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# Daily News Discussion (DND)

10th March 2021

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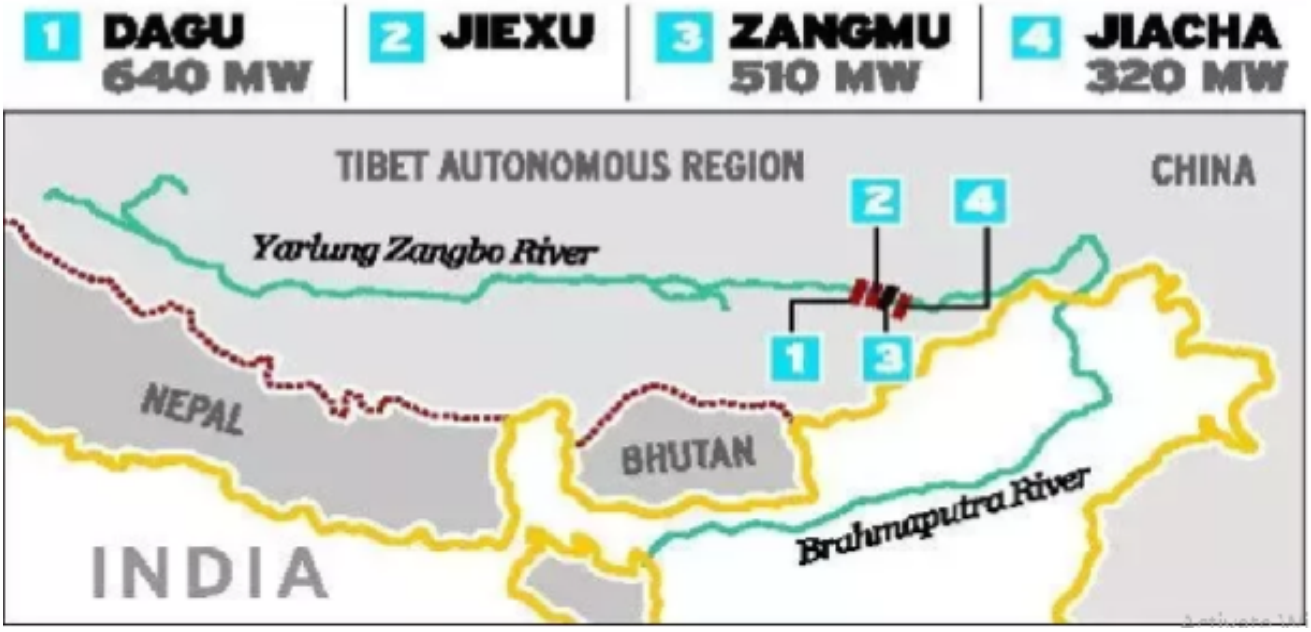
# 1. Geography

## 1.1.China gives green light for first downstream dams on Brahmaputra

### About

- A draft of China's new Five-Year Plan (2021-2025), which is set to be formally approved on Thursday, has given the green light for the first dams to be built on the lower reaches of Yarlung Zangbo river, as the Brahmaputra is known in Tibet before it flows into India.




| Country | Population | Water resources |
|---|---|---|
| China | 20% of global | 7% resources |
| India | 17% | 4% resources |

### Concerns

- China upper riparian country so decision directly impact downstream neighbour like india
- China hardly gives information eg In 2010 after several years of denial, it admitted that it's building Zangmu dam on Brahmaputra
- Issue of run of river (Water is released back after use) or storage dam
- As per reports china's dam are large enough to turned into storage dam
- India is apprehensive release of water during monsoon season
- No water cooperation treaty b/w two, countries signed MoU in 2002 for sharing Hydrological data

- Under MoU China agreed to share data but during **Doklam standoff in 2017 china refused**

## Ecological impact

- Concern for Assam as water was turning black with pollutants in 2017 in siang river (B'putra's name in Arunachal Pradesh)

## India

- Planing 10,000MW Multipurpose hydropower project in Arunachal Pradesh
- The Upper Siang project on Siang river in Arunachal Pradesh will be able to take the Excess load of water discharge and can even store water in case of deficit.

# 2. Polity

## 2.1.Ahead of Polls in 4 States, SC Needs to Prioritise the Challenge to Electoral Bonds

- Funds held by political parties has now become the most important determinant for winning elections, thanks to the first-past-the-post system.

**Political funding in india**

- Association of democratic reform (ADR)-70% Pol funding in last decade from unknown resources

**Legislation-pol funding**

- RPA 1951
- IT act
- Comp act
- Foreign contribution(regulation) act-FCRA

- Declare source above 20,000
- Comp can't donate more than 7.5% of netprofit

### Amendments

- Firstly, it amended the Foreign Contribution Regulation Act (FCRA), by making it legal for foreign companies to donate to political parties through their subsidiaries in India. despite the fact that the main purpose of FCRA was to prevent political parties, candidates and public servants from receiving foreign funds.
- The second amendment was brought about in the Companies Act, wherein the cap of 7.5% of annual profits (in last three years) which could be made by companies as donation to political parties, was removed.
- The third amendment was to the Income Tax Act by way of which the requirement of donor companies to disclose details about the political parties to which such a donation is made was done away with.

- Fin act 2017-
  - Amendment to RBI act 1934
  - Amendment to RPA 1951
  - Amendment to IT act 1961
  - Amendment to Comp act
- Fin act 2016-Amend FCRA 2010

- However, the most damaging amendment was brought about in the RBI Act that introduced a non-transparent way of donating unlimited amounts to political parties even through banking channels by purchasing electoral bonds
- The identity of the person who purchases these bonds is not known to the public or even to the Election Commission, but is known to the State Bank of India and through them, the government.

- Promissory note
- No interest Bearer instrument (no name of buyer & payee)

- Who can purchase ?

- Person, who is a Citizen of India or Incorporated or Established in India. -
- Individual
- HUF
- Company
- Association of person
- Firm
- Other person or agencies

- Who can encash electoral bond ?
  - Party registered under Sec 29A,RPA 1951
  - Secured not less than 1% in General election to HOP or State leg assembly
  - Account in SBI

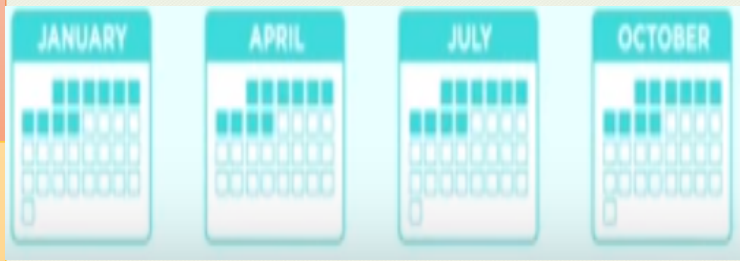
Denomination ?
(No upper limit)

Validity ?

- 15 days from date of issue
- If not-PM Relief fund
- Deposit by pol party credited on same day

Interestingly, the PMNRF also receives money that accrues from non-encashed electoral bonds sold by the State Bank of India (SBI) to political donors. Money from non-enchased bonds is transferred to PMNRF after every phase. So far electoral bonds have been sold in 13 phases. As per an RTI reply, the PMNRF has received over Rs 20 crore from SBI as the amount accrued from the non-encashed electoral bonds.

- ❑ KYC Norms
- ❑ Online
- ❑ Cheque,DD
- ❑ Electronic




- ❑ Info-confidential
- ❑ Non refundable
- ❑ No interest
- ❑ No stock exchange
- ❑ 10 days (J,A,J,O)
- ❑ Additional 30 days LS election
- ❑ No tax benefit

## Issues

### Black Money (Shell companies)

- RTIs have revealed that both the Election Commission of India and the Reserve Bank of India had strongly objected to the introduction of electoral bonds.

**Table 1. Total Donations via Electoral Bonds (March 2018-October 2019)**

Break-up of the Rs 6,128.71 crore collected from March 2018 to October 2019

| Denomination | Number of poll bonds sold | Amount | Percentage of total amount collected |
|---|---|---|---|
| Rs 1,000 | 47 | Rs 47000 | 0.00008% |
| Rs 10,000 | 60 | Rs 6 lakh | 0.001% |
| Rs 1 lakh | 1,695 | Rs 16.95 crore | 0.28% |
| Rs 10 lakh | 4,877 | Rs 487.70 crore | 7.96% |
| Rs 1 crore | 5,624 | Rs 5624 crore | 91.76% |

- Misuse more particularly through use of shell companies. This can subject the RBI to a serious reputational risk of facilitating money laundering transactions
- With respect to the removal of 7.5% cap on political funding by companies, the EC stated that the move "would lead to increased use of black money for political funding through shell companies.

### Sec 29C of RPA 1951

- The Election Commission stated that it is evident from the Amendment in Section 29C of the Representation of People Act, 1951 "that any donation received by a political party through an electoral bond has been taken out of the ambit of reporting under the Contribution Report as prescribed under Section 29C of the Representation of Peoples Act, 1951, and therefore, this is a retrograde step as far as transparency of donations

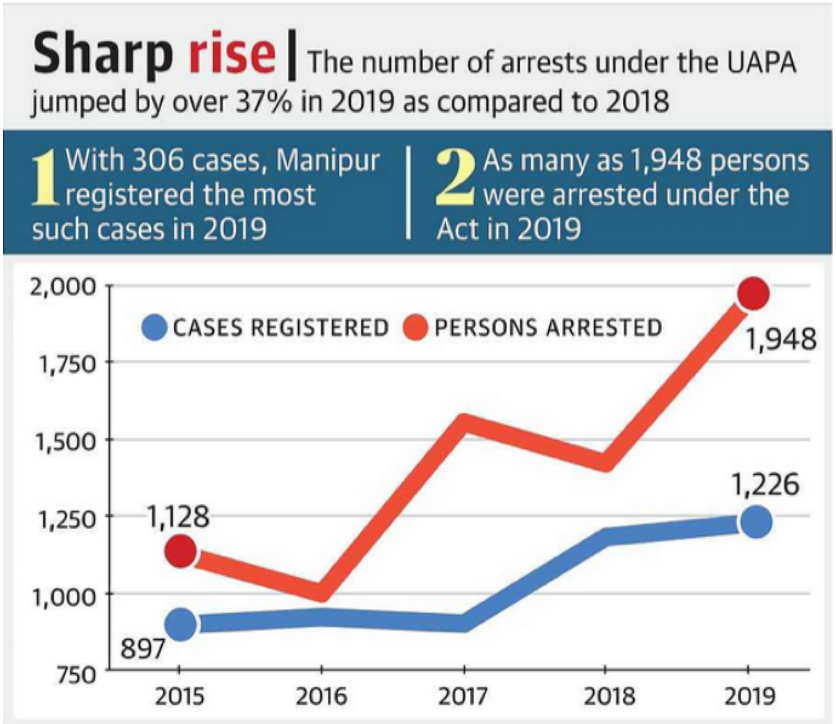
### Lobbying

- Thus, these amendments, cumulatively, not only allow unlimited donations by corporates to political parties, they even allow foreign companies that get contracts (like Dassault which manufactures the Rafale aircraft) to donate through their subsidiaries, and even allow them to do so anonymously through electoral bonds. Since only the government can come to know the identity of the donors, it is not surprising that the large majority of the donations are coming to the ruling party at the Centre
- The Supreme Court, thereafter, directed all political parties to give details of all donations received by these political parties through EBs in sealed cover by May 30, 2019.
- However, the matter has not been heard thereafter, despite several applications for staying the EBs

## 2.2.Unlawful Activities (Prevention) Amendment Act, 2019

### About

- In 2019, the highest number of such cases were registered in Manipur (306), followed by Tamil Nadu (270), Jammu & Kashmir (255), Jharkhand (105) and Assam (87) cases.
- The highest number of arrests in the same year were made in Uttar Pradesh (498), followed by Manipur (386), Tamil Nadu (308), Jammu & Kashmir (227) and Jharkhand (202).
- Cases under the UAPA are investigated by the State police and the National Investigation Agency (NIA). As far as the NIA is concerned, so far 48 special courts have been constituted across the country for the speedy trial of terror-related cases




### J&K

- After abrogation of Article 370, the number of terrorist incidents in Jammu and Kashmir have reduced significantly."
- The data provided shows that in J&K, 244 terrorist incidents were reported and 221 terrorists killed in 2020, while in 2019, the numbers were 594 and 157 respectively. Till February 28 this year, there were 15 incidents and eight terrorists killed.

### About organisation

- x`The government had declared 42 organisations as terrorist organisations and listed their names in the First Schedule of the UAPA

- Earlier, a reply by the government in the Lok Sabha shows that only 2.2 % of cases registered under the UAPA between 2016-2019 ended in convictions by court.

**1962**

China war + Demand-secession of TN

**Unlawful activities (Prev) act 1967**

- Cession or Secession
- Disrupt Sovereignty & integrity of india
- Disaffection against india

**1980-85**

Terrorism in Pb & other states

**Terrorist & disruptive activities act 1985**

- Detainee in police custody upto 60 days
- 1994-76000 arrested
- Lapse 1995-Misuse
- March,2019-11 Muslim acquitted

**1999** IC814-Hijacked

**2001** Parliament attack

**Prevention of terrorism act 2002**

- MDMK leader arrested-Pro LTTE remark
- 2004 repeal-political promisses

**2004**

**UAPA(amendment) act 2004**

| Unlawful activities | Terrorist act |
|---|---|
| 2(o)-already | Sec 15-new |

**1999** IC814-Hijacked

**2001** Parliament attack

**Prevention of terrorism act 2002**

- MDMK leader arrested-Pro LTTE remark
- 2004 repeal-political promisses

**2004** **UAPA(amendment) act 2004**

Unlawful activities | Terrorist act

2(o)-already | Sec 15-new

**Terrorist act**

- Intent or likely to threaten-Unity, integrity,security,economic security,Sovereignty-with terror
- By-Bomb,dynamite
- Casuses-deaths,loss damages to roperty,disruption of supplies
- Detain,kidnap,abduct-to compel indian or foreign govt

**26/11,2008-Mb attacks**

- 2008 amendment
- More provisions of TADA & POTA included
- Eg-custody,bail restriction etc

**2012 UAPA amd**

- Threaten to economic security is offence

| | |
|---|---|
| Criminalize ideology and association | ❑ Mere possession of any literature related to such org'<br>❑ Ideology common to such org'<br>❑ Even in absence of any violent act |
| Vague def' of Terrorism | ❑ Encompass wide range of non violent pol activities<br>❑ Political protest-offence |
| Detention | ❑ Detention without chargesheet upto 180 days<br>❑ Police custody upto 30 days<br>❑ No bail |
| Others | ❑ Violation of art 19<br>❑ 2/3rd cases (2016)-acquittal<br>❑ No sunset clause & provisions for mandatory periodic review |

**Jamaat-e-islami (J&K)** — 1942-founded

- 1975-Banned
- 1990-again Banned
- 1993-Ban removed
- 2019-Banned

- ❑ Aim-Modern revolutionary islam
- ❑ One wing-political party in Pak
- ❑ Al Badr-officially -militant wing of Jamaat-e-islami
- ❑ 1971-election-no seat
- ❑ 1977-won 1 seat

- ❑ Under sec 3 (3) of UAPA
- ❑ 3(3)-Immediate effect

## Procedure to ban organization (UAPA)

Central govt-notification → Specify grounds

- ❑ Power of civil court
- ❑ Consolidated fund of india
- ❑ Freeze fund for unlawful activities
- ❑ Places used for unlawful activities

↓ 30 days

❑ Tribunal-judge of HC- By central govt

↓

Tribunal-Notice to org'

↓ 30 days

Org' response

↓ 6 month

Final verdict → For 5 yrs

zette

state

ng-

- ❑ Notification copy to association
- ❑ Beat of drum or loudspeaker
- ❑ Any other mean

## Procedure to ban organization (UAPA)

Central govt-notification → Specify grounds

↓ 30 days

❑ Tribunal-judge of HC- By central govt

↓

Tribunal-Notice to org'

↓ 30 days

Org' response

↓ 6 month

Final verdict → For 5 yrs

Publication in official gazette

1 Newspaper-respective state

Any one of the following-

- ❑ Notification copy to association
- ❑ Beat of drum or loudspeaker
- ❑ Any other mean

| | UAPA act 1967 | UAPA (Amendment) act 2019 |
|---|---|---|
| **Who may commit terrorism** | central government may designate an organisation as a terrorist organisation if it:<br>1. commits or participates in acts of terrorism<br>2. prepares for terrorism<br>3. promotes terrorism, or<br>4. is otherwise involved in terrorism | additionally empowers the government to designate individuals as terrorists on the same grounds. |

| | UAPA act 1967 | UAPA (Amendment) act 2019 |
|---|---|---|
| **Approval for seizure of property by NIA** | an investigating officer is required to obtain the prior **approval of the Director General of Police** to seize properties that may be connected with terrorism. | adds that if the investigation is conducted by an officer of the **National Investigation Agency (NIA),** the approval of the **Director General of NIA would be required for** seizure of such property. |

| | UAPA act 1967 | UAPA (Amendment) act 2019 |
|---|---|---|
| **Investigation by NIA** | investigation of cases may be conducted by **officers of the rank of Deputy Superintendent or Assistant Commissioner of Police** or above | additionally empowers the **officers of the NIA, of the rank of Inspector or** above, to investigate cases. |

| | UAPA act 1967 | UAPA (Amendment) act 2019 |
|---|---|---|
| Insertion to schedule of treaties | Act defines terrorist acts to include acts committed within the scope of any of the treaties listed in a schedule to the Act<br>Schedule lists nine treaties,-<br>(i) Convention for the Suppression of Unlawful Seizure of Aircraft (1970);<br>(ii) Convention for the Suppression of Unlawful Acts against the Safety of Civil Aviation (1971); | adds another treaty to the list. This is the International Convention for Suppression of Acts of Nuclear Terrorism (2005). |

| | UAPA act 1967 | UAPA (Amendment) act 2019 |
|---|---|---|
| Insertion to schedule of treaties | iii) Convention on the Prevention and Punishment of Crimes against Internationally Protected Persons, including Diplomatic Agents (1973)<br>(iv) International Convention against the Taking of Hostages (1979)<br>(v) Convention on the Physical Protection of Nuclear Material (1980); | adds another treaty to the list. This is the International Convention for Suppression of Acts of Nuclear Terrorism (2005). |

| | UAPA act 1967 | UAPA (Amendment) act 2019 |
|---|---|---|
| Insertion to schedule of treaties | vi) Protocol for the Suppression of Unlawful Acts of Violence at Airports Serving International Civil Aviation, supplementary to the Convention for the Suppression of Unlawful Acts against the Safety of Civil Aviation (1988);<br>(vii) Convention for the Suppression of Unlawful Acts against the safety of Maritime Navigation (1988) | adds another treaty to the list. This is the International Convention for Suppression of Acts of Nuclear Terrorism (2005). |

| | UAPA act 1967 | UAPA (Amendment) act 2019 |
|---|---|---|
| Insertion to schedule of treaties | (viii) Protocol for the Suppression of Unlawful Acts against the Safety of Fixed Platforms located on the Continental Shelf (1988); and<br>(ix) International Convention for the Suppression of Terrorist Bombings (1997) | adds another treaty to the list. This is the International Convention for Suppression of Acts of Nuclear Terrorism (2005). |

## Analysis

- It will allow the National Investigation Agency much greater leeway to take control of cases that would otherwise fall under the domain of the police in individual states. This will further weaken India's federal system and concentrate greater power in the hands of the Central government.
- The designation of an individual as a terrorist gives the Central government the power to label and stigmatise an individual as a terrorist even when it doesn't have the evidence to actually prosecute and convict him. It is, in other words, an extra-legal form of punishment.
- Once an individual is designated as a terrorist, he will lose his job. His landlord will throw him out. His children will have a tough time at school. Everyone will look at him with suspicion and the police will keep harassing him and anyone he meets.
- Although the UAPA amendments provide for a process of appeal but it is the government itself which will set up the three-member review committee, two of whom can be serving bureaucrats.
- The chairperson will be a serving or retired high court judge but given the way governments are known to cherry-pick individuals for commissions and committees that are politically sensitive, the deck is likely to be stacked against any person challenging his designation as a terrorist.
- The government already has the power to prosecute and punish them under Chapter 4 of the existing Act. Indeed, dozens of such prosecutions have been launched on this basis.
- In other words, if the authorities have a 'terrorist' in their sights, they have full legal power under the existing UAPA to arrest and prosecute him. And if they have solid evidence to back up their charge, the trial court will surely convict that person and send him to jail.
- The problem is the UAPA does not define what is terrorist literature and terrorist theory. And given the attitude of the police – and the manner in security laws in India are routinely misused to target political opponents and dissidents

- "Right to Reputation is an intrinsic part of fundamental right to life with dignity under Article 21 of the Constitution of India and terming/tagging an individual as 'terrorist' even before the commencement of trial or any application of judicial mind over it, does not adhere to procedure established by law.
- The amendment does not specify the grounds of terming an individual as a terrorist and that "conferring of such a discretionary, unfettered and unbound powers upon the Central government is antithesis to Article 14."
- Other side
  - ✓ If an individual commits an act of terror or takes part in it, shouldn't he be designated as a terrorist?
  - ✓ Also, an individual who helps to promote or prepare for terrorism should also be designated as a terrorist.
  - ✓ And then there are those who attempt to plant terrorist literature and terrorist theory in the minds of the young. the root of terrorism is the propaganda that is done to spread it, the frenzy that is spread.

# 3. Economy

## 3.1.Only half of government schools, anganwadis have tap water supply

### About

- According to Parliamentary Standing Committee on Water Resources, only half of government schools and anganwadis have tap water supply, despite a 100-day campaign for 100% coverage being launched by the Jal Shakti Ministry in October 2020.

### About campaign

- launched on 2nd October, 2020
  - ✓ to provide potable piped water supply for drinking and cooking purposes
  - ✓ tap water for hand washing and in toilets in every school, anganwadi and ashramshala or residential tribal school.
  - ✓ 100-day period should have ended on 10th January, 2021 but now extended till 31st March 2021

### Jal Jeevan Mission

- 55 litres of water per person per day to every rural household through Functional Household Tap Connections (FHTC) by 2024.

### Objectives of the Mission are

- To provide FHTC to every rural household.
- To prioritize provision of FHTCs in quality affected areas, villages in drought prone and desert areas, Sansad Adarsh Gram Yojana (SAGY) villages, etc.
- To provide functional tap connection to Schools, Anganwadi centres, GP buildings, Health centres, wellness centres and community building

### Funding Pattern

- 90:10 (Centre: State) for Himalayan and North-Eastern States,
- 100% for Union Territories.
- 50:50 for other states

### Components

- Development of in-village piped water supply infrastructure to provide tap water connection to every rural household
- Development of reliable drinking water sources and/ or augmentation of existing sources to provide long-term sustainability of water supply system
- Wherever necessary, bulk water transfer, treatment plants and distribution network to cater to every rural household
- Technological interventions for removal of contaminants where water quality is an issue

- Retrofitting of completed and ongoing schemes to provide FHTCs at minimum service level of 55 lpcd;
- Greywater management
- Any other unforeseen challenges/ issues emerging due to natural disasters/ calamities which affect the goal of FHTC to every household by 2024, as per guidelines of Ministry of Finance on Flexi Funds

| | | |
|---|---|---|
| i) | National level | National Jal Jeevan Mission |
| ii) | State level | State Water and Sanitation Mission (SWSM) |
| iii) | District level | District Water and Sanitation Mission (DWSM) |
| iv) | Gram Panchayat level | Paani Samiti/ Village Water & Sanitation Committee (VWSC)/ User group |

- Efforts should be made to source funds from different sources/ programmes and convergence is the key
- Current situation
  - ✓ 48.5% of anganwadis and 53.3% of schools had tap water supply.
  - ✓ % of schools with tap water supply
  - ✓ 7.93% in UP
  - ✓ 10.89% in West Bengal
  - ✓ 12.99% in Jharkhand
- Anganwadis
  - ✓ Only 2-6% of anganwadis in Assam, Jharkhand, U.P., Chhattisgarh and Bengal
  - ✓ Seven States - Andhra Pradesh, Goa, Haryana, Himachal Pradesh, Tamil Nadu, Telangana and Punjab - achieved 100% coverage

## Greywater or sullage

- is all wastewater generated in households or office buildings from streams without fecal contamination.
- By definition greywater is generally waste water from showers, baths, basins, and washing machines.
- Greywater treatment is easier than municipal wastewater treatment, generating a large interest in its reuse and recycling.
- Typical applications for greywater recycling and re-use are toilet flushing, irrigation and other non-potable uses.
- Generally, any water that is drained from the house other than toilet water can be described as greywater

## Budget 2021-22,

- Jal Jeevan Mission (Urban) announced under the Housing and Urban Affairs Ministry to provide universal coverage of water supply to all households through functional taps in all statutory towns in accordance with SDG- 6

# 3.2.Why private companies are queueing up to set up New Umbrella Entities (NUE)

## About

- An idea floated by the Reserve Bank of India to create an alternate mechanism to the existing National Payments Corporation of India (NPCI).
- The RBI has set a deadline of March 31 for firms to submit their applications for setting up NUEs. About NUE
- NUE will be a non-profit entity that will set-up, manage and operate new payment systems, especially in the retail space such as ATMs, white-label PoS; Aadhaar-based payments and remittance services.
- In addition to this, they will develop new payment methods, standards and technologies as well as operate clearing and settlement systems.
- Monitor retail payment system developments and related issues in the country and internationally to avoid shocks, frauds and contagions.

## Framework of NUE

- The promoter or the promoter group for the NUE should be 'owned and controlled by residents' with 3 years' experience in the payments ecosystem.
- hall have a minimum paid-up capital of Rs. 500 crore.
- A minimum net worth of Rs. 300 crore should be maintained at all times
- Any entity holding more than 25% of the paid-up capital of the NUE will be deemed to be a promoter.
- No single promoter or promoter group should have more than 40% investment in the capital of the entity.
- Allowed foreign investment in NUEs as long as they comply with the guidelines.

## What is the need for NUEs?

- Currently, the umbrella entity for providing retail payments system
- is NPCI, which is a non-profit entity, owned by banks. NPCI operates settlement systems such as UPI, AEPS, RuPay, Fastag, etc.
- 48% of all electronic retail payments in the country pass through the NPCI infrastructure.

## Issues with NPCI

- Players in the payments space have indicated the various pitfalls of NPCI being the only entity managing all of retail payments systems in India.
- RBI's plan to allow other organisations to set up umbrella entities for payments systems aims to expand the competitive landscape in this area.
- Any sort of monopoly results in market inefficiencies.

- Of we have just one umbrella regulator, we will never be sure if transaction costs are as low as they could be, or if the variety of product offerings available to us could be better.
- Problem is that the NPCI is expected to both manage the digital payments industry as well as come up with the frameworks necessary to foster innovation.

## What is the solution to issues faced by NPCI

- One possible solution might be to create a separate and independent standards-setting body.
- Such body would come up with the protocols and standards required to foster innovation in the digital payments space.
- This is how most successful digital infrastructure systems work. Take the World Wide Web, for example.
- Any new standard that this body creates will have to first be approved by the NPCI, but then it can be rolled out throughout the digital payments ecosystem.

# 4. Science & Technology

## 4.1.Most distant source of radio emission discovered, holds clues about ancient universe

### About

SCIENCE & TECHNOLOGY

Most distant source of radio emission discovered, holds clues about ancient universe

It took 13 billion years for the quasar's light to reach earth

By DTE Staff

Published: Monday 08March 2021

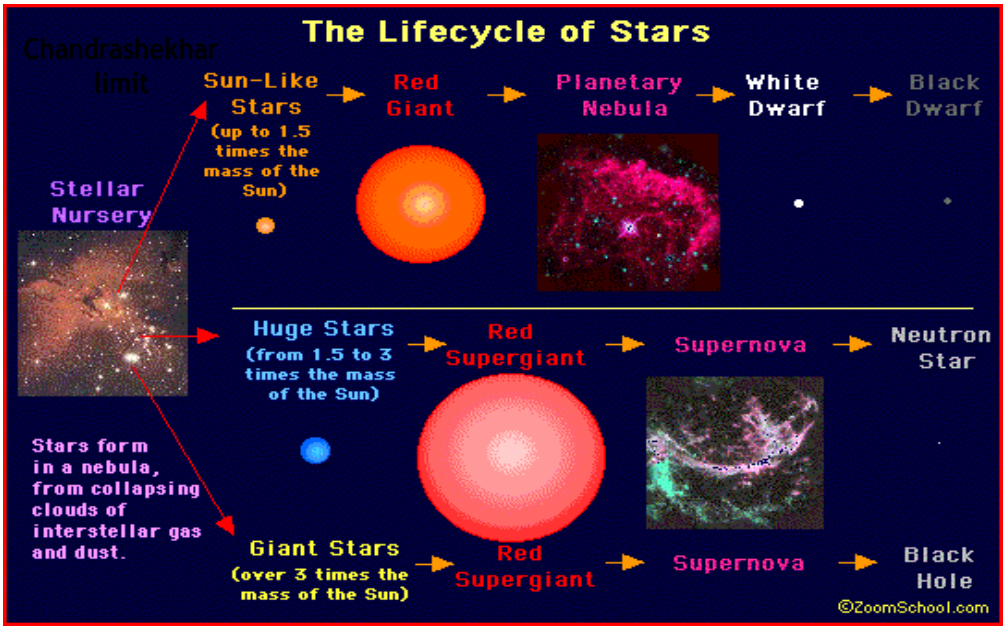
- An international team of astronomers have discovered the most distant 'radio-loud' quasar with the help of European Southern Observatory's Very Large Telescope (ESO's VLT). It took 13 billion years for the quasar's light to reach earth
- Named P172+18, the quasar emitted wavelengths which had a redshift of 6.8. Only three other 'radio-loud' sources with redshift greater than six have been discovered so far and the most distant one had a redshift of 6.18. The higher the redshift of the radio wavelength, the farther away is the source.

### Quasars

- are very luminous objects in faraway galaxies that emit jets at radio frequencies.
- They are only found in galaxies that have supermassive blackholes which power these bright discs.
- However, 90 per cent of them do not emit strong radio waves, making this newly-discovered one special

### Significance

- This particular quasar appears to the scientists as it was when the universe was just around 780 million years old. The glowing disc around a blackhole 300 million times more massive than our Sun, thus, holds clues about the ancient star systems and astronomical bodies.



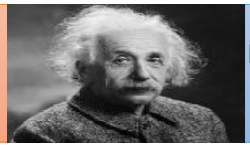
- It is also one of the fastest accreting quasars, which means it is accumulating objects from the galaxy at an enormous speed. This has led team that discovered it to infer that the blackhole at its centre is consuming from its galaxy at a stunning rate

| | |
|---|---|
| Primordial Black hole | ❑ Smallest<br>❑ Size-atom with mass of mountain<br>❑ Formation after big bang<br>❑ Not much of evidense |
| Stellar Black hole | ❑ Medium<br>❑ Size-20 times mass of sun<br>❑ Formation-Collapse of star- supernova explosion<br>❑ Indirect evidense |
| Supermassive black hole | ❑ Massive<br>❑ Size-of solar system<br>❑ Every glaxy contain BH at centre<br>❑ Indirect evidence<br>❑ Sagitarius A star (Milky way),BH in M-87 |

- The scientists think that the powerful radio jets shooting out of the quasar fuelled the appetite of the blackhole. The jets are thought to be capable of disturbing the gas around the black hole, increasing the rate at which gas falls in

- A detailed study of these 'radio-loud' super-bright objects can lead astronomers to understanding how the supermassive blackholes in their core grew to be as big so rapidly since the Big Bang.

**Nothing can escape from Black hole**

| | | |
|---|---|---|
| Newton law of escape velocity | | ❑ Escp vel of BH>Speed of light |
| Einstein special theory of relativity |  | ❑ No object can travel faster than speed of light |

**Nothing can escape from Black hole**

## Is There a quasar behind every black hole, and a black hole behind every quasar?

- There is a black hole behind every quasar, but not every black hole is a quasar. So yes, in a way, a quasar is simply one face a black hole may show. If you are looking at a quasar, you are absolutely looking at a black hole.

- To become a quasar, a black hole must meet a few criteria.

  ✓ It must be supermassive: millions or billions of times the mass of our Sun.

  ✓ Such black holes are found in the centers of most large galaxies, but even then, not every galaxy hosts a quasar. Specifically, a quasar is a supermassive black hole that is actively feeding on material.

✓ The infalling matter has swirled into a disk that has heated up, and it shines so brightly that its light drowns out the rest of the galaxy around the black hole.

## What about supermassive black holes that aren't feeding so voraciously?

- These are not quasars. Some are relatively dormant, like our own Milky Way's central black hole.
- Others are active, but not active enough to outshine their host galaxies.
- Astronomers call them active galactic nuclei, and they come in a variety of flavors. Quasars simply top the list for the brightest active galactic nuclei.
- What's more, a quasar seems to be a relatively short-lived phase of a black hole's life. So, a black hole that is quiet today may have once been a quasar, and the quasars we see in the distant past will eventually "turn off" after they've eaten everything around them.

## ESO's VLT

- The Very Large Telescope used to observe the P172+18 is located at Paranal Observatory in the Atacama Desert.
- According to the European Southern Observatory it is the world's most advanced optical telescope.

## Redshift Vs Doppler effect

- Red shift' is a key concept for astronomers. The term can be understood literally - the wavelength of the light is stretched, so the light is seen as 'shifted' towards the red part of the spectrum

## Doppler effect

- Doppler effect' after Christian Andreas Doppler, an Austrian mathematician who discovered that the frequency of sound waves changes if the source of sound and the observer are moving relative to each other.
- If the two are approaching, then the frequency heard by the observer is higher; if they move away from each other, the frequency heard is lower.
- There are many everyday examples of the Doppler effect - the changing pitch of police and ambulance sirens, or train whistles and racing car engines as they pass by. In every case, there is an audible change in pitch as the source approaches and then passes an observer.

## Redshift Vs Doppler effect

- However, to be accurate, the red shifts observed in distant objects are not exactly due to the Doppler phenomenon, but are rather a result of the expansion of the Universe.
- Doppler shifts arise from the relative motion of source and observer through space, whereas astronomical redshifts are 'expansion redshifts' due to the expansion of space itself.
- Two objects can actually be stationary in space and still experience a red shift if the intervening space itself is expanding.