM)
- Digital Agriculture

## CENTRAL COUNCIL OF MINISTERS

### CONTEXT

President Draupadi Murmu administered oaths to the Central Council of Ministers of the new government.

### What is the Central Council of Ministers?

- **Led by:** Prime Minister
- The Central Council of Ministers plays a vital role in government policy-making. In India's **Parliamentary system**, it serves as the **real executive authority**.
- **Constitutional Mandate:** According to **Article 74** of the Indian Constitution, the President of India, as the head of the Executive, must act on the aid and advice of the COM.
  - ▶ This article establishes the Council of Ministers with the Prime Minister at its head to aid and advise the President in exercising their functions.
  - ▶ **Appointment Process: Article 75** outlines the process of appointing ministers. The President appoints the Prime Minister, who then recommends other ministers. The size of the council should not exceed 15% of the Lok Sabha's strength.
  - ▶ **Participation in Proceedings: Article 88** empowers ministers to participate in proceedings of both the Lok Sabha and Rajya Sabha, as well as any joint session or parliamentary committee they are part of. However, it does not grant them the right to vote.

### Who are the Cabinet Ministers?

- Cabinet ministers are the **senior-most members** of the Central Council of Ministers, second only to the Prime Minister.
- They oversee critical ministries such as **Home Affairs, Finance, and Defence**, with the authority to organize meetings and make important policy decisions.

### Who are the Ministers of State (Independent Charge)?

- Ministers of State (Independent Charge) are **junior members** of the Central Council of Ministers.
- They administer their respective ministries independently, without oversight from cabinet ministers or other members of the government.

### Who are the Ministers of State?

- Ministers of State assist **cabinet ministers in their duties**.
- They are responsible for specific functions delegated to them by their superiors, typically cabinet ministers.
- Ministries like **Home, External Affairs, Health, and Education** may have multiple Ministers of State working alongside the cabinet minister.

## TAX DEVOLUTION

### CONTEXT

The Centre decided to release an additional installment of the **tax devolution share** of States along with their due share for June 2024. Effectively, Rs 1,39,750 crore is being transferred to States this month.

### What is Divisible Pool of Taxes?

- The divisible pool of taxes refers to the portion of tax revenue collected by the Union government that is shared between the Centre and the States.
- It encompasses various taxes such as corporation tax, personal income tax, Central GST, and the Centre's share of the **Integrated Goods and Services Tax (IGST)**.
- Notably, **cess and surcharge** imposed by the Centre are excluded from this pool.

### Role of the Finance Commission

- Under **Article 280** of the Constitution, the division of the divisible pool of taxes is determined by the Finance Commission, which is constituted every five years.
- Apart from distributing tax revenue, the Finance Commission also recommends grants-in-aid to States.
- **Composition of the Finance Commission:** The Finance Commission comprises a chairman and four other members appointed by the President. The qualifications for these members are specified in the **Finance Commission (Miscellaneous Provisions) Act, 1951**.

## INDIAN ARMY INTRODUCES "VIDYUT RAKSHAK"

### CONTEXT

The Indian Army has unveiled "**Vidyut Rakshak**," a cutting-edge innovation developed by the **Army Design Bureau (ADB)**, aimed at enhancing the monitoring and control of generators. This system signifies the Indian Army's commitment to leveraging advanced technologies for operational efficiency.

### About Vidyut Rakshak:

- "Vidyut Rakshak" is an **Internet of Things-enabled system** designed by the ADB to monitor, protect, and control generators within the Indian Army.
- This innovation applies to all existing generators, regardless of their type, make, rating, or age.

### Key Features:

- **Comprehensive Monitoring:** Vidyut Rakshak not only monitors generator parameters but also predicts and prevents faults, ensuring seamless operation.
- **Fault Prediction and Prevention:** The system anticipates potential faults and takes preventive measures, reducing downtime and maintenance costs.

- **Automation:** By automating manual operations, Vidyut Rakshak simplifies generator management tasks, thereby saving manpower and improving operational efficiency.
- **User-Friendly Interface:** The system features a user-friendly interface, making it easy for army personnel to operate and manage generators effectively.

## NATIONAL FORENSIC INFRASTRUCTURE ENHANCEMENT SCHEME

### CONTEXT

The Union Cabinet recently approved the **National Forensic Infrastructure Enhancement Scheme (NFIES)** to bolster scientific investigations across India and improve conviction rates in criminal cases.

### About NFIES

- **Duration:** 2024-25 to 2028-29
- **Aim:** to address the pressing need for enhanced forensic capabilities in the country.
- The NFIES seeks to establish campuses of the National Forensic Sciences University (NFSU) across various locations in India.
- Additionally, it aims to augment the infrastructure of existing Central Forensic Science Laboratories and NFSU in Delhi.
- This initiative is crucial, especially with the **implementation of new criminal laws from July 1**, which mandate forensic investigations for offenses carrying sentences of seven years or more.
- **Need of the Scheme:** There is currently a significant shortage of trained forensic professionals in these labs, making the establishment of new campuses and laboratories imperative for efficient and timely criminal investigations.

## ANAMIKA RAJEEV BECOMES NAVY'S FIRST WOMAN CHOPPER PILOT

### CONTEXT

Sub Lieutenant Anamika B. Rajeev became the Indian Navy's first woman helicopter pilot during a passing out parade held in the naval air station INS Rajali at Arakkonam in Ranipet district.

### Women in Defence Forces

#### Indian Army:

- Women officers now have opportunities for **Permanent Commission** in various branches, ensuring gender parity.
- Women candidates in **National Defence Academy (NDA)** has been opened, with cadets joining every six months.

- Women officers can now serve as pilots in the **Corps of Army Aviation**.
- Provision for enrolment of women as **Other Ranks (ORs) in Corps of Military Police** introduced.

#### Indian Navy:

- Women officers are recruited in all branches, **except Submarine specialisation**, since June 2023.
- Women officers serve on board warships and as **Specialist Naval Air Operations (NAO)** officers.
- Women officers can join the **Remotely Piloted Aircraft (RPA) stream**.
- Entry for women cadets in **NDA and Indian Naval Academy (INA)** has been permitted, increasing vacancies for women cadets.

#### Indian Air Force:

- Facilities for women personnel are provided as per authorized scales.
- Recruitment of officers is gender-neutral, with women officers inducted in all branches and streams.
- Women officers can serve in combat roles without restrictions.
- Entry for women officers through NDA and NCC Special Entry has been initiated.
- Various induction publicity programmes are conducted to encourage women candidates to join IAF.



### FACT BOX

#### The numbers

- A total of 11,414 women personnel are serving in the three services, with the Indian Army having the maximum of 7,054 of them, according to government data.
- The total number includes officers, other ranks, as well as those in medical, dental, and nursing services.
- The number of female personnel employed in the three services, excluding those in medical, dental, and nursing services, comes to 4,948.

## TELE MANAS CELL FOR ARMED FORCES

### CONTEXT

The **Ministry of Health and Family Welfare (MoHFW)** and the **Ministry of Defence (MoD)** signed an agreement (MoU) to establish **Tele MANAS Cell** in Pune. The military faces unique challenges that can affect mental health. These challenges need special attention and support.

## What is Tele MANAS?

- Tele Mental Health Assistance and Networking Across States (Tele-MANAS) is a service that provides **mental health support** over the phone. It's part of a larger program called the **District Mental Health Programme (DMHP)**.
- **National Apex Centre:** National Institute of Mental Health and Neuro Sciences (NIMHANS), Bengaluru

### Current Situation:

- ▶ There are already 51 Tele MANAS cells working across all States and UTs, offering services in 20 languages.
- ▶ Since it started in October 2022, Tele MANAS has received over 10 lakh calls (a lakh is 100,000) and handles more than 3,500 calls every day.
- ▶ This shows there's a big need for mental health support, especially in places like the Armed Forces.

### Government Health Initiatives:

- ▶ India's Mental Healthcare Act, 2017
- ▶ National Mental Health Programme (NMHP)
- ▶ National Tele Mental Health Programme
- ▶ NIMHANS and iGOT-Diksha Collaboration
- ▶ Ayushman Bharat - Health and Wellness Centres (AB-HWCs)
- ▶ World Health Day
- ▶ Kiran Helpline, Manodarpan Initiative

## INDIA'S CONSUMER PRICE INFLATION

### CONTEXT

The recent report on **India's consumer price inflation** for May 2024 has garnered attention due to its implications for the country's economic landscape. Consumer price inflation is a crucial indicator of the cost of living for citizens and plays a significant role in shaping monetary policy decisions by the **Reserve Bank of India (RBI)**.

### Key Findings:

- **Easing of Consumer Price Inflation:** In May 2024, India witnessed a slight easing in consumer price inflation, reaching a one-year low of 4.75%, down from 4.83% in April.
- **Stagnant Food Prices:** Food prices, however, remained unchanged, with a significant spike of 8.7%, particularly impacting urban households with a sharper rise of 8.83%.
- **Comparison to Previous Year:** This is in contrast to the previous year when retail inflation stood at 4.31%, with food prices rising less than 3%.
- **Surge in Vegetable Prices:** Vegetable prices surged by 27.3% in May, contributing to the overall inflationary pressure, while other food items like cereals, eggs, fruits,

and pulses also experienced significant inflation rates.

- **Challenges for Monetary Policy:** Despite retail inflation staying below 6% since September 2023, it remains above the central bank's target of 4%, posing challenges for monetary policy management.
- **Projections and Policy Response:** Projections suggest a potential moderation in food inflation, which could lead to a policy response from the RBI, such as a reduction in the policy interest rate to mitigate economic pressures.



### FACT BOX

#### About Consumer Price Inflation (CPI)

- CPI refers to an increase in the price level of a selected basket of goods and services over a select period of time.
- It measures retail inflation by collecting data on the prices of goods and services that are consumed by the retail population of the country.

#### CPI is used as a:

- ▶ macroeconomic indicator of inflation
- ▶ tool by the central bank and government for inflation targeting and for inspecting price stability
- ▶ deflator in the national accounts.
- **Main component:** food and beverages, followed by cereals and pulses, and milk and products.
- **CPI formula:**  $(\text{Price of basket in current period} / \text{Price of basket in base period}) \times 100$

## DIGITAL PAYMENTS INTELLIGENCE PLATFORM

### CONTEXT:

The Reserve Bank of India plans to set up a centralised digital payments intelligence platform for sharing data on a real-time basis across digital payment ecosystem aimed at detecting fraud.

### What is Digital payments intelligence platform?

- A Digital Payments Intelligence Platform is a sophisticated technology solution that leverages big data analytics, artificial intelligence (AI), and machine learning (ML) to provide insights into digital payment transactions. It's designed to analyze vast amounts of transaction data in real-time, identify patterns, detect anomalies, and predict future trends.
- AI and ML play a crucial role in these platforms. They help in fraud detection by identifying unusual patterns or anomalies in transactions that could indicate fraudulent activity.



- To advance this initiative, the RBI has formed a committee chaired by **A.P. Hota**.
- According to the annual report released by the RBI, there was a significant surge in the number of financial frauds reported by banks, increasing by 166% year-on-year in the financial year 2023-24. This starkly contrasts with the 13,564 cases reported in the previous fiscal year.

## INDIA TRADE DEFICIT WIDENS

### CONTEXT

India's merchandise trade deficit widened to a seven-month high in May, driven largely by a surge in imports, according to official data released by the commerce ministry.

### What is Trade Deficit?

- Trade deficit refers to a scenario in international trade where a country's expenditures on imports exceed its earnings from exports. It is also termed as a negative balance of trade.
- **Components of Trade Deficit Calculation:** The calculation of trade deficit encompasses various transactions in international trade:
  - **Goods and Services:** Includes imports and exports of physical goods and intangible services.
  - **Capital Account Transactions:** Involves asset transfers like trademark rights or mining rights.
  - **Current Account Transactions:** Encompasses primary income (e.g., dividends, interest, remittances) and secondary income (e.g., private remittances, pension payments).
- **Impact of Trade Deficit:** Trade deficit affects a country's balance of payments, reflecting all international transactions. It indicates the economic health concerning global interactions.
  - **Consumption Patterns:** Reflects residents' ability to purchase more goods than produced domestically.
  - **Capital Account:** Indicates foreign currency financing through loans and investments.

## OPEC+ EXTENDS OIL OUTPUT CUTS

### CONTEXT

OPEC+ extended deep oil output cuts until 2025 due to tepid demand growth and rising U.S. production. Current cuts of 3.66 million bpd were extended until end of 2025. Additional cuts of 2.2 million bpd extended until September 2024. These cuts will be gradually phased out from October 2024 to September 2025.

### What are OPEC and OPEC+?

- **OPEC Formation:** Established in 1960 by **Iraq, Iran, Kuwait, Saudi Arabia, and Venezuela**, OPEC aimed to coordinate petroleum policies and stabilize prices.
- **Membership:** Currently comprises 12 countries, primarily from the Middle East and Africa, collectively representing about 30% of global oil production.

- **OPEC Current Members:** Saudi Arabia, United Arab Emirates, Kuwait, Iraq, Iran, Algeria, Libya, Nigeria, Congo, Equatorial Guinea, Gabon, and Venezuela.
- **OPEC+ Partners:** Russia, Azerbaijan, Kazakhstan, Bahrain, Brunei, Malaysia, Mexico, Oman, South Sudan, and Sudan.
- **OPEC+:** Formed at the end of 2016, OPEC+ is a coalition including 10 non-OPEC oil exporters like Russia.
- **Objective:** Together, OPEC and OPEC+ aim to regulate global oil supply, accounting for approximately 41% of global oil production.

## ALTERNATE INVESTMENT FUNDS (AIFS)

### CONTEXT

In recent months, the Reserve Bank of India (RBI) has implemented and subsequently adjusted regulations concerning **Alternate Investment Funds (AIFs)**. The Indian government has asked the central bank to exempt **sovereign funds** (including a fund called **Special Window for Affordable and Mid-Income Housing (SWAMIH)**) from a recent set of tightened rules concerning investments in alternate investment funds (AIFs)

### What is AIF?

- Alternate Investment Funds (AIFs) are pooled investment vehicles that invest in assets other than traditional stocks and bonds.
- They include various categories like **private equity, venture capital, real estate funds, etc.**



### FACT BOX

#### About SWAMIH

- **Set up in:** 2019
- **Sponsored by:** Ministry of Finance
- **Managed by:** SBICAP Ventures
- **Backed by:** State Bank of India
- **Aim:** to support affordable housing projects by providing debt financing for stalled housing projects

## FRONT-RUNNING IN FINANCIAL MARKETS

### CONTEXT:

Front-running has become a significant concern in financial markets, particularly involving mutual funds and large investors. This practice, though illegal, persists as a serious violation that undermines market integrity.

## What is Front-Running?

- Front-running occurs when individuals or entities use confidential information about impending trades by large investors to profit from anticipated price movements.
- This **unethical practice** is typically carried out by insiders or intermediaries who exploit their access to sensitive information.
- **Mechanism of Front-Running:** Front-running exploits the impact of large trades on stock prices.
  - ▶ For instance, if a mutual fund plans to buy Rs 100 crore worth of shares, an insider might buy Rs 1 crore of the same stock beforehand. When the fund's trade pushes up the stock price by, say, 2%, the front-runner profits Rs 1 lakh from the price increase.
- **Detection and Regulatory Measures**
  - ▶ Securities and Exchange Board of India (Sebi) employ **sophisticated algorithms and data analytics** to detect instances of front-running and insider trading.
- **Impact on Mutual Funds and Investors**
  - ▶ While direct financial losses to mutual fund investors are rare, front-running tarnishes the reputation and credibility of asset managers.
  - ▶ It raises concerns about ethical practices within these institutions, potentially eroding investor trust and confidence.

## E-RUPEE

### CONTEXT:

A recent report highlighted that there has been a significant decline in usage of e-rupee, India's digital currency, dropping to just one-tenth of its peak in December.

## What is e-rupee?

- In 2022, the Reserve Bank of India (RBI) had launched the Central Bank Digital Currency (CBDC) — digital rupee or e-rupee (₹).
- A CBDC is the legal tender issued by a central bank in a digital form. It is the same as a fiat currency and is exchangeable one-to-one with the fiat currency. Only its form is different.
- E-rupee is a digital form of currency issued by the RBI, akin to digital currency notes. It is regulated and backed by the RBI, ensuring it has intrinsic value and is recognized as legal tender.
- **Types of CBDCs:**
  - ▶ **Retail CBDCs:** These are designed for general public use in everyday transactions, akin to the way physical cash is used currently.
  - ▶ **Wholesale CBDCs:** These are intended for use by financial institutions for interbank settlements and other wholesale transactions, enhancing efficiency and security in large-scale financial operations.

## RBI'S INCOME & EXPENDITURE

### CONTEXT

The **Reserve Bank of India (RBI)** announced a **record surplus transfer** to the government for the fiscal year 2024 (FY24), amounting to Rs 2,10,874 crore. This represents a significant increase compared to the previous year's surplus transfer.

## Income and Expenditure Overview

- **Income:** The RBI's total income saw a notable rise, driven primarily by an increase in interest income from both domestic and foreign sources.
  - ▶ **Interest income** includes earnings from **rupee securities, liquidity operations, and foreign securities**. Despite a decline in other income categories, the overall income growth remained robust.
- **Expenditure:** A sharp decline in provisions, which are funds set aside for contingencies, significantly reduced the RBI's overall expenditure.
  - ▶ Other expenses such as the **cost of printing notes, agency charges, employee costs**, and miscellaneous expenses also saw reductions.

Components of Income	Components of Expenditure
<ul style="list-style-type: none"> <li>○ <b>Interest Income:</b> Derived from domestic and foreign sources, including interest on rupee securities, loans and advances, and foreign securities.</li> <li>○ <b>Other Income:</b> Includes earnings from commissions, profits or losses on the sale of securities, and exchange gains or losses from foreign exchange transactions.</li> </ul>	<ul style="list-style-type: none"> <li>○ <b>Provisions:</b> Allocations to the Contingency Fund (CF) for unexpected financial contingencies and risks associated with monetary and exchange rate policies.</li> <li>○ <b>Other Expenses:</b> Costs related to printing currency notes, agency charges, employee expenses, and miscellaneous costs.</li> </ul>

## INDIA'S GOLD RESERVES

### CONTEXT

In fiscal year 2023-24, the **Reserve Bank of India (RBI)** initiated a substantial transfer of **gold reserves** from the UK to domestic vaults, marking one of India's largest movements of gold since 1991.

## India's Gold Reserves

- As of March 2024, RBI's total gold reserves amount to 822.10 metric tonnes. Historically, a significant portion of this reserve was stored abroad, including with the Bank of England.

- However, the recent transfer of 100 metric tonnes to India brings the local holding to over 408 metric tonnes, almost equalizing the distribution between domestic and foreign storage.
- **Breakdown of Gold Holdings:** According to RBI's annual report for FY24, over 308 metric tonnes of gold serves as backing for issued currency notes, while an additional 100.28 tonnes is held domestically as an asset of the banking department.
- **India's Global Ranking:** India ranks **9th globally in terms of gold reserves**. This substantial holding reflects India's cultural affinity for gold and its historical significance as a store of value, contributing to the country's economic stability.



### FACT BOX

#### What is a Gold Reserve?

- A gold reserve is the **gold held by a national central bank**, intended mainly as a guarantee to redeem promises to pay depositors, note holders (e.g. paper money), or trading peers, during the eras of the gold standard, and also as a store of value, or to support the value of the national currency.
- India, like many other countries, stores a significant portion of its gold reserves in **foreign vaults**.
- The top 10 countries with the most gold reserves include the **United States, Germany, Italy, France, Russia, China, Switzerland, Japan, India and Netherlands (estimates by World Gold Council)**

(Figure No. 5)

### UPSC PYQ

**Q: Consider the following statements: (2023)**

- 1: Statement – I: Switzerland is one of the leading exporters of gold in terms of value.
- 2: Statement – II: Switzerland has the second largest gold reserves in the world.

**Which one of the following is correct in respect of the above statements?**

- (a) Both statement-I and Statement-II are correct and Statement-II is the correct explanation for Statement-I
- (b) Both Statement-I and Statement-II are correct and Statement-II is not the correct explanation for Statement-I
- (c) Statement-I is correct but Statement-II is incorrect.
- (d) Statement-I- is incorrect but Statement-II is correct.

**Solution: (c)**

### PRESTON CURVE

#### CONTEXT:

The Preston Curve illuminates a crucial relationship between **life expectancy** and **per capita income** in countries worldwide. Preston's groundbreaking research revealed a pattern where wealthier nations generally enjoy **longer life spans** compared to their less affluent counterparts. This connection underscores the profound influence of economic prosperity on public health outcomes.

### Gold reserve by Country (in tonnes)

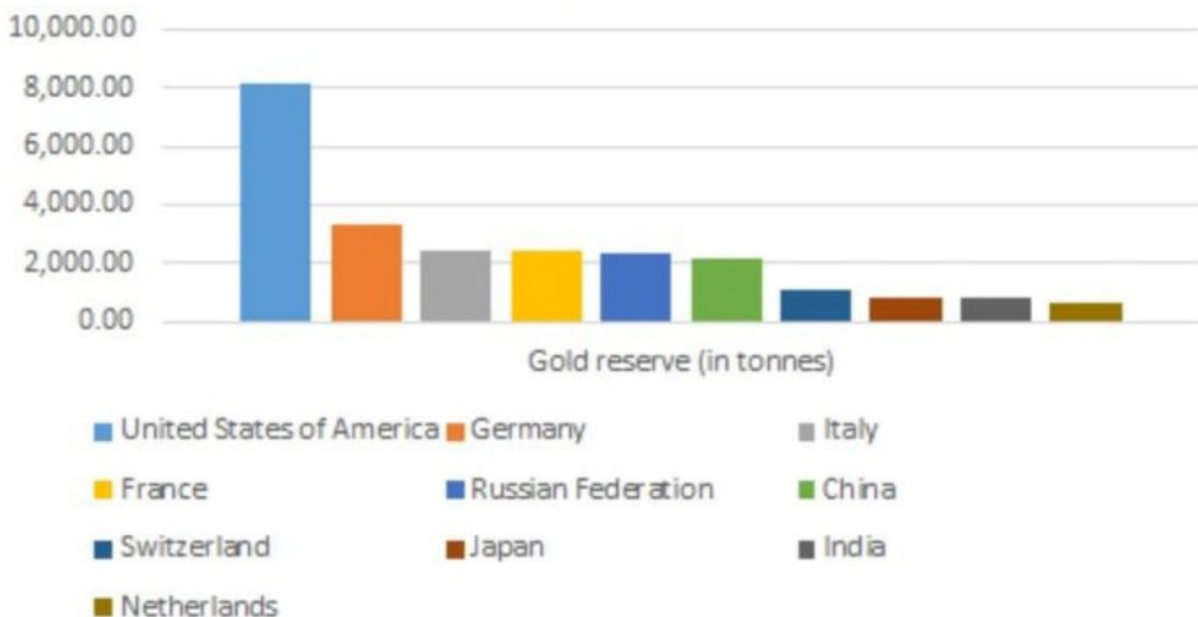


Figure no. 5

**About the Preston Curve:**

- **Proposed by:** American sociologist Samuel H. Preston in 1975
- The essence of the Preston Curve lies in its observation that as a **country's per capita income increases**, so does its **average life expectancy**.
- This correlation is attributed to various factors associated with higher income levels, including
  - ▶ improved access to healthcare
  - ▶ better education
  - ▶ cleaner environments
  - ▶ enhanced nutrition
- For instance, India's journey from an average per capita income of Rs 9,000 in 1947 to approximately Rs 55,000 in 2011 corresponded with a remarkable increase in life expectancy from a mere 32 years to over 66 years.
- **Patterns in Development Indicators:** The Preston Curve extends beyond life expectancy, encompassing a range of development indicators such as **infant and maternal mortality rates, education, and healthcare access**. These indicators tend to improve alongside rising per capita income, reflecting broader societal advancements facilitated by economic growth.

- Offshore listings are critical fundraising channels for Chinese companies. These deals also account for a bulk of the revenue global investment banks make in Asia.

**About Initial Public Offering (IPO)**

- An **Initial Public Offering (IPO)**, is when a privately held company, or a government-owned entity like **LIC**, raises funds by **selling shares** to the **public or new investors**.
- Through the IPO, the company gets its name listed on the **stock exchange**.
- **Filing with SEBI:** Before launching an IPO, the company must file its offer document with the **Securities and Exchange Board of India (SEBI)**, the market regulator.
- **SEBI Criteria:** To safeguard investors, SEBI has set rules that companies must meet before conducting an IPO. These criteria include:
  - ▶ Having net tangible assets of at least Rs 3 crore.
  - ▶ Maintaining a net worth of Rs 1 crore in each of the preceding three full years.
  - ▶ Achieving a minimum average pre-tax profit of Rs 15 crore in at least three of the last five years.



**FACT BOX**

- **Per Capita Income:** Per capita income measures the average amount of money earned per person in a nation or region. It can also be called income per person in an economic unit.
- **Calculation:** Per Capita Income = National Income / Population
- **Net National Income (NNI):** NNI serves as an indicator of the total economic activity within a country. It's calculated by subtracting the **depreciation** of fixed capital assets from the gross national income. Fixed capital assets include dwellings, buildings, machinery, transport equipment, and physical infrastructure. Essentially, NNI reflects the nation's income after accounting for the wear and tear and obsolescence of its capital assets.
- **Gross National Product (GNP):** It is the total value of all finished goods and services produced by a country's citizens in a given financial year, irrespective of their location (located domestically or abroad).
  - ▶  $GNP = GDP + \text{Net factor income from abroad}$

**EXTERNAL COMMERCIAL BORROWINGS (ECBS)**

**CONTEXT**

Shriram Finance Ltd. (private **non-banking financial company (NBFC)**), has recently announced the raising of funds totaling \$425 million and EUR 40 million through a **syndicated term loan transaction**. The three-year **external commercial borrowing facility** was structured as a social loan.

**About External Commercial Borrowings (ECBs)**

- ECBs are **commercial loans** obtained by **eligible resident entities** from **recognized non-resident entities**. These loans serve as a source of funding for various business activities.
- **Parameters:** ECBs must adhere to specific parameters, including minimum maturity periods, permitted and non-permitted end uses, maximum all-in-cost ceiling, and other regulatory requirements.
- **Routes for ECBs:** ECBs can be raised through either the **automatic route** or the approval route, depending on certain criteria.
- **Approval Route:** Under the approval route, prospective borrowers submit their requests to the **Reserve Bank of India (RBI)** through an **Authorized Dealer (AD) category-I Bank**.

**CHINA'S OFFSHORE LISTING CHALLENGES**

**CONTEXT:**

- Chinese firms aiming for **offshore listings** have hit a **regulatory roadblock**, leading to **prolonged delays and lower valuations**.



## AIR POLLUTION CRISIS

### CONTEXT:

A recent study conducted by researchers from Singapore reveals alarming statistics regarding the health impacts of air pollution. The study using data for 40 years sheds light on the **significant number of premature deaths** worldwide attributed to man-made emissions and natural sources of pollution.

### Major Air Pollutants

The major air pollutants include **PM 10, PM 2.5, Nitrogen Dioxide, Ozone, Carbon, etc.**

- **PM 10 and PM 2.5:** Extremely fine particulate matter (PM) particles, with diameters smaller than 10 and 2.5 microns, respectively.
  - ▶ **Sources include** vehicle emissions, industrial processes, wildfires, and dust storms.
- **Nitrogen Dioxide (NO<sub>2</sub>):** Results from burning of fuel, including emissions from vehicles and power plants.
  - ▶ **Impact:** Short-term exposure can worsen respiratory diseases like asthma, while long-term exposure may contribute to asthma development and respiratory infections.
- **Ozone (O<sub>3</sub>):** Forms at surface level by reaction of atmospheric pollutants in sunlight.
  - ▶ **Impact:** Associated with increased risk of hospital admissions for Chronic Obstructive Pulmonary Diseases (COPD) and cardiovascular and respiratory deaths.
- **Sulphur Dioxide (SO<sub>2</sub>):** Emitted from burning fossil fuels by power plants and industrial facilities.
  - ▶ **Impact:** Harmful to the cardiovascular system and respiratory health; can react with other compounds to form particulate matter.
- **Ammonia (NH<sub>3</sub>):** Found in high concentrations due to increased fertilizer use and livestock waste.
  - ▶ **Impact:** Contributes to aerosol pollution, harmful algal blooms, and reduces air and water quality.
- **Lead (Pb):** Toxic metal found in the Earth's crust, with increased quantities from mining, smelting, and manufacturing.
  - ▶ **Impact:** Particularly harmful to children, causing intellectual disability and behavioural disorders, even at low levels of exposure.
- **Carbon Monoxide (CO):** Toxic gas released from burning carbon-containing fuel.
  - ▶ **Impact:** Can cause unconsciousness and death at high levels; long-term exposure linked to increased risk of heart disease.

## RISING NITROUS OXIDE EMISSIONS

### CONTEXT

A recent report highlights the **sharp increase in nitrous oxide emissions** from agricultural activities. Nitrous oxide, a potent greenhouse gas, is being emitted at alarming rates due to the use of chemical fertilizers and animal waste on croplands.

### Key Findings:

- **Surging Emissions:** Between 1980 and 2020, nitrous oxide emissions soared by 40%, primarily driven by the intensified use of chemical fertilizers and animal waste in agriculture.
- **Top Emitters:** Countries like China, India, and the US are among the top 10 emitters of nitrous oxide. Brazil, Russia, Pakistan, Australia, Indonesia, Turkey, and Canada also contribute significantly to these emissions.
- **Rapid Increase in Nitrogen Fertilizers:** The use of commercial nitrogen fertilizers has seen a dramatic rise, from 60 million metric tonnes in 1980 to 107 million metric tonnes in 2020.
  - ▶ Additionally, animal manure contributed 101 million metric tonnes in 2020, resulting in a combined usage of 208 million metric tonnes.



### FACT BOX

#### About Nitrous Oxide (N<sub>2</sub>O)

- Nitrous oxide, commonly known as laughing gas or happy gas, is a colorless, non-flammable gas.
- Nitrous oxide is a highly potent greenhouse gas with a global warming potential approximately 300 times greater than CO<sub>2</sub>.
- It poses severe consequences for the environment and human health.
  - ▶ **Environmental Impact:** Soil, water, and air pollution. It also contributes to ozone layer depletion and exacerbates climate change. One pound of N<sub>2</sub>O warms the atmosphere about 300 times the amount that one pound of carbon dioxide does over a 100 year timescale.
  - ▶ **Health Risks:** Paralysis and even death.

## CATASTROPHIC BLEACHING IN LIZARD ISLAND

### CONTEXT:

Australia's Lizard Island, nestled in the northern reaches of the Great Barrier Reef, has recently been thrust into the global spotlight due to a catastrophic event—mass coral bleaching. The island has become a tragic emblem of the escalating impacts of climate change on marine ecosystems.

**Key Findings**

- Approximately 97 percent of the coral reefs surrounding Lizard Island have succumbed to bleaching and subsequent mortality.
- Coral bleaching occurs when corals expel algae, turning them white and leaving them vulnerable to disease and death.
- The severity of bleaching observed at Lizard Island underscores the rapid and devastating consequences of prolonged heat stress on marine biodiversity.

**About Lizard Island**

- Lizard Island is located in the Coral Sea off the coast of Queensland.
- It is part of the larger **Great Barrier Reef Marine Park**, a **UNESCO World Heritage** site known for its stunning coral formations and diverse marine life.

**What are coral reefs?**

- Coral reefs are the colonies of tiny living creatures called ‘**polyps**’ that are found in oceans.
- They are the underwater structures that are formed of **coral polyps** that are held together by calcium carbonate.
- They are usually found in shallow areas at a depth less than 150 feet. However, some coral reefs extend even deeper, up to about 450 feet.

**Types of Coral reefs in India:**

- **Fringing reefs:** Fringing reefs evolve and develop near the continent and remain close to the coastline. These reefs are separated from the coastline by small, shallow lagoons. They are the most commonly found reefs in the world.
- **Barrier reefs:** Barrier reefs are found offshore on the continental shelf. They usually run parallel to the coastline at some distance. A deep and wide lagoon is located between the coastline and the barrier reef.
- **Atolls:** Atolls are formed on mid-oceanic ridges. They are shaped circularly or elliptically and are surrounded by seas on all four sides and have shallow waters in the center called a lagoon.

- **Pink color:** Carotenoids are pigments that are red-orange in color. When flamingos eat foods containing carotenoids, the pigment is transferred to their body and broken down causing the flamingo to be pink.



Figure No. 6

**Lake Natron and Its Ecosystem**

- Lake Natron, nestled in northern Tanzania within Africa’s Great Rift Valley, is home to millions of pink flamingos painting its alkaline waters. However, this iconic display of nature’s beauty faces grave threats from human activities and climate change, jeopardizing the world’s largest migratory bird colony.
- Lake Natron and its neighboring lakes, like Lake Bogoria in Kenya, are hostile environments for most life forms due to their high temperatures and chemical composition, characterized by caustic soda and hypersaline waters.

**PINK FLAMINGO**

**CONTEXT**

Human activities and changing weather patterns are threatening the Pink Flamingos, world’s largest migratory bird colony.

**About Flamingos**

- Flamingos belong to the family **Phoenicopteridae**.
- They are nomads since they do not generally have permanent homes.
- Flamingoes are considered social birds and can be found in flocks of a few pairs, increasing to tens of thousands.

**DISCOVERY OF LIMBLESS AMPHIBIAN IN KAZIRANGA NATIONAL PARK**

**CONTEXT**

A team of herpetologists conducting a rapid survey in **Kaziranga National Park and Tiger Reserve** has made a notable discovery. For the first time, they recorded the presence of a **striped caecilian** (*Ichthyophis spp*), a **limbless amphibian**.

## What are Caecilians?

- Caecilians are a group of limbless, burrowing amphibians that resemble earthworms or limbless lizards like snakes and amphisbaenians.
- Order Gymnophiona:** They belong to the order Gymnophiona, one of the three extant amphibian orders alongside **Anura (frogs and toads)** and **Caudata (newts and salamanders)**.
- Habitat and Distribution:** Caecilians are mostly found in moist tropical and subtropical regions of **South and Central America, South and Southeast Asia, and Sub-Saharan Africa**.
- Terrestrial and Elusive:** They are primarily terrestrial and spend the majority of their lives underground. Caecilians burrow in various habitats such as **forests, grasslands, savannas, shrublands, and wetlands**.
- Anatomy:** Caecilians lack limbs and have no appendicular skeleton or shoulder girdle. Their spine shows a kink where the pelvic girdle once was, reflecting their adapted burrowing lifestyle.
- Caecilians play a vital role as indicator species, reflecting environmental conditions and contributing to pest control.



### FACT BOX

#### About Kaziranga National Park

- State:** Assam
- It was declared as a **National park** in 1974 and as a **Tiger Reserve** in 2006. Designated as a **UNESCO World Heritage Site** in 1985.
- It is also recognised as an Important Bird Area by BirdLife International.
- Area:** Covers an area of approximately 1,307.49 square kilometers.
- Biodiversity:** Home to the world's largest population of Indian one-horned rhinoceroses. Also hosts significant populations of **tigers, elephants, wild water buffalo, and swamp deer**.
- It receives the highest legal protection and strong legislative framework under the provisions of the **Indian Wildlife (Protection) Act, 1972 and Indian Forest Act, 1927**

## IBERIAN LYNX (LYNX PARDINUS)

### CONTEXT:

IUCN changes Iberian lynx's status to 'vulnerable' from 'endangered' in conservation success story.

## About

- The Iberian lynx (*Lynx pardinus*) is one of the four extant species within Lynx, a genus of medium-sized wild cats.
- Habitat:** The Iberian lynx is endemic to the Iberian Peninsula in southwestern Europe.
  - It inhabits **Mediterranean scrubland, oak and cork oak forests, and grasslands**.
- IUCN Status:** Vulnerable
- CITES:** Appendix II
- Threats:** Habitat loss, hunting, and a decline in prey populations—particularly the European rabbit



Figure No.: 7



### FACT BOX

#### About Mediterranean scrubland

- Mediterranean scrubland, also known as Mediterranean scrub or maquis, refers to a type of vegetation found in the Mediterranean Basin and similar climate regions around the world.
- Environment characteristics:** It is characterized by dense, evergreen shrubs, small trees, and drought-resistant plants adapted to dry summers and mild, wet winters typical of Mediterranean climates.
- Found in:** Mediterranean Sea region, Central Chile, the Southwest United States, Australia, and Africa

## ATLANTIC BLUEFIN TUNA (THUNNUS THYNNUS)

### CONTEXT

The Atlantic bluefin tuna, one of the most overfished fish species globally, now faces a new threat: warming seas. Marine heatwaves are causing bluefins to migrate to the north, according to a new study.



**About**

- **Order:** Scombriformes
- **Family:** Scombridae
- It is one of three bluefin tuna species, together with **Pacific bluefin and Southern Bluefin.**
- Atlantic bluefin tuna are the largest tuna species.
- The Atlantic bluefin tolerates a wide range of temperatures. It lives in subtropical and temperate waters of the **Atlantic Ocean** and the **Mediterranean and Black seas**, although sightings in the **Black Sea** are now rare
- Bluefin Tuna are known to be **highly migratory**, with individuals making long migrations every year.

**Conservation status:**

- ▶ **IUCN Status:** Vulnerable
- ▶ **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES):** Appendix I
- ▶ **Wildlife Protection Act, 1972:** Schedule I

The one-horned rhino has just one horn, setting it apart from its African counterparts. However, it's not the only rhino with one horn—the **Javan rhino** also sports a single horn.

- They live in areas with very fertile soil; people use the same land for farming purposes.

**GREATER ONE-HORNED RHINO (RHINOCEROS UNICORNIS)**

**CONTEXT:**

Adivasi farmers being evicted from Kaziranga, among Asia's most militarised protected areas

**About:**

- The greater one-horned rhino (Indian rhino) is the largest of the rhino species.
- **Habitat:** Tropical grassland, shrublands, savanna
- **Distribution:** Northern India (Kaziranga national park in Assam, Pobitora wildlife sanctuary) and southern Nepal.



**FACT BOX**

- Rhinoceroses are **large, herbivorous mammals** identified by their characteristic horned snouts.
- They belong to the family Rhinocerotidae
- There are currently five species of Asian and African rhinoceros
- **Black rhinos, Sumatran rhinos and Javan rhinos:** Critically Endangered
- **Greater one-horned rhinos:** Vulnerable
- **White rhinos:** Near-Threatened

(Figure No. 8)

**ENDANGERED RHINOCEROS OF THE WORLD**

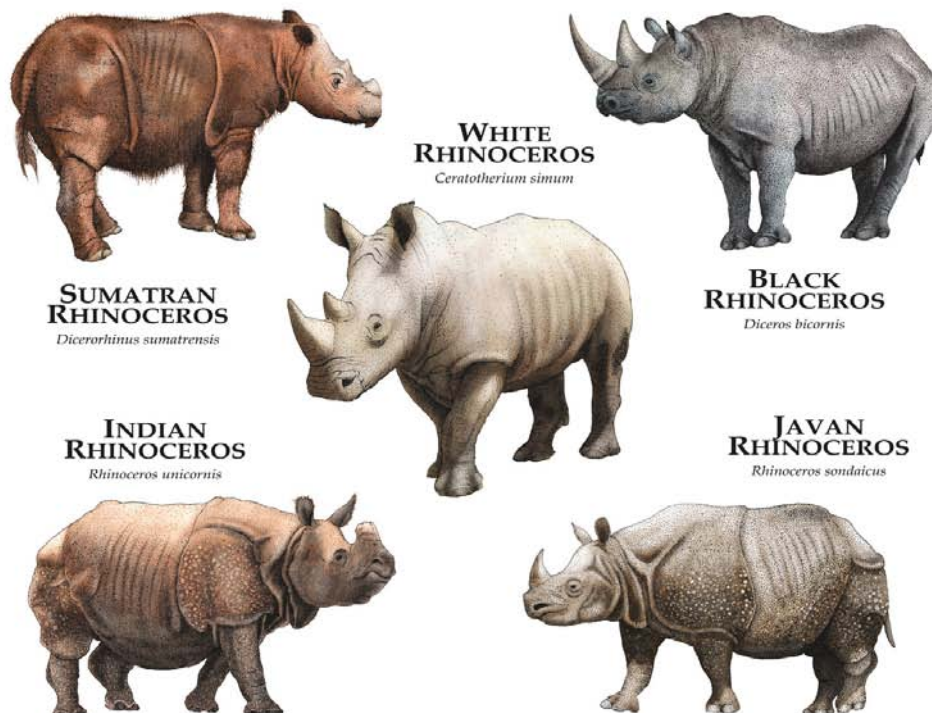


Figure no. 8



## UNDERWATER ACOUSTIC WAVES

### CONTEXT

In the frigid waters of the Arctic, NATO scientists are conducting a critical mission to study the effects of **climate change on underwater acoustic waves**, crucial for tracking Russian submarines amidst shifting environmental dynamics.

### About Acoustic Waves

- Acoustic waves are the primary means through which submarines and marine life communicate and navigate underwater.
- NATO's mission aims to analyze how global warming, which disproportionately affects the Arctic, alters the propagation of these crucial soundwaves.
- During the mission, NATO vessels equipped with **hydrophones** are emitting sound signals underwater to be captured and analyzed.
- This data will illuminate how changing temperatures and salinity levels in the Arctic Ocean influence the movement and clarity of acoustic signals.

## 2024 ENVIRONMENT PERFORMANCE INDEX (EPI)

### CONTEXT

India's environmental performance has come under scrutiny with its ranking among the lowest in air quality, projected emissions, and biodiversity preservation in the **2024 Environment Performance Index (EPI)**.

### Key Findings:

- The number one country in the index is **Estonia**, which decreased its greenhouse gas emissions by 59% compared to 1990 levels.
  - The **Global West and Eastern Europe** emerge as top-performing regions in the EPI, reflecting their strong environmental conservation efforts.
  - Conversely, **Sub-Saharan Africa and Southern Asia** rank at the bottom among the eight regions assessed, underscoring the pressing need for enhanced sustainability measures in these areas.
- India ranked 176th among 180 countries, above **Pakistan, Vietnam, Laos, and Myanmar** only, in the overall index.
  - However, it remains one of the lowest performers, especially in air quality, emissions, and biodiversity preservation.
- India's performance lags in several indicators mainly because of its heavy dependence on coal, which contributes to not only **greenhouse gas (GHG) emissions** but also high air pollution levels.
- Air quality:** In air quality, India ranks 177th, above Pakistan, Bangladesh and Nepal only

- In **projected emissions** by 2025, India ranks 172nd.
- Transboundary Pollution in South Asia:** South Asia ranks lowest on the EPI, with India identified as the **largest emitter of transboundary pollution** in the region.
  - The impact of Indian pollution extends to neighboring Bangladesh, affecting the well-being of its residents.
- Climate Change Performance:** Despite its overall low ranking, India secures a relatively better position (133) in the climate change category.
  - This improvement is attributed to India's investments in renewable energy and its commitment to achieving net-zero emissions by 2070.
  - India will require an additional USD 160 billion per year in climate change mitigation investments to achieve its goals.
    - Categories enhanced India's performance:** solid waste management, forests, and agriculture
    - Categories downgraded India's performance:** air quality, emissions, and biodiversity categories



### FACT BOX

#### About Environment Performance Index (EPI)

- Released by:** the Yale Center for Environmental Law and Policy and the Columbia Center for International Earth Science Information Network
- The EPI is released once every two years
- Objective:** to assess the performance of countries in achieving the targets of the **UN Sustainable Development Goals, Paris Agreement 2015**, and most recently, the **Kunming-Montreal Global Biodiversity Framework 2022** — key climate change mitigation measures globally.
- The 2024 EPI has 58 indicators, including biodiversity, air pollution, air and water quality, waste management, emission growth rates, projected emissions, etc., under the three main heads of ecosystem vitality, environmental health and climate change.

## NORD STREAM LEAKS

### CONTEXT

Recent research has examined the aftermath of methane release resulting from explosions damaging the **Nord Stream pipelines** in September 2022. An estimated 10,000 to 50,000 tonnes of methane dissolved in the surrounding seawater post-explosion.

### About Nord Stream Pipeline

- Nord Stream 1 (NS1) and Nord Stream 2 (NS2), constructed by Russia's Gazprom, span 1,200 km across the Baltic Sea, each consisting of two large pipes.



Figure no. 9

- They were designed to transport 110 billion cubic meters of natural gas annually from Russia to Germany.
- **2022 Explosions:** In September 2022, explosions damaged both NS1 and NS2 at multiple points in Swedish and Danish waters, rendering them non-operational. This incident raised significant environmental concerns due to the **release of methane**.

- ▶ **Environmental Effects:** It reacts with hydroxyl radicals (OH) and oxidizes into water vapor and CO<sub>2</sub>, indirectly contributing to global warming and reducing the atmosphere's ability to cleanse other pollutants.
- ▶ **Air Quality and Health:** It contributes to ozone formation, which decreases air quality and poses health risks such as respiratory issues and reduced crop yields.



**FACT BOX**

**About Methane and its Emission**

- Methane (CH<sub>4</sub>) is the primary component of natural gas and a **potent greenhouse gas (GHG)**.
- Upon release into the atmosphere, methane acts as a **greenhouse gas by trapping heat**. This process is crucial as it helps regulate Earth's temperature, preventing it from falling to freezing levels naturally.
- **Comparative Impact:** Methane, though short-lived compared to carbon dioxide (CO<sub>2</sub>), is significantly more effective at trapping heat. Over a 100-year period, methane has a global warming potential (GWP) of 28 to 36 times that of CO<sub>2</sub>.

**Impact of Methane**

- ▶ **Global Warming:** Methane absorbs energy and preventing it from escaping Earth's atmosphere

**PROTECTING THE WESTERN GHATS**

**CONTEXT**

The Centre has proposed **eco-sensitive areas (ESAs)** in six states, including **Karnataka, Maharashtra, and Goa**, to safeguard the Western Ghats. However, these states are seeking a reduction in the extent of ESAs to facilitate development projects.

**What are ESAs?**

- ESAs are **designated areas** surrounding **national parks and wildlife sanctuaries** aimed at preserving the **ecological balance and biodiversity of sensitive regions** like the **Western Ghats**.

- They act as buffer zones between highly protected areas and places with less protection.
- These areas restrict certain activities to prevent environmental degradation and maintain the natural habitat.
- **Purpose:** to lessen human impact on these special places.
- **Extent:** Usually within 10 km of park or sanctuary boundaries. If there are important natural pathways beyond 10 km, they might stretch further.
- They're similar to ecotones, those transition zones between different ecosystems.
- **Notified by:** They are notified by the Ministry of Environment, Forests and Climate Change, Government of India around Protected Areas, National Parks and Wildlife Sanctuaries.



### FACT BOX

#### Categories of Activities in ESAs

- **Prohibited:** Commercial Mining, Setting of Saw Mills, Setting of industries causing pollution, the establishment of major hydroelectric projects etc.
- **Regulated:** Felling of Trees, Establishment of hotels and resorts, erection of electrical cables, drastic change of agricultural systems etc.
- **Permitted:** Ongoing agriculture and horticulture practices by local communities, rainwater harvesting, organic farming etc.

#### About Western Ghats

- The Western Ghats run along India's west coast, starting from Gujarat through Maharashtra, Goa, Karnataka, Kerala, and Tamil Nadu.
- Covering 160,000 square kilometers, they're a massive mountain range.
- Anamudi, in Tamil Nadu, is their highest peak.
- Recognized for their significance, they're on the UNESCO World Heritage list.
- **Biological Diversity:** Among the world's top 8 hotspots for biodiversity.
- **Role in Water Systems:**
  - ▶ They act as a water source for rivers that provide water to 40% of India.
  - ▶ Rivers flowing from here are crucial for agriculture and life in the region.

#### Climate Influence:

- ▶ Their winds influence the climate by bringing in moisture. These winds cause monsoon rains in summer
- ▶ They are also responsible for the drying up and cooling of the peninsula in winter.

## CHANGING RIVERS IN ALASKA

### CONTEXT

Rivers and streams in Alaska are undergoing a **noticeable change in color**, shifting from a clear blue to a rusty **orange hue**. This transformation has occurred over the past five to 10 years, raising concerns about the health of these water bodies.

### Causes of Discoloration:

- **Thawing permafrost** is releasing toxic metals such as **iron, zinc, copper, nickel, and lead** into the waterways.
- These metals, harmful to river and stream ecosystems, were previously locked away underground for thousands of years.

### Impact of Thawing Permafrost:

- ▶ Arctic soils, including permafrost, naturally contain organic carbon, nutrients, and metals like mercury.
- ▶ As permafrost melts due to rising temperatures, these minerals and metals are exposed and leach into nearby water sources.
- **Climate Change Factor:** The Arctic is warming at a rate four times faster than the global average, exacerbating permafrost thawing and its associated impacts on water quality.
- **Similar Case in Colorado:** Colorado's Rocky Mountains are also experiencing a similar phenomenon, attributed to a warming climate and other environmental factors.



### FACT BOX

#### Alaska's river systems

- Alaska's major interior river systems include the **Yukon/Koyukuk and the Kuskokwim**.
- Alaska has approximately **365,000 miles of river**, of which 3,193 miles are designated as wild & scenic—less than 1% of the state's river miles.

## "PAINTING WITH LIGHT" PROJECT ON AIR POLLUTION

### CONTEXT

Researchers and artists teamed up for a project called "**Painting with Light**" to visualize air pollution in India and other countries. They used digital light painting and low-cost air pollution sensors to create striking images showing pollution levels.

### Key Findings:

- In India, they found significant differences in air quality between urban Delhi and rural Palampur, with Palampur having much lower pollution levels.



- Similar variations were observed in Ethiopia and Wales, highlighting the impact of different environments on air quality.
- Particulate Matter (PM) pollution, particularly PM2.5, was the main focus due to its severe health impacts.



**FACT BOX**

**Extent of Pollution in India:**

- An estimated 1.36 billion people in India experience PM2.5 concentrations exceeding the WHO’s recommended annual guideline level of 5 micrograms per cubic meter.
- 96% of India’s population, or 1.33 billion people, face PM2.5 levels more than seven times the WHO guideline.
- Over 66% of Indian cities report annual PM2.5 averages greater than 35 micrograms per cubic meter.

**Health Impacts:**

- Air pollution is a significant threat to human health, responsible for an estimated one in every nine deaths globally.
- Exposure to PM2.5 pollution can lead to asthma, cancer, stroke, lung disease, and other serious health conditions.
- Children’s cognitive development, mental health, and existing illnesses, like diabetes, can be adversely affected by exposure to fine particles.



Figure No. 10



**FACT BOX**

**About Hoolock Gibbons**

- Hoolock gibbons are **smaller than great apes** like gorillas and orangutans.
- Genera:** *Hoolock* (hoolock gibbons), *Hylobates* (hylobates), *Symphalangus* (siamangs) and *Nomascus* (crested gibbons). Siamangs are the largest gibbon species
- They are frugivores, primarily eating fruit.
- Found in the forests of Assam and other northeastern states, hoolock gibbons are categorized as **Endangered and Vulnerable species**, highlighting the importance of conservation efforts.
- Conservation Status:
- IUCN:** Endangered (Western Hoolock Gibbon) and Vulnerable (Eastern Hoolock Gibbon)
- Both the species are listed on Schedule I of the Indian (Wildlife) Protection Act, 1972.

**CANOPY BRIDGES FOR INDIA’S ONLY APE**

**CONTEXT**

The **Northeast Frontier Railway (NFR)** in eastern Assam is taking steps to safeguard the hoolock gibbon, India’s only ape species. Canopy bridges are being constructed to help the gibbons move safely across a railway track that divides their habitat.

**Background**

- The **Hollongapar Gibbon Sanctuary** in Jorhat district, spanning 2,098.62 hectares, hosts the largest concentration of hoolock gibbons in India.
- These gibbons are known for their vocalizations and spend much of their time in the upper canopy of trees.
- A **1.65-km-long railway track** cuts through the sanctuary, posing a threat to the **gibbons’ arboreal nature**.
- Canopy bridges** are being built to help them safely cross the track. Safety measures include securing the ends and knots of the bridges and **installing safety nets below**.
- The canopy bridges will be designed to blend with the environment, allowing lianas and creepers to grow along them. This ensures the bridges appear natural and minimizes disruption to the gibbons’ habitat.

**UPSC PYQ**

**Q:** Consider the following pairs: (2010)

Protected area	Well-known for
1. Bhitarkanika, Orissa	Salt Water Crocodile
2. Desert National Park, Rajasthan	Great Indian Bustard
3. Eravikulam, Kerala	Hoolock Gibbon

Which of the pairs given above is/are correctly matched?

- (a) 1 only
- (b) 1 and 2 only
- (c) 2 only
- (d) 1, 2 and 3

**Solution (b)**



## GLOBAL SOIL PARTNERSHIP

### CONTEXT

The recent Global Soil Partnership Assembly discussed how to meet "ambitious and urgent" target of improving and maintaining health of at least 50 percent of world's soils by 2030.

### Soil Map of India

In India, the Indian Council of Agricultural Research (ICAR), has classified soils into 8 categories:

#### Alluvial Soil:

- ▶ **Formation:** Deposited by rivers, particularly originating from the Himalayas.
- ▶ **Composition:** Contains clay, sand, and silt particles.
- ▶ **Characteristics:** Highly fertile due to adequate potash, lime, and phosphoric acid.
- ▶ **Types:** Old alluvium (Bangar) and new alluvium (Khadar).
- ▶ **Locations:** Northern plains from Punjab to West Bengal, Assam, and delta regions of rivers like Mahanadi, Kaveri, Godavari, and Krishna.
- ▶ **Crops:** Wheat, maize, sugarcane, rice, pulses, and oilseeds.

#### Black Soil (Regur):

- ▶ **Formation:** Derived from lava and volcanic rocks.
- ▶ **Composition:** Rich in potash, lime, magnesium carbonate, and calcium carbonate.
- ▶ **Locations:** Predominantly found in Gujarat, Maharashtra, Madhya Pradesh, Andhra Pradesh, Karnataka, and Tamil Nadu.
- ▶ **Characteristics:** High moisture retention and water holding capacity.
- ▶ **Crops:** Cotton, wheat, millet, and tobacco.

#### Peaty Soil:

- ▶ **Formation:** Accumulation of organic matter in humid climates.
- ▶ **Composition:** High organic matter, low potash, and phosphate content.
- ▶ **Locations:** Few districts of Kerala, coastal areas of Tamil Nadu, Bihar, Uttaranchal, and Sundarbans of West Bengal.
- ▶ **Characteristics:** Acidic, black soil.
- ▶ **Organic Matter Content:** 10-40%.

#### Saline and Alkaline Soil:

- ▶ **Formation:** High sodium, potassium, and magnesium content, poor drainage, and dry climate.
- ▶ **Locations:** Arid and semi-arid areas of Punjab, Uttar Pradesh, Bihar, Rajasthan, Haryana, and Maharashtra.

- ▶ **Characteristics:** High salt content, calcium, and nitrogen deficiency.
- ▶ **Improvement:** Enhanced irrigation, drainage, gypsum application, and cultivation of salt-resistant crops.
- ▶ **Suitability:** Leguminous crops.

#### Red Soil:

- ▶ **Formation:** Weathering of metamorphic and igneous rocks, high iron content.
- ▶ **Locations:** Parts of Karnataka, Orissa, Jharkhand, Madhya Pradesh, Tamil Nadu, and Maharashtra.
- ▶ **Characteristics:** Rich in potash, sandy or clayey texture, deficient in nitrogen, phosphate, and humus.
- ▶ **Color:** Red due to iron oxide.

#### Desert Soil:

- ▶ **Formation:** High sand content (90-95%), low clay content, low rainfall.
- ▶ **Locations:** Rajasthan, Rann of Kutch in Gujarat, parts of Haryana, and Punjab.
- ▶ **Characteristics:** Low water holding capacity, high phosphate content.
- ▶ **Vegetation:** Cactus, shrubs; fertility increased temporarily by rainfall and irrigation.

#### Laterite Soil:

- ▶ **Formation:** Heavy rainfall regions, sedimentation of rocks, high iron oxide content.
- ▶ **Locations:** Western and Eastern Ghats, Vindhya, Malwa Plateau, Satpura.
- ▶ **Characteristics:** Pinkish color, high in nitrogen, acidic.
- ▶ **Suitable Crops:** Rubber, coconut, coffee, cashew nuts, sugar, ragi, and rice.

#### Mountain Soil:

- ▶ **Formation:** Accumulation of organic matter from forest growth.
- ▶ **Locations:** Himalayan regions, Sikkim, Arunachal Pradesh, peninsular India, Eastern Ghats, and Assam.
- ▶ **Characteristics:** Rich in humus.
- ▶ **Texture:** Sandy.



### FACT BOX

#### Global Soil Partnership

- ◉ **Established in:** 2012
- ◉ **Objective:** to position soils on the Global Agenda, promote inclusive policies and soil governance as well as sustainable soil management, by bringing together multiple stakeholders.

**Achievements:**

- ▶ annual celebration of UN World Soil Day (5 December)
- ▶ International Year of Soils 2015
- Establishment of an Intergovernmental Technical Panel on Soils and related international networks for different soil matters

**UPSC PYQ**

**Q:** With reference to agricultural soils, consider the following statements: (2018)

- 1: A high content of organic matter in soil drastically reduces its water holding capacity.
- 2: Soil does not play any role in the sulphur cycle.
- 3: Irrigation over a period of time can contribute to the salinization of some agricultural lands.

Which of the statements given above is/are correct?

- (a) 1 and 2 only    (b) 3 only  
 (c) 1 and 3 only    (d) 1, 2 and 3

**Solution: (b)**

**BREAKTHROUGH IN NIPAH VIRUS RESEARCH**

**CONTEXT**

Scientists at the **Institute of Advanced Virology (IAV)** developed a safe and effective way to generate **non-infectious Nipah virus-like particles (VLPs)** in the laboratory.

**Key-highlights of the research:**

- This breakthrough provides a **safer platform** for research and development of treatments against the deadly Nipah virus (NiV) in a **BSL-2 laboratory**.
- It brings researchers closer to developing monoclonal antibodies and antivirals against NiV and similar pathogens.

**Characteristics of VLPs:**

- ▶ VLPs closely resemble viruses but are non-infectious as they contain no viral genetic material.
- ▶ They carry most of the virus’s characteristics, making them valuable tools for studying viral binding, entry kinetics, and immune responses.

**HiBiT-Tagged NiV-VLPs:**

- ▶ Scientists created “HiBiT-tagged” Nipah virus-like particles (NiV-VLPs) using **plasmid-based expression systems**.

- ▶ These VLPs are identical to the native virus but **cannot replicate**.
- ▶ The inclusion of a **highly sensitive HiBiT tag** accelerates their potential in **antiviral drug** screening and vaccine development.
- ▶ **HiBiT-tagged VLPs** offer **reduced risks** compared to using native viruses in research assays.
- ▶ This method is applicable to **other virulent pathogens** and is advantageous for studying **BSL-3/BSL-4 level viruses** in lower **bio-containment levels**.



**FACT BOX**

**About Nipah Virus**

**What is Nipah virus?**

NIPAH VIRUS (NiV) INFECTION IS A NEWLY EMERGING ZOOZONOSIS THAT CAUSES SEVERE DISEASE IN BOTH ANIMALS AND HUMANS

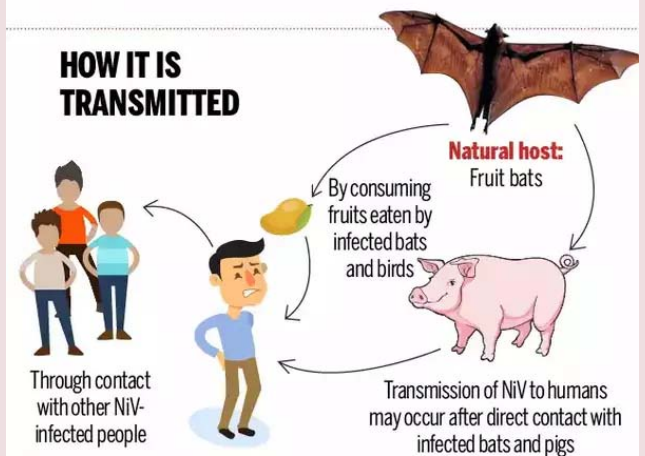


NiV first identified in 1998 during an outbreak in Malaysia



Fruit bats are natural hosts of NiV

**HOW IT IS TRANSMITTED**



**Figure No. 11**

- **Transmission:** Nipah virus is a zoonotic virus, meaning it can spread from animals to humans. It can also be transmitted through contaminated food or directly between people.
- **Pathogenicity:** This virus is highly dangerous, with a fatality rate of up to 80% in humans.
- **Hosts:** **Fruit bats** (family *Pteropodidae*), especially those from the *Pteropus* genus, are the natural hosts for Nipah virus. Interestingly, fruit bats don’t seem to get sick from it.
- **Treatment:** Currently, there are no specific drugs or vaccines for Nipah virus infection. However, the **World Health Organization (WHO)** has recognized Nipah as a **priority disease for research and development**.

- ▶ Research on Nipah virus has been limited because of the strict biosafety precautions required for handling this dangerous pathogen, which is classified as a **BSL-4 pathogen**.

## GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS)-BASED TOLLING

### CONTEXT:

The **National Highway Authority of India (NHAI)** has invited expressions of interest for the implementation of a satellite-based electronic toll collection system.

### About the initiative:

- **Spearheaded by:** Indian Highways Management Company Limited (IHMCL)
- This initiative aims to enhance tolling efficiency and transparency while providing a seamless experience for highway user.
- The introduction of GNSS-based electronic toll collection is poised to streamline vehicular movement on national highways. These include
  - ▶ barrier-free tolling
  - ▶ enhancing the overall driving experience
  - ▶ introducing distance-based tolling, where users are charged solely for the distance travelled on the highway
- Its implementation will involve an **On-Board Unit (OBU)**, or a tracking device, fitted inside a vehicle whose location can be mapped using **GAGAN**, the Indian satellite navigation system with an approximate accuracy of 10 metres.
- NHAI plans to integrate the **GNSS-based electronic toll collection (ETC) system** within the existing **FASTag ecosystem**, initially adopting a hybrid model alongside **Radio Frequency Identification (RFID)-based ETC**.



### FACT BOX

#### National Highways Authority of India (NHAI)

- **Formed in:** 1988
- **Ministry:** Ministry of Road Transport and Highways
- NHAI is a Central Authority to develop, maintain and manage the National Highways.

#### India's Road Network

- India has the world's second-largest road network, covering approximately 66.71 lakh kilometers, with national highways constituting 2% and carrying over 40% of total traffic.

- There are currently 599 national highways spanning 1,46,145 kilometers (December 2023).
- **Classification:** These highways are classified into various categories such as
  - ▶ North-South Corridors
  - ▶ East-West Corridors
  - ▶ Golden Quadrilateral (**connecting Delhi, Mumbai, Chennai, and Kolkata**)
  - ▶ 3-D Highways (**highway with 3 digit number, secondary branch of the main highway**)

## DISCOVERY OF FROST ATOP MARS' VOLCANOES

### CONTEXT:

Recent discoveries have challenged assumptions about **Mars' climate**, with researchers detecting **frost on equatorial volcanoes**. This finding contradicts expectations of hot, arid conditions in the planet's equatorial regions and suggests a more complex climate system than previously thought.

### Key Findings:

- **Frost Discovery:** Researchers have detected **frost** atop volcanoes in **Mars' Tharsis region**, near the planet's equator. This discovery challenges previous assumptions about the planet's climate, which were thought to **preclude frost formation** in equatorial regions due to **high temperatures**.
  - ▶ The frost was observed within the **calderas of Martian volcanoes**, large hollows at their summits.
  - ▶ The frost, with a thickness of about a hundredth of a millimeter (roughly the width of a human hair), covers a significant area within the calderas of Martian volcanoes.
    - ◆ Although ephemeral, lasting only a few hours after sunrise before evaporating in sunlight, this frost contributes to the cycling of water between the Martian surface and atmosphere during the cold seasons.
- The frost was first spotted by **ESA's ExoMars Trace Gas Orbiter (TGO)** atop **the massive Olympus Mons volcano** (nearly three times the height of Mount Everest)



### FACT BOX

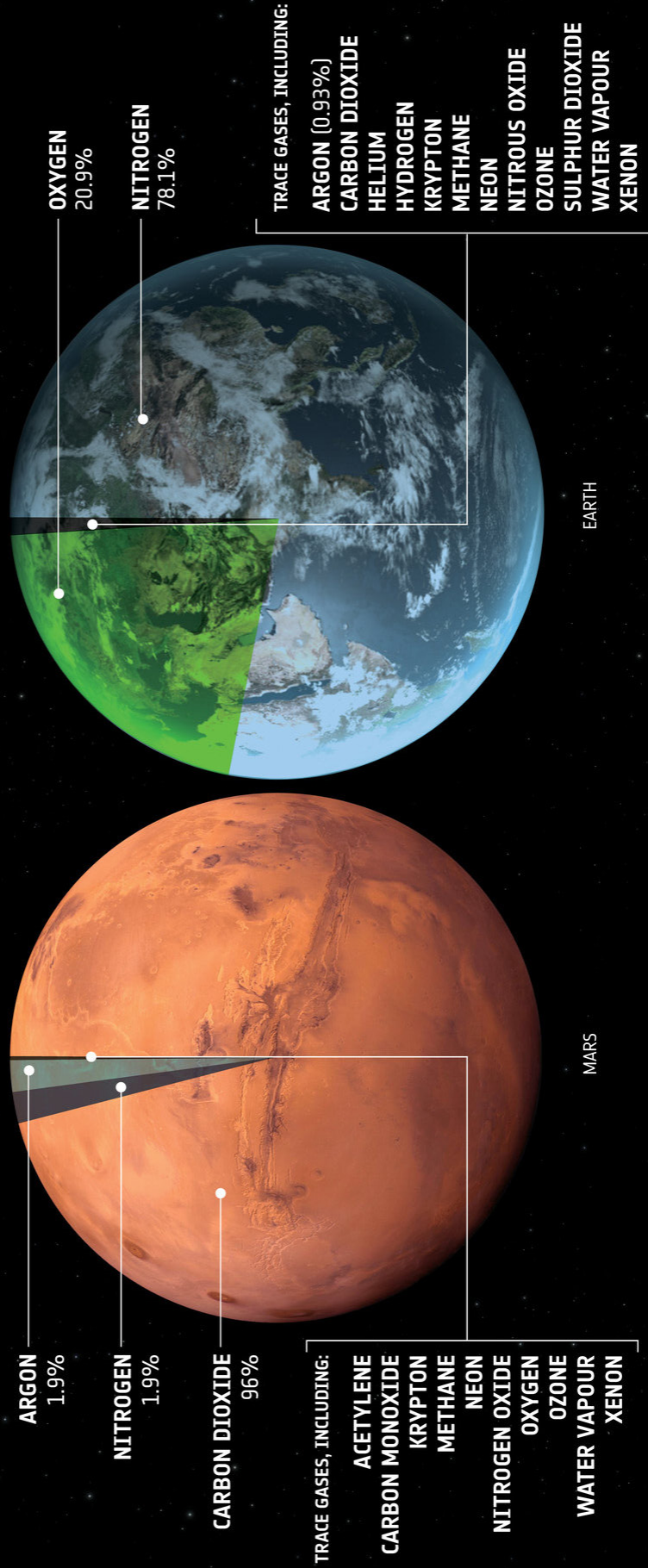
#### Mars' Atmosphere dynamics

- Mars' atmosphere is over 100 times thinner than Earth's
- **Composition:** 95% carbon dioxide, 3% nitrogen, 1.6% argon
- **Features:** Volcanoes, vast craters and massive ridges





→ COMPARING THE ATMOSPHERES OF MARS AND EARTH



Atmospheric composition by volume | Planets not to scale | Atmosphere of Mars is less than 1% of Earth's | Trace gases listed alphabetically

www.esa.int

European Space Agency

Figure no. 12



- Just like Earth, Mars too has big volcanos, including the largest volcano in the solar system, Olympus Mons, which is 100 times larger by volume than Earth's largest volcano of Mauna Loa in Hawaii.
- India's Mars Orbiter Mission (MOM)** or Mangalyaan is the country's first mission to the Red Planet to test key technologies for interplanetary exploration
- Natural satellites:** Deimos and Phobos  
(Figure No. 12 on previous page)

### About Frost

- Frost is a thin layer of ice on a solid surface that forms from water vapor turning solid.
- Simply put, it is water vapor, or water in gas form, that becomes solid.
- Frost occurs when the temperature of the air in contact with the ground is below the freezing-point of water.
- Types of frost:** Ground frost, air frost, hoar frost

### Key-highlights:

- Aditya-L1 reached the **Lagrangian point (L1)** in January 2024, 127 days after its launch on in September 2023. L1 is approximately 1.5 million km from Earth, allowing continuous observation of the Sun.
- Remote Sensing Instruments:** SUIT and VELC onboard Aditya-L1 have recorded dynamic activities of the Sun during May 2024.
  - SUIT captures **solar ultraviolet images**, while VELC observes **visible emission lines** from the Sun.
- Solar Events Recorded:** Several X-class and M-class flares, accompanied by Coronal Mass Ejections (CMEs), were detected during May 2024, leading to significant geomagnetic storms.
- The **active region AR13664** on the Sun erupted **multiple X-class and M-class flares** during May. These events caused major **geomagnetic disturbances**.

## ISRO'S ADITYA-L1 SPACECRAFT CAPTURES SOLAR ACTIVITY

### CONTEXT

ISRO's Aditya-L1 spacecraft, equipped with two remote sensing instruments - **Solar Ultra Violet Imaging Telescope (SUIT)** and **Visible Emission Line Coronagraph (VELC)**, has captured recent solar activity.



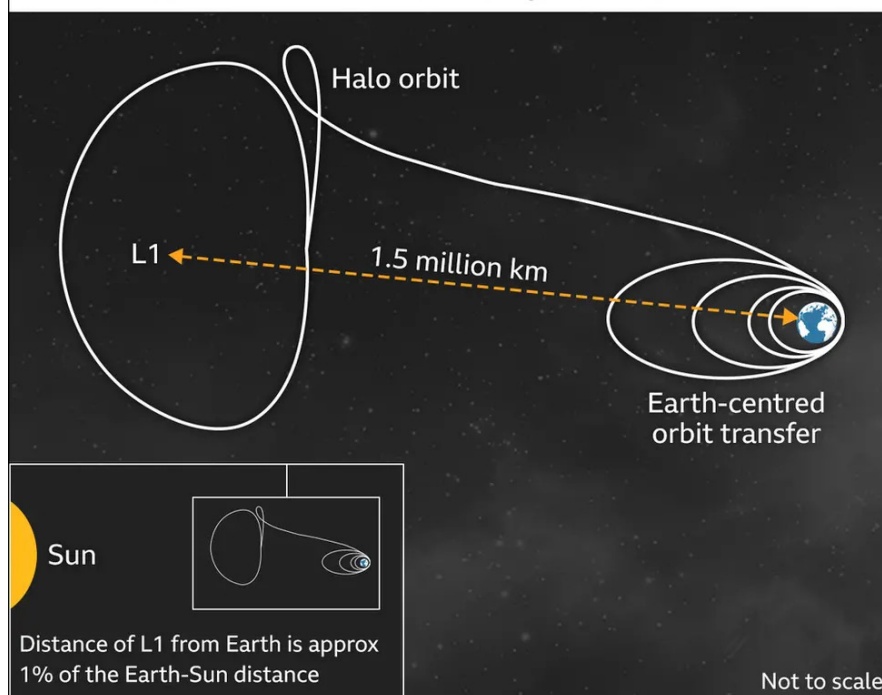
### FACT BOX

#### About Aditya-L1

- Aditya-L1 is a satellite dedicated to the comprehensive study of the Sun.
- The orbiter carries seven scientific instruments to observe and study-
  - the solar corona (the outermost layer)

### Aditya-L1 mission trajectory

The first Indian solar mission to study the Sun



Source: Indian Space Research Organisation

B B C

Figure no. 13

- ▶ the photosphere (the Sun's surface or the part we see from the Earth)
- ▶ the chromosphere (a thin layer of plasma that lies between the photosphere and the corona)

Aditya L1 is India's first space-based mission to study the solar system's biggest object

**Basic Concepts:**

- **Coronal Mass Ejections (CMEs):** Powerful eruptions of solar plasma and magnetic field from the Sun's corona into space.
- **Solar Flares:** Sudden bursts of energy and radiation from the Sun's surface, often associated with magnetic disturbances and emissions across the electromagnetic spectrum.
- **Geomagnetic Storms:** Disturbances in Earth's magnetic field caused by interactions with solar wind and CMEs, potentially leading to disruptions in communication systems and power grids.
- **Lagrangian point (L1):** L1 is a location in space where the gravitational forces of two celestial bodies, such as the Sun and Earth, are in equilibrium. This allows an object placed there to remain relatively stable with respect to both celestial bodies. L1 is located 1.5 million km (932,000 miles) from the Earth, which is 1% of the Earth-Sun distance.

technology. The 400-foot-tall Starship rocket was launched atop a thundering pillar of fire.

**About Starship:**

- Starship is the tallest and most powerful rocket ever launched, standing at 397 feet tall when fully stacked on the Super Heavy booster.
- The Super Heavy booster, standing 232 feet tall, is equipped with 33 Raptor engines, producing 16.7 million pounds of thrust.
- Starship itself is 165 feet tall and has six Raptor engines, powered by liquid oxygen and liquid methane.
- The rocket requires more than 10 million pounds of propellant for launch.

(Figure No. 14)

**SPACEX'S STARSHIP TEST FLIGHT**

**CONTEXT**

SpaceX successfully completed the fourth test flight of its Starship rocket, marking a significant advancement in rocket

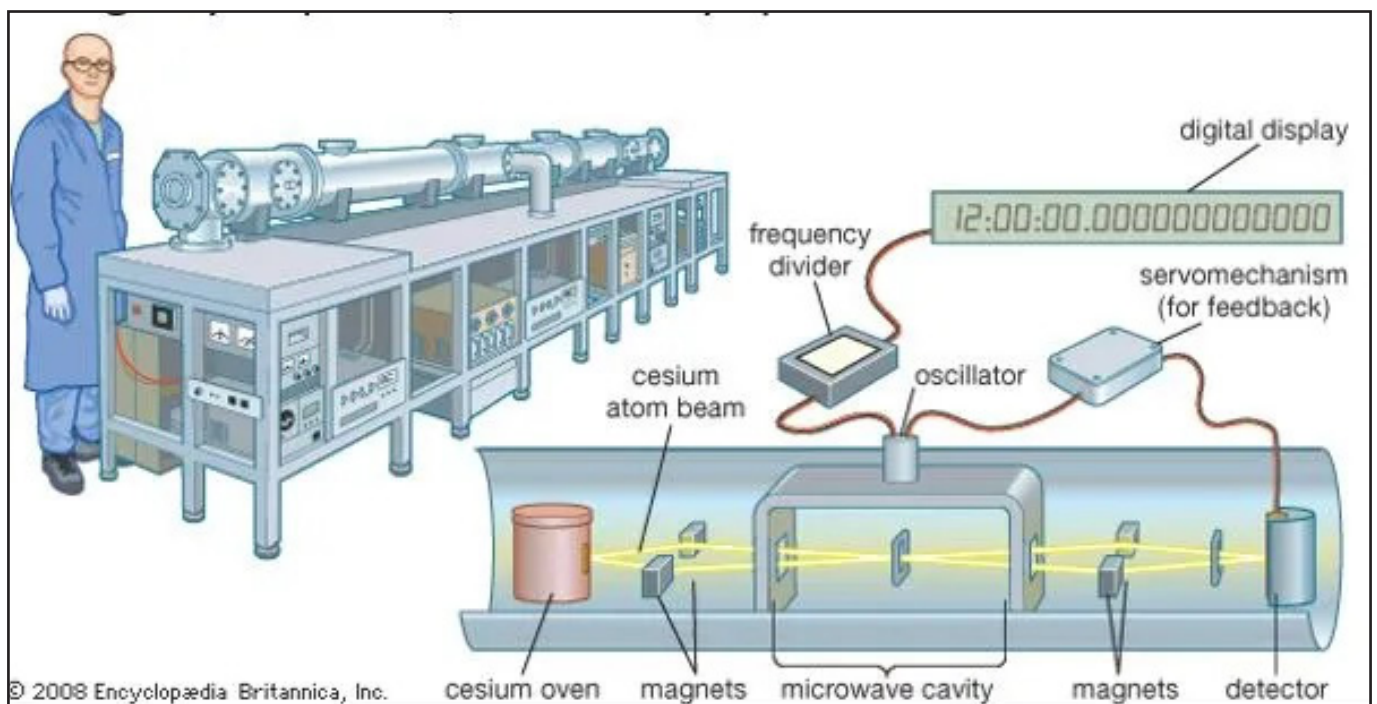
**PORTABLE OPTICAL ATOMIC CLOCKS**

**CONTEXT**

A recent study introduced a **portable optical atomic clock** suitable for onboard ships. This innovation, utilizing **molecular iodine** as a frequency standard, represents a significant advancement in **optical timekeeping**. Miniaturization of components like the **spectrometer, laser system, and frequency comb** enables compact designs suitable for various applications.

**About Atomic clock**

- An atomic clock is a device that uses the vibrations of atoms to measure time
- Specifically, it uses the oscillations of the electrons in in atoms to keep time



© 2008 Encyclopædia Britannica, Inc.

Figure no. 14

- They work by using a type of atom called a "cesium atom".
- To measure time using cesium atoms, an atomic clock uses a device called a "microwave cavity".
- **Types of atomic clocks:** There are two types of atomic clocks: cesium atomic clocks and hydrogen maser atomic clocks.
  - ▶ Cesium atomic clocks are the most common and are used to define the international standard for time, called Coordinated Universal Time (UTC).
  - ▶ Hydrogen maser atomic clocks are even more accurate than cesium atomic clocks and are used in scientific research.
- **Application:** It is used in many applications that require precise timing, such as:
  - ▶ GPS systems and scientific research navigation
  - ▶ emergency responses, and military operations

## INTERNATIONAL YEAR OF QUANTUM

### CONTEXT

The United Nations has declared **2025 as the International Year of Quantum Science and Technology** to increase public awareness of the importance of quantum science and to bolster support for using it to address current challenges.

### What is Quantum Computing?

- Quantum computing is a revolutionary field at the intersection of computer science, physics, and mathematics.
- It harnesses the principles of quantum mechanics to solve complex problems faster than classical computers.
- This advantage stems from leveraging quantum phenomena like superposition and entanglement.
- **Types of Quantum Technologies** Various qubit technologies are being explored, including gate-based ion trap processors, gate-based superconducting processors, photonic processors, neutral atom processors, Rydberg atom processors, and quantum annealers.
- In 2023, India became the **seventh country** to have a **National Quantum Mission**, after the US, Austria, Finland, France, Canada and China, dedicated to the development of quantum technologies.

### Quantum Mechanics Basics

- Quantum mechanics explores the behavior of particles at a microscopic scale. In this realm, particles behave differently from what we observe in the macroscopic world. Key to quantum computing is the concept of qubits, which can exist in superposition states, unlike classical bits.
  - ▶ A **qubit (or quantum bit) is the quantum mechanical analogue of a classical bit.**

### Principles of Quantum Computing

- **Superposition:** Qubits can exist in multiple states simultaneously, providing inherent parallelism for quantum computers.
- **Entanglement:** When qubits become entangled, the state of one qubit instantly correlates with another, regardless of distance.
- **Decoherence:** Environmental factors can disrupt the quantum state of qubits, leading to decoherence. Overcoming this challenge is crucial for building stable quantum computers.

### UPSC PYQ

**Q: Which one of the following is the CONTEXT in which the term "Qubit" is mentioned? (2022)**

- Cloud Services
- Quantum computing
- Visible light communication technologies
- Wireless Communication Technologies

**Solution: (b)**

## INITIATIVE ON CRITICAL AND EMERGING TECHNOLOGIES (ICET)

### CONTEXT

Indian National Security Advisor (NSA) Ajit Doval and US National Security Advisor Jake Sullivan led the second session of the India-US initiative on **Critical and Emerging Technology (iCET)**.

### What is iCET?

- The Initiative on Critical and Emerging Technologies (iCET) was launched during the Quad summit in Tokyo in 2022, by Prime Minister Narendra Modi and US President Joe Biden.
- It aims to deepen strategic cooperation between India and the United States in several key sectors:

#### Focus Areas:

- ▶ Artificial Intelligence (AI)
- ▶ Quantum Computing
- ▶ Semiconductors
- ▶ Advanced Telecommunications
- ▶ Biotechnology
- ▶ Clean Energy
- ▶ Quantum Technology

## SIPRI YEARBOOK 2024

### CONTEXT

A recent report by the **Stockholm International Peace Research Institute (SIPRI)** has highlighted the status of **global nuclear arsenals** in 2024. The report sheds light on the nuclear capabilities of various nations, including India, Pakistan, and China.

### Key Findings of SIPRI Yearbook 2024

- **Nuclear Arsenals:** Russia and the US possess the majority of the world’s nuclear weapons, accounting for 90% of the total.
  - ▶ China’s nuclear arsenal has seen a significant increase, growing from 410 warheads in January 2023 to 500 in January 2024.
  - ▶ India possesses 172 “stored” nuclear warheads as of January 2024, slightly more than Pakistan.
- **Modernization:** Nine nuclear-armed nations, including **India, Pakistan, and China**, are actively modernizing their nuclear arsenals. This includes developing new nuclear delivery systems.
- **Operational Alert:** Around 2,100 nuclear warheads, primarily from the US and Russia, are kept in a state of high operational alert on ballistic missiles. China also reportedly placed some warheads on high alert for the first time.
- **World’s nuclear-armed states:** United States, Russia, the United Kingdom, France, China, India, Pakistan, the Democratic People’s Republic of Korea (North Korea) and Israel.

### India’s Nuclear Development:

- India adheres to a no-first-use (NFU) policy but retains the option of retaliating to non-nuclear threats.
- **Missile Capabilities:** As of January 2024, India had approximately 80 operational missiles. New developments include:
  - ▶ **Agni-P:** Medium-range ballistic missile.
  - ▶ **Agni-V:** Intermediate-range ballistic missile, nearing deployment.
  - ▶ **Agni-VI:** Under design, with intercontinental range.
  - ▶ **Shourya:** Land-based version of the K-15 submarine-launched ballistic missile in development.
- **Naval Component:** India is building a nuclear triad with ballistic missile submarines (SSBNs):
  - ▶ **INS Arihant:** First deployed in 2018 for deterrence patrols.
  - ▶ **INS Arighat:** Launched in 2017, deployment expected in 2024.
  - ▶ Plans for additional **Arihant-class submarines**.



### FACT BOX

#### About SIPRI

- **Established in:** 1966
- **Based in:** Stockholm
- SIPRI is an **independent international institute** dedicated to research into conflict, armaments, arms control and disarmament.
- **SIPRI Yearbook:** The present release is the 55th edition of the SIPRI Yearbook.
  - ▶ It is a compendium of cutting-edge information and analysis on developments in armaments, disarmament and international security.

## STREPTOCOCCAL TOXIC SHOCK SYNDROME (STSS)

### CONTEXT:

Health officials in Japan are alarmed by a surge in cases of **Streptococcal Toxic Shock Syndrome (STSS)**, also known as ‘**flesh-eating bacteria**’.

### About Streptococcal Toxic Shock Syndrome (STSS):

- STSS is a severe bacterial infection caused by **group A Streptococcus bacteria**. These bacteria release toxins that enter deep tissues and the bloodstream, triggering a rapid and dangerous response in the body.
- **Symptoms:** STSS begins with symptoms such as **fever, chills, muscle aches, nausea, and vomiting**.
  - ▶ Within 24 to 48 hours, it can progress to low blood pressure, organ failure, rapid heart rate, and fast breathing.
- **Risk Factors and Severity:** Group A Streptococcus usually causes strep throat in children but can lead to serious symptoms in adults, including **limb pain, swelling, and low blood pressure**.
  - ▶ This can escalate quickly to tissue death, breathing difficulties, and organ failure, especially in individuals over 50.
- **Prevention:** Preventing STSS involves practicing good hygiene, such as regular handwashing and covering the mouth when coughing or sneezing. Proper wound care and prompt medical attention for infections can prevent complications that may lead to STSS.
- **Diagnosis:** Blood tests to detect group A strep bacteria and assess organ function.
  - ▶ STSS is confirmed when a person has a group A strep infection alongside low blood pressure and signs of two or more organ failures.
- **Treatment:** Administering strong antibiotics intravenously to eliminate the bacteria. Patients also receive fluids to stabilize blood pressure and support organ function.



## DONANEMAB, NEW ALZHEIMER'S DRUG

### CONTEXT

The **US Food and Drug Administration (FDA)** has unanimously voted in favor of administering **Donanemab**, a new Alzheimer's drug.

### What is Donanemab?

- Donanemab is a **monoclonal antibody**, much like its predecessor Lecanemab, designed to target **amyloid beta protein** plaques in the brain, a characteristic feature of Alzheimer's disease that can be observed through imaging techniques.
- Other amyloid-fighting drugs, such as Leqembi and Biogen, were approved by the FDA last year.
- Donanemab can significantly slow down cognitive decline in early Alzheimer's patients by 35.1% over a span of 76 weeks.
- It is currently the **only one of its class available to Alzheimer's patients**, outside clinical trials.



### FACT BOX

#### Alzheimer's Disease

- Alzheimer's disease is a progressive neurological disorder characterized by the degeneration and eventual death of brain cells. This degeneration leads to a range of symptoms, including:

#### Symptoms:

- Memory loss
- Difficulty with language (speaking or writing)
- Impaired judgment
- Changes in mood and personality
- Confusion regarding time or place
- Progression and Severity
- The disease is believed to be caused by the **abnormal accumulation of proteins** in and around brain cells. Two key proteins involved in Alzheimer's pathology are:
  - Amyloid:** Abnormal deposits of amyloid protein form plaques around brain cells.
  - Tau:** Tangled formations of tau protein disrupt neuronal communication in the brain.
- Dementia in India report 2020** estimates that there are 5.3 million people over the age of 60 years living with dementia in India, with the prevalence projected to increase to 14 million by 2050.

(Figure No. 15 below)

## INFLAMMATORY BOWEL DISEASE (IBD)

### CONTEXT:

UK scientists have identified a significant genetic weakness present in 95% of people with IBD. This weakness makes certain immune cells, particularly macrophages, more prone to triggering excessive inflammation in the bowels.

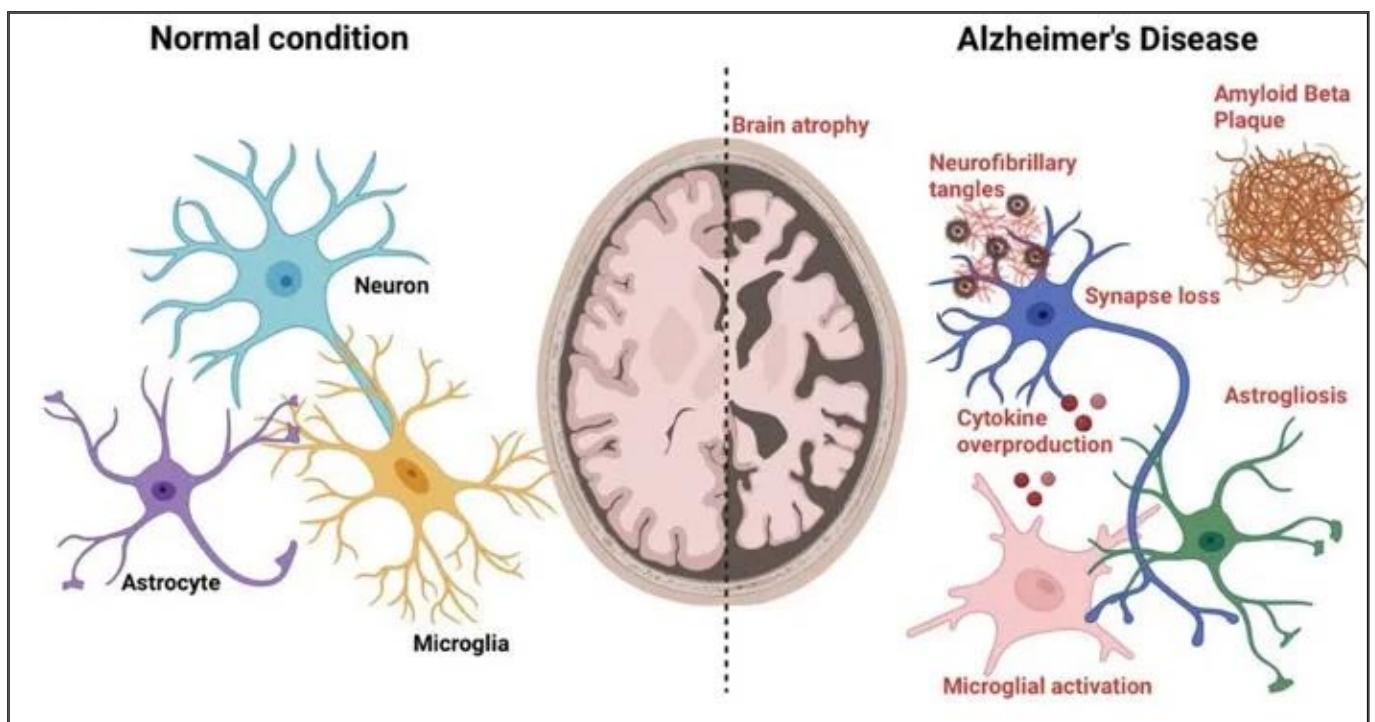


Figure no. 15

**Key Findings:**

- **Role of Macrophages:** Macrophages, a type of white blood cell, play a crucial role in IBD by releasing inflammatory chemicals called cytokines in the intestines. Excessive inflammation caused by macrophages is a key characteristic of IBD.
- **Master Regulator Gene:** Through deep genetic analysis, researchers discovered a specific section of DNA that acts as the “master regulator” for inflammation in macrophages. Individuals with a particular version of this gene are more susceptible to developing IBD due to their heightened inflammatory response.
- **Potential Treatment Avenue:** Drugs already approved for other conditions, such as cancer, have shown promise in reducing inflammation in IBD patients’ samples. These drugs target the problematic macrophages and could potentially serve as a treatment for IBD in the future.

- Poliovirus spreads easily from person to person, mainly through contaminated feces entering the mouth (faecal-oral route). Less commonly, it can spread through contaminated water or food.
- **Symptoms and Effects:** Initially, poliovirus infects the throat and intestines, causing flu-like symptoms. In severe cases, it can invade the nervous system, leading to **paralysis**, especially in the limbs. In rare instances, it can be fatal.
- **Variations of Poliovirus:** There are three types of poliovirus:
  - ▶ Wild Poliovirus Type 1
  - ▶ Wild Poliovirus Type 2
  - ▶ Wild Poliovirus Type 3
- Wild poliovirus types 2 and 3 have been eradicated globally, and type 1 remains in a few areas. Type 1 is most likely to cause paralysis.
- **Vaccines available to fight polio:** Inactivated poliovirus (IPV), Oral polio vaccine (OPV):
- According to the World Health Organisation, polio remains endemic in only two countries: **Pakistan and Afghanistan**.



**FACT BOX**

**About Inflammatory Bowel Disease (IBD)**

- Inflammatory Bowel Disease (IBD) is a group of chronic conditions affecting the digestive tract, including Crohn’s disease and ulcerative colitis.
- These conditions cause inflammation and damage to the gastrointestinal (GI) tract, leading to symptoms like **abdominal pain, diarrhea, and fatigue**.
- While the exact cause of IBD is unclear, both genetic and environmental factors are believed to play a role.
- There is currently no cure for IBD.
- The disease is distinct from **irritable bowel syndrome (or IBS)** although some of the symptoms overlap.
- A diagnosis of IBD is only made if there is inflammation in the bowels.

**India’s Case:**

- In 2012, the WHO removed **India from the list of countries** with active **endemic wild poliovirus transmission**. India launched the **Pulse Polio immunisation programme** in 1995 after a resolution for a global initiative of polio eradication was adopted by the **World Health Assembly (WHA)** in 1988.

**PRAVAHA**

**CONTEXT:**

The **Indian Space Research Organisation (ISRO)** has developed **Computational Fluid Dynamics (CFD) software** named **Parallel RANS Solver for Aerospace Vehicle Aero-thermo-dynamic Analysis (PraVaHa)**.

**About PraVaHa:**

- PraVaHa is a **Computational Fluid Dynamics (CFD) software** developed by the **Indian Space Research Organisation (ISRO)** at the **Vikram Sarabhai Space Centre (VSSC)**.
- It’s designed to **simulate airflow** around various aerospace vehicles, including **launch vehicles, re-entry vehicles with and without wings, and internal flows**.
- Currently, it can simulate airflow under both **Perfect Gas and Real Gas conditions**. Work is ongoing to simulate chemical reactions during **air dissociation and combustion**, particularly relevant for **scramjet vehicles**.
- In the **Gaganyaan program**, PraVaHa has been extensively used for the aerodynamic analysis of human-rated launch vehicles, including **HLVM3, Crew Escape System (CES), and Crew Module (CM)**.

**PAKISTAN REPORTS FIFTH POLIO CASE**

**CONTEXT:**

Pakistan has confirmed the fifth polio case of the year, more than a fortnight after the victim’s death, jolting the country’s efforts to eradicate the crippling disease.

**What is Polio?**

- Polio, short for **poliomyelitis**, is a **highly contagious viral disease** that primarily affects children under 5 years old.
- It is caused by the **poliovirus**.

## CHINA'S CHANG'E-6 MISSION

### CONTEXT:

In a monumental feat for space exploration, **China's Chang'e-6 spacecraft** has successfully landed on the far side of the Moon, marking the first-ever attempt to collect samples from this uncharted territory.

### Key Highlights:

- **Mission Objective:** Chang'e-6's primary mission is to collect and return samples from the Moon's far side, a pioneering endeavor in space exploration.
- **Landing Site:** The chosen landing area within the **South Pole-Aitken Basin**, specifically the **Apollo Basin**, was selected based on its potential for scientific exploration and favorable landing conditions, including flat terrain and communication suitability.
- **Technological Advancements:** Chang'e-6's lander is equipped with advanced sensors, including **microwave, laser, and optical imaging sensors**, enabling precise measurements and obstacle detection on the lunar surface. To ensure a smooth landing, **gamma-ray sensors** are employed to accurately measure height despite lunar dust interference.
- **Sampling Process:** The probe is set to complete sampling within two days, utilizing both drilling for subsurface samples and a robotic arm for surface sample collection. Despite challenges, including limited communication windows due to the Moon's obstruction, the mission aims for efficient sample retrieval within a reduced timeframe.
- **International Collaboration:** The mission incorporates scientific instruments from France, Italy, the European Space Agency/Sweden, and notably, a payload from Pakistan, marking the first inclusion of a Pakistani orbiter in a **Chinese lunar mission**.



### FACT BOX

#### Far Side of the Moon

- The far side of the Moon is the side **not visible from Earth**, a result of a phenomenon called "tidal locking."
- In contrast, the near side, which constitutes 60% of the Moon's surface, is always visible from Earth.
- **This side isn't actually dark;** it receives ample sunlight and experiences lunar day and night cycles, just like the near side.
- **Differences:** Despite being lesser-known, the **far side of the Moon** is distinct from the near side in appearance and geological features.
- **Day and Night:** A lunar day lasts over 29 Earth days, while a lunar night is roughly two weeks long. This extended cycle is due to the Moon's rotation around its axis and its orbit around Earth, resulting in the same side always facing our planet.

- **Exploration:** Throughout history, human exploration has focused on the near side, with several lunar expeditions visiting its familiar terrain. However, recent missions, like China's Chang'e-6, are pioneering efforts to explore and understand the mysteries of the far side.

### Indian Achievement:

- Last year, India made its mark by becoming the first country to land near the **lunar south pole region** with its Chandrayaan-3 mission, showcasing Asia's growing prowess in lunar exploration.

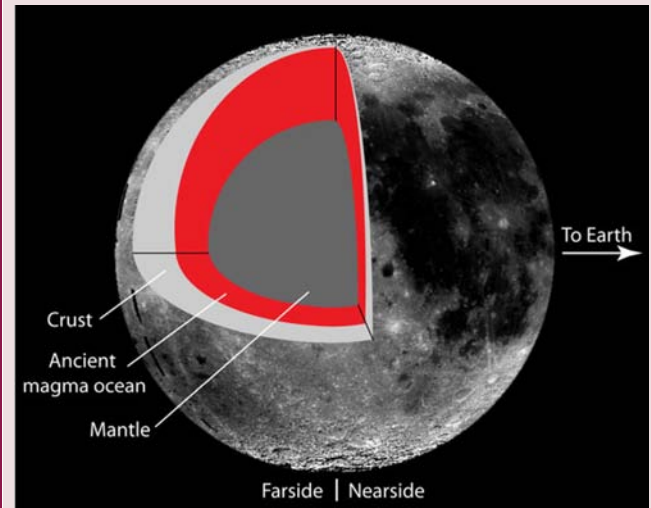


Figure No. 16

### UPSC PYQ

**Q: Assertion (A):** The same face of the moon is always presented to the earth. [2005]

**Reason (R):** The moon rotates about its own axis in 23 and half days which is about the same time that it takes to orbit the earth.

- Both A and R are true and R is the correct explanation of A
- Both A and R are true but R is NOT a correct explanation of A
- A is true but R is false
- A is false but R is true

**Solution: (c)**

## WHITE PHOSPHORUS

### CONTEXT

A **global human rights group** accused Israel of using **white phosphorus** incendiary shells on residential buildings in conflict-hit southern Lebanon, possibly harming civilians and violating international law.

### What is White Phosphorus?

- White phosphorus is a solid waxy substance that looks yellowish or colorless.
- It has a distinct garlic-like smell.
- Uses and Properties:**
  - White phosphorus ignites instantly when it touches oxygen.
  - Militaries use it for lighting up battlefields, creating smoke screens, and as an incendiary.
  - Once ignited, it's hard to put out, and it sticks to surfaces like skin and clothes.
- Health Risks:** White phosphorus is harmful to humans in all forms of contact.
- Its smoke contains **phosphoric acids and phosphine**, which can harm the eyes and respiratory system.
- Contact with white phosphorus can cause **deep and severe burns**, even penetrating through bone.
- Ban:** The incendiary substance is not banned, but its use in densely populated areas has been widely condemned.



Figure No. 17



#### FACT BOX

#### Convention on Certain Conventional Weapons:

- In 1980, the **Convention on Prohibitions or Restrictions** on the use of **certain conventional weapons** was established. This convention aims to ban or restrict weapons causing undue suffering or indiscriminate harm.
  - Protocol III:** Protocol III of this convention is crucial for limiting incendiary weapons. Its main goal is to protect civilians and civilian infrastructure from these harmful weapons.
  - It prohibits deliberately targeting civilians and imposes restrictions on using incendiary weapons in populated areas.

### 1000 DAYS IN SPACE

#### CONTEXT

**Oleg Kononenko**, a Russian cosmonaut, became the first person to spend 1,000 days in space, according to the Russian space agency **Roscosmos**. He achieved this milestone during his current trip to the **International Space Station (ISS)**, which began on September 15, 2023.

#### International Space Station (ISS):

- The ISS serves as a spacecraft, observatory, laboratory, and living quarters for astronauts.
- It floats approximately 240 miles above the Earth's surface and can accommodate up to 10 people at once.
- Objective:** to facilitate long-term exploration of space and provide tangible benefits to people on Earth through scientific research.
- Collaborative Effort:** Built and operated by 15 countries, including the US, Russia, and Japan, the ISS was initiated in 1998 to serve as a hub for various space-based research initiatives.
- Orbital Dynamics:** The ISS orbits the Earth 16 times a day, traveling at a staggering speed of 28,000 km/h, which is equivalent to ten times the speed of a bullet on Earth's surface.
- Bright Night Sky Object:** As it orbits the Earth, the ISS is the third brightest object visible in the night sky and can be observed with the naked eye by people on the ground.

### DISCOVERY OF EARLIEST-KNOWN GALAXY BY JWST

#### CONTEXT:

NASA's **James Webb Space Telescope (JWST)** has uncovered a remarkable find - the **earliest-known galaxy**, challenging previous assumptions about the universe's infancy. This galaxy, named **JADES-GS-z14-0**, was observed approximately 290 million years after the **Big Bang**, during a period known as **cosmic dawn**.

#### Key Findings:

- JADES-GS-z14-0 measures about **1,700 light years** across and possesses a mass equivalent to 500 million stars like sun.
- Despite its early formation, it was rapidly generating stars, approximately 20 per year.
- Surprising Brightness:** The brightness and size of this early galaxy defy previous expectations. Scientists were astonished by its **luminosity**, as it was larger and brighter than anticipated for a galaxy at this early stage.
- Comparison:** While notable for its time, JADES-GS-z14-0 is **dwarfed** by present-day galaxies like **Milky Way**, which spans about 100,000 light years and contains the mass of around 10 billion sun-sized stars.



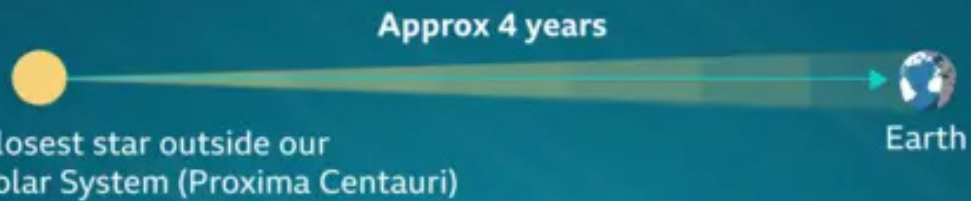
## How James Webb is able to see back in time

Light from the Sun takes eight minutes to reach us, so we see the star as it was eight minutes ago

If the Sun disappeared it would take us eight minutes to notice



Light from a distant star may take years to reach us across the expanse of space, so we see it as it was years ago



Light from the first stars began its journey billions of years ago so Webb will see those stars as they were billions of years ago

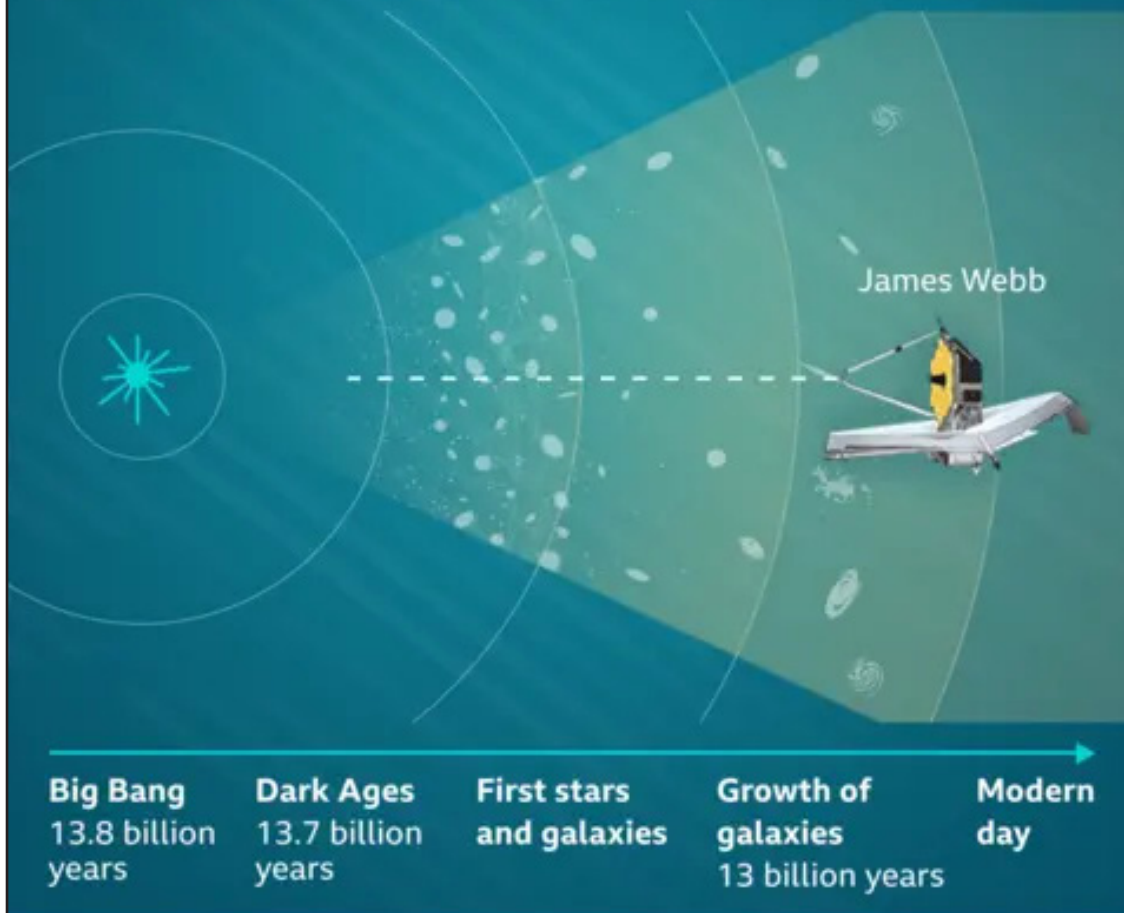


Figure no. 18

- **Second Discovery:** In addition to JADES-GS-z14-0, the JWST also identified the second oldest-known galaxy, **JADES-GS-z14-1**, dating back approximately 303 million years post-Big Bang. This galaxy, although smaller, still exhibited significant star formation.
- **Implications:** These discoveries challenge existing theories about early galaxy formation. They hint at a **denser, more gas-rich environment** in the early universe, with star formation processes differing markedly from those seen today.



**FACT BOX**

**About James Webb Space Telescope (JWST)**

- JWST is a cutting-edge observatory designed for **infrared observations**, equipped with advanced instruments to address key questions in astronomy.
- Named after former NASA administrator James E. Webb, it represents a collaboration between **NASA, the European Space Agency (ESA), and the Canadian Space Agency**.
- **Key Features:**
  - ▶ **Optimized for Infrared:** JWST boasts a large aperture telescope tailored for infrared observations, enabling it to explore a wide range of astronomical phenomena.

- ▶ **Operational Orbit:** Positioned at the **Earth-Sun L2 Lagrange point**, about 1.5 million kilometers away from Earth, JWST benefits from simplified operation, pointing, and stability requirements compared to the Hubble Space Telescope.
- ▶ **Temperature Control:** Operating at an ultra-low temperature of **-233°C (-387°F)**, JWST's instruments are kept cold to prevent their own infrared emissions from interfering with astronomical signals.

**L2 Point Explanation:**

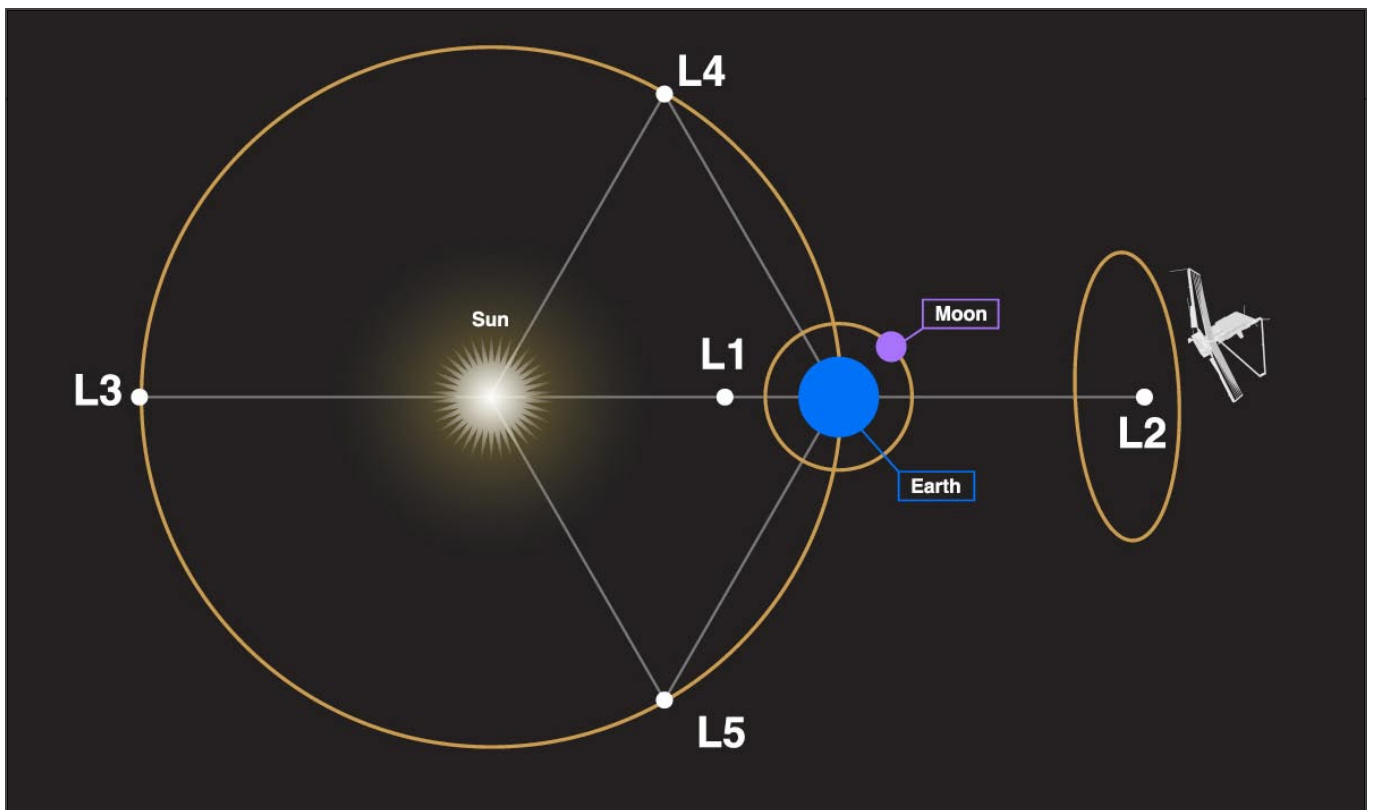
- Lagrange Points are regions where the gravitational forces of the Sun and Earth balance the orbital motion of a satellite, allowing it to maintain a fixed position relative to both celestial bodies with minimal energy expenditure.
- **L2 Point:** Specifically, the second **Lagrange Point (L2)** is one of five such points in space. Placing a spacecraft at L2 enables it to remain in a stable position relative to the Earth and Sun.

*(Figure No. 19)*

**AGNIBAAN SORTED**

**CONTEXT**

In a major milestone for India's private space sector, **Agnikul Cosmos** has successfully launched its **SOrTeD mission**. The mission featured a **single-stage launch vehicle demonstration** powered by the **world's first single-piece 3D-printed semi-cryogenic engine, Agnilet**.



*Figure no. 19*

## Key highlights of the mission:

- Agnibaan SOrTeD (SubOrbital Technological Demonstrator) is a **single-stage rocket** fueled by a **semi-cryogenic engine**.
- **Launch Site:** The SOrTeD mission took off from ALP-01, India's first private launchpad, located at the Satish Dhawan Space Centre in Sriharikota.
- The **Agnibaan rocket** is capable of carrying up to 300 kg payload to a 700 km high orbit.
- **Mission Maneuvers:** The mission included precise maneuvers such as a pitch-over maneuver and wind biasing before splashing down in the Bay of Bengal.
- The data collected from the SOrTeD mission will be instrumental in fine-tuning the development of the Agnibaan launch vehicle, which is expected to be highly customizable and capable of carrying a 300kg payload to a 700km orbit.



## FACT BOX

### Semi-Cryogenic Engine vs Cryogenic Engines

#### Semi-cryogenic Engine:

- SOrTeD used Agnilet, India's first semi-cryogenic engine, which uses a mix of liquid and gas for propellant. It is the world's first single-piece 3D-printed semi-cryogenic rocket engine.
- **Vehicle Specs:** The launch vehicle was a 6.2-meter-tall single-stage rocket with an elliptical nose cone.
- It was equipped with advanced avionics architecture and autopilot software.
- This engine runs on sub-cooled **Liquid Oxygen (LOX)** and **Aviation Turbine Fuel (ATF)**.

#### Cryogenic Engines:

- It uses liquid oxygen (which is very cold) and regular fuel, like kerosene or ATF
- It uses both liquid oxygen and liquid hydrogen, both of which are extremely cold.
- They use less cold fuel, making them simpler and cheaper to handle and store compared to cryogenic engines.
- It uses extremely cold fuel. They are more powerful as liquid hydrogen provides higher impulse, meaning more thrust per unit of fuel.

- Less powerful and efficient as compared to cryogenic engine.
- More efficient for long-distance missions or heavier payloads.
- They are often used in the initial stages of a rocket for their cost-effectiveness and simpler handling
- They are used in the later stages for their higher efficiency and greater power needed to place satellites into higher orbits or for deep space missions

### About 3D printing

- 3D printing is a process where a machine creates objects **layer by layer** from a digital model, using materials like plastic or metal. This method can make the **part stronger and more reliable**
- Single piece using 3D printing means that the entire part was made as one continuous piece using a 3D printer, rather than being assembled from multiple parts.

## ESA'S EARTHCARE MISSION

### CONTEXT

A **Falcon 9 rocket** by SpaceX recently launched an **Earth science mission** jointly led by the **European Space Agency (ESA)** and **Japan**. This launch marks ESA's temporary collaboration with SpaceX for space access.

### Mission Details:

- Named EarthCARE, the mission is valued at 800 million euros (\$870 million) and focuses on **studying clouds and aerosols in the atmosphere**.
- The spacecraft is equipped with four instruments, including a **cloud profiling radar** provided by the Japanese space agency JAXA, costing 8.3 billion yen (\$53 million).

### Mission Objectives:

- ▶ EarthCARE, weighing 2,200 kilograms, orbits at an altitude of 393 kilometers in a sun-synchronous orbit.
- ▶ Its primary goal is to gather data on **clouds, aerosols, reflected sunlight, and radiated heat in the atmosphere**.
- ▶ This data will contribute to atmospheric science, aiding in climate and weather modeling.
- While other spacecraft, like **NASA's PACE spacecraft** launched in February, also conduct similar measurements, EarthCARE's mission enhances the **global understanding of Earth's atmosphere and climate dynamics**.

## ICMR'S INITIATIVE FOR SICKLE CELL DISEASE

### CONTEXT

The **Indian Council of Medical Research (ICMR)** has embarked on a critical mission to **combat sickle cell disease**, a prevalent health concern in India. A key obstacle in this fight is the **lack of hydroxyurea formulations** specifically designed for paediatric patients, making precise dosing a challenge. To address this pressing issue, the ICMR has issued a call to collaborate on the joint development and **commercialization of paediatric formulations of hydroxyurea**.

### About Sickle Cell Disease:

- Sickle cell disease is one of India's most **prevalent monogenic disorders**, posing substantial health risks.
- India faces a significant burden of sickle cell disease, with over **20 million affected individuals**.
- It is an **inherited blood disorder** marked by **defective hemoglobin**.
- It **inhibits the ability of hemoglobin in red blood cells to carry oxygen**.
- Sickle cells tend to stick together, blocking small blood vessels causing painful and damaging complications.
- **Symptoms:** Anemia, Pain crisis, or sickle crisis, acute chest syndrome, splenic sequestration (pooling). stroke, jaundice, priapism (painful obstruction of the blood vessels in the penis by sickle cells)
- **Treatment:** Blood transfusions, Vaccinations and antibiotics, Folic acid, Hydroxyurea, Bone marrow transplant.

Red Blood Cells (normal Haemoglobin)	Cells with Sickle Cell Haemoglobin
They are smooth, disk-shaped, and flexible, like doughnuts without holes.	They are stiff and sticky. When they lose their oxygen, they form into the shape of a sickle or crescent, like the letter C.
They can move through the blood vessels easily.	These cells stick together and can't easily move through the blood vessels. This can block small blood vessels and the movement of healthy, normal oxygen-carrying blood. The blockage can cause pain.
Normal red blood cells can live up to 120 days.	Sickle cells only live for about 10 to 20 days. They may be destroyed by the spleen because of their shape and stiffness. The spleen helps filter the blood of infections.

### UPSC PYQ

**Q: Consider the following statements in the CONTEXT interventions being undertaken under Anaemin Mukh Bharat Strategy : (2023)**

- 1: It provides prophylactic calcium supplementation for pre-school children, adolescents and pregnant women.
- 2: It runs a campaign for delayed cord clamping at the time of child-birth.
- 3: It provides for periodic deworming to children and adolescents.
- 4: It addresses non-nutritional causes of anaemia in endemic pockets with special focus on malaria, hemoglobinopathies and fluorosis.

How many of the statements given above are correct?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

**Solution: (c)**

## PAEDIATRIC INFLAMMATORY BOWEL DISEASE

### CONTEXT

**Inflammatory Bowel Disease (IBD)** is making headlines due to increasing awareness and diagnosis among children in India.

### What is IBD?

- IBD is a chronic condition where the **body's immune system** mistakenly attacks the **cells of the digestive tract**, causing **inflammation and ulcers**.
- **Symptoms:** This chronic autoimmune condition affects the digestive tract, causing symptoms like fever, abdominal pain, diarrhea (sometimes bloody), and weight loss.
- **Types:** There are two main types of IBD:
  - **Ulcerative Colitis:** Affects only the large intestine (colon).
  - **Crohn's Disease:** Can affect any part of the digestive tract, from the mouth to the anus.
- **Causes of IBD:** The exact cause is still unknown, but several factors contribute to its development:
- **Immune System Dysregulation:** Children with IBD often have a weak or overactive immune system that responds inappropriately to environmental triggers like viruses or bacteria.
- **Genetics:** There may be a genetic predisposition, as IBD sometimes runs in families.



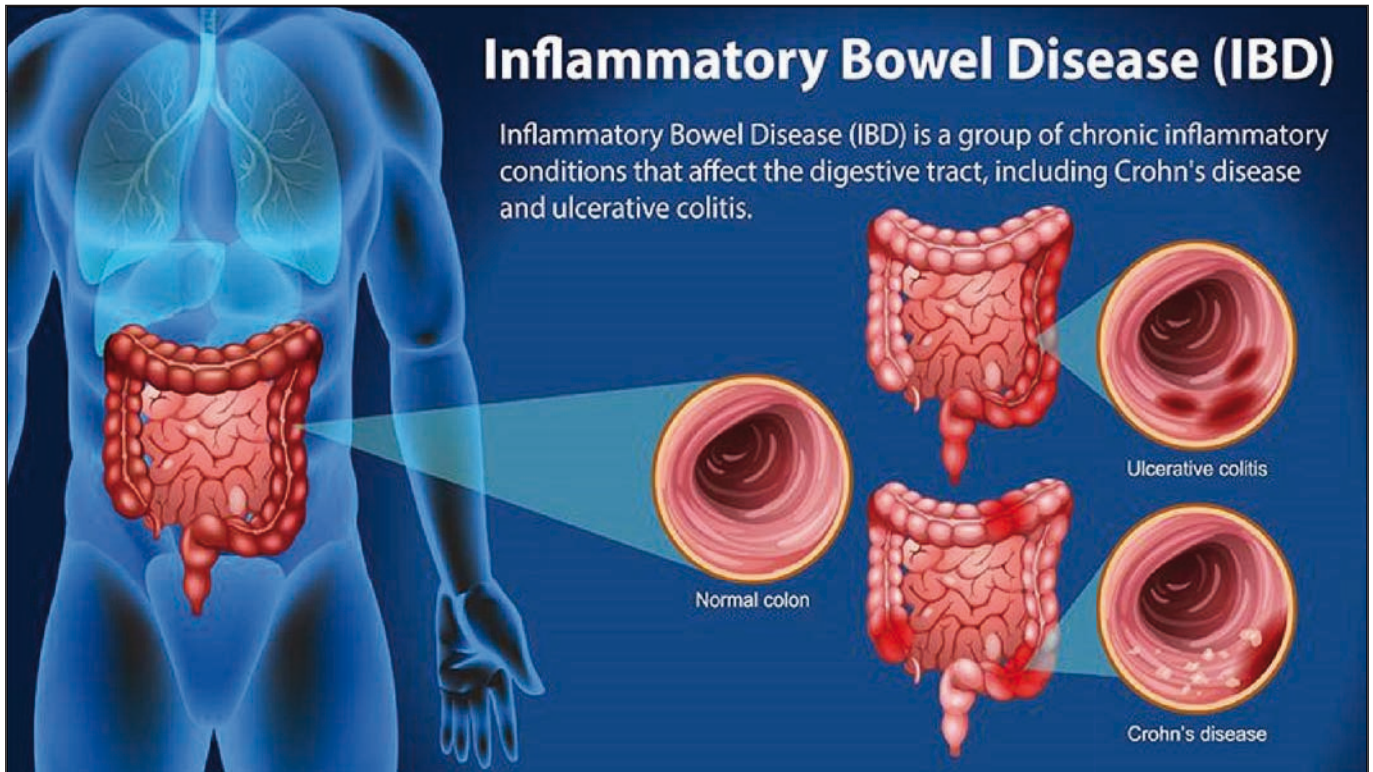


Figure no. 20

- **Gut Microbiota:** The millions of microorganisms in the human gut play a crucial role. Changes in the gut microbiota, influenced by frequent antibiotic use or westernized diets, are linked to IBD.
- **Environmental Factors:** Lifestyle changes and dietary habits can also trigger or exacerbate IBD.

## PLUTONIUM 240

### CONTEXT:

Researchers have reported the results of the first attempt to measure the PFNS of induced fission in Pu-240 with neutrons of energy greater than 0.85 MeV.

### About

- $^{240}\text{Pu}$  is a radioactive isotope with a half-life of 6,561 years. It decays primarily through alpha emission, with a small fraction undergoing spontaneous fission.
- $^{240}\text{Pu}$  is produced as a byproduct in nuclear reactors through the neutron capture of  $^{239}\text{Pu}$ . In typical reactor-grade plutonium,  $^{240}\text{Pu}$  constitutes about 20-30% of the total plutonium content.
- In civilian nuclear power, the presence of  $^{240}\text{Pu}$  in reactor-grade plutonium affects fuel performance and reactor design. Its tendency for spontaneous fission increases neutron emission, which can complicate reactor control and fuel handling procedures.
- The presence of  $^{240}\text{Pu}$  is a crucial factor in weapons-grade plutonium. Its high rate of spontaneous fission can lead to premature detonation in nuclear weapons, reducing yield and reliability. For this reason, weapons-grade plutonium typically contains less than 7%  $^{240}\text{Pu}$ .

## GREEN-BEARD GENES

### CONTEXT:

Recent research has delved into the fascinating phenomenon of **altruism** across various species, sparking interest among scientists seeking to unravel its genetic and behavioral underpinnings. One notable area of investigation focuses on social amoebae like *Dictyostelium discoideum*, providing valuable insights into the evolution of cooperative behavior in nature.

### Key-findings of the Research

- Studies on social amoebae, particularly *Dictyostelium discoideum*, have uncovered significant findings regarding the genetic basis of altruism.
- Researchers have identified "green-beard" genes that enable individuals carrying the same gene variant to recognize and cooperate with each other preferentially.
- Furthermore, mechanisms such as **gene expression and protein binding** have been observed to facilitate cooperation and deter exploitation within social groups of amoebae.
  - ▶ Green-beard genes, named for their hypothetical ability to "recognize" and cooperate with others bearing the same gene, play a crucial role in fostering altruistic behavior.
  - ▶ Alternatively, these genes can induce harmful behavior towards those with different gene variants.
- **The Role of Tgr Genes:** Two genes, **tgrB1** and **tgrC1**, have been identified in *Dictyostelium discoideum*, which regulate altruistic behavior. These genes facilitate cell recognition and cooperation, ensuring that altruistic amoebae recognize and cooperate with their kin.

- These findings not only shed light on the **genetic mechanisms driving altruism** but also offer broader insights into the evolution of cooperation and sociality across diverse species.



**FACT BOX**

**About Altruism:**

- Altruism is the selfless act of helping others without expecting anything in return. This feature is observed across various species in nature.

- **Examples:** Altruism is widespread in nature. Worker honey bees sacrifice their reproductive capabilities to care for their queen and her offspring, and meerkats assuming sentinel roles to alert their clan of potential threats.
- Altruism often involves individuals sacrificing their own interests for the benefit of their kin or social group.



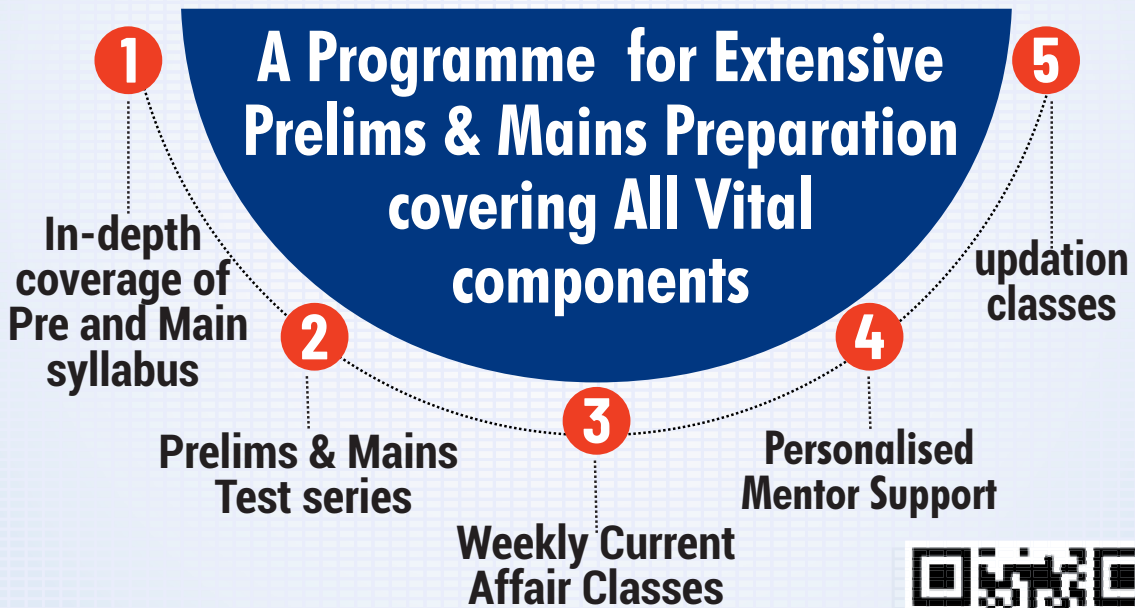
**IAS 2025-26**

**GS SCORE**

An Institute for Civil Services

**More Than Basics, Actual Preparation**

**GS FOUNDATION**  
**Prelims *cum* Mains**



Offline • **LIVE** • Online

☎ **8448496262**

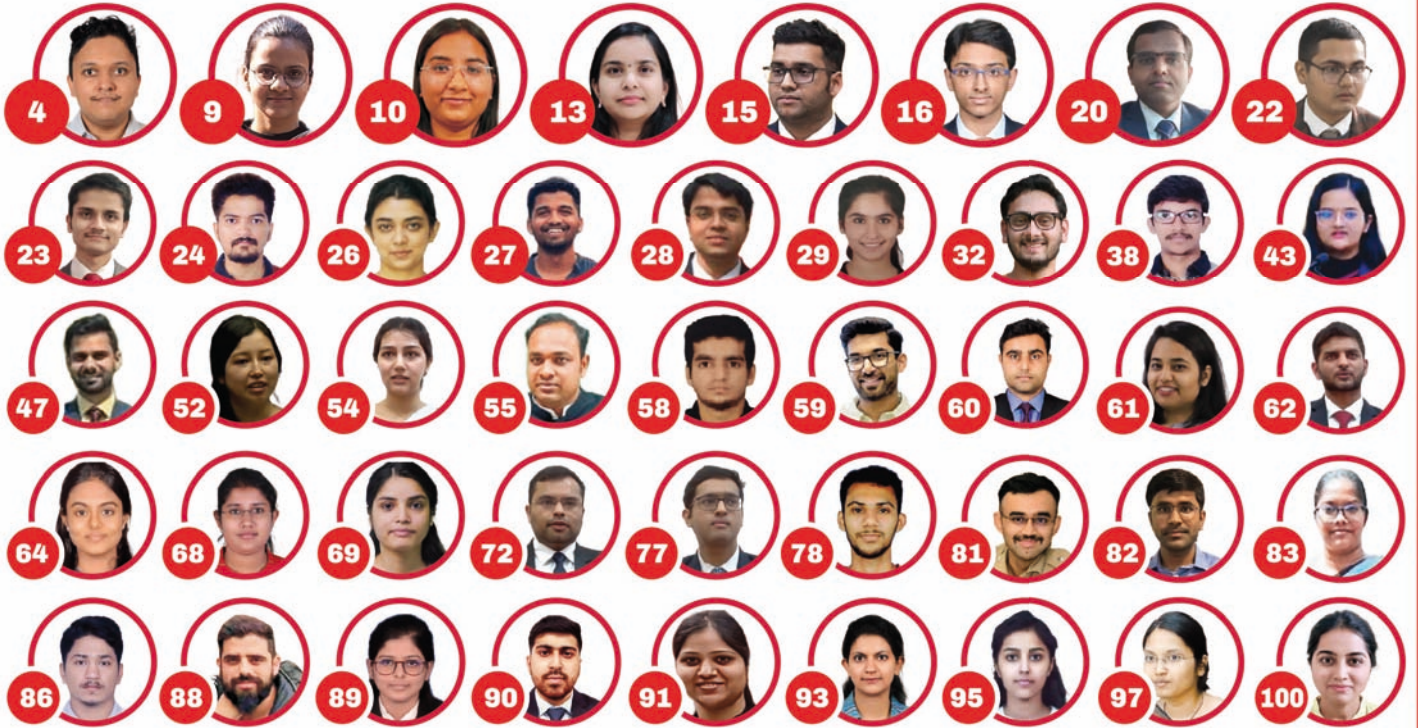




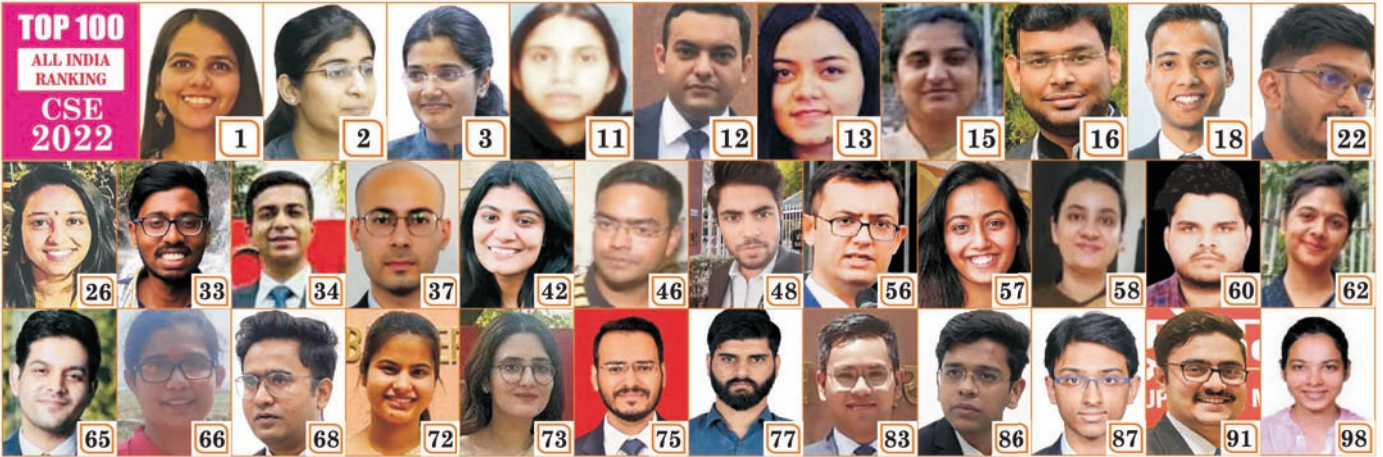


Scan QR Code for detailed RESULT

### TOP 100 ALL INDIA RANKING CSE 2023



### TOP 100 ALL INDIA RANKING CSE 2022



### TOP 100 ALL INDIA RANKING CSE 2021

