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MINISTRY OF
SCIENCE AND
TECHNOLOGY



MK Yadav Sir

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Sebi moots ASBA-like feature for stock trade

Proposed system aims at preventing misuse of client funds by brokers

KHUSHBOO TIWARI & SAMIE MODAK
Mumbai, 17 January

The Securities and Exchange Board of India (Sebi) on Tuesday gave details of a proposed framework for shifting to a new payments system for secondary market trades. The move is primarily aimed at safeguarding investors from potential misuse of their funds by brokers.

According to industry players, the new system, along with the shift to the shorter T+1 settlement cycle, would make the domestic securities market one of the most efficient and sophisticated in the world.

In a discussion paper titled 'Blocking of funds for trading in secondary market', the market regulator is aiming to leverage the new multiple debits facility for the Unified Payments Interface (UPI) approved by the Reserve Bank of India (RBI).

"It is felt that the RBI-approved UPI mandate service of a single block and multiple debits can be integrated with the secondary market to provide a block mechanism whereby clients will be able to block funds in their bank account for trading in the secondary market, instead of transferring them upfront to the trading member, thereby providing enhanced protection of cash collateral," Sebi said in a paper inviting public feedback.

At present, an investor has to make an upfront fund transfer to its broker before initiating any trade.

This provides the broker with an extra float, helping it generate extra revenues in terms of interest income.

Turn to Page 6 ▶



QUITE A CHANGE

The current system

- 1 Customer transfers funds to brokers
- 2 Money goes into pooled account
- 3 Broker gives collateral to dearing corporation
- 4 Broker is able to retain idle client fund

The proposed system

- 1 Customer initiates UPI mandate request at the broker interface for blocking of funds
- 2 Request goes to customer's bank for blocking funds; confirmation is sent to acquirer bank of clearing corp
- 3 Clearing corp sends confirmation to intermediaries and investor
- 4 Broker allows customer to trade

Context: The Securities and Exchange Board of India (Sebi) gave details of a proposed framework for shifting to a new payments system for secondary market trades.

- A similar system is implemented for the primary market and is popularly known as ASBA (application supported by blocked amount).

Application Supported by Blocked Amount (ASBA)

- **About:** ASBA is a process developed by SEBI to apply for IPOs, Rights and Debts Issue, FPS and more.
 - It entails that the amount to be paid for **subscribing the shares** does not get debited from the investor's account until the shares have been allotted by the company.
 - **Investors can apply for ASBA** and have the bank block out the application money until the shares get allotted to the investor.
- **Key features:** ASBA will provide the authorization of the investor to subscribe only when the application is selected for the issue.
 - This blocking is carried out by **Self-Certified Syndicate Banks (SCSB)**.
 - Upon the approval of the issue to the investor, the funds are paid accordingly.
 - **Self Certified Syndicate Banks (SCSBs)** are SEBI authorized banks that confirm to the conditions laid by SEBI to accept the applications, verify and block the amount to the extent of what the application requires, upload the details to the web and stay updated with the process until the shares are allotted.
 - If the issue gets withdrawn, or the investor has not been allotted the shares, then SCSBs refund the money back to the investor's account.
- **Significance:** The reason for this process to come into effect was to **eliminate the inconvenience of finding refunds or have shares not be allotted**.
 - As such, the investor does not need to hurry around to pay via cheques and demand drafts, because **ASBA** demands that the investor has adequate funds (along with a Demat account, PAN number and a trading account).
- **Mandatory:** Subscribing to issues via **ASBA is a mandatory option since as of 2016**.
 - If the money has been blocked in an interest bearing ASBA account then the amount will continue to earn interest during the time it takes to get the allotment of the share. The investor needs to be an Indian resident to avail ASBA.

DTE

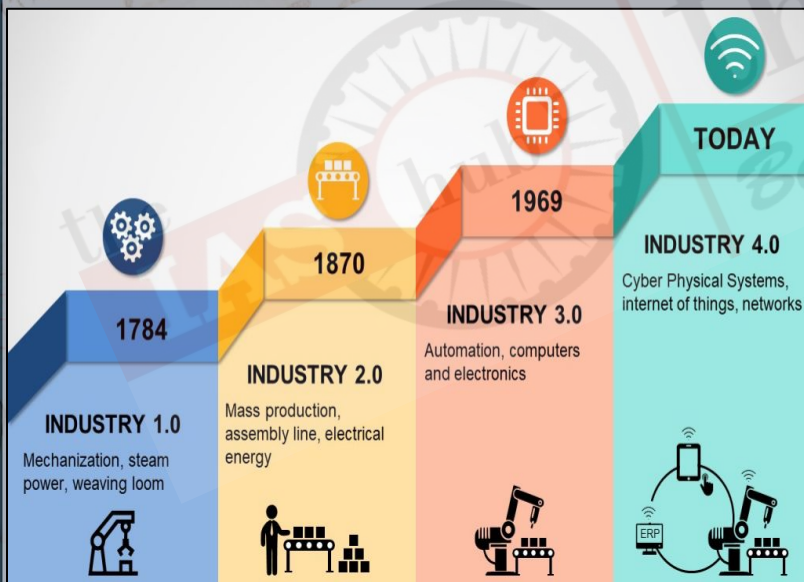
JAN 18

FOURTH INDUSTRIAL REVOLUTION

(Syllabus: GS Paper 3 - Economy)

Fourth industrial revolution: World Economic Forum advocates it; others fear corporate takeover; who is right

Technology can never exist in isolation; it has to exist within social realities, say critics of 4IR



Context: On May 26, 2022, US researchers unveiled a pacemaker that dissolves in the human body after completing its job.

- The pacemaker is a near-perfect example of the ongoing **fourth industrial revolution (4IR)**, which, simply put, is the use of different technologies to blur the boundaries between the digital, physical and biological worlds.

Fourth industrial revolution (4IR)

- About:** The fourth Industrial Revolution is moving from an electronic based industry to a process which is the combination of **human beings and electronics**.
 - It includes **cyber-physical systems**, the Internet of things, big data analytics, cloud computing, cognitive computing, artificial intelligence, 3-D printing, and autonomous vehicles etc.
 - The best example would be **processed artificial intelligence** has broken the distinction between the Man, The Machine and Intelligence.
- Impact of Industry 4.0:**
 - Services and business models improvement.
 - Reliability and continuous productivity.
 - IT security and better resource utilization.
 - Machine safety and better working condition.
- Significance for India:**
 - It can play a major role in **alleviating poverty**.
 - Better and low-cost health care** can be achieved through the implementation of AI-driven diagnostics, personalized treatment, early identification of potential pandemics, and imaging diagnostics, among others.
 - Enhancing farmer's income** by providing them with the latest technologies, improvement in crop yield through real-time advisory, advanced detection of pest attacks, and prediction of crop prices to inform sowing practices.
 - It will **strengthen infrastructure** and improve connectivity to the very last village.
 - Artificial intelligence can be used to **empower and enable specially-abled people**.
 - It will **improve ease of living and ease of doing business** using smart technologies.

“VIRAASAT” - Celebrating Handloom Home Décor to begin from January 20, 2023

Context: The Ministry of Textiles is going to organize “VIRAASAT” - Celebrating Handloom Home Décor – Special Handloom Expo - at Handloom Haat, New Delhi from 20.01.2023 to 30.01.2023 to showcase the Home Décor products made by Handloom.

Key Points

- Nearly month-long exclusive handloom **sari exhibition “VIRAASAT”**- Celebrating 75 handwoven Saris of India’, concluded.
- The **Ministry of Textiles** organized the exhibition in which 160 participants from different parts of the country exhibited famous Handcrafted varieties of Saris.
- The event celebrated both tradition as well as **versatility of the Handloom Sector**.
- The exhibition **focused on the age-old tradition of Sari weaving** by showcasing exclusive handloom weaves from different parts of the country in their full fervor.
- Coinciding with the 75 years of Independence, “**Azadi ka Amrit Mahotsav**” there was an exhibition-cum-sale of Handloom Saris by 75 handloom weavers.
- Also, **a series of activities organized for the visiting public** such as: Viraasat – Celebrating the heritage: Curated display of handloom saris, Viraasat-Ek Dharohar: Direct retail of saris by weavers, Viraasat Ke Dhage: Live loom demonstration, Viraasat–kal se kal tak : Workshops and talks on sari and sustainability, Viraasat–Nritya Sanskriti : Famous Folk dances of Indian culture and 5 F theme Pavilion – **(Farm- Fibre-Factory- Fashion- Foreign)**.
- For awareness of the general public and handloom connoisseurs, a **publicity program was taken up to advertise this event through Print Media** - Newspapers, Posters, invitation cards, Social Media, Cultural Program and Designers Workshops etc.
- A **social media campaign** under a common hashtag **#MySariMyPride** was also launched to support handloom weavers.

ON ARREARS OF PENDING ROYALTY AMOUNT FOR TRANSPORTING FROM DANTEWADA

Chhattisgarh-Centre Face off Over Iron Ore Transit Permit

NMDC asked to pay ₹144 crore as arrears or stop transportation

Nidhi.Sharma@timesgroup.com

New Delhi: In yet another face-off with the Centre, the Congress government in Chhattisgarh has furnished a bill of ₹144 crore to a central public sector enterprise under the steel ministry and asked it to pay or stop iron ore transportation from the state's forest areas.

The National Mineral Development Corporation (NMDC), India's largest iron ore producer, has been asked to pay ₹144 crore as arrears of pending "royalty amount" for transporting iron ore from Dantewada in south Bastar. Chhattisgarh levies a transit fee per tonne of iron ore transported from its forest area. Central public sector enterprises acquire a transit permit after paying this fee. What surprised the Centre was the fact that the demand was suddenly raised in December, even as NMDC has acquired transit permits over the past several years.

A Union steel ministry spokesperson told ET, "This demand has been raised as arrears from 2002 till 2011 – that is from the time the new state of Chhattisgarh was formed. Since the state government had threatened to stop the operations NMDC has paid one-third of the demand – ₹48 crore – under protest. But we have challenged it in court."

NMDC has paid the transit fee and acquired permits since 2012.

The timing of the demand to settle the ar-



BACK AND FORTH

Demand was suddenly raised in December, even as NMDC has acquired transit permits over the past several years

Chhattisgarh levies a transit fee per tonne of iron ore transported from its forest area

NMDC has paid the transit fee and acquired permits since 2012

Since the state government had threatened to stop the operations, NMDC had paid one-third of the demand

This demand has been raised as arrears from 2002 till 2011 – that is from the time the new state of Chhattisgarh was formed

rears is curious as it comes close on the heels of the Centre rejecting the state government's request to withdraw ₹17,240 crore of the employees which has been deposited under the market-driven National Pension System (NPS) since November 2004.

The Congress government in Chhattisgarh had decided to switch back to the Old Pension Scheme from April 1, 2022. However, the

Pension Fund Regulatory and Development Authority rejected the demand to withdraw the money, which has been invested in different financial instruments.

The steel ministry has also raised objections to the way the transit fee is decided by the state. "There is no logic to the way the state decides unilaterally on the permit fee. It was fixed at ₹7 per tonne when the state was formed and revised without any consultation. All mining companies pay several taxes to the state but it is levied just to transport or pass through the roads in the forest area," said the official.

Context: In yet another face-off with the Centre, the Congress government in Chhattisgarh has furnished a bill of ₹144 crore to a central public sector enterprise under the steel ministry and asked it to pay or stop iron ore transportation from the state's forest areas.

- The **National Mineral Development Corporation (NMDC)**, India's largest iron ore producer, has been asked to pay ₹144 crore as arrears of pending "royalty amount" for transporting iron ore from Dantewada in south Bastar

National Mineral Development Corporation (NMDC)

- **About:** It is India's largest iron ore producer and exporter, producing more than 35 million tonnes of iron ore from three mechanized mines in Chhattisgarh and Karnataka. It also operates the only mechanized diamond mine in the country at Panna in Madhya Pradesh.
 - It is involved in the exploration of iron ore, copper, rock phosphate, limestone, dolomite, gypsum, bentonite, magnesite, diamond, tin, tungsten, graphite, coal etc.
- **Nodal Ministry:** Incorporated in 1958 as a Government of India fully owned public enterprise, NMDC is under the administrative control of the **Ministry of Steel**, Government of India.
- **Navratna:** The company has been categorized by the Department of Public Enterprises as "Navratna" **Public Sector Enterprise in 2008.**
- **Headquarters:** Its corporate office is located in **Hyderabad.**

China lifts block, UNSC lists LeT's Makki as terrorist

Brother-in-law of Hafiz Saeed, Makki recruited youths for attacks in India

SHUBHAJITROY
NEW DELHI, JANUARY 17

SEVEN MONTHS after it blocked India's bid to list Pakistan-based terror outfit Lashkar-e-Taiba's deputy chief Abdul Rehman Makki as a "global terrorist", China lifted the block and allowed the United Nations Security Council to designate him as a global terrorist for "raising funds, recruiting and radicalising youth to violence and planning attacks in India".

Bahawalpur-born Makki, already a US-designated terrorist, is also the head of the political affairs wing of the Jama'at-ud-Dawah, a member of JuD's markazi (central) team and daawati (proselytisation) team.

Brother-in-law of JuD and LeT chief Hafiz Muhammad Saeed, Makki has been the head of LeT's foreign relations department and a member of its shura (governing body).

His listing by the UNSC is significant and is similar to the listing of Jaish-e-Mohammed chief Masood Azhar as a global terrorist in June 2019 when Beijing lifted its block.



Pakistan-based terrorist
Abdul Rehman Makki. ANI

New Delhi welcomed the UNSC decision and said "listings and sanctions by the UNSC are an effective tool to curb such threats and dismantle terror infrastructure in the region".

Arindam Bagchi, spokesperson for the Ministry of External Affairs said, "We welcome the decision of the UN Security Council's ISIL and Al-Qaeda Sanctions Committee to list Lashkar-e-Tayyiba (LeT) terrorist Abdul Rehman Makki, who is also the brother-in-law of LeT leader Hafiz Saeed. Makki has occupied various leadership

CONTINUED ON PAGE 4

UNSC'S SANCTIONS COMMITTEE (Syllabus: GS Paper 2 - International Relations)

Context: The ISIL and Al Qaida Sanctions Committee of the U.N. Security Council (UNSC) has placed Abdul Rehman Makki, a fundraiser and key planner of the Pakistan-based terrorist outfit Lashkar-e-Taiba (LeT), on its sanctions list.

UNSC's sanctions committee

- **About:** It is one of the most important and active UN subsidiary bodies working on efforts to combat terrorism, particularly in relation to Al Qaeda and the Islamic State group.
 - It is also known as the **Da'esh, Al Qaeda Sanctions and 1267 Committee**.
 - The **1267 list of terrorists** is a global list, with a UNSC stamp. It is full of Pakistani nationals and residents.
- **Origin:** It was first set up in **1999**, and strengthened after the September, 2001 attacks.
- **Members:** It comprises **all permanent and non-permanent members** of the United Nations Security Council (UNSC).
- **Functions:** It discusses UN efforts to limit the movement of terrorists, especially those related to travel bans, the freezing of assets and arms embargoes for terrorism.
- **Process by which people are listed under this committee:**
 - Any member state can submit a proposal for listing an **individual, group, or entity**.
 - The 1267 Committee meets as required with a notice of four working days.
 - Decisions on listing and de-listing are adopted by consensus.
 - The proposal is sent to all the members, and if no member objects within five working days, the proposal is adopted. An **"objection"** means curtains for the proposal.
 - Any member of the Committee may also put a **"technical hold"** on the proposal, and ask for more information from the proposing member state. During this time, other members may also place their own holds.
 - The **matter remains on the "pending" list of the Committee** until such time as the member state that has placed the hold decides to turn its decision into an **"objection"**, or until all those who have placed holds remove them within a timeframe laid down by the Committee.
 - Pending issues must be resolved in six months, but the member state that has placed the hold may ask for an additional three months. At the end of this period, if an objection is not placed, the matter is considered approved.
- **Criteria:** The **proposal must include acts or activities indicating the proposed individual/group/entity** had participated **"in the financing, planning, facilitating, preparing, or perpetrating of acts or activities"** linked to **"ISIL (Da'esh), Al-Qaida or any cell, affiliate, splinter group or derivative thereof"**.

Department of Fisheries conducts planning meeting for 'Sagar Parikrama' Phase III

Context: DoF, **Union Ministry of Fisheries, Animal Husbandry and Dairying (MoFAH&D)**, Government of India, organised the planning meeting for 'Sagar Parikrama' Phase III in New Delhi.

- **Phase III program of 'Sagar Parikrama'** is being organized in the **state of Maharashtra** and a tentative plan has been proposed by the state officials

Sagar Parikrama

- **About:** It is a **navigation journey** to be conducted in all coastal states/UTs through a pre-decided sea route to demonstrate solidarity with all fisherfolk, fish farmers and concerned stakeholders.
 - It is envisioned as a part of '**Azadi Ka Amrit Mahotsava**' saluting our great freedom fighters, sailors and fishers.
- **Origin:** The Parikrama started from **Mandvi, Gujarat** in 1st phase and organised in other districts of Gujarat and other State/UTs in subsequent phases.
 - The first leg of 'Sagar Parikrama' started on 5th March 2022 from Mandvi and ended at Porbandar on 6th March 2022.
- **Distance:** The entire distance has covered from the **coastline of Mandvi** on the coast of the Arabian Sea in the Kutch district of Gujarat, situated at the estuary where the river Rukmavati meets the Gulf of Kutch.
 - The **Rukmavati River** is a south flowing river originating in the central Kutch District and empties into the Arabian Sea.
- **Interaction programmes:** It conducted interaction programmes with **fishermen, fisher communities and stakeholders** in these locations and districts in order to know the problems of Coastal Fisher folk.
 - It was envisaged in the sea across the coastal belt demonstrating solidarity with all fisher folk, fish farmers and concerned stakeholders as a spirit of Atma Nirbhar Bharat.
- **Significance:** It focus on **sustainable balance between the utilisation of marine fisheries resources for food security** of the nation and livelihoods of coastal fisher communities and protection of marine ecosystems.
 - Oceans are vital to the economies, security and livelihoods of Indian coastal states.
 - The Country has a coastline of 8118 km, covering 9 maritime States/4UTs and providing livelihood support to millions of coastal fisher folk.

News marked false by PIB to be taken down: draft rule

Aroon Deep
NEW DELHI

The Ministry of Electronics and Information Technology on Tuesday proposed a draft rule that will require social media platforms to take down content that has been “fact-checked” by the Press Information Bureau’s fact-check unit as false.

Rule 3(1)(b)(v) of the amended version of the Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Rules, 2021 state that platforms “shall make reasonable efforts to cause the user of its computer resource not to” post content that has been “identified as fake or false by the fact check unit at the Press Information Bureau of the Ministry of Information and Broadcasting or other agency authorised by the Central Government for

fact checking”.

The insertion of the draft condition comes even as the government held discussions with real money gaming platforms on Tuesday, during which industry representatives largely approved of the draft as far as the regulation of wagering platforms was concerned. .

News reports

While the fact check unit of the PIB has debunked several baseless rumours that circulate on social media platforms such as WhatsApp and Twitter, the body has also issued denials on behalf of the government in response to news reports by online publications and newspapers alike in the past. In at least one case, the fact check unit has called reporting “false” on the basis of an official response.

Context: Any piece of news that has been identified as “fake” by the fact-checking unit of the Press Information Bureau (PIB) – the **Centre’s nodal agency to share news updates** – will not be allowed on online intermediaries, including social media platforms like Facebook, YouTube and Twitter, the Ministry of Electronics and IT (MeitY) has said in a draft proposal.

Key Points

- As MeitY uploaded a new draft of amendments to the **Information Technology Rules, 2021**, to include regulations for online gaming platforms, it has significantly changed the proposal’s scope to include this new provision.
- The proposal has **alarmed members of civil society**, who fear that anything the government contradicts could potentially become a ground for content takedowns.
- The latest proposal suggests that there is **now potential for content takedowns** because something has been flagged as fake news by the PIB.
- The **purview of the proposal could go much further** than that – it says that content that has been marked as misleading by “any other agency authorised by the government for fact-checking” or “in respect of any business of the Centre” will not be allowed on online intermediaries.
- The requirement has been added under **due diligence requirements** that intermediaries need to follow to enjoy safe harbour, which is legal immunity from third-party content they host.
- **Intermediaries essentially allow users to access services** on the internet, and the proposed changes to the rules mean that not just social media platforms but internet service providers and web hosting providers – who are all classified as intermediaries currently – will have to follow the rules if notified with this provision.
- This means that if a piece of news has been flagged as fake or false by either the **PIB or any other fact-checking agency authorised by the government**, internet service providers will also have to disable the link to that particular news piece. MeitY did not respond to an immediate request for comment.
- **PIB’s fact-checking unit was set up in 2019** to verify news related to the government’s ministries, departments and schemes. It routinely flags information about the government it believes is fake or misleading, albeit rarely explaining why it has flagged a particular piece of information.
- PIB’s fact-checking unit has itself, at times, tweeted incorrect information – for instance, in 2020, it stamped a genuine recruitment notice of the **Intelligence Bureau (IB)** as fake, and the Publications Division of the Ministry of Information and Broadcasting had to point out the incorrect ‘fact-check’.
- According to the draft, it will be an **obligation on intermediaries that they cannot have content marked false by PIB** or any other agency approved by the government. Beyond intermediaries, it would apply to the entirety of the technology stack, including hosting service providers and internet service providers.

MILITARY TATTOO & TRIBAL DANCE FESTIVAL**(Syllabus: GS Paper 1 - Art & Culture)**

Military Tattoo & Tribal Dance Festival to be held in New Delhi on 23rd & 24th January to celebrate Parakram Diwas on birth anniversary of Netaji Subhas Chandra Bose

Context: As part of the Republic Day Celebrations 2023 and to mark the 126th birth anniversary of Netaji Subhas Chandra Bose (celebrated as Parakram Diwas), a Military Tattoo & Tribal Dance Festival '**Aadi Shaurya - Parv Parakram Ka**' will be held at Jawaharlal Nehru stadium, New Delhi on January 23 & 24, 2023.

Key Points

- The two-day festival will showcase the **prowess of the Armed Forces** and the ethnic beauty of India's tribal culture.
- The programme comprises a **Military Tattoo (Paramotor Gliding, Hot Air Balloon, Horse Show, Motor Cycle Display, Air Warrior Drill, Navy Band)** and an hour of **traditional dance performances (Khukhri Dance, Gatka, Mallakhamb, Kalaripaytu, Thangta)** by tribal artists from across the country.
- The aim of the festival is to **remember the sacrifices of the country's bravehearts** and celebrate the rich cultural heritage which makes India so unique and diverse.
- The objective is to **celebrate together the bravery of Netaji Subhas Chandra Bose**; embrace the true spirit of India and renew the commitment to building a strong and prosperous 'New India'.
- **Ministry of Defence and Ministry of Tribal Affairs** are jointly organising the event, with Indian Coast Guard being the coordinating agency.

India No. 1? China's popn dips for 1st time in 60 yrs

Beijing/Hong Kong: China's population fell last year for the first time in six decades, a historic turn that may mark the start of a long period of decline with profound implications for its economy and the world.

China's National Bureau of Statistics reported a drop of roughly 850,000 people for a population of 1.41175 billion in 2022, the first dip since 1961, the last

► FPIs pull out \$2.1bn in Jan as China opens up, P 25

year of China's great famine. That possibly makes India the world's most populous nation. Last year, UN experts put India's population at 1.412 billion in

**China's GDP grows 3%,
2nd lowest in 50 yrs**

Hit hard by the zero-Covid policy and slump in its real estate market, China's economic growth fell to 3% in 2022, its second lowest rate in 50 years, according to official data released Tuesday. This was way below the 5.5% official target, the National Bureau of Statistics said. **P 25**

2022, but they didn't expect the country to overtake China until this year. **REUTERS**

► China will get old..., P 28

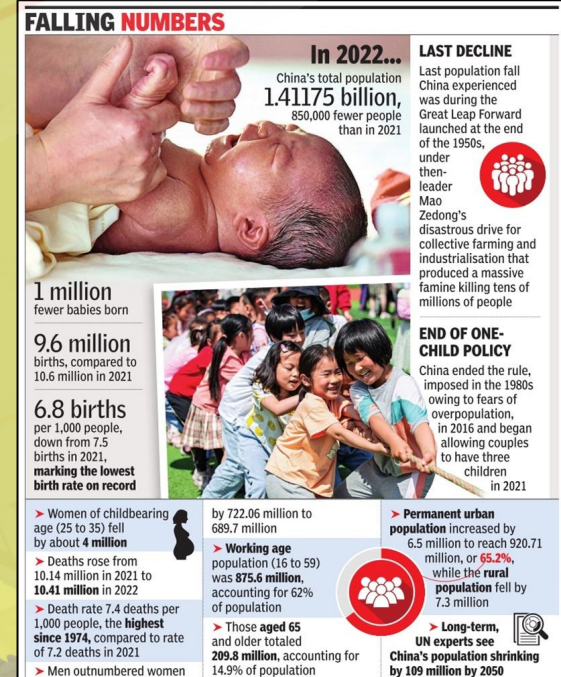
CHINA'S POPULATION

(Syllabus: GS Paper 1 - Population)

Context: China's population fell last year for the first time in six decades, a historic turn that may mark the start of a long period of decline with profound implications for its economy and the world.

Key Points

- **China's National Bureau of Statistics** reported a drop of roughly 850,000 people for a population of 1.41175 billion in 2022, the first dip since 1961, the last year of China's great famine. That possibly makes India the world's most populous nation.
- Last year, UN experts put **India's population at 1.412 billion in 2022**, but they didn't expect the country to overtake China until this year.
- China's population is **shrinking** faster than expected.
- Long-term, UN experts see the **country's populace shrinking by 109 million by 2050**, more than triple the decline of their previous forecast in 2019.
- In 2022, the country officially registered its **first population dip in six decades**.
- Much of the **demographic downturn** is the result of China's one-child policy imposed between 1980 and 2015 as well as sky-high education costs that have put many Chinese off having more than one child or even having any at all.
- The **one child policy and a traditional preference for boys** have also created a deep gender imbalance.
- The data was the **top trending topic on Chinese social media** after the figures were released on Tuesday.
- One hashtag, **"#Is it really important to have offspring?"** had hundreds of millions of hits.



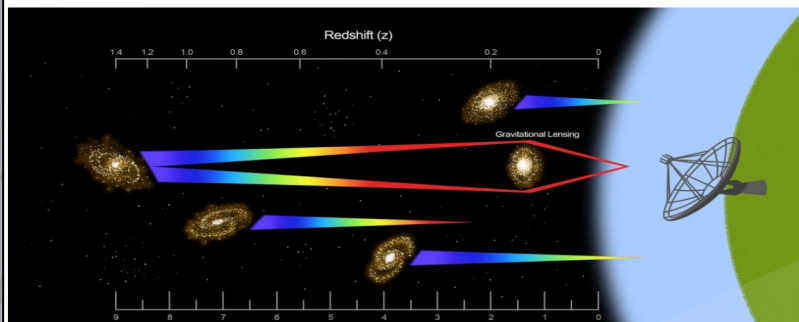
GIANT METREWAVE RADIO TELESCOPE

(Syllabus: GS Paper 3 - Sci & Tech)

Giant Metrewave Radio Telescope in Pune helps detect atomic hydrogen from far-away galaxy

Finding opens up exciting new possibilities for probing the cosmic evolution of neutral gas with low-frequency radio telescopes

By DTE Staff
Published: Tuesday 17 January 2023



GMRT

- **About:** GMRT is an array of thirty fully steerable parabolic radio telescopes of 45 meter diameter. It is operated by the **National Center for Radio Astrophysics of the Tata Institute of Fundamental Research (NCRA-TIFR)**.
- **Indigenous project:** Its design is based on the 'SMART' concept - for **Stretch Mesh Attached to Rope Trusses**.
- **Functions:** It functions at the meter wavelength part of the radio spectrum because **man-made radio interference** is considerably lower in this part of the spectrum in India and there are many outstanding astrophysics problems which are best studied at metre wavelengths.
- **Locations:** The location for GMRT, **Pune meets several important criteria** such as low man-made radio noise, availability of good communication, vicinity of industrial, educational and other infrastructure and, a geographical latitude sufficiently north of the geomagnetic equator in order to have a reasonably quiet ionosphere and yet be able to observe a good part of the southern sky as well.

Context: A radio signal originating from atomic hydrogen in an extremely distant galaxy was detected by the **Giant Metrewave Radio Telescope (GMRT)** located in Pune.

- This is the **largest astronomical distance** over which such a signal has been picked up.

Key Points

- **Atomic hydrogen** is the basic fuel required for star formation in a galaxy.
- When hot ionised gas from the surrounding medium of a **galaxy** falls onto the universe, the gas cools and forms atomic hydrogen.
- This then becomes **molecular hydrogen** and eventually leads to the formation of stars.
- Understanding the **evolution of galaxies** over cosmic time requires tracing the evolution of neutral gas at different cosmological periods.
- **Atomic hydrogen emits radio waves** of 21 cm wavelength, meaning the wavelength is a direct tracer of the atomic gas content in nearby and distant galaxies.
- However, this radio signal is feeble and nearly impossible to detect the emission from a distant galaxy using current **telescopes** due to their limited sensitivity.
- Until now, the most **distant galaxy** detected using 21 cm emission was at redshift $z=0.376$, corresponding to a look-back time – the time elapsed between detecting the signal and its original emission – of 4.1 billion years.
- **Redshift represents the signal's wavelength** change depending on the object's location and movement; a greater value of z indicates a farther object.

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