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EDITORIALS

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CONTENTS

- [More than 5000 worlds beyond our solar system](#)
- [Battle of Batteries](#)
- [Assam-Meghalaya Border Pact to settle 50-year-old border row](#)
- [The Status of GST Compensation Dues](#)
- [Bill assent, a delay and the Governor's options](#)
- [Shigella sonnei : Intestinal Infection](#)
- [Supply chain chaos and Power Shortages](#)
- [Role of Civil Services in a Democracy](#)
- [Reflections on the 'quasi-federal' democracy](#)
- [Another Model for Inflation Control](#)
- [RBI's sudden repo rate hike and What does this mean?](#)
- [What is Roe vs Wade case?](#)
- [The Internet Splintering in Russia-Ukraine war](#)
- [How to prove genocide, the most serious war crime?](#)
- [What is parboiled rice, and why does the Centre want to stop purchasing it?](#)
- [Strengthening death penalty standards](#)
- [Sri Lanka economic crisis](#)
- [Raja Ravi Varma - An artist of the royals](#)
- [De-notified, Nomadic and Semi-nomadic Tribes](#)
- [Earth Day 2022 - 'Invest In Our Planet'](#)
- [Can climate change be solved by pricing carbon?](#)
- [Ritonavir-Boosted Nirmatrelvir \(Paxlovid\)](#)

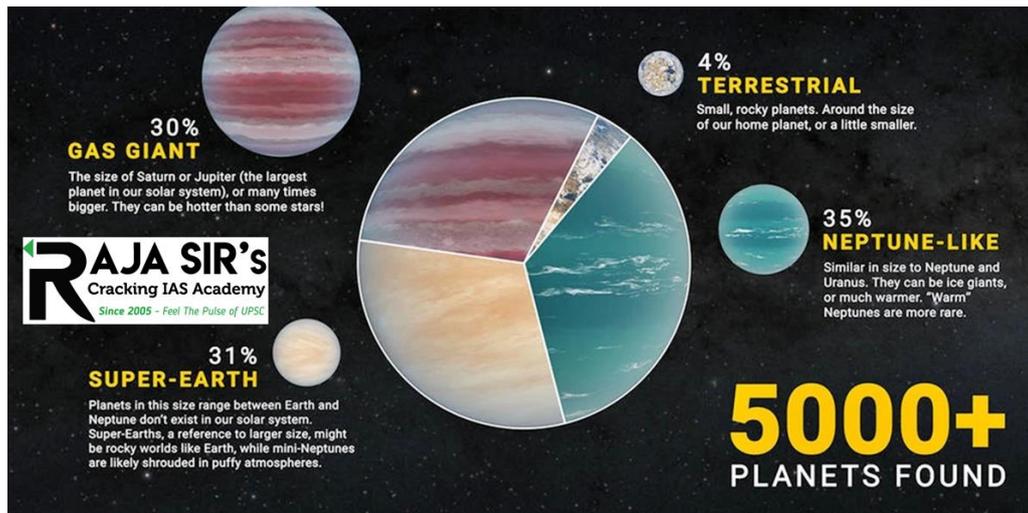
- [Near Field Communication \(NFC\) technology](#)
- [Neptune Cruise Missile](#)
- [Time-lapse imaging, or Embryoscope](#)
- [The Indian Antarctic Bill and its various provisions](#)
- [What Is 'J' Form and How Will It Benefit Farmers?](#)
- [What a truly complete human genome tells us?](#)
- [What is a look out notice, and when is it issued?](#)
- [What is liquid nano urea?](#)
- [Prostitution as profession](#)
- [West Nile Virus \(WNV\)](#)
- [India, Pakistan conclude Indus water talks in cordial atmosphere](#)
- [Surrogacy for Single Men?](#)

More than 5000 worlds beyond our solar system

The count of **confirmed new worlds outside of our solar system** just ticked **beyond 5,000** with the discovery of **65 new exoplanets**, confirmed by the National Aeronautics and Space Administration.

The latest contribution to the **NASA Exoplanet Archive**, which records exoplanet discoveries that appear in peer-reviewed, scientific papers, comes as NASA's \$10 billion **James Webb Space Telescope** readies for **planet-gazing operations in deep space**.

It's not just a number," said Jessie Christiansen, science lead for the archive and a research scientist with the **NASA Exoplanet Science Institute** at the California Institute of Technology in Pasadena, in a statement. "**Each one of them is a new world**, a brand-new planet. I get excited about everyone because we don't know anything about them."



How were exoplanets discovered?

The **discovery of exoplanets had begun in 1992** with strange new worlds orbiting an even stranger star. It was a type of **neutron star** known as a **pulsar**, a **rapidly spinning stellar corpse** that pulses with millisecond bursts of searing radiation.

Measuring **slight changes in the timing of the pulses** allowed scientists to reveal planets in orbit around the pulsar.

Finding just **three planets around this spinning star** essentially opened the floodgates, said Alexander Wolszczan, the lead author on the paper that, 30 years ago, unveiled the **first planets to be confirmed outside our solar system**.

"If you can find planets around a **neutron star**, planets have to be basically everywhere," Wolszczan said. "The planet production process has to be very robust." The **Nancy Grace Roman Space Telescope**, expected to **launch in 2027**, will make new exoplanet discoveries using a variety of methods.

The **ESA (European Space Agency) mission ARIEL**, launching in **2029**, will observe exoplanet atmospheres; a piece of NASA technology aboard, **called CASE**, will help zero in on exoplanet clouds and hazes.

Varied features of exoplanets

The **5,000-plus planets** found so far include **small, rocky worlds like Earth**, gas giants many times **larger than Jupiter**, and "**hot Jupiters**" in scorchingly close orbits around their stars.

There are "**super-Earths**," which are **possible rocky worlds bigger than our own**, and "**mini-Neptunes**," smaller versions of our system's Neptune. They also

include planets orbiting two stars at once and planets stubbornly orbiting the collapsed remnants of dead stars.

Are there aliens on any one of the exoplanets?

Astronomers believe that there is a possibility of **finding something resembling life on any of these exoplanets**. "To my thinking, it is inevitable that we'll find some kind of life somewhere - most likely of some primitive kind," Wolszczan said.

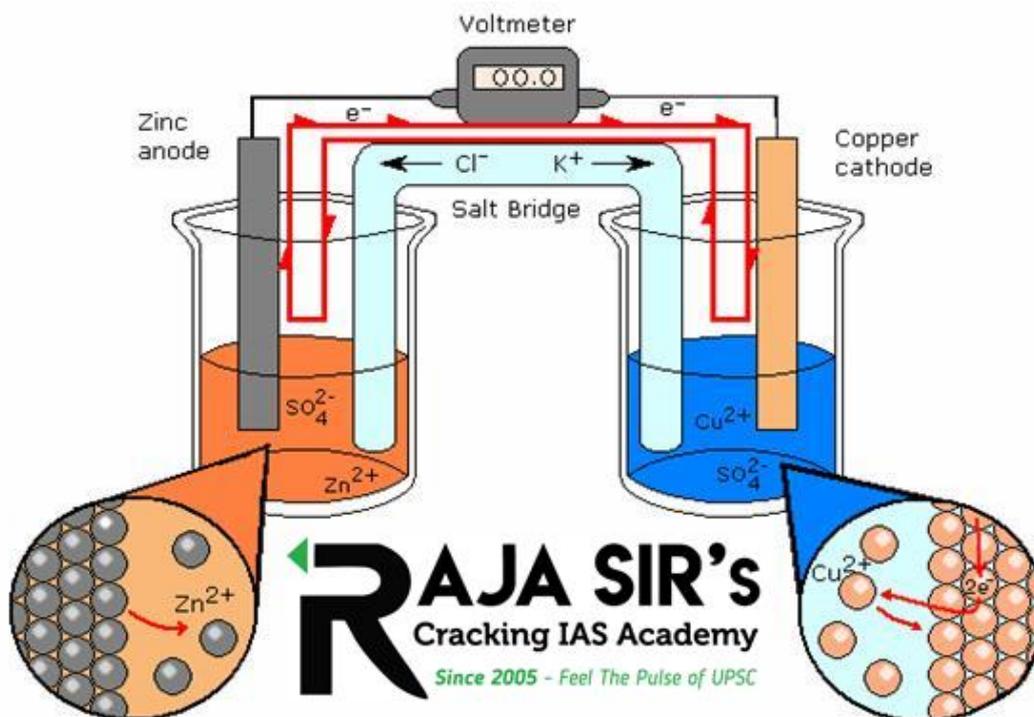
The close connection between the **chemistry of life on Earth** and **chemistry found throughout the universe**, as well as the detection of **widespread organic molecules**, suggests detection of life itself is only a matter of time, he added.

Battle of Batteries

Battery or cells are referred to as the parallel combination of electrochemical cells. The major difference between a primary cell and the secondary cell is that primary cells are the ones that cannot be charged but secondary cells are the ones that are rechargeable.

Primary cells have high density and get discharged slowly. Since there is no fluid inside these cells they are also known as dry cells. The internal resistance is high and the chemical reaction is irreversible. Its initial cost is cheap and also primary cells are easy to use.

1. Daniel cell : Daniel cell is a primary cell which cannot supply steady current for a long time. It consists of a copper vessel containing a strong solution of copper sulphate. A zinc rod is dipped in dilute sulphuric acid contained in a porous pot. The porous pot is placed inside the copper sulphate solution.

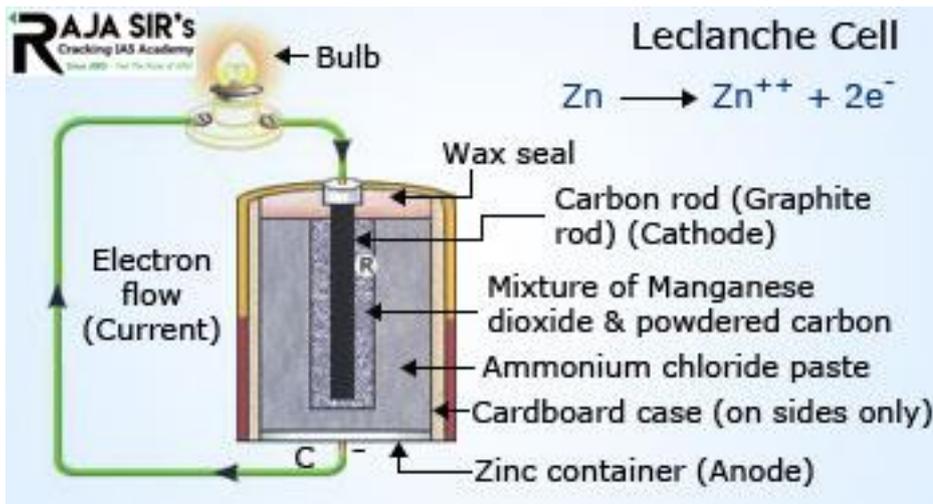


The zinc rod reacting with dilute sulphuric acid produces Zn^{++} ions and 2 electrons. Zn^{++} ions pass through the pores of the porous pot and reacts with copper sulphate solution, producing Cu^{++} ions. The Cu^{++} ions deposit on the copper vessel. When Daniel cell is connected in a circuit, the two electrons on the zinc rod pass through the external circuit and reach the copper vessel thus neutralizing the copper ions. This constitutes an electric current from copper to zinc. Daniel cell produces an emf of 1.08 volt.

2. Leclanche cell: A Leclanche cell consists of a carbon electrode packed in a porous pot containing manganese dioxide and charcoal powder. The porous pot is immersed in a saturated solution of ammonium chloride (electrolyte) contained in an outer glass vessel. A zinc rod is immersed in electrolytic solution.

At the zinc rod, due to oxidation reaction Zn atom is converted into Zn^{++} ions and 2 electrons. Zn^{++} ions reacting with ammonium chloride produces zinc chloride and ammonia gas.





The ammonia gas escapes. The hydrogen ions diffuse through the pores of the porous pot and react with manganese dioxide. In this process the positive charge of hydrogen ion is transferred to carbon rod. When zinc rod and carbon rod are connected externally, the two electrons from the zinc rod move towards carbon and neutralizes the positive charge. Thus current flows from carbon to zinc. Leclanche cell is useful for supplying intermittent current. The emf of the cell is about 1.5 V, and it can supply a current of 0.25 A.

Galvanic Cell

Chemical energy is converted to electrical energy

At Anode: **Oxidation**
 $Zn(s) \rightarrow Zn^{2+}(aq) + 2e^{-}$
Oxidation half reaction

At Cathode: **Reduction**
 $Cu^{2+}(aq) + 2e^{-} \rightarrow Cu(s)$
Reduction half reaction

Zn has a weaker pull of electrons Cu has a stronger pull of electrons

Note: Neutral atoms (Zn & Cu in solid form) made solid metal (Electrode) & Metal ions (Zn^{2+} & Cu^{2+} in aqueous form) can usually dissolve in water.

3. Voltaic / Galvanic cell: A simple voltaic cell is made by immersing one zinc plate and one copper plate inside a water diluted sulfuric acid solution. If the copper plate and zinc plate are connected externally with an electrical load, an electric current

starts flowing from copper plate to zinc plate through the load. That means there is some electrical potential difference developed between the copper plate and the zinc plate. As the current flows from copper to zinc, it is obvious that the copper plate becomes positively charged and the zinc plate becomes negatively charged.

Secondary cells have low energy density and are made of molten salts and wet cells. The internal resistance is low and the chemical reaction is reversible. Its initial cost is high and is a little complicated to use when compared to the primary cell.

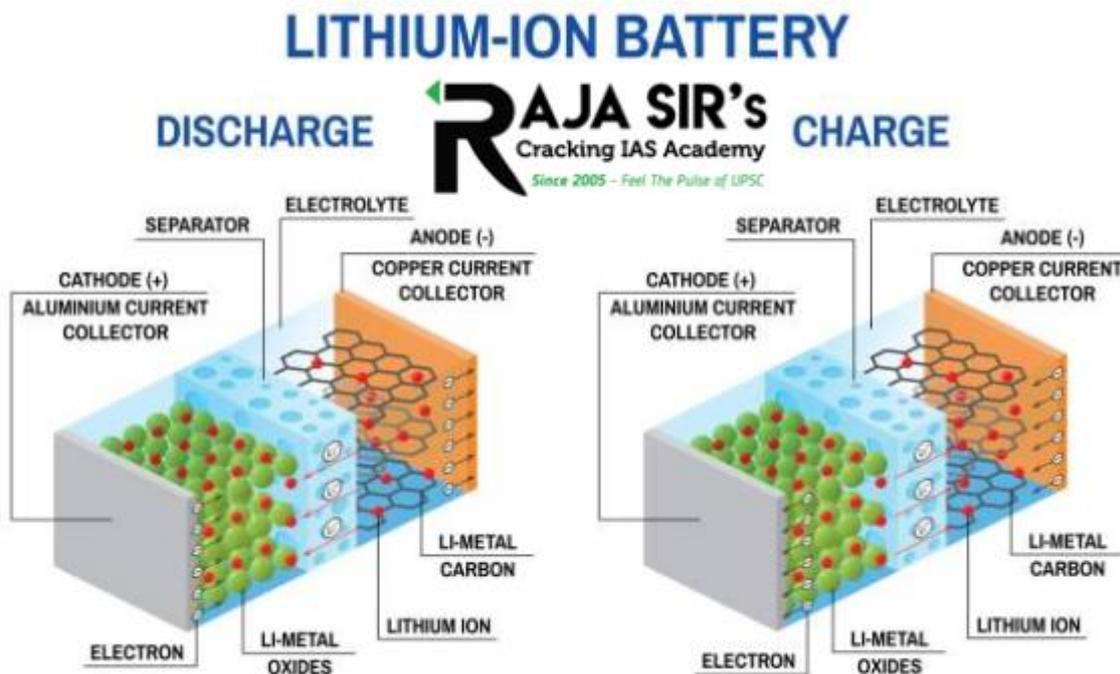
Primary cell	Secondary cell
Primary cells are irreversible i.e., once they get discharged, they cannot be charged again.	Secondary cells are reversible and can be easily charged by electrical supply.
Their internal resistance is very high.	They possess low internal resistance.
They are cheaper.	They are comparably expensive.
They can be easily used.	In comparison to primary cells, they are difficult to handle.
They have a short lifetime.	They are durable.
They are smaller in size.	They are larger.
They are used in small devices like a torch and other portable appliances.	In large devices like inverters and automobiles, secondary cells are used.
They are made up of dry cells.	They are made of wet cells and molten salts.
They cause an irreversible chemical reaction.	They cause a reversible chemical reaction.

The growing concern over climate change has led to global efforts to electrify the transportation sector. In parallel, cost of Li-ion (Lithium-ion) battery technology has decreased by a staggering order of magnitude in the last decade. The convergence of these two factors has resulted in a unique time in our history where we are at the cusp of a dramatic transition in the transportation sector, with electric vehicles poised to replace petrol vehicles. EVs are vehicles that are either partially or fully powered on electric power. While some EVs used lead acid or nickel metal hydride batteries, the standard for modern battery electric vehicles is now considered to be lithium ion batteries.

The world governments have been providing incentives to usher in the transition and private industry ramping up plans for capturing the market. There is a

worldwide race emerging, with vehicle companies, battery manufacturers, and material suppliers vying with each other for market share. However, Li-ion batteries are complex devices requiring a level of sophistication that can take years to perfect. Hurrying the development of this complex technology without careful safeguards can lead to increasing safety incidents, as evidenced recently on Indian roads.

How does a lithium-ion battery work?



- Anode, cathode, electrolyte and separator are the main components of a lithium-ion (rechargeable) battery.
- The two electrodes are immersed in the electrolyte and are separated by the separator.
- The anode is usually made up of **graphite (carbon)**.
- Carbon graphite has a **layered structure** that can store the lithium ions in between its layers.
- The cathode is made up of a combination of **lithium-cobalt**.
- Lithium is unstable in the element form; hence the combination lithium-cobalt oxide is used for the cathode.
- Cathode plays an important role in determining the energy density of a Li-ion battery.

- The higher amount of lithium, bigger the capacity.

Working of a lithium-ion battery

- Both electrodes in a li-ion battery can **intercalate** or 'absorb' lithium ions.
- When the battery is being charged, lithium ions are absorbed (stored) in the anode.
- During discharge, lithium ions naturally flow back to the cathode through the electrolyte.
- This creates **free electrons** in the anode which move along the wire generating electricity.
- The process (to and fro movement of lithium-ion) repeats with each charge and discharge cycles.
- **Electrolyte (lithium salt)** enables the movement of **lithium ions** between the electrodes. Most of the electrolytes used in commercial lithium-ion batteries are non-aqueous solutions, in which Lithium hexafluorophosphate (LiPF₆) salt dissolved in organic carbonates, in particular, mixtures of ethylene carbonate (EC) with dimethyl carbonate (DMC), propylene carbonate (PC), diethyl carbonate (DEC), and/or ethyl methyl carbonate (EMC).

Charge Process: Positive electrode (cathode) is oxidized (loses electrons) and Li⁺ ions pass across the electrolyte and are intercalated (insert between layers) in negative electrode (anode - graphite).

Discharge Process (opposite of charge process): An oxidation reaction occurs at the anode (-ve), Li⁺ ions are de-intercalated and migrate across the electrolyte to be re-intercalated into the cathode material.

- The **separator** functions as a physical barrier keeping cathode and anode apart.
- It **prevents the direct flow of electrons** and **lets only the ions pass through**.
- While the cathode determines the performance of a battery, electrolyte and separator determine its safety.
- **Permeable polymer membranes** such as polyethylene (PE) and polypropylene (PP) are used as separators.

Battery manufacturing is a complex operation involving forming sheets of the anode and cathode and assembling them into a sandwich structure held apart by a thin separator.

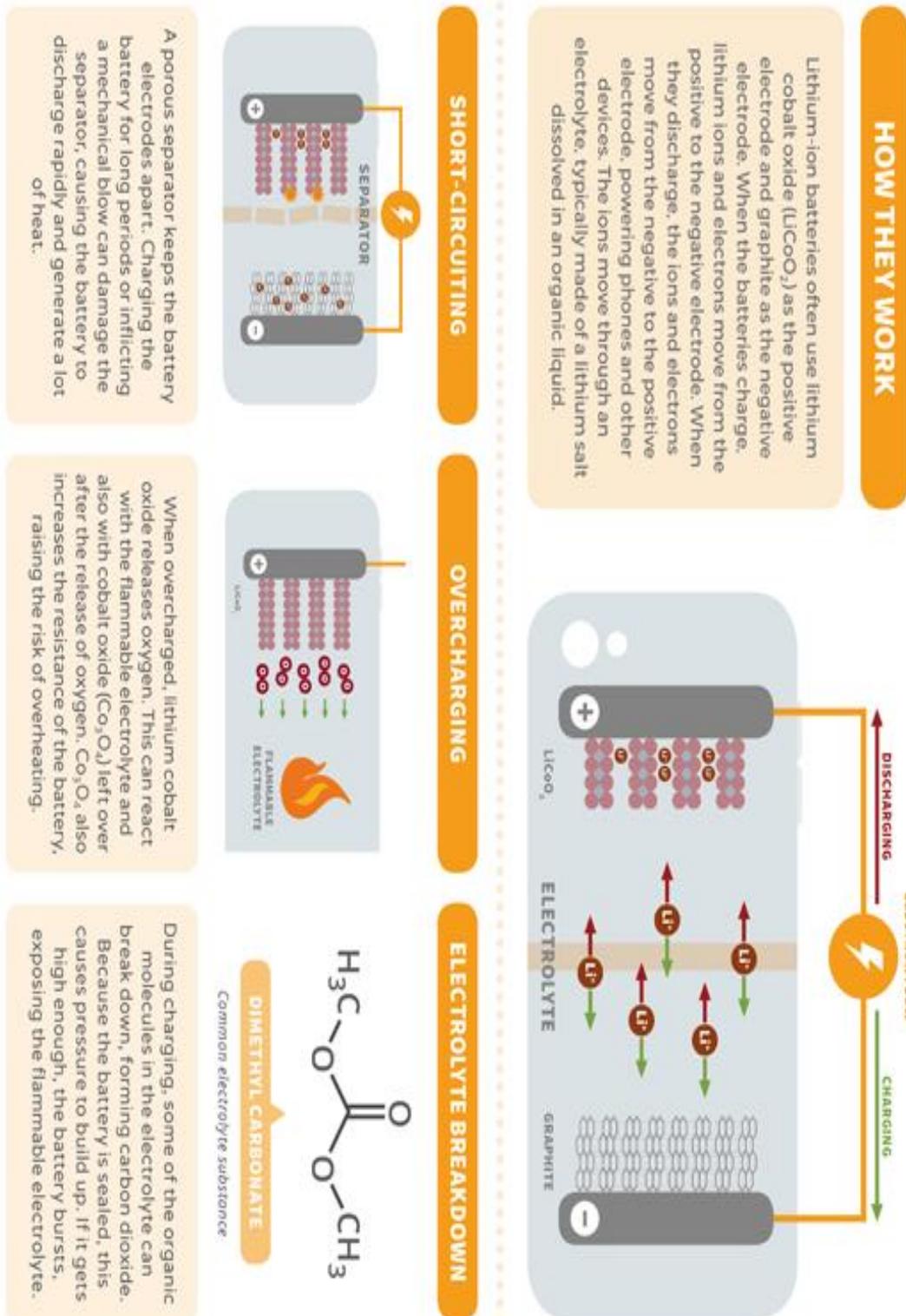
Separators, about 15 microns in thickness – about a fifth of the thickness of the human hair – perform the critical function of preventing the anode and cathode from shorting. Accidental shorting of the electrodes is a known cause of fires in Li-ion cells. It is important that the various layers are assembled with high precision with tight tolerances maintained throughout the manufacturing process. Safety features, such as thermal switches that turn off if the battery overheats, are added as the sandwich is packaged into a battery cell.

Battery cells are assembled into modules and then further assembled into packs. Li-ion batteries require tight control on the state of charge and the temperature of operation to enhance safety and increase usable life, achieved by adding multiple sensors. Packs are designed to ensure uniform temperature profile with minimal thermal variation during operation. Ensuring robust detection, coupled with battery management systems that interpret the data and change operation based on changes to the batteries state, remain critically important in enhancing battery performance.

Battery packs are integrated into the vehicle in unique formfactors depending on the design of the vehicle. The location of the battery should protect it from external penetration, ensure passenger safety while talking into consideration the overall weight distribution. Close interaction between vehicle manufacturers and battery manufacturers is essential so that the whole is greater than the sum of the parts.

There are multiple tradeoffs in this complex ecosystem: engineering higher safety often results in higher costs and lower driving range. In this competitive landscape where companies are vying for market share, a race to the bottom can compromise safety.

What causes battery fires?



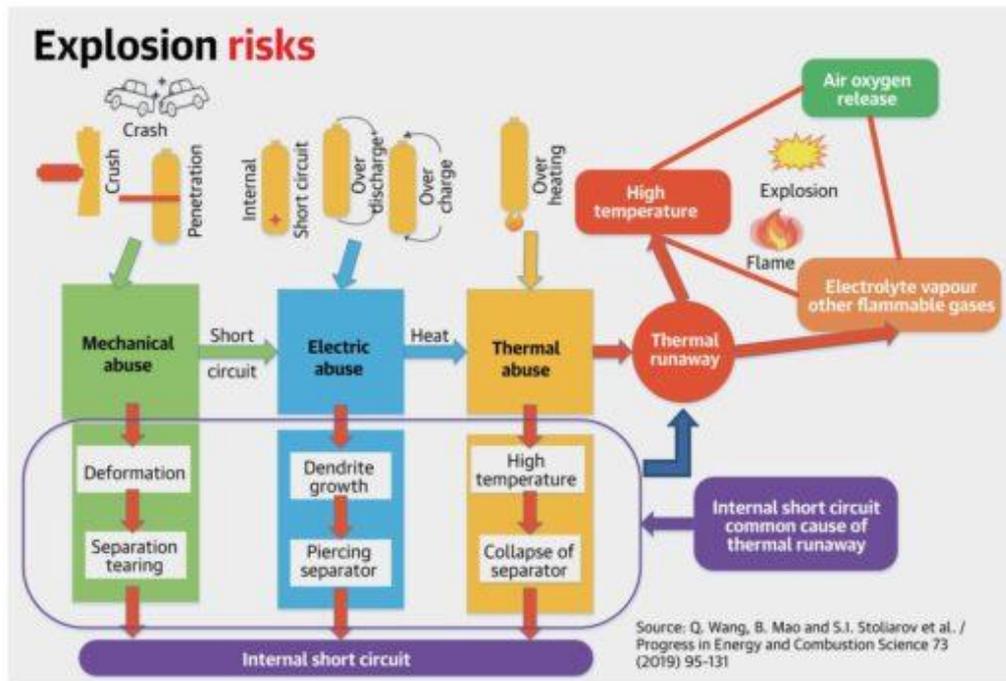
While Li-ion batteries are complex, over the last three decades numerous companies have perfected the art of manufacturing high-quality cells and integrating them into vehicles with minimal safety concerns. The energy density of petrol is five hundred times that of a typical Li-ion battery, therefore safety should be manageable

if robust controls are in place. However, batteries do store energy in a small package and if the energy is released in an uncontrolled fashion, the thermal event can be significant.

Battery fires, like other fires, occur due to the convergence of three parts of the “fire triangle”: heat, oxygen, and fuel. If an adverse event such as a short circuit occurs in the battery, the internal temperature can raise as the anode and cathode release their energy through the short. This, in turn, can lead to a series of reactions from the battery materials, especially the cathode, that release heat in an uncontrolled manner, along with oxygen.

Such events also rupture the sealed battery further exposing the components to outside air and the second part of the fire triangle, namely, oxygen. The final component of the triangle is the liquid electrolyte, which is flammable and serves as a fuel. The combination leads to catastrophic failure of the battery resulting in smoke, heat, and fire, released instantaneously and explosively.

The trigger for such events can be a result of internal shorts (like a manufacturing defect that results in sharp objects penetrating the separator), external events (an accident leading to puncture of the cell and shorting of the electrodes), overcharging the battery which leads to heat releasing reactions on the cathode (by a faulty battery management system that does not shut down charging despite the battery achieving its designed charge state), or bad thermal design at the module and pack level (by not allowing the battery internal heat to be released). Any of these triggers may cascade into a significant safety incident.



Are battery fires inevitable?.

Over the past three decades, Li-ion batteries have proved to be extremely safe, with the industry increasing controls as safety incidents have surfaced. Safety is a must and is an important consideration that battery and vehicle manufacturers can design for at multiple levels from the choice of battery material to designs at the cell, pack, and vehicle level.

Preventing fires requires breaking the fire triangle. Battery cathodes are a leading cause of the heat release. Some cathodes, such as ones with lower nickel content or moving to iron phosphate, can increase safety. Tightly controlled manufacturing will prevent accidental shorts in the cells, eliminating a leading cause of fires. Many companies now add a ceramic layer on the separator to mechanically prevent shorts. Sensing the state of the battery and integrating this data into sophisticated battery management systems is an important aspect of design. Protecting the cell with robust thermal management is critical, especially in India where ambient temperatures are high. Finally, battery packs need to be protected from external penetration. Any large-scale manufacturing process inevitably has a certain percentage of defects; therefore, such steps are needed to minimise the number of adverse events.

Long term changes are also underway. Safety remains a concern for Li-ion manufacturers worldwide especially as cell sizes become larger for applications like solar-connected storage. Companies are developing internal “switches” that turn off parts of the battery that undergo thermal events to stop them at their inception. Research is now underway to replace the flammable liquid electrolyte with a solid electrolyte to eliminate one part of the fire triangle. A similar thread of research is the development of nonflammable liquid electrolytes. All these changes promise to remove the threat of battery fires as the roll out of mass electrification takes place.

Engineering safety requires commitment from all parts of the battery supply chain and tight integration between vehicle companies and battery companies. Further, regulators play an important role, providing the testing and certification needed to ensure that technology innovations perform at the level that is promised. Li-ion batteries are not forgiving of shoddy engineering and approaches that rely on cutting corners. Companies with tightly controlled manufacturing with years of experience can maintain the number of adverse safety incidents to a minimum. Such batteries maybe more expensive, but safety should not be “just another” metric. Rather, ensuring safety should be the priority for manufacturers.

Are pouch-type batteries more vulnerable?

All three types of lithium-ion batteries currently used in electric cars - cylindrical, prismatic and pouch-type - are fundamentally the same in functionality, but each has pros and cons. Cylindrical and prismatic batteries are cased in hard materials.

Pouch-types use sealed flexible foils and are protected by thin metal bags. The technology used in cylindrical batteries is old and yields consistent results. These cells can withstand high internal pressure without deforming. They are also cheaper, making them ideal for mass production. But they are heavier and their shape stops cells from being packed as densely as with other battery forms. Tesla Inc mostly uses cylindrical batteries, some supplied by LGES.

Prismatic batteries are considered safer and lighter than cylindrical cells and, because they are rectangular, can be more densely packed. They optimize space better

than cylindrical cells, but are typically more expensive and have a shorter lifecycle. They can also swell.

Compared with cylindrical and prismatic cells, pouch-type battery cells allow for lighter and thinner cell fabrication, and design flexibility for different capacities and space requirements for different vehicle models. However, they are vulnerable to swelling, and are more vulnerable in crashes, posing a greater fire risk.

Iron ion battery developed by IIT Madras

- Fe^{2+} ions are the charge carriers in iron ion battery (in lithium-ion battery **lithium ions** do the job).
- The iron ion battery uses **mild steel** as the anode and **Vanadium pentoxide** as the cathode.
- The large inter-layer spacing in vanadium pentoxide makes intercalation easier (loss and gain of ions).
- In pure iron, intercalation is not possible. But, a small amount of carbon in mild steel facilitates this process.
- Ether-based electrolyte containing dissolved iron perchlorate is used as an electrolyte.
- The energy density of iron ion battery is 220 Wh/kg (**350 Wh/kg** in case of lithium-ion battery).
- When compared with lithium metal-based batteries, iron ion batteries would be cheaper yet safer.

Energy density is measured in **watt-hours per kilogram (Wh/kg)** and is the amount of energy the battery can store with respect to its mass.

How is iron better than lithium?

- The **redox potential** (potential to lose or gain electrons) of iron ion is higher than lithium-ion.
- The radius of the Fe^{2+} ion is nearly the same as that of the lithium-ion.
- Iron is more stable during the charging process and therefore prevents short-circuiting of the batteries.
- When more iron ions bind to the cathode, more energy (higher energy density) can be stored in the battery.

Comparison: Lead-acid battery, Lithium-ion battery & Iron ion battery by IIT

Lithium

Comparison table	Lead-acid battery	Lithium-ion battery	Iron ion battery by IIT
Electrolyte	Sulphuric acid	Lithium salt (Lithium hexafluorophosphate)	Iron perchlorate
Anode	Lead	Carbon (graphite)	Mild Steel
Cathode	Lead dioxide	Lithium-Cobalt Oxide (Lithium-Nickel-Manganese-Cobalt Oxide)	Vanadium pentoxide
Applications	Inverters, automobile batteries, solar batteries	Mobile, laptop, electric vehicle batteries	-
Energy Density (Wh/kg)	30 to 40	350	220
Weight and Space	Heavy and occupies more space	Comparatively lighter and occupies less space	-
Lifecycle	Low (2-4 years)	High (6-8 years)	-
Maintenance	Yes	No	No
Reliability	Low (full discharge damages battery)	High	-
Initial cost	Low	High	-
Lifecycle cost	High	Low	-
Toxicity	High	Low	Low

Why lithium?

- Lithium is the **lightest metal** and a powerful **reducing agent** (willing to donate its electrons).
- Lithium-ion batteries capitalize on the strong reducing potential of lithium ions to power the redox reaction – reduction at the cathode, oxidation at the anode.
- Among twelve minerals identified as strategic minerals, **Lithium** and **Cobalt** are significant.
- Lithium is lightest known metal. It has a density of 0.534 g/cm³ (half as dense as water).
- It's light and soft and has the lowest melting points of all metals and a high boiling point.
- **Lithium-ion batteries** are key to **lightweight, rechargeable** power for laptops, phones, electric vehicles.
- **Lithium** and another battery component, **cobalt**, could become scarce as demand increases.
- China controls most of the lithium supply across the world.

World's Lithium Reserves in Million Tons			World's Lithium Production in Thousand Tons		
Country	Reserves		Country	Production	
Chile	7.5	47%	Australia	18.7	43%
China	3.2	20%	Chile	14.1	33%
Australia	2.7	17%	Argentina	5.5	13%
Argentina	2	13%	China	3	7%

World total	16 MT	World total	43 TT
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Cobalt

- Cobalt is an important **ferromagnetic alloying metal** having irreplaceable industrial applications.
- Cobalt is extracted as a by-product of copper, nickel, zinc or precious metals.
- **Superalloys** made of cobalt are wear & corrosion-resistant at elevated temperatures.
- Role of cobalt in Lithium-ion batteries
- **Lithium-cobalt-oxide** is used as the **cathode in rechargeable batteries**.
- Lithium-cobalt-oxide is an intercalation compound with the lithium, cobalt and oxygen arranged in layers.
- Cobalt is indispensable to assure the **rate performance** (rate of charging & discharging occurs).
- When the lithium-ion arrives or departs from the cathode, cobalt changes its oxidation state (**compensates for the gain/loss of charge**) so that the **lithium-cobalt-oxide stays electrically neutral**.
- Cathodes are commonly oxides made from transition metals such as nickel, cobalt, copper, iron, etc.
- Replacing the costly cobalt with significantly cheaper nickel can be a fire hazard.
- **Aluminium & manganese** can be added to stabilize, but it lowers the capacity of the cell by a small amount.

Cobalt Reserves across India and the World

State	Reserves in MT		Region with reserves
Odisha	31	69%	Kendujhar and Jajpur districts
Jharkhand	9	20%	Singbhum district
Nagaland	5	11%	Tuensang district
Total	44.9 MT		Presently, there is no production of cobalt from cobalt resources.

India is aggressively pushing electric mobility. All electric vehicles at present use **Lithium-ion batteries**.

Hence, India has to aggressively push to secure **lithium and cobalt (strategic minerals)** resources both internally and externally.

China has already taken a substantial lead in the race by aggressively procuring these minerals from **Congo**.

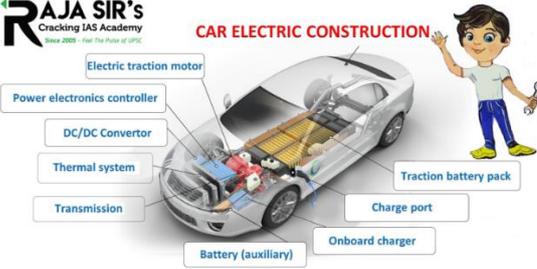
- The demand for cobalt is usually met through imports.
- **Recycling technologies** for recovery of cobalt from **waste Li-ion batteries** have been an evolving process.
- Imports of cobalt and alloys were at 875 tonnes in 2017-18.
- Imports were mainly from **USA & Canada** (13% each), Belgium (12%), Norway & UK (9% each) and China (8%) & Morocco (7%).

World's Reserves of Cobalt Content (in TT)			World's Production of Cobalt Content in 2017 (in TT)		
Country	Reserves		Country	Production	
Congo (Kinshasa)	3400	49%	Congo	82.5	59%
Australia	1200	17%	New Caledonia	9.4	7%
Cuba	500	7%	China	9	6%
World Total	6900 TT		Total	139 TT	

Internal Combustion Engine Vehicles vs. Electric Vehicles

EVs are a lot better than ICEVs

	Internal Combustion Engine Vehicles (ICEV)	Electric Vehicles (EV)	Winner

<p>Major Components</p>	<p>IC engine, Transmission System.</p>		<p>EV</p>
<p>Weight</p>	<p>Comparatively heavier.</p>	<p>Comparatively lighter.</p>	<p>EV</p>
	<p>Heavy due to large and heavy metallic engines with complicated design.</p>	<p>Motor engines are relatively lighter as they have fewer components and simplistic design.</p>	<p>EV</p>
<p>Space occupied by components</p>	<p>Comparatively more because of large engines.</p>	<p>Comparatively less ==> more space for seating ==> good for congested countries like India</p>	<p>EV</p>
<p>Efficiency</p>	<p>Less efficient because of loss of energy in the form of heat in IC engines and due to friction between transmission systems (rotatory motion has to be transmitted using a complex set of</p>	<p>More efficient as the loss of energy in the form of heat is very low (not many moving parts in motors) and transmission losses are minimum (the motor engine shaft transmits rotatory motion either directly to the wheels or with the help of fewer bearings and shafts).</p>	<p>EV</p>

	bearings and shafts).		
Maintenance	More maintenance (frequent, oil change, components replacement) is required as there are many moving parts.	Less maintenance as the battery is the only major component to be replaced. (low recurring cost)	EV
The initial cost of development and ownership	Comparatively low as the technology is in place for a century now.	High as the technology is still evolving.	IC
Total lifecycle economic cost	High	Low (electricity cost associated with operating an EV over a distance of 1 km is significantly lower than the petrol/diesel cost required to operate a comparable IC vehicle)	EV
Acceleration and speed control	Comparatively less as there are many states like ignition, four stages of IC engine, transmission, etc.	EVs are much faster as the transmission of power and rotatory motion are almost instantaneous.	EV

Environmental footprint	High	Comparatively low (EV are more efficient)	
Range	Once the tank is full ICEVs can travel non-stop for hundreds of km	The range of EVs at present is only a few hundred km.	IC
Fuelling	Done in a few minutes.	Charging batteries take a few hours	IC
Infrastructure	Filling stations and other infrastructure is in place.	Charging stations are slowly popping up.	IC
Resale value	Resale value is falling as EVs are the future	Better	EV
Import-substitution.	Heavy dependence on imported fuels.	Clean electricity can replace fossil fuels. India now generates 22% (79 GW) of its electricity from renewable sources alone.	EV

Lithium iron phosphate (LFP) batteries

Lithium iron phosphate (LFP) batteries are different from more traditional energy dense batteries such as nickel manganese cobalt (NMC) and nickel cobalt aluminium (NCA).

- LFP batteries contain less expensive iron and phosphorus. They don't contain costly elements such as nickel and cobalt in the cathodes.

- Average cost of NMC and NCA batteries has been hovering around \$130 per kWh whereas LFP batteries cost less, perhaps approximately \$90 kWh.

Why LFPs are taking off. They cost less and are better at safety and longevity when compared to batteries which are nickel rich.

- But this longevity and safety comes at a cost.
- LFP batteries are less energy dense when compared to the other battery chemistries mentioned above.
- Lower energy density = lower range for your EVs which is a big hurdle to shifting away from internal combustion engines.

The engineering behind LFPs. All lithium ion batteries are charged and discharged by the movement of lithium back and forth between the positive side cathode and negative side anode. This transfer causes reactions which degrade the battery materials.

- The degradation of materials leads to an upper limit on the number of recharge cycles and also on retention of enough energy to power vehicles.
- Such degradation of battery material due to repetition of reactions and loss of charge can also be seen in mobile phone batteries.
- But in an LFP battery, the lithium is moved through iron and phosphorus which is less destructive compared to moving lithium through nickel and cobalt.
- This also means LFP batteries can be charged faster, are significantly safer and perform better in extreme heat.

How LFPs came about. LFP batteries are not new. They have been around since the 1990s. Their low energy density always proved to be a hurdle and they weren't used that widely due to this primary reason.

- In March of 2020, BYD - the world's fourth largest battery maker, came up with a new LFP battery design which it said was safer and less expensive compared to nickel rich batteries. The range achievable was also comparable.
- BYD adopted LFP batteries in 2020 and today almost all EVs that BYD produces in China use LFP batteries.

- From just 2020 to now. The transition was quite rapid. Other battery makers have quickly followed suit.

The Chinese domination. The Chinese were dominant in the battery production space earlier and with the LFP boom their domination just got more serious.

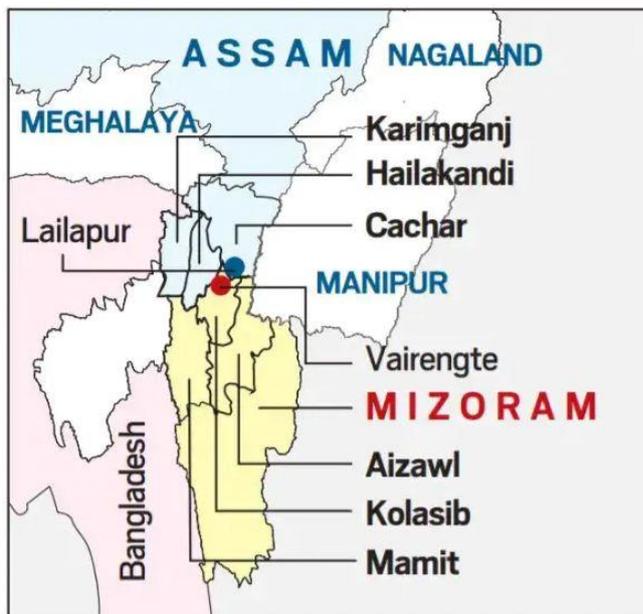
- China produces more than 90 per cent of our globe's LFP batteries.
- CATL, the world's largest battery maker, also came up with its own design of LFP batteries. Tesla uses CATL batteries in their EVs made in China.
- It is quite possible that LFP batteries will become the most widely used type of lithium ion battery in EV manufacturing, replacing the traditionally dominant batteries with nickel rich cathodes. Demand for EVs is rising rapidly

Share of major fuels in Power Generation in India			
Total Installed Capacity (As on 31.05.2019)			
Fuel		Giga Watt	% share
Thermal	Total Thermal	226.3	63.2%
	Coal	194.5	54.3%
	Lignite	6.3	1.7%
	Gas	24.9	7.0%
	Oil	0.64	0.2%
Hydro (Renewable)		45.4	12.7%
Nuclear		6.8	1.9%
Renewable		79.3	22.0%
Total		357.9	

Assam-Meghalaya Border Pact to settle 50-year-old border row

Two months after signing a draft resolution on January 29, Assam and Meghalaya partially resolved a 50-year-old dispute along their 884.9 km boundary on 29th March 2022. It was facilitated by the Union Home Minister who urged the States to resolve their boundary disputes by August 15, 2022, when the country celebrates 75 years of Independence. The agreement is expected to pave the way for resolving disputes in the remaining sectors of the Assam-Meghalaya boundary and similar areas of difference between Assam and three other northeastern States.

Genesis



Meghalaya was carved out of Assam as an autonomous State in 1972. The creation of the new State was based on the Assam Reorganization (Meghalaya) Act of 1969. However the Meghalaya government refused to accept this Act as areas of the present-day East Jaintia Hills, Ri-Bhoi and West Khasi Hills districts of Meghalaya were transferred to the Karbi Anglong, Kamrup (metro) and Kamrup districts of Assam.

Meghalaya contested these transfers after statehood, claiming that **they belonged to its tribal chieftains**. Assam said the Government of Meghalaya could neither provide documents nor archival materials to prove its claim over these areas. After claims and

counter-claims, the dispute was **narrowed down to 12 sectors** on the basis of an official claim by Meghalaya in 2011.

Steps taken

1983: First serious attempt to solve the boundary issue took place with the formation of a **joint official committee**. It suggested that the Survey of India should re-delineate the boundary with the cooperation of both the States towards settling the dispute. However there was no follow-up action.

1985: An independent panel headed by Justice Y.V. Chandrachud was formed over the issue and submitted its report in 1987. However, the report was rejected by the Meghalaya Government which considered the report to be Pro-Assam.

1991: Following more disputes and resultant violence, the two governments agreed in January 1991 to jointly demarcate the border with the help of the Survey of India. About 100 km of the border was demarcated by the end of 1991, but Meghalaya found the exercise unconstitutional and refused to cooperate.

2011: The Meghalaya Assembly passed a resolution for central intervention and the constitution of a boundary commission. The Assam Assembly retaliated with a resolution to oppose the move. But the Centre made the two governments appoint nodal officers to discuss the boundary dispute to minimize the points of differences.

2019: The Meghalaya government petitioned the Supreme Court to direct the Centre to settle the dispute. However, the petition was dismissed by the Court.

2021: In January 2021, Union Home Minister urged all the north-eastern States to resolve their boundary disputes by August 15, 2022, when the country celebrates 75 years of Independence.

In June 2021, the **two States decided to resume talks at the CM level and adopt a "give-and-take" policy** to settle the disputes once and for all.

Of the 12 disputed sectors, six 'less complicated' areas – Tarabari, Gizang, Hahim, Boklapara, Khanapara-Pilingkata and Ratacherra were chosen for resolving in the first phase. Both States formed three regional committees, one each for a district affected by the disputed sectors.

Issues

Colonial Problem: The fault lines created by the British in boundary demarcation are still unaddressed. They created boundaries according to their commercial interests. In the process, sensitivities of local communities regarding land were either ignored or suppressed.

Political Milieu: There has been a proliferation of political conversations that target migrants and 'outsiders'. This shrinks the space and scope for fluid borders and fixes the identities of people as per the region.

Economic relevance: Economic competition for land coupled with a lack of non-farm jobs across the Northeast region, is also enhancing bitterness among states.

Half Hearted attempts by the governments: The sustained tensions at border points is a result of half hearted attempts by the governments. They have deployed paramilitary forces but have not been able to truly develop the region.

Agreed in the settlement

The regional committees acted based on five principles: **(a)** Historical facts of a disputed sector; **(b)** Ethnicity; **(c)** Administrative convenience; **(d)** Willingness of people; **(e)** Contiguity of land preferably with natural boundaries such as rivers, streams and rocks.

On 29th January 2022, the two governments had signed a draft resolution prepared on the basis of the recommendations of these regional panels. This paved the way for the March 29 closure of the six disputed sectors.

According to the partial boundary deal, Assam will get 18.51 sq. km of the 36.79 sq. km disputed area while Meghalaya will get the remaining 18.28 sq. km.

Significance of the Assam Meghalaya Agreement

Future Dispute resolution: It will help in solving the dispute in the other six disputed sectors – Langpih, Borduar, Nongwah, Matamur, Deshdemoreah Block I and Block II, and Khanduli. Further, it could be a guiding light for solving Assam's dispute with other states like Mizoram, Nagaland, Arunachal Pradesh etc.

Reduction in Violence: Certainty over boundaries would reduce border clashes between the masses and save invaluable human lives. For instance, the July 2021 Assam and Mizoram police force clash resulted in the death of six Assamese policemen.

Development of the North East: It will help in better development of the region as peace would bring more projects and investments into the region.

Foreign Policy Objectives: It will help actualise India's Act East policy and also prevent an adversarial China from taking advantage of the fault lines in Northeastern region.

Bottlenecks

Lack of Clarity: There is no clarity yet on the villages or uninhabited stretches that would be divided.

Discontent in masses: Some political parties and community-based groups in Meghalaya are unhappy about acceding any part of the disputed areas to Assam. Similarly there are groups in Assam who want full control over the disputed land.

Fear of Displacement: There is apprehension among the 'non-tribal' people about living in 'tribal' Meghalaya with 'no rights'. They fear they may have to shift their residence in the light of transfer of land.

Road ahead

First, the test of both the CMs would be to sell the agreement to their respective domestic constituencies, and ensure that the residents on the border villages are not alienated in the process.

Second, the two States must further leverage their political capital with the Centre and expeditiously solve the issue of the other six disputed areas.

Third, the Survey of India should be provided with all the financial, technical and human resources so as to ensure that delineation happens as per the Agreement.

Sectarian tribalism has been the bane of the North-eastern States, with underdevelopment acting as a catalyst in complicating knotty issues over land and other issues in the region. The Northeastern states must realize that they share a collective destiny. They should be sensitive to and accommodative of each other's interests so that the entire region can prosper. In this regard the Agreement between Assam and Meghalaya is a positive beginning. It should pave the way for peaceful settlement of other such disputes in the region.

The Status of GST Compensation Dues

GST

- GST launched in India on 1 July 2017 is a comprehensive indirect tax for the entire country.
- It is charged at the time of supply and depends on the destination of consumption.
- For instance, if a good is manufactured in state A but consumed in state B, then the revenue generated through GST collection is credited to the state of consumption (state B) and not to the state of production (state A).
- GST, being a consumption-based tax, resulted in loss of revenue for manufacturing-heavy states.

Compensation under GST regime

STATES WITH MOST GST DUES PENDING (In ₹ crore)

	Released	Shortfall loan released	Yet to be released
RAJA SIR'S Cracking IAS Academy <small>Since 2005 - Feel The Pulse of UPSC</small>			
Maharashtra	17,834	13,782	11,563
UP	8,299	8,140	6,954
Tamil Nadu	6,697	8,095	6,733
Delhi	6,446	6,193	5,461
West Bengal	4,531	6,425	4,292
All states	96,576	159,000	53,661

Source: Finance Ministry reply tabled in Rajya Sabha

- Due to the consumption-based nature of GST, manufacturing states like Gujarat, Haryana, Karnataka, Maharashtra and Tamil Nadu feared a revenue loss.
- Thus, GST Compensation Cess or GST Cess was introduced by the government to compensate for the possible revenue losses suffered by such manufacturing states.
- However, under existing rules, this compensation cess will be levied only for the first 5 years of the GST regime - from July 1st, 2017 to July 1st, 2022.
- Compensation cess is levied on five products considered to be 'sin' or luxury as mentioned in the GST (Compensation to States) Act, 2017 and includes items such as- Pan Masala, Tobacco, and Automobiles etc.

Distributing GST Compensation

- The compensation cess payable to states is calculated based on the methodology specified in the GST (Compensation to States) Act, 2017.
- The compensation fund so collected is released to the states every 2 months.
- Any unused money from the compensation fund at the end of the transition period shall be distributed between the states and the centre as per any applicable formula.

Significance of GST Compensation

- States no longer possess taxation rights after most taxes, barring those on petroleum, alcohol, and stamp duty were subsumed under GST.
- GST accounts for almost 42% of states' own tax revenues, and tax revenues account for around 60% of states' total revenues.
- Finances of over a dozen states are under severe strain, resulting in delays in salary payments and sharp cuts in capital expenditure outlay amid the pandemic-induced lockdowns and the need to spend on healthcare.

Status of the outstanding GST compensation due to the States

- The Finance Ministry said that outstanding GST compensation dues to States for 2021-22 stood at ₹78,704 crore.
- This means that dues have been remitted to States for the eight-month period of April 2021 till November 2021.
- Normally, compensation for 10 months from April-January of any financial year is released during that year and the compensation for February-March is released only in the next financial year.
- The pending amount will also be released as and when the amount from cess accrues in the compensation fund.

Bill assent, a delay and the Governor's options

The State of Tamil Nadu has been witnessing a confrontation between the elected government and the State Governor on the question of giving assent to the National Eligibility cum Entrance Test (NEET) Bill passed by the State Assembly.

Position of Governor in Constitutional setup in India

- Appointee of the President: The Governor is an appointee of the President, which means the Union government.

- Although Article 154(1) of the Constitution vests in the Governor the executive power of the State, he is required to exercise that power in accordance with the Constitution.
- In other words, the Governor can act only on the aid and advice of the Council of Ministers.
- It is a settled constitutional position that the Governor is only a constitutional head and the executive power of the State is exercised by the Council of Ministers.
- In *Shamsher Singh vs State of Punjab* (1974), the Supreme Court had clearly affirmed this position.
- Dr. Ambedkar explained the position of the Governor in the Constituent Assembly as follows: "The Governor under the Constitution has no functions which he can discharge by himself: no functions at all."
- The Sarkaria Commission restates this position in its report, "it is a well-recognized principle that so long as the council of ministers enjoys [the] confidence of the Assembly its advice in these matters, unless patently unconstitutional, must be deemed as binding on the governor".
- In 2016, a five-judge constitution Bench of the Supreme Court (the *Nabam Rebia* case) reaffirmed the above position on the governors' powers in our constitutional setup.

Options before the Governor in the matter of giving assent to a Bill passed by the Assembly

- Assent of the Governor or the President is necessary for a Bill to become law.
- Four options: Article 200 of the Constitution provides for four alternative courses of action for a Governor when a Bill after being passed by the legislature is presented to him for his assent.
 - 1] The Governor can give his assent straightaway.
 - 2] The Governor can withhold his assent.
 - 3] He may also reserve it for the consideration of the President, in which case the assent is given or withheld by the President.
 - 4] The fourth option is to return the Bill to the legislature with the request that it may reconsider the Bill or any particular provision of the Bill.

- When such a message is received from the Governor, the legislature is required to reconsider his recommendations quickly.
- However, if the legislature again passes the Bill without accepting any of the amendments suggested by the Governor he is **constitutionally bound to give assent to the Bill.**

Issue of the NEET Bill

- The Governor of Tamil Nadu returned the NEET Bill to the Assembly for reconsideration of the Bill.
- Accordingly, the Assembly held a special session in the first week of February and passed it again and presented it to the Governor for his assent.
- He has not assented to the Bill so far.
- While it is true that Article 200 does not lay down any time frame for the Governor to take action under this Article, it is imperative on the part of the Governor to exercise one of the options contained therein.
- The option mentioned in Article 200 is meant to be exercised by the Governor without delay.
- Non-action is not an option: Although Article 200 does not say by what time the Governor should take the next step, it clearly and unambiguously states the options for him to exercise.
- It is obvious that if the Governor does not exercise any of those options he will not be acting in conformity with the Constitution because non-action is not an option contained in Article 200.
- In fact, the words used in Article 200 "... it shall be presented to the governor and the governor shall declare..." indicates that the Constitution requires the Governor to act without delay upon the presentation of the Bill.
- In view of the mandatory provision in the proviso to Article 200, it is clear that the Constitution does not permit the Governor to sit on a Bill after the Assembly re-submits it to him after reconsideration.

Points to Ponder

- Giving assent to a Bill passed by the legislature is a part of the legislative process and not of the executive power.
- Withholding of assent, though an option, is not normally exercised by Governors because it will be an extremely unpopular step.

- Besides, withholding assent to a Bill by the Governor, an appointee of the President, neutralises the entire legislative exercise by an elected legislature enjoying the support of the people.
- This option is undemocratic and essentially against federalism.
- Practices in UK and Australia: In the United Kingdom it is unconstitutional for the monarch to refuse to assent to a Bill passed by Parliament.
- Similarly, in Australia, refusal of assent to a Bill by the crown is considered repugnant to the federal system.

In our constitutional system, the Governor or the President is not personally responsible for their acts. But when a Governor does not take any decision on a Bill which is put up for his assent, he is not acting in exercise and performance of the duties cast upon him.

Shigella sonnei : Intestinal Infection

An **outbreak of shigella bacteria** is believed to be the reason behind the recent incident of suspected food poisoning in **Kasaragod district, Kerala**.

- Earlier in 2019, the bacteria were found in Koyilandy district, Kerala.

Shigella Bacteria

- Shigella is a genus of bacteria that causes an **infection called shigellosis**. It is the **second leading cause of diarrhea (after Rotavirus)** worldwide and the third leading cause of death in children less than 5 years old.
- The annual number of shigellosis episodes **throughout the world is estimated to be 164.7 million**.
- **Possible Symptoms:** Symptoms include diarrhoea, fever, stomach cramps which can last for seven days.
- **Transmission:** Shigella is generally transmitted through contaminated food or water, or through person-to-person contact.
- Shigellosis is primarily a disease of **poor and crowded communities** that do not have adequate sanitation or safe water.
- **Incubation Period:** The incubation period of shigellosis is **typically 1-4 days**.
- **Different Species:** The severity of the disease varies by the infecting species:

- **Shigella dysenteriae infections** usually cause dysentery, which may also occur in infection with *Shigella flexneri*.
- **Shigella boydii and Shigella sonnei** often have self-limited watery diarrhea.
- **Vaccines:** Currently, there are **no vaccines** available for shigellosis.
- **Medium Priority Bacteria:** Due to the increasing rate of multidrug resistance, in particular resistance to **fluoroquinolone** in Asian and African regions, this has been classified as a medium priority for research and development of new and effective antibiotic treatments by the **WHO Priority Pathogens List of antibiotic-resistant bacteria**.

Treatment Protocol

- **Hydration:** The cornerstone of shigella treatment is the maintenance of hydration and electrolyte balance.
- In young children, **oral rehydration with a reduced osmolarity solution** is indicated to treat the WHO-defined category of some dehydration and is preferable to intravenous fluids unless severe dehydration is present.
- **Use of Antibiotics:** Although shigellosis is primarily **self-limiting**, **antibiotics** are recommended for reducing illness duration and for preventing transmission.
- The current drugs of choice are **third-generation cephalosporins (ceftriaxone or cefixime) and macrolides (azithromycin)**.
- **Public Hygiene:** Handwashing is said to reduce **shigella transmission by 70%**. Recommended public health control measures are exclusion of ill people with shigellosis from work, food preparation, and childcare.

Probiotics and Prebiotics

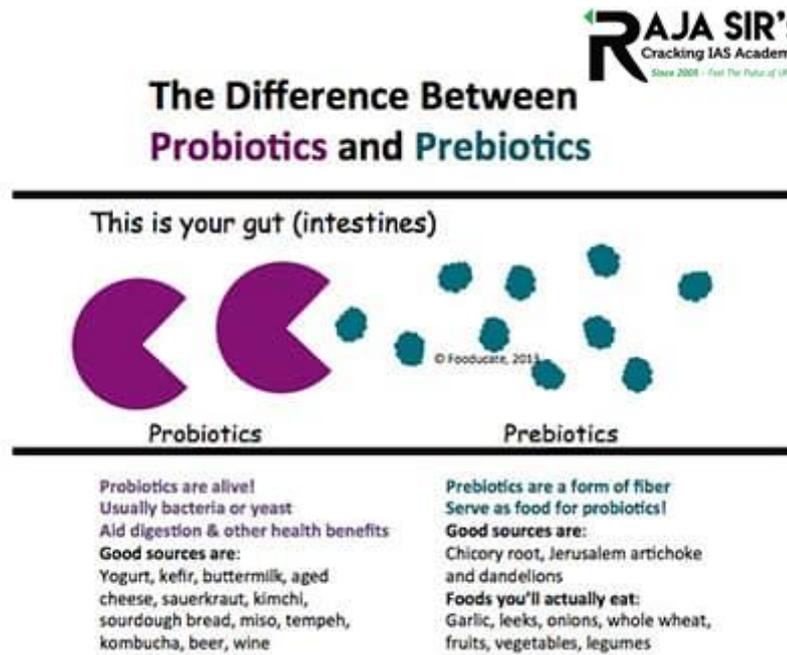
Probiotics are live microorganisms that, when administered in adequate amounts, confer a health benefit to the host. There are different groups of probiotic microorganisms. Prebiotics are nondigestible dietary ingredient that beneficially affects the host by selectively stimulating the growth or activity of a limited number of bacteria in the colon. That definition has been modified by many people, but it is a simple one. Fructooligosaccharides are a primary example of prebiotics, whereas nonstarch polysaccharides, plant wall polysaccharides, and pectins, among other carbohydrates, are not necessarily prebiotic agents, but most are classified as dietary fiber. Thus, all fiber is not prebiotic, and all prebiotics are not fiber, but what fiber

and prebiotics have in common is that neither is digestible by human enzymes. Rather, they are fermented and digested by the microbiota of the intestine.

Lactobacillus plantarum JBC5

- Lactobacillus plantarum JBC5 showed great promise in promoting healthy ageing in a model organism, Caenorhabditiselegans, a worm with genetic characteristics similar to those of humans.
- LPJBC5 improved learning and memory.
- LPJBC5 conferred resistance against abiotic and biotic stresses such as oxidative, heat, and pathogen.
- LPJBC5 reduced the production of reactive oxygen species and improved mitochondrial function, thereby reducing apoptosis in worms.

PREBIOTICS	PROBIOTICS
PREBIOTICS are a special form of dietary fiber that acts as a fertilizer for the good bacteria in your gut.	PROBIOTICS are live bacteria in yogurt, dairy products and pills. There are hundreds of probiotic species available. Which of the hundreds of available probiotics is best for the average healthy person is still unknown.
PREBIOTIC powders are not affected by heat, cold, acid or time.	PROBIOTIC bacteria must be kept alive. They may be killed by heat, stomach acid or simply die with time.
PREBIOTICS provide a wide range of health benefits to the otherwise healthy person. Most of these have been medically proven.	PROBIOTICS are still not clearly known to provide health benefits to the otherwise healthy. Some are suspected but still not proven.
PREBIOTICS nourish the good bacteria that everyone already has in their gut.	PROBIOTICS must compete with the over 1000 bacteria species already in the gut.
PREBIOTICS may be helpful for several chronic digestive disorders or inflammatory bowel disease.	Certain PROBIOTIC species have been shown to be helpful for childhood diarrhea, irritable bowel disease and for recurrence of certain bowel infections such as C. difficile.



E. coli

Most *E. coli* strains are beneficial to humans. They live in our intestines and produce important vitamins, such as **vitamin K and B-complex vitamins**, which we absorb.

E. coli or *Escherichia coli* bacterial strain was named after its discoverer, the German pediatrician Theodor Escherich. As a natural bacterium in the intestinal tract of humans, other mammals and birds **most *E. coli* bacteria are harmless**. However, there are also strains of bacteria that are pathogenic, i.e. disease-causing, and can lead to bacterial infections. If there are apathogenic (non-pathogenic) *E. coli* bacteria in the intestine, this is not of further concern. Pathogenic species, on the other hand, are dangerous to health: if they reach other parts of the body outside the intestine, the risk of infection or disease is increased.

Botulism

Botulism is a rare but serious illness caused by a toxin that attacks the body's nerves and causes difficulty breathing, muscle paralysis, and even death. This toxin is made by *Clostridium botulinum* bacteria. These bacteria can produce the toxin in food, wounds, and the intestines of infants.

2005 - Nobel Prize for *H. pylori* Discovery

The ulcer-causing gastric pathogen *Helicobacter pylori* is the only bacterium known to colonize the harsh acidic environment of the human stomach. *H. pylori* survives in

acidic conditions by producing urease, which catalyzes hydrolysis of urea to yield ammonia thus elevating the pH of its environment.

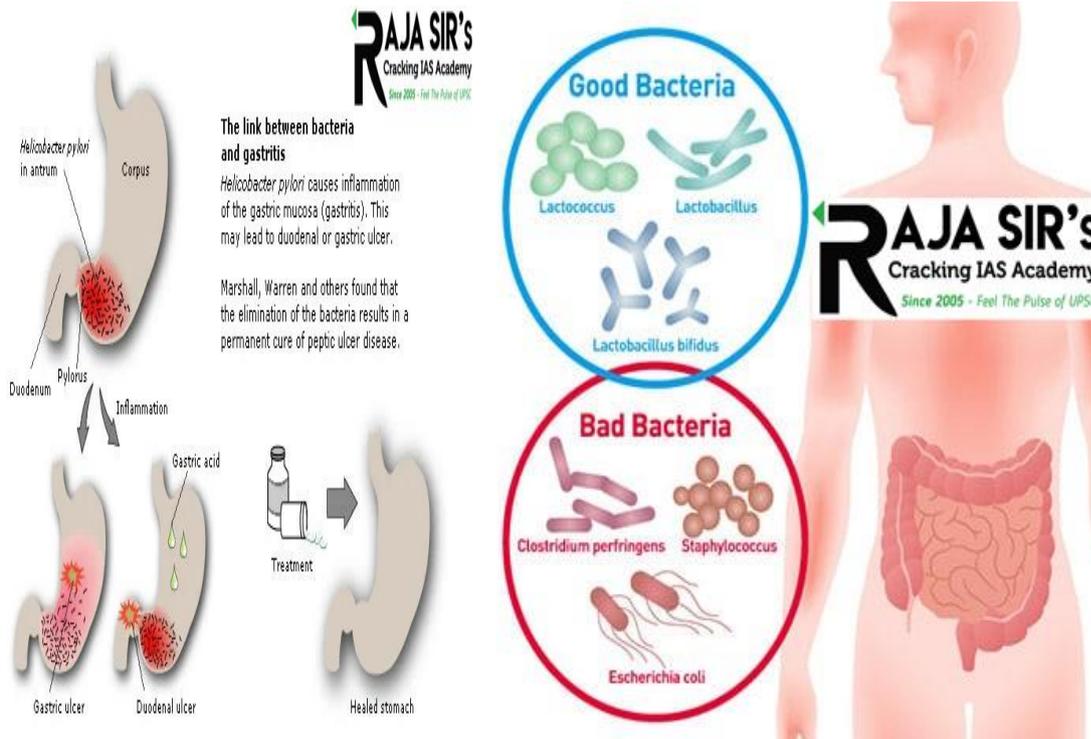
The bacterium *Helicobacter pylori* that colonises the human stomach is now usually seen as a disease-causing organism. Pioneering research carried out by **Barry J. Marshall and J. Robin Warren** established infections by this bacterium as the most common cause of peptic ulcers.

It is now known that the spiral-shaped bacterium, with its four flagella, is able to penetrate deep into the stomach lining's thick mucus where it converts urea, a waste product in the stomach, into ammonia. This provides the bacteria with the weapon to counter the acidic environment and enables them to colonise the lower stomach region.

H. pylori needs an environment with only 5 per cent oxygen, the exact level of oxygen in the stomach.

Subsequent studies found that 90 per cent of people with duodenal ulcers and up to 80 per cent of people with gastric ulcers are infected with *H. pylori*. Infection, rather than lifestyle, was identified as the root cause of stomach ulcers. The findings also suggested that as long as the bacteria remained, the inflammatory condition would persist; ulcers could be cured only if the stomach could be rid totally of the bacteria. Thanks to this path-breaking discovery, which came in 1982, peptic ulcers, often resulting in severely disabling conditions including stomach cancer with life-long medication, are no longer a chronic ailment. It is now a disease that is curable with a regimen of antibiotics and acid blockers.

In most circumstances, it appears that *H. pylori* does not cause disease unless the delicate balance between the host and the organism is disturbed by other factors. There is a lot of ongoing research to identify these; while some say that they may well include stress and diet, recent research also suggests that a human immune system dysfunction in recognising microbial products can result in disease development.



CODEX

The Codex Alimentarius Commission(CAC) is an intergovernmental body established jointly by the UN's Food and Agriculture Organisation (FAO) and the World Health Organisation (WHO) in 1963, within the framework of the Joint Food Standards Programme. The Secretariat of the CAC is hosted at FAO headquarters in Rome.

The Agreement on Application of Sanitary and Phytosanitary Measures (SPS) of the World Trade Organization (WTO) recognizes Codex standards, guidelines and recommendations as reference standards for international trade and trade dispute settlement

Currently the Codex Alimentarius Commission has 189 Codex Members made up of 189 Member Countries and 1 Member Organization (The European Union). India became the member of Codex Alimentarius in 1964.

- Codex Standards **cover all the main foods**, whether processed, semi-processed or raw.
- In addition, materials used in the further processing of food products are included to the extent necessary for achieving the principal objectives of the code.

- Codex provisions **concern the hygienic and nutritional quality of food**, including microbiological norms, food additives, pesticide and **veterinary drug residues, contaminants, labelling and presentation**, and methods of sampling and risk analysis.

Codex Committee on Spices and Culinary Herbs (CCSCH):

It was formed in **2013**.

- | Terms | of | Reference: |
|--|-----------|-------------------|
| <ul style="list-style-type: none"> ▪ To elaborate worldwide standards for spices and culinary herbs in their dried and dehydrated state in whole, ground, and cracked or crushed form. ▪ To consult, as necessary, with other international organizations in the standards development process to avoid duplication. ▪ Host: ▪ India is the host country and Spices Board India is the Secretariat for organising the sessions of the committee. ▪ Spices Board (Ministry of Commerce and Industry) is the flagship organization for the development and worldwide promotion of Indian spices. | | |

Food Safety and Standards Authority of India (FSSAI)

The Food Safety and Standards Authority of India is a autonomous statutory body under **Food Safety and Standards Act, 2006**. The Food Safety and Standards Act (**FSS**) **of 2006** is the primary legislation governing food safety and standards. This act also establishes the framework for developing and enforcing food safety regulations in India. On a state level, the FSSAI selects food safety officials. The **Ministry of Health and Family Welfare** has administrative jurisdiction over the FSSAI. It is headquartered in Delhi.

Landmark Cases With FSSAI

Nestle India Limited Maggi Case: Maggi noodles were found to contain too much lead to be safe for human eating, and the Food Safety and Standards Authority of India (FSSAI) recommended that they be banned.

Cadbury India: Worms were discovered in Cadbury's Dairy Milk, according to reports. The FSSAI decided that the packing was not suitable or airtight and ordered that it be changed.

FSSAI Guidelines On Trans Fats

- On December 29, 2020, the Food Safety and Standards Authority of India (FSSAI) reduced the permissible limit of **trans fatty acids (TFA)** in oils and fats to **3% for 2021** and 2% by 2022, against the earlier cap of 5%. The decision was affected by an amendment to the Food Safety and Standards (Prohibition and Restriction on Sales) Regulations.
- The new rules apply to **edible refined oils, vanaspati** (partially hydrogenated oils), margarine, bakery shortenings, and other cooking media like vegetable fat spreads and mixed fat spreads.
- In 2018, the World Health Organization (WHO) had called for global elimination of industrially-produced **TFAs by 2023**.

FSSAI Proposes Conditional Licensing For Proprietary Foods

- **Proprietary food products** are those for which no identification standards have been set under any current rules, but which are generally prepared using allowed ingredients and additions.
- The **FSSAI's Conditional Licensing** concept is to monitor the market penetration of items whose composition has been diluted to avoid compliance with regulated food products.

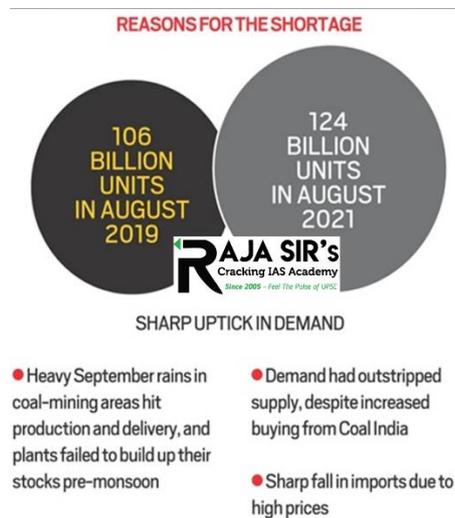
Supply chain chaos and Power Shortages

First, with summer approaching before time, power demand has shot up to record levels. The second reason for the rise in power demand is that the economy is recovering, and demand from the industrial sector is going up. All things put together, power demand crossed 207 GW on April 29, which is about 14 per cent higher than what it was a year ago. Experts feel that the peak demand may even touch 215 GW in the coming months.

Coal shortage crisis

- On average, coal stocks available are only good enough for about eight days' generation against a norm of 24 days.
- In some plants, the stocks available are just about enough to run the plant for a day or two more.
- Part of the problem of poor coal stock is also rumoured to be on account of the non-payment of dues of coal companies.
- But this is not the major cause of the shortage.

Reasons for coal shortage and fall in generation



- The fall in coal stock in power stations is because of two main reasons.
- Rise in international price of coal: The first is that due to a rise in the international price of coal on account of the Ukraine crisis, all plants that were importing coal have either stopped generating completely or are generating at much lower levels.
- We have a sizeable generating capacity based on imported coal, estimated at about 16 GW to 17 GW.
- All these plants after stopping imports are now looking for domestic coal, creating pressure on domestic coal.
- Non-availability of rakes with Indian railways for transporting coal: Though about 22 MT of coal may be available in power stations, if one includes the stocks available with mining companies, the figure is well over 70 MT.
- So, it is all a question of transporting the coal to the power stations.
- Fall in generation from gas-based plants: To make matters worse, generation from gas-based plants has also fallen due to high gas prices in the world market.

- Impact on hydro generation: Reservoirs, too, are drying up due to intense heat which will adversely affect hydro generation.

Transportation problem faced by Indian Railways

- The railways have about 2,500 rakes which can be used for coal transportation.
- With a turn-around time of about four-and-a-half days which goes up to nine days for coastal regions, the railways can provide only about 525 rakes on any single day.
- Of this, about 100 rakes are used for transporting imported coal and therefore, only about 425 rakes are available on a daily basis for transporting domestic coal.
- But only 380 rakes were being provided in the first half of April this year, though efforts are on to increase this to about 415 rakes.
- The railways prefer to transport coal over short distances in order to save on the turn-around time.
- There is also the issue of availability of tracks since they are being used on a back-to-back basis.
- Thus production has to be enhanced so that the replenishment rate is higher than consumption.
- Unless we do that, the total stock of coal in the country will deplete further and it will no longer be a mere transportation problem as it is now, but a general lack of supply of coal.

Role of Civil Services in a Democracy

India is the largest democracy and the Indian people are its ultimate source of power. All the countries need some kind of administrative machinery for the implementation of their policies therefore, civil services are the basis of the governments. **Lord Cornwallis** reformed and organized the civil services and is known as the father of civil services in India. A civil service official in India is a servant of the Indian society and is chosen on the basis of merit in the Civil Service Examination organized by the Union Public Service Commission. Civil services are part of the bureaucracy and the role of civil servants is determined by written rules. The Indian Administrative Service, Indian Foreign Service, Indian Police Service, and Indian Forest Service are some of the important civil service posts of India.

Evolution of the Civil Services in India:

Indian civil service system had its origin in the Mauryan period. **Kautilya's Arthashastra** laid down the principles of selection and promotion of civil servants, their code of conduct, the conditions of loyalty for the appointment, and the methods to evaluate their performance.

In **Medieval India**, the Mughal civil service system focused on the management of land revenue, looking after government factories, and the development of the patrimonial state. Britishers use civil services to strengthen the British administration in India. Servants promoted British interests and their role was regulatory. As a result, civil servants became State Servants during **British rule**. Later on, developmental roles were also given to them. Civil services in India changed considerably after the enforcement of the Constitution of independent India. Civil services acquired a prominent role in implementing National and State policies of welfare and planned development processes.

Provisions enumerated in the Constitution:

Part **XIV** of the Indian Constitution states the provisions of civil services-

1. **Article 309**- It deals with the powers of the Parliament and State legislatures.
2. **Article 310**- It is concerned with the Doctrine of Pleasure.
3. **Article 311**- It stated dismissal, removal, or reduction in rank.
4. **Article 312**- It enlisted the creation of a new All India service.
5. **Article 315 to Article 322**- All these Articles deal with Public Service Commissions.
6. **Article 323A**- It is concerned with Administrative tribunals.

Functions of the Civil Servants For the Protection of Democracy:

Civil servants assist in identifying pivotal policy areas and their role in policymaking and implementation is of paramount importance to the development process.

A. Policymaking and Implementation

Due to their administrative expertise, they are the “think tank” of the Government. They collect data and information related to core issues. They engage themselves in developing policy proposals keeping in mind its future prospects, its acceptability, etc. It is also the responsibility of the civil servants to check the feasibility of the proposals

in relation to the Constitutional provisions. They also take up the task of implementing the laws and policies of the Government.

B. Providing Welfare and Protective Services to the People

Civil servants by maintaining law and order protect the life and liberty of the people. With increasing environmental pollution, the protection of the environment also acquired a front seat. All the governments are taking steps to control it. Similarly, the current pandemic COVID-19 situation has become the priority issue over which rules are being made from time to time. No stone is left unturned by the civil servants in performing their functions.

C. Administrative Adjudication

This quasi-judicial role is also performed by the civil servants. They act as judges in Administrative tribunals and settle the disputes between the State and the citizens. Example- the Income Tax Appellate Tribunal.

D. Connecting Bridge Between State and the Society

Since citizens are the main focus point of the administrative system, the civil servant has become a connecting bridge between the State and the society. Most of the Government programs are managed and run by the civil servants only and they try to solve the issues faced by the citizens at the earliest which ultimately results in a smooth and closer relationship between them and the citizens.

E. Developmental Goals, Priorities, and Programs

Formulation of appropriate developmental goals and programs in order to secure the support of the people and for the development of the nation is the responsibility of the civil servants.

For example, the **Break the silence initiative-** (Chuppi Todd campaign) was launched by an IPS officer, Arif Shaikh thereby a WhatsApp number is circulated where women can lodge complaints with the police regarding abuse at home amidst the COVID lockdown. Similarly, **Electricity smart meters** were installed by an IAS officer, Ritu Maheshwari in order to tackle electricity theft in Kanpur. Another developmental goal was the **construction of over 16,000 ponds** done by the District

collector of Dewas, Umakant Umrao who helped the farmers of Madhya Pradesh to fight against the drought issue.

Loopholes in the working of Civil Services:

1. The existence of various outdated rules and procedures hinders the civil servants from performing their roles successfully.
2. There is insecurity of tenures. Besides this, arbitrary transfers are common.
3. A lot of political interference hampers the functioning of the civil servants.
4. Providing reward to the incompetent and corrupt servant and neglecting the loyal one is also one of the loopholes behind their low performance.
5. Irregular promotion and empanelment erode their ethics, self-esteem, and public service values.
6. There is a shortage of adequate transparency and accountability procedures.

Civil services have a prominent role in Indian governance. Since British rule in India, civil services had been modified and operative. Due to rapid economic growth, civil servants have been trained to deal with issues arising due to globalization therefore, their role needs to be shifted from being controllers to facilitators and from being providers to enablers. A civil servant must be required to implement the orders of the government with utmost honesty and without any bias, fear, or favor. Political neutrality should be an accepted norm.

Reflections on the 'quasi-federal' democracy

Federalism is a system of government in which the power is divided between a central authority and various constituent units of the country. This vertical division of power among different levels of governments is referred to as federalism. Federalism is one of the major forms of power-sharing in modern democracies. India consciously adopted a version of federalism that made the Union government and State governments interdependent on each other (latter more vis-a-vis the former).

The **federal features** of the Constitution of India are:

- **Written Constitution:** Features of the Indian Constitution is not only a written document but also the longest constitution in the world. Originally, it included a Preamble, 395 articles (22 parts), and 8 schedules.
- **Dual Polity:** The constitution establishes a dual polity that includes the union at the periphery. Each is endowed with sovereign powers to be exercised in the field assigned to them respectively by the Constitution.
- **Bicameralism:** The constitution provides for a bicameral legislature in which an upper house (Rajya Sabha) and a lower house (Lok Sabha). Rajya Sabha represents the states of the Indian Union, whereas The Lok Sabha represents the people of India as a whole.
- **Division of Powers:** The Constitution divided the powers between the Center and the states in terms of the Union List, State List, and Concurrent List in the Seventh Schedule.
- **Supremacy of the Constitution:** The Constitution is the supreme law of the country. The laws made by the Center and the states should be in conformity with Provision. Otherwise, they may be declared invalid by the Supreme or High Court through its power of judicial review.
- **Rigid Constitution:** The division of powers established by the Constitution as well as supremacy of the constitution can be maintained only if the method of its amendment is rigid. It is necessary for both houses to agree to amend the constitution.
- **Independent judiciary:** The constitution establishes an independent judiciary headed by the Supreme Court for two purposes: one, to protect the supremacy of the constitution, and two, to settle the disputes between the Centre and states or between the states.

Besides the above federal features, the Indian constitution also possesses the following **unitary features**:

- **Strong Centre:** The division of powers is in favour of the center and unequal from a federal point of view. Firstly, the Union list contains more subjects than the state list,

secondly, the more important subjects have been included in the union list and the Centre has overriding authority over the concurrent list.

- **Single constitution:** The constitution of India embodies not only the constitution of the Centre but also those of the states. Both the Centre and the States must operate within this single frame.
- **Destructible nature of states:** Unlike in other federations, the states in India have no right to territorial integrity. The parliament can change the area, boundaries, or name of any state.
- **Emergency provisions:** The emergency provisions are contained in Part XVIII of the Constitution of India, from Articles 352 to 360. In the emergency provisions, the central government becomes all-powerful and the states go into total control of the Centre.
- **Single citizenship:** Single citizenship means one person is the citizenship of the whole country. The constitution deals with citizenship from Articles 5 and 11 under Part 2.
- **All India services:** In India, there are all India services (IAS, IPS and IFS) which are common to both the Centre and the states. These services violate the principle of federalism under the constitution.
- **Appointment of governor:** The governor is appointed by the president. He also acts as an agent of the Centre. Through him, the Centre exercises control over the states.
- **Integrated election machinery:** The election commission conducts elections for central and state legislatures. But the Election commission is constituted by the president and the states have no say in this matter.
- **Equality (= Equity) of representation:** The states are given representation in the upper house on the basis of population. Hence, the membership varies from 1 to 31.
- **Integrated Judiciary:** The term Integrated Judiciary refers to the fact that rulings made by higher courts bind lower courts. The Supreme Court of India incorporates all lower courts, from the Gram Panchayat to the High Courts. The Supreme Court is at the very top.

- Union veto over State Bills: The governor has the authority to hold certain sorts of laws passed by the state legislature for presidential consideration. The President has the authority to refuse to sign such bills not only in the first instance but also in the second.

Reasons for a centralized federal structure

There are at following reasons that informed India's choice of a centralised federal structure.

1. Partition of India and the concomitant concerns: The 1946 Objectives Resolution introduced by Nehru in the Assembly were inclined towards a decentralized federal structure wherein States would wield residuary powers.
 2. Reconstitution of social relations in a highly hierarchical and discriminatory society: The centralized structure would unsettle prevalent trends of social dominance, help fight poverty better and therefore yield liberating outcomes.
 3. Building of a welfare state: In a decentralized federal setup, redistributive policies could be structurally thwarted by organized (small and dominant) groups. Instead, a centralized federal set-up can prevent such issues and further a universal rights-based system.
 4. Alleviation of inter-regional economic inequality: Provincial interventions seemed to exacerbate inequalities. India's membership in the International Labour Organization, the Nehru Report (1928), and the Bombay Plan (1944) pushed for a centralized system to foster socio-economic rights and safeguards for the working and entrepreneurial classes.
 5. Linguistic reorganization: It would not have been possible if India followed a rigid or conventional federal system. In other words, the current form of federalism in the Indian context is largely a function of the intent of the government of the day and the objectives it seeks to achieve.
- From the above, it is clear that India has deviated from the traditional federal systems like the USA and incorporated a large number of unitary features, tilting the balance of power in favor of the Centre.
 - Hence K C Wheare described the constitution of India as "quasi-federal".

Road ahead

- The majoritarian tendencies sometimes are subverting the unique and indigenised set-up into an asymmetrical one.
- Inter alia, delayed disbursement of resources and tax proceeds, bias towards electorally unfavourable States, evasion of accountability, imposition of language, weakening institutions, proliferation of political ideologies all signal towards the diminishing of India's plurality or regionalisation of the nation.
- While it would be safe to argue that our federal set-up is a conscious choice, its furthering or undoing, will depend on the collective will of the citizenry and the representatives they vote to power.

Another Model for Inflation Control

Recently, **the Monetary Policy Committee** has announced its primary focus on inflation or the "inflation targeting". Keeping the high inflationary pressure into consideration, the Reserve Bank of India (RBI) has raised the policy repo rate in order to ensure price stability. The wholesale price inflation has been in the double digits for over 12 months. The consumer price index (CPI) has breached the Reserve Bank of India (RBI)'s upper target of 6%.

Inflation targeting

Inflation targeting is based on the idea that inflation is the result of "overheating" of the economy. It reflects an **excess of output** over its 'natural' level.

Therefore, the central bank raised the **interest rate** or 'repo rate' to control inflation. It is the rate at which the central bank lends to commercial banks. It induces firms to stay their **investment plans**, and focus on **reducing inventories**, and lowering production.

This ensures the contraction of the output takes to the natural level of output (i.e., optimal level). This may lead to a decline in inflation. It ensures full employment and freely functioning labour market.

Issues in inflation targeting in India.

India's **official model of inflation control** is based on **unscientific** a foundation. The Indian model is based on the idea to achieve "**natural level of output**". However, it is a **theoretical** and unobservable phenomenon. The **RBI report of 2014** did not mention any empirical validity of this model of inflation.

India's model is based on the idea that inflation is driven by **agricultural goods prices**.

Therefore, the production and supply of agricultural goods should be increased. This would cause the Indian economy to expand without inflation. However, whenever there is **surplus agricultural production**, the government procures food grains at the highest price. This leads to inflation.

The growing per capita income in India has shifted the **average consumption basket** towards foods rich in minerals, such as fruits and vegetables, and protein, such as milk and meat. But the expansion of the supply of these foods has been lower than the growth in demand for them.

Therefore, the RBI's present move of increasing the repo rate is not an efficient solution for an **agricultural price-driven inflation**.

Road ahead

Monetary policy can control inflation by curbing the growth of **non-agricultural output**. This would in turn lower the growth of demand for agricultural goods. As the demand for agricultural goods slows, so will inflation.

There should be a focus to increase the **supply** of food other than rice and wheat like **fruits, vegetables, milk** and **meat**.

The government should work hard towards increasing **agricultural productivity** and thereby increasing agricultural production and supply.

RBI's sudden repo rate hike and What does this mean?.

The RBI had sounded a note of caution in its April policy meeting stating that price stability will henceforth take precedence over growth as consumer inflation surged as a consequence of the Russia-Ukraine conflict. March CPI inflation of 6.95 per cent was much above the upper limit of RBI's tolerance band. With global prices of fuels as well as other commodities remaining high through April 2022, it is likely that CPI reading

April will also be quite high. RBI has been behind the curve, waiting for inflation to cool over the past months, even as other central banks have been hiking rates. This has led to the fairly large 40 bps hike in repo rate.

The other reason that seems to have prompted RBI's move is the impending Federal Open Market Committee decision. US Federal Reserve has begun its rate hike cycle in March 2022 and is expected to hike the Federal Fund rate rather aggressively, by at least 50 basis points this week. If the RBI fails to act now, the spread in the sovereign bond yields of India and US will narrow resulting in accelerated foreign capital outflows. FPIs have already pulled out close to ₹14,000 crore from Indian debt since February 2022.

Many in the market are also of the opinion that the RBI may have stayed its hand due to the LIC IPO that is currently open. The central bank may not have wanted to roil stock markets with a rate hike ahead of the IPO.

Why has it raised CRR too?

Excessive liquidity in the system results in higher inflation and the RBI has been trying to suck out liquidity through various tools in the previous policies. The hike in CRR by 50 basis points is yet another move towards this end. The central bank has stated that ₹87,000 crore of liquidity will be withdrawn through this move.

What does this mean for borrowers and depositors?

Interest rates on loans will begin moving higher with the RBI making a decisive hike in repo rate. Many banks including SBI, Axis Bank and Bank of Baroda had increased MCLR over the last few days, making rates of all loans more expensive. MCLR will undergo further upward revision with this move.

The repo rate hike is however a good news for savers who have been witnessing negative real interest rates on their investment. With returns on saving products such as bank and NBFC deposits and small saving schemes, fixed income investors will benefit. Those holding sovereign and corporate bonds will however see erosion in value as yields increase.

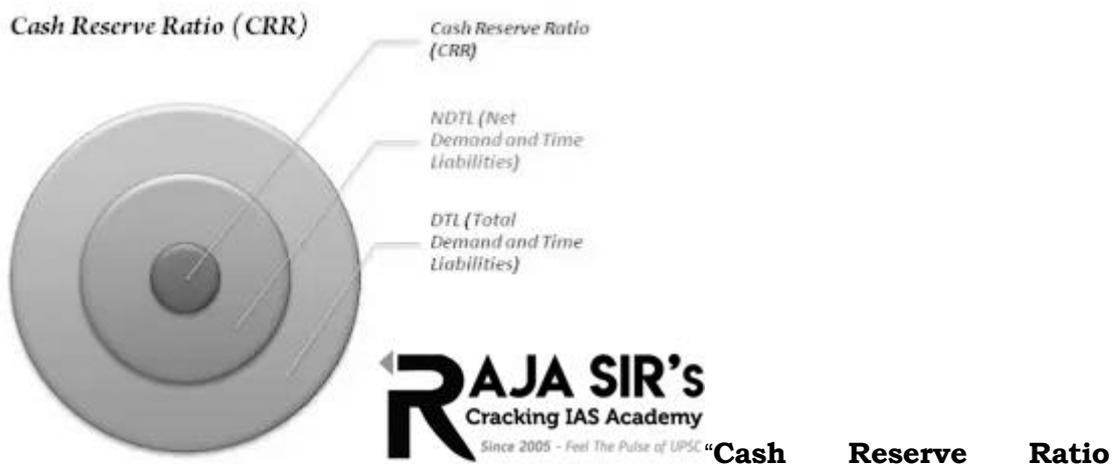
Will this rate hike smother the nascent recovery in Indian economy?

This will definitely impact consumer demand for houses, consumer durables and other discretionary items. With credit to the large companies and industries just beginning to revive, the rate hike could slow down credit growth to industry too. But over the longer-term, price stability will play an important role in supporting demand.

If RBI is so worried about inflation, why is it retaining the 'accommodative' stance when it comes to monetary policy?

The RBI cannot afford to go towards aggressive monetary tightening like other advanced economies because the economy is not completely out of the woods yet. While there are signs of mild revival in investment cycle, private consumption is yet to move strongly above pre-pandemic level. External risks from the ongoing geopolitical tensions, high commodity prices and slow-down in China threaten growth forcing RBI to continue with its accommodative policy.

What is CRR?



(CRR) refers to the certain proportion of Net Demand and Time Liability (NDTL) of the commercial banks which has to be reserved in the form of cash (liquid asset) under the supervision of RBI as per **Section 42 of the RBI Act**

In other words, RBI has mandated that every commercial bank must keep a specific part of its net deposits in form of cash to avoid the shortage of cash and to control the supply of money in the economy.

The value of CRR is **4%** right now however it can be adjusted any time by RBI. In case any commercial bank defaults to maintain CRR a penalty of **3% above Bank Rate** will

be imposed. Also, this penalty will be increased to **5% above Bank Rate** if the banks will continue defaulting succeeding working days.

DTL and NDTL:

NDTL refers to the net cash available in a bank for the distribution of credit to its customers, this means total cash deposits of commercial banks excluding banker cheques, other bank's deposits, subsidy etc.

DTL (Demand and Time Liabilities) is the total deposits (Liabilities) such as saving account deposits, current account deposits, time deposits (fixed deposits) and recurring deposits during the specified time period.

Objectives of Cash Reserve Ratio:

CRR is one of the most important components of the monetary policy of the Reserve Bank of India. The main objectives of CRR are as follows.

- CRR control the supply of money in the market.
- CRR facilitates to avoid the circumstances of a cash crunch.
- CRR facilitates in maintaining the rate of inflation in the economy.

How does Cash Reserve Ratio work?

Suppose State Bank of India has Net Demand and Time Liabilities is Rs 1000 crores and CRR is 4% which is mandated by RBI. Therefore, Rs 40 crores will be reserved in the form of cash with RBI and hence Rs 960 crore is available for the disbursement of loans.

Now if RBI needs to increase the supply of money in the market, it reduces the cash reserve ratio. Therefore, the amount of distributable cash will be more and thus it leads to a higher rate of inflation.

Conversely, if RBI needs to decrease the inflation rate in the country, simply it would increase the cash reserve ratio. Therefore, the creditable cash will be less and it decreases the supply of money in the market. Thus the rate of inflation goes down.

In this way, RBI regulates the supply of money and hence control the rate of inflation in India.

Cash Reserve Ratio vs Statutory Liquid Ratio:

Although both CRR and SLR are regulated by the Reserve Bank of India and have the same objective yet there are few differences between them.

- CRR is regulated under section 42 of the RBI Act 1934 whereas SLR is regulated by the Banking Regulation Act.
- CRR has to maintain in form of cash only whereas SLR could be maintained in the form of gold, RBI approved securities and cash as well.
- In the case of CRR, commercial banks neither get interested nor may invest in the financial market, on the other hand in case of SLR commercial banks do earn incentives as well.
- The main objective of CRR is to control inflation and to protect from cash crunch whereas Statutory liquidity ratio's objective is to control the bank's leverage.

What is Roe vs Wade case?

Recently, a leak by political journalism company Politico has revealed that, the US Supreme Court has decided to overturn *Roe v. Wade, 1973* the court's landmark 1973 judgment that made abortion a constitutional right.



Roe v. Wade Judgment

- In 1973, in the landmark **Roe vs Wade judgment**, the Supreme Court of the United States made the **right to abortion a constitutional right**, establishing a benchmark for **abortion laws across the world**.
- In this case, the US Supreme Court struck down laws that **made abortion illegal in several states and** ruled that abortion would be allowed up to the **point of foetal viability**, that is, **the time after which a foetus can survive outside the womb**.

- Foetal viability was around **28 weeks (7 months)** at the time of the **Roe judgment**, experts now agree that advances in medicine have brought the threshold down to **23 or 24 weeks (6 months or a little less)**.
- Foetal viability is often seen as the point at which the **rights of the woman can be separated from the rights of the unborn fetus**.
- Abortion laws across the world rely on this metric but those **opposing abortions argue that this is an arbitrary timeframe** that legislation and the court in Roe adopted.

Debate Regarding Abortion

- The abortion debate is the ongoing controversy **surrounding the moral, legal, and religious status of induced abortion**.
- In many western countries, the sides involved in the debate are the self-described "**pro-choice**" and "**pro-life**" movements.
- Pro-choice emphasizes the **woman's choice whether to terminate a pregnancy**.
- On the contrary, the pro-life position **stresses the humanity of both the mother and fetus**, arguing that a fetus is a human person deserving of legal protection.
- Each movement has, with varying results, **sought to influence public opinion and to attain legal support for its position**.
- Many people believe that abortion is **essentially a moral issue**, concerning the beginning of **human personhood, rights of the fetus, and bodily integrity**.

Present case

- The current case pertains to challenging the **Mississippi law on abortion**.
- In 2018, the state of **Mississippi banned most abortions after 15 weeks** – much before fetal viability, and sooner than was allowed by Roe – throwing a direct challenge to the **1973 judgment**.
- In 2019, "**heartbeat**" **abortion law** was passed in Mississippi, an even more restrictive measure that banned most abortions once fetal cardiac activity could be detected – which is about six weeks.
- The **heartbeat law** said that physicians who performed an **abortion after a fetal heartbeat** was detected could have their medical licenses revoked.
- The law made **no exceptions for pregnancies caused by rape or incest**.
- This law too was blocked by a district judge, and in **February 2020, the 5th Circuit Court of Appeals in New Orleans agreed with the decision**.

Impact of the Judgement

- Since there is **no federal law** protecting the right to abortion in the US, the overturning of Roe **would leave abortion laws entirely up to the states.**
- In essence, in overlooking the checks and balances of **Roe vs Wade and in disabling personal agency**, the matter will no longer be set within the **paradigm of women's rights.**
- It is also likely to impact the **larger framework of human rights, tilting it away from the poor and the voice-less.**

Abortion Laws in India

- Under the **Indian Penal Code, 1860**, abortion remains a criminal offence under **Section 312.**
- However, the **Medical Termination of Pregnancy Act, 1971 (MTP)** And its amendment simply provides an exception to the criminalization.
- The MTP Act, 1971 allows **abortion until 20 weeks of pregnancy.**
- Through an amendment in 2021, the **ceiling for abortions was raised to 24 weeks**, but only for special categories of pregnant women such as **rape or incest survivors, that too, with the approval of two registered doctors.**
- In the case of fetal disability, **there is no limit to the timeline for abortion**, but that is allowed by a medical board of specialist doctors set up by the governments of states and union territories.

The Internet Splintering in Russia-Ukraine war

- **In 2001**, when the **internet was staring at a slew of regulations** from across the **globe**, **Clyde Wayne Crews**, a researcher at libertarian think-tank Cato Institute, proposed the idea of '**splinternet**' – an **internet splintered into disparate realms** controlled by **different dispensations or powers.**

The **fundamental proposal** was to have **more internet** instead of **having more regulations.**

- Over the **past two decades**, a **splintering of the internet has occurred** in some limited ways. China's '**Great Firewall**' keeps American tech giants out while pushing

online services developed indigenously. Russia, in 2019, passed the **sovereign internet law** – or the **online Iron Curtain** – that enabled the country to disconnect its internet from the rest of the world.

The splintering

- Crews may have been ahead of his time in **propounding a splinternet**. But the events of the past four weeks pose the **first serious challenge** to the way the internet has evolved into a **global system of interconnected computer networks** that use the **Internet Protocol suite (TCP/IP)** to communicate between networks and devices.

Splintering is the idea of splitting the internet into disparate realms controlled by different dispensations or powers. This internet is controlled by autonomous political groups or any other controlling powers—such as tech or e-commerce companies or countries with diverging national interests tied to nationalism or religion. The internet normally allows people unlimited access to virtually everything. While the splinternet limits citizen to access to data, force to keep businesses within the borders and even changes the operation within a state.

- However **dystopian the idea** may have seemed over these years, Russia's invasion of Ukraine does seem as a potential trigger for a splintered internet. **France's digital affairs** envoy Henri Verdier, in an interview to Bloomberg News, recently stated that the combination of Moscow's increasing online censorship attempts, combined with Ukraine's repeated calls for Russia to be taken offline, and could potentially offer the trigger for the eventual "**fragmentation of the internet.**"
- "**Will the unique, neutral, multi-stakeholder, free internet survive this crisis?**" Verdier asked. "I'm not sure."
- The **internet is essentially a global network of physical cables**, which can include **copper telephone wires, TV cables, and fiber optic cables**, alongside wireless connections such as **Wi-Fi** and **3G/4G** that leverage the physical cables to hook users and devices on to the internet. **Countries hook on to global web services** via undersea cables or nodes that are connection points through which data is transmitted to and from other countries' communication networks. The **concept of the splinternet** envisages **blocks or regulation of these connections points.**

- **Viability barrier**
- Can Russia, or China, **simply create a parallel or alternative system** that will be viable? There are already experiments of **government-managed walled gardens** that are taking shape.
- **In Iran**, for instance, a project called the **National Information Network (NIN)** – also known as **National Internet in Iran** – has been initiated by the state-owned Telecommunication Company of Iran. The Supreme Council of Cyberspace of Iran defines the NIN as “**a network based on the Internet Protocol with switches and routers and data centers** which allows for data requests to avoid being routed outside of the country and provides secure and private intranet networks”.
- China's '**Great Firewall**', also known as '**The Golden Shield Project**', is another experiment on these lines. It was initiated by the Ministry of Public Security division of the Chinese government in 1998. The focus of this project is **to monitor and censor what can and cannot be seen through an online network in China**, and is continually improving in restriction techniques through various methods. It blocks access to many foreign internet services, which in turn helps domestic tech giants, such as Baidu, to spread their reach.
- Like **Baidu**, Russia already have tech champions such as **Yandex** and **Mail.Ru**. But unlike their Chinese counterparts, Russians have been able to access global tech platforms such as Facebook, Twitter and Google, albeit some censorship.
- But in the years since its **invasion of Crimea**, Moscow has been proactively working on its **segregated internet project**. The country plans to create its own Wikipedia, and Russian legislators have passed a law that bans the sale of smartphones that do not have **pre-installed Russian software**.
- Much of these provisions and restrictions on western platforms is being done through a “**sovereign internet law**” enacted by Moscow in 2019, that allows Roskomnadzor – a state owned communications player – to regulate internet access in the country and potentially cut its online ties to the rest of the world.
- As sanctions tightened, Moscow said it had decided **to block Facebook** in retaliation to restrictions slapped by it on Russian media outlets.
- **India**, too, is understood to be working on a **new cybersecurity** and **data governance framework** amid the continued “**weaponisation**” of the internet by **Big Tech**

platforms during the **Russia-Ukraine conflict**, that put into focus the sweeping powers of social media platforms.

- The groundwork and **sandboxing for a splintered Indian internet** has ostensibly been happening over the last few years. Just last year, Union ministers and political leaders from the ruling BJP put their weight behind the **microblogging app Koo** – it was at the same time New Delhi was in a kerfuffle with Twitter.

What are the problems with splintering?

- So far, **state-sponsored cyber-warfare**, despite stray instances, has been a scattered occurrence. This has mainly been possible because of diplomatic involvement of countries and jurisdictions in **maintaining cyber-relations**. The **splinternet** could put a spanner in these works.
- According to **Verdier**, any move by Russia to move toward an independent internet “would have severe consequences”, including the **temptation by countries** to launch **cyberattacks** as they would be insulated from the impact.
- “Today if I break the Russian internet, probably I will break my own internet, because it’s the same,” Verdier told Bloomberg, arguing the shared nature of the **World Wide Web** protected all users from losing service.
- US President Joe Biden has already warned that Russia is considering attacks on critical infrastructure. “**Based on evolving intelligence**, Russia might be planning a cyber attack against us,” Biden said at a press conference on 21 March 2022. “The magnitude of **Russia’s cyber capacity** is fairly consequential and it’s coming.”
- Moscow has categorically denied these accusations. “The Russian Federation, unlike many western countries, including the **United States**, does not engage in state-level banditry,” Kremlin spokesman Dmitry Peskov said Tuesday.
- **Case for a splinternet**
- Crews had argued two decades ago that “**warfare on the digital commons invites more regulation and adds** to a deteriorating and antiquated internet”. He had written that **splintering the internet** would not only increase the options but also protect the

rights of internet users, “which depend so critically on the institution of private property”.

- It is also notable how a project for **Bitcoin** – a **cryptocurrency developed in the aftermath of the 2008 financial crisis** with the fundamental driver being lack of trust in a centralised authority – has evolved and culminated into propagation of Web 3.0, which is a reimagined and decentralised form of an open, trustless, and permissionless internet, or perhaps, another splinter in the existing internet.

How to prove genocide, the most serious war crime?

- War crimes are defined as serious violations of humanitarian laws during a conflict.
- The definition, established by the **Rome Statute of the ICC**, is derived from the **1949 Geneva Conventions**.
- It is based on the idea that individuals can be held liable for the **actions of a state or its military**.
- The **taking of hostages, willful killings, torture or inhuman treatment of prisoners of war, and forcing children to fight** are some of the more obvious examples.

Geneva Conventions (1949)

- The **Geneva Conventions (1949) and their Additional Protocols** are international treaties that contain the most important rules limiting the barbarity of war.
- They protect people who **do not take part in the fighting (civilians, medics, aid workers) and those who can no longer fight** (wounded, sick and shipwrecked troops, prisoners of war).
- The **first Geneva Convention** protects wounded and sick soldiers on land during war.
- The **second Geneva Convention** protects wounded, sick and shipwrecked military personnel at sea during war.
- The **third Geneva Convention** applies to **prisoners of war**.
- The **fourth Geneva Convention** affords protection to civilians, including in occupied territory.
- **India** is a party to the **Geneva Convention**.

Criteria for War Crimes

- **Criteria:** To decide whether an individual or a military has committed a war crime, international humanitarian law lays down **three principles**:
- **Distinction:** It is **illegal to target** objectives that are “expected to cause incidental loss of **civilian life**, injury to civilians, damage to civilian objectives, which would be excessive in relation to the concrete and direct military advantage anticipated.
- **Proportionality:** Proportionality prohibits armies from responding to an attack with excessive violence.
- **For example:** If a soldier is killed, for example, you cannot bomb an entire city in retaliation.
- **Precaution:** It requires parties to a conflict to avoid or minimise the harm done to the civilian population.
- **Gray Area in Definition:** Raids on a cities or villages, bombing residential buildings or schools, and even the killing of groups of civilians do not necessarily amount to war crimes – not if their military necessity is justified.
- The same act can become a war crime if it **results in unnecessary destruction, suffering and casualties that exceed the military gain** from the attack.
- Further, Civilian and military populations have become increasingly hard to distinguish

War Crimes .vs. Crimes Against Humanity

- The **United Nations Office on Genocide Prevention and the Responsibility to Protect (or Genocide convention)** separates war crimes from genocide and crimes against humanity.
- War crimes are defined as occurring in a domestic conflict or a war between two states.
- While genocide and **crimes against humanity** can happen in peacetime or during the unilateral aggression of a military towards a group of unarmed people.

International Criminal Court

It is a **permanent judicial body created by the 1998 Rome Statute** of the ICC (its founding and governing document), and began functioning on **1st July 2002** when the Statute came into force.

Headquarter: The Hague, Netherlands

Members:

123 nations are States Parties to the Rome Statute and recognise the ICC's authority.

The **USA, China, Russia, and India are not the members.**

The forum was established as a court of **last resort to prosecute offences that would otherwise go unpunished**, and has jurisdiction over four main crimes: genocide, crimes against humanity, war crimes, and the crime of aggression.

Genocide - The most serious war crime

Washington and Kyiv are accusing **Russia of genocide in Ukraine**, but the ultimate **war crime has a strict legal definition** and has rarely been proven in court since it was cemented in **humanitarian law** after the Holocaust.

The **1948 Genocide Convention** defines genocide as crimes committed "**with intent to destroy, in whole or in part**, a national, ethnical, racial or religious group, as such."

Three cases so far have met **international courts' threshold**: the **Cambodian Khmer Rouge's slaughter of minority Cham people and Vietnamese in the 1970s**, who were among an estimated 1.7 million dead; the **1994 mass killing of Tutsis in Rwanda** that left 800,000 dead; and the **1995 Srebrenica massacre** of some 8,000 Muslim men and boys in Bosnia.

Criminal acts comprising **genocide include killing members of the group**, causing them serious bodily or mental harm, creating conditions calculated to destroy them, preventing births, or forcibly transferring children to other groups.

What must prosecutors do to prove genocide?

To establish genocide, prosecutors must first show that **the victims were part of a distinct national, ethnic, racial or religious group**. This excludes groups targeted for political beliefs.

Genocide is harder to show than other violations of international humanitarian law, such as **war crimes** and **crimes against humanity**, because it requires evidence of specific intent.

“Genocide is a difficult crime to prove. Parties have to bring a lot to the table,” said Melanie O'Brien, president of the International Association of Genocide Scholars. She cited the combined requirement of showing intent, the targeting of a protected group, and crimes like killings or forcibly removing children.

The **International Criminal Court** opened an investigation into alleged **war crimes** and **crimes against humanity** in Ukraine in February. It also has jurisdiction over genocide.

Ukrainian prosecutors, already investigating alleged **Russian crimes** since the **2014 annexation of Crimea**, said they have identified thousands of potential war crimes by Russian forces since Feb. 24 and compiled a list of hundreds of suspects.

Who is accusing Russia?

Ukrainian President **Volodymyr Zelenskiy** and **US President Joe Biden** have both accused Russian soldiers of genocide, focusing on evidence of rape, torture and killings in areas around Kyiv recaptured this month by Ukrainian troops.

“Yes, I called it genocide because it has become clearer and clearer that (Russian President Vladimir) Putin is just trying to wipe out the idea of being able to be Ukrainian and the evidence is mounting,” Biden said.

British Prime Minister Boris Johnson said that the scale of atrocities “doesn’t look far short of genocide.”

Moscow, which called the attack against its smaller neighbour “**a special operation**” to halt genocide against Russian speakers in Ukraine, says the **West has faked evidence to smear its army**.

The US administration has declared **seven situations genocide** since the 1990s: **Bosnia, Rwanda, Iraq, Sudan’s Darfur province, Islamic State’s killings** including against the Yezidi, the crackdown on Rohingya Muslims in Myanmar and the treatment of Uyghur Muslims in China.

What cases are happening now?

The **International Criminal Court** previously issued an arrest warrant on charges of genocide against former Sudanese President Omar al-Bashir, but his trial cannot begin until he is in custody in The Hague.

The **International Court of Justice** also has **jurisdiction over the Genocide Convention**, the **first human rights treaty adopted by the U.N. General Assembly in 1948**, stating the international community's commitment to prevent the atrocities of World War Two from ever happening again.

It is hearing two cases: **one claiming Myanmar committed genocide against Rohingya Muslims**, the other **brought by Ukraine to argue that Russia is using accusations of genocide** as a false pretext for invasion. Such cases generally take years to reach a verdict.

Past cases

The **International Criminal Tribunal for Rwanda** convicted dozens of senior officials, all of them Hutus, of genocide against Tutsis.

When former Rwandan Mayor Jean-Paul Akayesu was found guilty of the crime in 1998, the **court became the first international tribunal to interpret the definition of genocide** set forth in the **1948 Genocide Convention**.

In 2018, a **hybrid U.N.-Cambodian tribunal** found two leaders of Cambodia's Khmer Rouge guilty of genocide following years of debate about whether the **"Killing Fields"** constituted genocide. The judges ruled that the **Khmer Rouge** had a policy to target Cham and Vietnamese people to create **"an atheistic and homogenous society"**.

The **International Criminal Tribunal** for the former Yugoslavia convicted several key figures of genocide for their roles in the Srebrenica killings during the **Balkan wars of the 1990s**. They include wartime Bosnian Serb military commander Ratko Mladic and Bosnian Serb political leader Radovan Karadzic. Former Yugoslav President Slobodan Milosevic died in custody before his genocide trial concluded.

What is parboiled rice, and why does the Centre want to stop purchasing it?

Recently, Telangana Chief Minister **K Chandrashekar Rao** and members of his Cabinet staged a dharna at Telangana House, demanding a **uniform paddy procurement policy**. The protest came after the Centre said it was stopping the purchase of excess **parboiled rice**, of which **Telangana is a major producer**. The Centre has said demand is low and it cannot waste money on buying the excess quantity of parboiled rice.

What is parboiled rice?

The dictionary meaning of '**parboil**' is '**partly cooked by boiling**'. Thus, the expression parboiled rice refers to rice that **has been partially boiled at the paddy stage**, before milling. Parboiling of rice is not a new practice, and has been followed in India since ancient times. However, **there is no specific definition of parboiled rice** of the **Food Corporation of India** or the **Food Ministry**.

Today, there are several processes for parboiling rice. For example, the **Central Food Technological Research Institute (CFTRI)**, Mysuru, uses a method in which the paddy is **soaked in hot water for three hours**, in contrast to the more common method in which **paddy is soaked for 8 hours**. The water is then drained and the paddy steamed for 20 minutes. Also, the **paddy is dried in the shade** in the method used by the CFTRI, but is **sun-dried in the common method**.

The **Paddy Processing Research Centre (PPRC)**, Thanjavur follows a method known as the **chromate soaking process**. It uses **chromate**, a family of salt in which the anion contains both **chromium and oxygen**, which removes the odour from the wet rice.

All processes generally involve **three stages—soaking, steaming and drying**. After passing through these stages, the **paddy goes for milling**.

Are all rice varieties suitable for parboiling?

Generally, **all varieties can be processed into parboiled rice**, but it is ideal to use **long slender varieties** to prevent breakage during milling. However, **aromatic varieties should not be parboiled** because the process can make **it can lose its aroma**.

What are the benefits?

There are several benefits. For example, **parboiling makes rice tougher**. This reduces the **chances of the rice kernel breaking during milling**. Parboiling also **increases the nutrient value of the rice**. Third, parboiled rice has a **higher resistance to insects and fungi**.

However, parboiling comes with some disadvantages too. The rice becomes **darker and may smell unpleasant** due to prolonged soaking. Besides, setting up a parboiling rice milling unit requires a **higher investment than a raw rice milling unit**.

How much is the stock of parboiled rice in the country?

According to the **Food Ministry**, the total stock of parboiled rice is **40.58 lakh metric tonnes (LMT)** as on 1 April 2022. Out of this, the **highest stock is in Telangana** at 16.52 LMT, followed by Tamil Nadu (12.09 LMT) and Kerala (3 LMT). The stock was in the range 0.04-2.92 LMT in 10 other states –Andhra Pradesh, Chhattisgarh, Odisha, Jharkhand, West Bengal, Karnataka, **Bihar**, Punjab and Haryana.

The Centre will **procure 1.36 LMT of parboiled rice from Telangana** for the Kharif Market Season (KMS) of 2020-21. For the ongoing KMS 2021-22, the Centre expects to procure 5.82 LMT parboiled rice from only two states–Jharkhand (3.74LM) and Odisha (2.08 LMT). From the other 10 rice-producing states, including Telangana, the Ministry has no plan to procure parboiled rice. In the coming days, the total parboiled rice stock will increase to 47.76 LMT.

How high is the demand?

The **Food Ministry** pegs the **parboiled rice demand at 20 LMT per annum** for distribution under the **National Food Security Act, 2013**. According to the Ministry, the demand for parboiled rice has come down in recent years.

In the last few years, production in **parboiled rice-consuming states** such as **Jharkhand, Kerala** and **Tamil Nadu** has increased, resulting in less movement to the deficit states.

Earlier, the **Food Corporation of India (FCI)** used to procure parboiled rice from states such as Telangana to supply to these states. But in recent years, **parboiled rice**

production has increased in these states. So, the Ministry says, the current stock of parboiled rice is sufficient to meet the demand for the next two years.

What has been the pattern of procurement from Telangana?

Telangana has been the major supplier so far. Data available with the Food Ministry shows that the FCI procured 25.62 LMT of par-boiled rice from Telangana during both seasons – kharif and rabi – in 2020-21. The quantity was even higher in 2019-20, at 44.71 LMT.

Strengthening death penalty standards

While **hearing death sentence appeals** since September 2021, the **Supreme Court** has repeatedly **expressed concern over the manner** in which trial courts and High Courts have carried out sentencing with very little (relevant) information.

While the Bench headed by **Justice L Nageswara Rao** has commuted death sentences citing errors committed by courts below, the Bench headed by **Justice U U Lalit** has called for reports from **probation officers**, prison superintendents, and independent mental health experts in an attempt to correct the errors. The Bench headed by Justice Lalit agreed to **comprehensively examine procedures in death penalty cases** to ensure that judges who have to choose between life imprisonment and the death sentence have comprehensive sentencing information.

What has caused the SC to examine practices in death penalty sentencing?

The court is undertaking an exercise **to reform the procedures** by which information necessary in a **death penalty case** is brought before courts. In so doing, the Supreme Court is acknowledging concerns with the manner in which **death penalty sentencing is being carried out**. While the death penalty has been held to be constitutional, the manner in which it has been administered has triggered accusations of unfairness and arbitrariness.

How are judges supposed to choose between life and death sentences?

In May 1980, when the Supreme Court upheld **the constitutional validity of the death penalty in Bachan Singh's case**, a framework was developed for future judges to follow when they had to choose **between life imprisonment and the death penalty**. At the heart of that framework was the recognition that the legislature in

the **Criminal Procedure Code** had made it clear that life imprisonment would be the default punishment and judges would need to give “**special reasons**” if they wanted to impose the death sentence. Through the **1980 framework** – popularly but inaccurately known as the “**rarest of rare**” framework – the Supreme Court said that judges must consider both aggravating and mitigating factors concerning the crime and the accused when deciding if the death penalty is to be imposed.

The judgment also made it clear that **life imprisonment as a sentence would have to be “unquestionably foreclosed”** before judges imposed the death sentence. There was an indicative list of factors that the judgment identified as being relevant, but it was clear that it was not meant to be an exhaustive list.

What has happened to this framework in the four decades since Bachan Singh?

The Supreme Court has **repeatedly lamented the inconsistency** in application of the **Bachan Singh framework**. Similar concerns have been expressed by the **Law Commission of India (262nd Report)**. One of the main concerns has been the crime-centred approach to sentencing, often in violation of the mandate in Bachan Singh that factors relating to both the crime and the accused have to be considered. **There has been widespread concern** that the imposition of death sentences has been arbitrary. A study by **Project 39A** looking at **15 years of death penalty sentencing** in trial courts has shown that the **Bachan Singh framework** has broken down, with judges attributing to it multiple and inconsistent meanings. A study of the **595 death sentences imposed** in the last five years shows that this concern is intensifying.

What is the reason for this?

One of the main reasons is that very sparse sentencing information about the accused is brought before the judges. While the judgment in Bachan Singh did develop a framework, it was a framework that depended on the relevant information brought before the court. But the framework did not have any mechanisms to ensure the **actual collection of such information** and its presentation before judges.

This has resulted in a situation where there is barely **any meaningful information** about the accused that enters the sentencing process. It is an empirical reality that the vast **majority of death row prisoners** is economically vulnerable and

very often receive poor legal representation (see **Project 39A's Death Penalty India Report 2016**). As a result, they do not have access to professionals and experts with the necessary training and skill sets to undertake the complex exercise of collecting mitigation information.

Also, **sentencing judges** have often dismissed the consideration of mitigating factors depending on their perception of the crime despite there being no basis in the law for dismissing the relevance of such factors. **It points to a deeper gap** – that there has been **no real guidance on how judges must go** about assigning weight to aggravating and mitigating factors, and how they should approach weighing one factor against another.

What is mitigation, and what are mitigating factors?

A **criminal trial has two stages** – the **guilt stage** and the **sentencing stage**. Sentencing happens after the accused has been found guilty of the crime; this is the stage where **punishment is determined**. Therefore, anything presented or said during sentencing cannot be used to reverse or change the finding of guilt.

It is a **fundamental tenet of criminal law** that sentencing must be individualised, i.e, in the process of determining punishment, the judge must take into account **individual circumstances of the accused**. It speaks to a very intuitive sense of justice that all our decisions and actions result from a complex interplay of various factors concerning our lives, and the emphasis is that such interplay is different for each individual.

The idea of mitigation is to give **practical application** to considerations of **culpability and deservedness** that are crucial to the moral idea of punishment. **Justice would be an incomplete idea** if criminal law was incapable of considering an individual in all their complexity and the various factors that contributed to a set of decisions and actions in their lives.

Who can collect all this information?

The Supreme Court has recognised that it is important to collect this complex interplay of information sentencing is to be done in a proper manner. The judgments in **Santa Singh (1976)** and **Mohd Mannan (2019)** have recognised the interdisciplinary nature

of such an exercise, and that it requires professionals other than lawyers to collect such information.

The task is not something lawyers are trained to do – that is the reason the American Bar Association's 2003 Guidelines for the Appointment and Performance of Defence Counsel in Death Penalty recognises the role of a mitigation specialist with a clearly defined role that goes beyond what lawyers can do.

Is this practical in India's justice system?

There must be a **very high degree of fairness in a system** that is interested in subjecting individuals to the experience of death row, and ultimately taking lives through the instrumentality of law. With that as the starting point, the criminal justice system needs to do all it can to ensure that systems are created for procedural fairness. The question we need to start with is: **“What does fairness and individualised justice require in death penalty cases?”** We cannot start by asking the **“practicality”** question and then define the requirements of fairness/ individualised justice accordingly.

Can procedural reforms address the broader concerns with the death penalty?

Justice Harry Blackmun who served on the **United States Supreme Court for 24 years (1970-94)** started out being a strong votary of the death penalty, and was part of decisions to restore the death penalty in the US. For most of his time on the Bench, Justice Blackmun tried to bring in procedural reforms to make the American death penalty system fairer.

But ultimately, in his last year in the court, he declared that efforts to reform the death penalty had failed, and that it was impossible to achieve the required fairness. “I no longer shall tinker with the machinery of death,” he famously declared.

The paths of reforming the death penalty on the one hand and **abolishing it on the other**, go alongside each other for a very long distance. Every instance of engagement on reforming the death penalty throws light on the inherent unfairness of using the death penalty, especially in a system like ours.

Sri Lanka economic crisis

- Recently, **Inflation in Sri-Lanka has soared past 17%. People** are dying while waiting in queues for **fuel, and authorities are scrapping school exams after running out of dollars to import paper and ink.**
- Sri Lanka is going through its **worst economic crisis since its Independence.**
 1. Driven out by **hunger and loss of jobs, people from the island nation** are seeking refuge in India, which is doing its best to help the neighbouring country.
 2. Despite continuous helping hands from India, the situation is not improving in Sri Lanka. **The ripples of the economic crisis** are now being **felt in India too.**
- **India has extended financial assistance to the tune of \$2.4 billion in the last three months to Sri Lanka:**
 1. A \$400 million RBI **currency swap**
 2. Deferral of a **\$500 million loan**
 3. **A \$1.5-billion credit line** for importing fuel, food and medicines.
- Besides the **International Monetary Fund Bailout**, the southern neighbour also has **sought credit support of \$2.5 billion from China.**
- **The island has been facing severe power cuts and double-digit inflation,** which hit double digits since the beginning of the year.
- **The Sri Lankan central bank allowed the local currency to devalue by 30% in a month to enhance exports.**
- **The crisis has been mainly caused by a shortage of foreign exchange reserves.** They have plummeted 70% in two years to just \$2 billion at the end of February, which can barely cover two months of imports. Meanwhile, the country has **foreign debt obligations of about \$7 billion this year.**

Reasons

1. **The forex crisis is the result of several factors:**

- **Tourism, which is the country's third-largest foreign exchange earner, came to a virtual halt** after the 2019 Easter Sunday suicide bombings which killed more than 250 people. Tourist arrivals dropped by as much as 70%.
- **The Covid-19 pandemic brought a severe blow to the tourism industry.** And remittances from foreign workers, which is the nation's biggest source of dollars, slumped 22.7% to \$5.5 billion in 2021.
- **The country's heavy dependence on imports for essential goods** like sugar, pharmaceuticals, fuel, pulses and cereals worsened the crisis.

2. **Sudden shift to "Organic Farming":**

- **The government's ban on chemical fertilizers** last April as it looked to become the first country to fully adopt organic farming backfired.
- A survey showed that 90% of Sri Lanka's farmers used chemical fertilisers for cultivation.
- **The move led to a drastic drop in domestic food production,** pushing up food prices.
- **The decision was rolled back after months of mass protests** by farmers but the damage was done. Food inflation soared to 25.7% in February.

3. **Low Industrial production:** Garment factories and tea estates could not function, as Covid-19 raged in clusters. Thousands of Sri Lankan labourers in West Asian countries were left stranded and returned jobless.

4. **Policy Failures of Government:**

- **Food hoarding** : The government declared emergency regulations for the distribution of essential food items. It put wide import restrictions to save dollars which in turn led to consequent market irregularities and reported hoarding.
- **Continuous borrowing** : Fears of a sovereign default rose by the end of 2021, with the country's foreign reserves plummeting to \$1.6 billion, and deadlines for repaying external loans looming.

Impact of the Sri-Lankan crisis

1. **Transshipment nature of Sri-Lankan ports:**

- Thousands of containers sent from India to Sri Lanka, including for its own consumption as well as trans-shipment cargo, have been lying uncleared at Colombo port as authorities can't economically afford to transfer containers between terminals.
- **India also relies considerably on Colombo port for global trade given it is a transshipment hub.**
- 60% of India's trans-shipment cargo is handled by the port. India-linked cargo, in turn, accounts for 70% of the port's total trans-shipment volume.

2. **Relations deterioration with India impacting Lankan Tourism and Investment:**

- **India has traditionally been among Sri Lanka's largest trade partners.** Prior to the pandemic, India was the top tourism source for Sri Lanka.
- **More than one-fifth of Sri Lanka's total imports come from India.**
- **India is also one of the largest contributors to Foreign Direct Investment in Sri Lanka.** FDI from India amounted to about \$1.7 billion from 2005 to 2019.
- **The main investments from India** are in the areas of petroleum retail, tourism and hotel, manufacturing, real estate, telecommunication, banking and financial services.
- **A number of leading companies from India have invested and established** their presence in Sri Lanka. These include Indian Oil, Airtel, Taj Hotels, Dabur, Ashok Leyland, Tata Communications, Asian Paints, SBI and ICICI Bank.

3. **Sri-Lankan geopolitical location in Indian Ocean :**

- **A predatory bond between Sri Lanka and China** will threaten India's interest in the Indian Ocean.
- **Sri-Lanka economic crisis can change into refugee crisis**, if it leads to polarisation between different communities.
- **The Food scarcity, unemployment crisis and communal politics** are breeding grounds for fundamentalism and extremism.

4. **India's assistance being viewed in Sri Lanka very sceptically:**

- The leadership has thanked India for the timely assistance, but there is growing scepticism in Sri Lankan media and some sections, over Indian assistance **"being tied" to New Delhi inking key infrastructure projects.**

- They mainly include the **strategic Trincomalee Oil Tank Farm project, the National Thermal Power Corporation's recent agreement with Ceylon Electricity Board to set up a solar power plant in Sampur, with investment from India's Adani Group.**
- Lankan media accuses New Delhi of resorting to **"diplomatic blackmail"**. The political opposition has accused the **Adani Group of entering Sri Lanka through the "back door", avoiding competitive bids and due process.**

Road ahead

- **Measures for Sri Lanka:** The government should take **measures for economic recovery** of the country **as soon as the shortage of certain essential commodities ends**, which is expected before the start of the Sinhala-Tamil New Year (in mid-April).
- The government should also **join hands with the Tamil political leadership to create a roadmap for the economic development** of the war-affected northern and eastern provinces, among the areas badly hit by the current crisis.
- It would be best to **raise domestic tax revenue and shrink government expenditure to limit borrowing, particularly sovereign** borrowing from external sources.
- Tough measures should be taken for **restructuring the administration of concessions** and subsidies.
- **India's Assistance:** It would be completely unwise for India to let the Chinese take over expanding chunks of Sri Lankan territory. India must **offer Sri Lanka financial help, policy advice and investment from Indian entrepreneurs.**
- Indian businesses must **build supply chains** that intertwine the Indian and Sri Lankan economies in goods and services ranging from the export of tea to information technology services.
- India, rather than any other nation, should **help steer Sri Lanka towards realising its potential**, to reap the rewards of a **stable, friendly neighbourhood.**

Sri Lanka requests IMF for rapid financial aid

The IMF's main lending instruments are:

- **Stand-By Arrangement (SBA):** Described by the IMF as its 'workhorse', the SBA is intended for emerging and advanced market economies to address short-term or potential balance of payments problems. It typically covers a period of 12-24 months, but no more than 36 months, and repayments are due within three-to-five years.
- **Standby Credit Facility (SCF):** Similar in purpose to the SBA, this instrument is used to address short-term or potential balance of payments problems, but intended for low-income countries under the PRGT. SCF has a repayment grace period of four years and a final maturity of eight years.
- **Extended Fund Facility (EFF):** The EFF is designed for emerging and advanced market economies with longer-term balance of payments problems, where impediments to growth are considered structural. EFFs are typically approved for three years but may be extended. Repayments are due within four-to-ten years.
- **Extended Credit Facility (ECF):** The ECF is the equivalent to the EFF for low-income countries and falls under the PRGT. It is designed to address medium-to-long-term structural issues. ECFs are also provided initially for three years but may be extended up to five years and include a five-year grace period, with a maturity of ten years.
- **Rapid Financing Instrument (RFI):** The RFI provides rapid financial assistance to countries with urgent balance of payments needs. RFIs can be used for a range of urgent needs, like natural disasters, conflicts and commodity price shocks, and should be repaid within three and a quarter to five years.
- **Rapid Credit Facility (RCF):** The RCF, as is the case with the RFI, is designed for rapid financial assistance during crises, but serves low-income countries under the PRGT, and carries a grace period of five years and final maturity of ten years. Unlike other facilities, RCFs and RFIs are provided in one outright loan disbursement, meaning no conventional conditionality needs to be met during the programme prior to disbursements. However, as countries still have to provide a letter of intent to the IMF detailing their planned economic

response to the crisis, to which the IMF must agree, RCF and RFI have nonetheless been considered to include *de facto* conditionality. In response to Covid-19, the IMF doubled how much countries can borrow under the RCF and RFI.

- **Flexible Credit Line (FCL):** The FCL is designed for countries that the IMF deems to have strong policy frameworks and track records in economic performance that are in an immediate cash crunch - but want to avoid the stigma and adverse market reaction associated with regular IMF programmes with conditionality. The FCL therefore does not involve ongoing conditions and functions as a one-to-two year renewable credit line. Five countries have used the FCL so far (Chile, Colombia, Mexico, Peru and Poland). Repayment is required over a three-to-five-year period.
- **Precautionary and Liquidity Line (PLL):** The PLL is designed to meet the liquidity needs of countries with economic frameworks that the IMF deems sound, but with remaining problems that preclude them from using the FCL. Only the Republic of North Macedonia and Morocco have used the PLL so far.
- **Catastrophe Containment and Relief Trust (CCRT):** The CCRT is different from the instruments above because it allows the IMF to provide grants, rather than loans, to the poorest countries in the form of debt relief. It was designed in 2015 during the Ebola outbreak to provide relief during catastrophic natural or public health disasters and free up resources to meet exceptional balance of payments needs. In 2020, its eligibility criteria were relaxed in response to Covid-19 and the instrument was initially approved for 25 eligible countries.
- **Policy Support Instrument (PSI):** Finally, the IMF offers a facility to low income countries under the PRGT that involves no financing whatsoever. The PSI was designed to give low-income countries a 'tool' that enables them to secure IMF advice without financial assistance, with the intention of signalling confidence to donors, creditors and the general public that they are supported by the IMF. PSIs last between one and five years and cannot be used in conjunction with an ECF.
- **Preventing Illegal Refuge:** The state of Tamil Nadu has already started feeling the impact of the crisis with the **reported arrival of 16 persons from Sri Lanka through illegal means.**

- Tamil Nadu was home to nearly three lakh refugees after the **anti-Tamil pogrom of 1983**.
- The authorities, both in India and Sri Lanka, should **ensure that the present crisis is not used to step up smuggling activities** and trafficking or whip up emotions in both countries.
- **Crisis as an Opportunity:** Neither Sri Lanka nor India can afford to have strained ties. As a much larger country, the **onus is on India**, it needs to be extremely patient and engage Sri Lanka even more regularly and closely.
- There is also a need to **step up our people-centric developmental activities** while scrupulously staying clear of any interference in Colombo's domestic affairs.
- The crisis should be used as an opportunity for New Delhi and Colombo to thrash out a **solution to the Palk Bay fisheries dispute** - a longstanding irritant in bilateral ties.

Raja Ravi Varma - An artist of the royals

Often referred to as the **father of modern Indian art**, **Raja Ravi Varma** is widely known for his **realistic portrayal of Indian gods and goddesses**. While he majorly painted for the royalty, he is also credited for **taking art to the masses** with his **prints and oleographs**. On 6 April 2022, one of his significant paintings, **Draupadi Vastraharan**, will be going under the hammer for the first time. Estimated to fetch between Rs 15 and Rs 20 crore, the canvas depicts the disrobing of Draupadi in a scene from the Mahabharata. We take a look at what helped shape Varma's art and how he finally took it to the masses.

Formative years and influences

Raja Ravi Varma was born in **April 1848 in Kilimanoor, Kerala**, to a family which was **very close to the royals of Travancore**. At a young age, he would draw animals and everyday scenes on the walls in indigenous colours made from natural materials such as leaves, flowers and soil. His uncle, Raja Raja Varma, noticed this and encouraged his talent. **Patronised by Ayilyam Thirunal**, the then **ruler of Travancore**, he learnt watercolour painting from the royal painter Ramaswamy Naidu, and later trained in oil painting from Dutch artist Theodore Jensen.

How he became an artist of the royals

Varma became a **much sought-after artist for the aristocrats** and was commissioned several portraits in late 19th century. Arguably, at one point, he became so popular that the **Kilimanoor Palace in Kerala opened a post office** due to the sheer number of painting requests that would come in for him. He travelled across India extensively, for work and inspiration.

Following a portrait of **Maharaja Sayajirao of Baroda**, he was commissioned **14 Puranic paintings for the Durbar Hall** of the new Lakshmi Vilas Palace at Baroda. Depicting Indian culture, Varma borrowed from episodes of Mahabharata and Ramayana for the same. He also received patronage from numerous other rulers, including the Maharaja of Mysore and Maharaja of Udaipur.

As his popularity soared, the artist **won an award for an exhibition of his paintings at Vienna in 1873**. He was also awarded three gold medals at the **World's Columbian Exposition in Chicago in 1893**.

Who were his protagonists?

Believed to have made more than **7,000 paintings before his death at the age of 58** in 1906, Varma combined European realism with Indian sensibilities. While he travelled to find his subjects, painting the Indian royals and aristocrats, his inspiration came from varied sources – from **Indian literature to dance drama**. Much of his celebrated art also borrows heavily from **Indian mythology**. In fact, he is often credited with defining the **images of Indian gods and goddesses** through his relatable and more realistic portrayals often painted with humans as models. The depictions include **Lakshmi as the goddess of wealth, Saraswati as the goddess of knowledge and wisdom**, and **Lord Vishnu with his consorts, Maya and Lakshmi**.

How he took Indian art to the masses

Raja Ravi Varma aspired to take **his art to the masses** and the intent led him to open a **Lithographic Press in Bombay in 1894**. The idea, reportedly, came from Sir T Madhava Rao, former Dewan of Travancore and later Baroda, in a letter where he pointed out to Varma that since it was impossible for him to meet the large demand

for his work, it would be ideal for him to send some of his select works to Europe and have them produced as oleographs. Varma, instead, chose to establish a printing press of his own. The **first picture printed at Varma's press** was reportedly The Birth of Shakuntala, followed by numerous mythological figures and saints such as **Adi Shankaracharya**.

In 1901, Ravi Varma sold the printing press to a **German lithographer**, Fritz Schleicher, who continued to manufacture the lithographs. The popularity of the prints, in fact, continued till modern times, with Varma's style acting as inspiration for artists who illustrated the popular comic book series **Amar Chitra Katha**.

De-notified, Nomadic and Semi-nomadic Tribes

A **standing committee of Parliament**, tabled last week, has **criticised the functioning of the development programme** for **denotified, nomadic and semi-nomadic tribes**.

These are communities who are the **most vulnerable and deprived**. **Denotified tribes (DNTs)** are communities that were '**notified**' as being '**born criminal**' during the British regime under a series of laws starting with the **Criminal Tribes Act of 1871**. **Nomadic and semi-nomadic communities** are defined as those **who move from one place to another** rather than **living at one place all the time**.

A **National Commission for De-notified, Nomadic and Semi-Nomadic Tribes (NCDNT)** was constituted in 2006 by the then government. It was headed by **Balkrishna Sidram Renke** and submitted its report in June 2008, in which it said, "It is an irony that **these tribes somehow escaped the attention of our Constitution makers** and thus got deprived of the Constitutional support unlike Scheduled Castes and Scheduled Tribes."

The **Renke commission** estimated their population at **around 10.74 crore** based on Census 2001. A new Commission constituted in **February 2014** to prepare a state-wise list, which submitted its report on 8 January 2018, identified **1,262 communities as de-notified**, nomadic and semi-nomadic.

While a number of these tribes are categorised under **SC, ST and OBC**, many are not. The standing committee report in Parliament has cited a statement by the Secretary,

Department of Social Justice and Empowerment, that **269 DNT communities are not covered under any reserved categories.**

These communities are frequently left out because they are less visible and difficult to reach.

What is the standing committee report about?

The **Standing Committee on Social Justice and Empowerment**, headed by BJP Lok Sabha MP Rama Devi, tabled its 31st report in Parliament in first week of April 2022.

The report said the "Committee are constrained to note that the **Scheme for economic empowerment of DNT communities** formulated to provide coaching, health insurance, facilitate livelihood and financial assistance for construction of homes for the members of DNT, with total outlays of Rs 200 crore for the period of five years from 2021-22 to 2025-26 and the Department could not spend even a **single rupee in 2021-22** and the budgetary allocation has been reduced to Rs 28 crore for 2022-23 against the budgetary allocation of Rs 50 crore for 2021-22. The Committee are dismayed that the Department has already delayed in formulation of the Scheme for welfare of **Denotified, Nomadic and Semi Nomadic communities.**"

About the functioning of the **Development and Welfare Board for De-notified, Nomadic and Semi-Nomadic Communities (DWBDNC)**, the standing committee said:

"At present **269 such Denotified, Nomadic and Semi-Nomadic communities** are specified and a survey is now in under process to place these castes in **SC, ST and BC categories**. The Committee are surprised to find that the Department has not been able to take any decision till date hence they would like the Department to take necessary action in this regard so that these castes are placed either under SCs, STs or BCs and avail benefits."

What is DWBDNC, and what is its role?

The commission report submitted in 2018 had recommended the **setting of up a permanent commission** for these communities. But since **most DNTs** are covered under **SC, ST or OBC**, the government felt setting up a permanent commission, which would deal with redress of grievances, would be in conflict with the mandate of **existing commissions for SCs** (National Commission for Scheduled Castes), **STs** (**National Commission for Scheduled Tribes**) and **OBCs** (**National Commission for**

Backward Classes). The government therefore set up the DWBDNCs under the Societies Registration Act, 1860 under the aegis of Ministry of Social Justice and Empowerment for the purpose of implementing welfare programmes.

The **DWBDNC was constituted on 21 February 2019** under the chairmanship of Bhiku Ramji Idate. Also, a committee has been set up by the **NITI Aayog** to complete the process of identification of the **de-notified, nomadic and semi-nomadic communities (DNCs)**. Ethnographic studies of DNCs are being conducted by the Anthropological Survey of India, with a budget of Rs 2.26 crore sanctioned. On 30 March 2022 the DoPT issued an advertisement for the recruitment of consultants in the DWBDNC.

What is the history of deprivation faced by these communities?

This has a long history, **first during colonial rule**, and then in independent India. The **Renke Commission** said this is partly because these communities are largely politically 'quiet' – they do not place their demands concretely before the government for they lack vocal leadership and also lack the patronage of a national leader.

Many commissions and committees constituted since Independence have referred to the problems of these communities. These include the **Criminal Tribes Inquiry Committee, 1947** constituted in the **United Provinces (now Uttar Pradesh)**, **Ananthasayanam Ayyangar Committee in 1949** (it was based on the report of this committee the Criminal Tribes Act was repealed), and **Kaka Kalelkar Commission** (also called first OBC Commission) **constituted in 1953**. In 1965, an Advisory Committee constituted for **revision of the SC and ST list** under the chairmanship of **B N Lokur** referred to denotified tribes. The **B P Mandal Commission** constituted in 1980 also made some recommendations on the issue.

The National Commission to Review the Working of the Constitution under the chairmanship of **Justice M N Venkatachaliah**, said in its 2002 report that: "The denotified tribes/communities have been wrongly stigmatized as crime prone and subjected to high handed treatment as well as exploitation by the representatives of law and order as well as by the general society."

Earth Day 2022 - 'Invest In Our Planet'

Earth Day, celebrated annually on 22 April, is a reminder to **protect the environment, restore damaged ecosystems** and **live a more sustainable life**. First celebrated in **1970**, this year marks its 52nd anniversary.

What is Earth Day?

Earth Day has been **celebrated since 1970**. It was first observed in the **United States**, when some 20 million people **took to the streets to protest** against the 1969 **Santa Barbara oil spill**. Since then, the occasion has played an important role in raising awareness on other environmental issues.

In fact, the **landmark Paris Agreement**, which was signed by **nearly 200 countries** to set a common target to **reduce global greenhouse emissions**, was signed on **Earth Day in 2016**.

According to earthday.org, the **world's largest recruiter to the environmental movement**, the mission is to "**diversify, educate and activate the environmental movement worldwide**". In 2009, the **United Nations designated April 22** as '**International Mother Earth Day**'.

According to the UN, **International Mother Earth Day** is celebrated as a reminder that the Earth and its ecosystems provide us with **life and sustenance**. "**The healthier our ecosystems are, the healthier the planet** - and its people. Restoring our damaged ecosystems will help to **end poverty, combat climate change** and **prevent mass extinction**. But we will only succeed if everyone plays a part," the UN states.

What is the importance of Earth Day?

We have been seeing a **spurt of climate events** over the last decade or more that have affected millions of people, from **extreme heat to wildfires and floods**. The Covid-19 pandemic, the UN says, is also linked the health of our ecosystem.

"**Climate change, man-made changes** to nature as well as crimes that disrupt biodiversity, such as **deforestation, land-use change, intensified agriculture** and **livestock production** or the growing illegal wildlife trade, can accelerate the speed of destruction of the planet," the UN states.

What is this year's focus?

This year, earthday.org has selected the theme, '**Invest In Our Planet**'. It explains, "This is the moment to change it all – the **business climate**, the **political climate**, and how we take action on climate. Now is the time for the unstoppable courage to preserve and protect our health, our families, our livelihoods... together, we must **Invest In Our Planet**." It also warns that time is short.

Can climate change be solved by pricing carbon?

As **climate change bakes the planet**, dozens of nations and many local governments are putting a **price tag on greenhouse gas emissions** that are increasing **flooding, droughts** and other costly catastrophes.

Pennsylvania on 23 April 2022 became the **first major fossil fuel-producing state** in the US to adopt a **carbon pricing policy** to address climate change. It joins 11 states where **coal, oil and natural gas power plants** must buy credits for every ton of carbon dioxide they emit.

President Joe Biden is attempting a less direct approach – known as the **social cost of carbon** – that calculates future climate damages to justify tougher restrictions on polluting industries. Republicans say that could crush many businesses. They want the US Supreme Court to stop the administration after **lower courts in Louisiana** and Missouri split on the issue.

Governments elsewhere have moved more aggressively. **Canada**, for example, **imposes fuel charges on individuals** and also makes big polluters pay for emissions. It's **one of 27 nations** with some kind of carbon tax, according to The World Bank.

The **varied strategies** come as scientists warn climate change is accelerating – and all can help reduce emissions. But experts say U.S. efforts have been hobbled by its fractured approach.

"Part of the reason you need all of these things to work in tandem is we do not have a federal climate policy," said Seth Blumsack, director of the **Center for Energy Law**

and Policy at Penn State University. “We have **social cost of carbon** used in regulatory decisions but not (a carbon price) that is faced by the market.”

So what's the price tag?

It varies. A lot.

The Biden administration's **social cost estimate is about \$51**, meaning **every ton of carbon dioxide spewed from a power plant** or tailpipe today is projected to contribute to **\$51 in economic damages in coming years**. The state of New York has its own social cost of carbon, updated in 2020 to **\$125 a ton** to account for economic trends.

By contrast, **emissions were most recently valued at \$13.50 per ton** at auction under the **Regional Greenhouse Gas Initiative** in the Northeast, which Pennsylvania is joining. A similar “**cap and trade**” emissions program is in place in California, and one is due to go into effect in Washington State in 2023.

Canada's carbon taxes include a minimum fuel charge for individual's equivalent to about **\$40 per ton**.

Why the big differences?

The **social cost of carbon** attempts to capture the value of all climate damage, centuries into the future. **Carbon pricing** reflects **how much companies are willing to pay today** for a limited amount of emission credits offered at auction.

In other words, the **social cost of carbon guides policy**, while carbon pricing represents policy in practice.

“You're trying to get the price to reflect the true cost to society,” said economist Matthew Kotchen, a former U.S. Treasury Department official now at Yale University.

“A more stringent policy would have a higher carbon price. A more lax policy would give you a lower carbon price.”

In the most efficient world, economists say the two figures would line up, meaning there would be agreement about what climate change damages will cost and the policies used to address them.

Is any of this working?

Emissions from northeastern states would have been **about 24% higher** if the carbon pricing consortium hadn't been in place, according to researchers from Duke University and the Colorado School of Mines.

The **carbon auctions** also have brought in **almost \$5 billion** that can be used to reduce household energy cost increases and promote renewable energy.

The **consortium began in 2009** – the year of a failed push in Congress to establish a nationwide cap and trade program. The bipartisan proposal died amid arguments over cost and whether climate change was even occurring.

Following lawsuits from environmentalists, President Barack Obama's administration crafted the **social cost of carbon** and began including future damage estimates in **cost-benefit analyses for new regulations**. It was used under Obama more than 80 times, including for tightened vehicle emissions standards and regulations aimed at shuttering coal plants.

President Donald Trump moved to **roll back many of the Obama-era rules** – and to help justify the changes, the Republican administration cut the **social cost of carbon** from about **\$50 per ton to \$7 or less**. The lower number included only domestic climate impacts and not global damages.

“On its face that might sound okay, but when you think about it, global harms from climate change have implications in the U.S. in terms of the **global financial system**,” said Romany Webb, a climate change law expert at Columbia Law School.

What's next?

On the day Biden took office, he set up an interagency group that revived the Obama estimate and promised a revised figure incorporating previously overlooked **consequences of climate change**. Many economists expect the revised figure to be higher, perhaps more than double the current \$51.

Without a nationwide cap and trade program, environmentalists and some economists want the government to be more aggressive in using the **social cost of carbon** to overhaul government energy policy.

Under Biden, the U.S. Interior Department for the first time is applying climate damage considerations to oil and gas sales on public lands and waters. An upcoming lease sale in Wyoming, for example, could result in future emissions of **34 million tons (31 million metric tons) of carbon dioxide**. That's equivalent to more than \$1.5 billion in future damages.

But the agency still plans to sell the leases because officials said there were no **"established thresholds"** to evaluate whether the increased emissions were acceptable, or not.

The expansion of **carbon pricing into Pennsylvania** remains tenuous. A legal challenge is pending and the state's term-limited Democratic governor could soon be replaced by a successor who opposes the state's participation.

"While pricing carbon would be the gold standard, it seems politically difficult to actually get there," said Brian Prest with Resources for the Future, a Washington, D.C.-based research organization.

Ritonavir-Boosted Nirmatrelvir (Paxlovid)

On 22 April 2022, the **World Health Organisation (WHO)** said **Pfizer's oral antiviral drug Paxlovid** was "strongly recommended" for **patients with non-severe Covid-19** who are at highest risk of developing severe disease and hospitalisation, such as **unvaccinated, older, or immunosuppressed patients**.

The recommendation was based on new data from **two randomised controlled trials** involving 3,078 patients. The data show that the risk of hospitalisation was reduced by **85%** following this treatment, the WHO said in a statement. In a high-risk group (over 10% risk of hospitalisation), that meant **84 fewer hospitalisations per 1,000 patients**.

The drug

Paxlovid consists of **nirmatrelvir tablets and ritonavir tablets**, co-packaged for oral use. It was given **emergency use authorisation (EUA)** by the USFDA in December last year.

Nirmatrelvir inhibits a viral enzyme called **protease** that is necessary for the virus to **replicate itself inside the host cell**. Ritonavir slows down the breakdown of nirmatrelvir in order to help it remain in the body for longer at higher concentrations. A drug like **nirmatrelvir** is considered to have an advantage over vaccines because it attacks vulnerability in the virus that **does not mutate like spike proteins** – which vaccines target – do. As a result, the medication is seen to be effective against all variants. (The Omicron wave showed that in a very large number of cases, vaccines are unable to prevent infection, even though they do prevent serious illness and deaths.)

Even before the WHO's latest endorsement, **Paxlovid was seen as a wonder drug** that presented a dramatic new advantage in the battle against the coronavirus. A second oral Covid-19 drug, **molnupiravir**, manufactured by Merck and Ridgeback, too received FDA authorisation in December last year, but showed a somewhat lower efficacy in clinical trials.

Paxlovid is administered as three tablets – two of nirmatrelvir and one of ritonavir – taken together orally twice daily for five days, that is, a total of 30 tablets.

The USFDA authorised Paxlovid for use only up to five consecutive days.

The **EUA for Paxlovid** was based on clinical data that showed a reduced risk of hospitalisation or death by 89 per cent within three days of the onset of symptoms, and 88 per cent within five days of the onset of symptoms, compared to the placebo group.

The **European Medicines Agency (EMA)** issued advice that **Paxlovid can be used to treat adults with Covid-19** who do not require supplemental oxygen and who are at increased risk of progressing to severe disease.

Generic versions

On 16 November last year, Pfizer had announced it had signed a **voluntary licence agreement for Paxlovid** that would facilitate the production and distribution of the drug by granting sub-licences to qualified **generic medicine** manufacturers.

Pfizer's licensing agreement with the United Nations-backed public health organisation **Medicines Patent Pool (MPP)** was intended to enable the supply of the medicines to 95 low- and middle-income countries including India, comprising approximately 53% of the world's population.

It was announced at the time that **Pfizer would not receive royalties on sales in low-income countries**, and that royalties would be waived on sales in all countries covered by the agreement for as long as Covid-19 remained classified as a **Public Health Emergency of International Concern** by WHO.

Subsequently, on 17 March this year, the MPP announced that it had signed agreements with 35 companies to manufacture the **generic version of nirmatrelvir**, which in combination with a low dose of ritonavir can be supplied in 95 low- and middle-income countries. **Six companies will produce the drug substance**, nine will produce the drug product, and the rest will do both, the MPP said in a release.

The companies are located, besides **India**, in **Bangladesh, Brazil, China, Dominican Republic, Jordan**, Israel, Mexico, Pakistan, Serbia, Republic of Korea, and Vietnam.

The MPP, founded by the **Geneva-based Unitaaid**, works to increase access to, and facilitate the development of, life-saving medicines for low- and middle-income countries. MPP partners with civil society, governments, international organisations, industry, patient groups, and other stakeholders to prioritise and license needed medicines and **pool intellectual property** to encourage generic manufacture and the development of new formulations.

Drug in India

Nineteen of the 35 companies with which the MPP has signed sub-licensing agreements are Indian, and they include drugmakers such as **Bengaluru-based Biocon Ltd; Mumbai-based Glenmark Pharmaceuticals, Sun Pharmaceuticals**, and Cipla; Ahmedabad headquartered Torrent Pharmaceuticals and Cadila Pharmaceuticals; Hetero Drugs and Laurus Labs of Hyderabad; and Emcure Pharmaceuticals of Pune.

It was reported earlier this week that Hetero's drug could be available at chemists' very soon, but no confirmation was available.

In its 22 April 2022 statement, WHO said it was “**extremely concerned**” that **low- and middle-income countries** could be pushed to the “**end of the queue**” while accessing Paxlovid treatment – in the same way these countries had suffered when it came to the supply of Covid-19 vaccines. It said that Pfizer's licensing agreement with the MPP limited the number of countries that can benefit from generic production of the medicine.

Push in the US

The Biden administration is aiming to **expand access to oral antiviral treatments** like **Paxlovid** by doubling the number of locations at which they are available, the White House said on 26 April 2022.

Currently, **pharmacies were dependent on states** to obtain the pills. The government sends the treatments to select pharmacies, as well as directly to states and community centres. Under the current system, the treatments are available in around 20,000 locations.

The administration now expects to increase their direct distribution to over 30,000 locations and **reach 40,000 sites over the coming weeks**, quoting an official.

Demand for Paxlovid has been unexpectedly light due to complicated eligibility requirements, **reduced testing**, and potential for drug interactions. The US has agreed to **buy up to 20 million pills at around \$530 a course**, and Pfizer is on pace to produce 3.5 million courses earmarked for US use by the end of April.

Near Field Communication (NFC) technology

Near Field Communications (NFC) is a short-range wireless technology that allows mobile devices to actively *interact with passive physical objects and other active mobile devices*, connecting the physical world to mobile services in ways that empower and benefit users. A term “Tap ‘n Go” is also used for this, because it clearly conveys a visual image in which this technology is intended to be used.

NFC builds upon Radio-Frequency Identification (RFID) and contactless smartcard technologies that enable stored data to be actively “read” at a short distance.

RFID is a powerful enabling technology that is being applied in an astonishing range of applications and uses, from supply chain management and product inventory control to identity authentication and access control. However, as RFID technologies become widely deployed, the possibility of unwanted identification, tracking and surveillance may increase, as may the likelihood of data interception, "cloning" and misuse.

NFC technology addresses some of the security and privacy concerns of RFID by restricting the physical separation of NFC devices and tags to a close proximity. Additionally, NFC includes specific reference use cases, additional technical specifications and usage profile specifications for existing standards. In the most-common use case scenarios, users' mobile devices will scan, acquire and act upon the data available in posters and kiosks, connect and exchange data with other devices, emulate RFID tag readers to read and act on scannable coupons, vouchers, tickets and emulate a contactless card to act as a loyalty, access, or payment card. NFC builds upon the proven strengths of RFID "remote identification" technologies while addressing many of the security and privacy risks.

NFC has potential to become an extensively used system for making payments in the near future. NFC technology is being added to a growing number of mobile handsets to enable mobile payments, as well as many other applications.

Need for NFC

Though contactless or proximity cards are already around, their reach isn't very vast and bringing NFC to mobiles and other similar platforms will definitely up the usage.

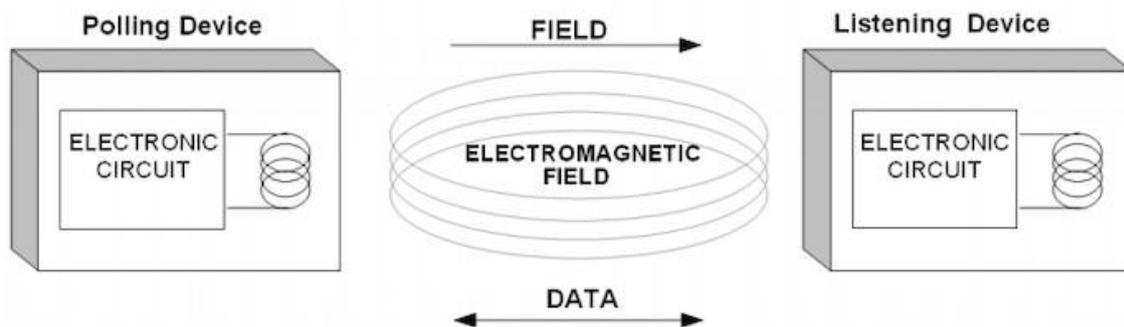
The essence of NFC is short-range wireless communication that is both safe and effective. *The maximum distance is about 20cms, which ensures that no unauthorized communication takes place. It scores over various shortcomings of Bluetooth such as high power consumption and security concerns. This form of communications also works when one of the devices is not powered.*

NFC-enabled Smartphone have the potential to replace credit cards. This is because NFC phones pack a smart chip - a complex 80-character code that is really hard to crack. Such a device can safely store confidential credit card details and be handy for purchases on the go.

Since all NFC transactions take place within a very small area, anywhere from a touch to 4 centimeters. *This means that you can't unknowingly purchase something because you walk next to a smart poster.*

NFC cannot be labeled a 'new' technology, as Nokia has been active in this line since 2004. Along with Philips and Sony, it has founded the NFC Forum. Participation of 130 countries in this forum clearly signals that NFC is set become a way of life in the years to come.

Working

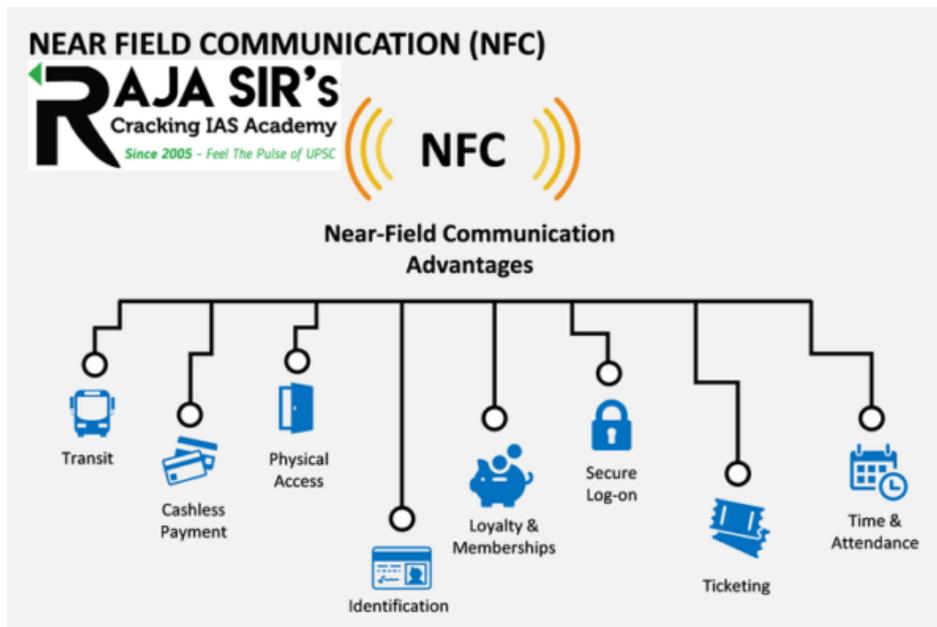


Near Field Communication is based on inductive-coupling, where loosely coupled inductive circuits share power and data over a distance of a few centimeters. NFC devices share the basic technology with proximity (13.56MHz) RFID tags and contactless smartcards, but have a number of key new features. Any device, a cell phone, a camera or a watch, can be equipped with an NFC 'initiator', *which is simply an antenna that can store data.* If the device is an NFC Smartphone, the 'initiator' and 'target' (an NFC reader) need to be up close for data exchange to happen. The 'reader' is attached to a point-of-sale (PoS) terminal or cash-register in a retail store that accepts NFC payments. A simple wave of the phone can pay for a purchase.

Alternatively, two NFC phones can be tapped lightly to exchange business cards.

In standby mode, a well-designed NFC solution does not consume any power. And since transactions happen in seconds, the power drain is not huge.

Applications



Emerging NFC standards allow users to transfer information by touching devices.

Social networking

- NFC simplifies and expands social networking options:
- File Sharing, sharing e-Business Cards, sharing e-Money, mobile gaming, Social Networking Sites etc.
- Bluetooth and Wi-Fi Connections
- NFC can be used to initiate higher speed wireless connections for expanded content sharing.

e-Commerce

- NFC expands e-Commerce opportunities, increases transaction speed and accuracy, while reducing staffing requirements.

Identity documents

- NFC's short range helps keep encrypted identity documents private.
- ID card: An NFC enabled device can also act as an encrypted student, employee, or personal ID card or medical ID card.
- Keycard: An NFC enabled device may serve as car, house, and office keys.
- Rental Car and hotel keys: NFC rental car or hotel room keys may allow fast VIP check-in and reduce staffing requirements.
- NFC can be deployed in ticketing services, rural banking, interactive and targeted advertising, healthcare, hospitality, libraries and pharmacies. In fact, an NFC phone could become the single-key to access to your car, home and office.

How is NFC different from or related to other wireless/RF technologies?

Near Field Communication (NFC) is a standards-based, short-range (a few centimeters) wireless connectivity technology that enables simple and safe two-way interactions between electronic devices, allowing consumers to perform contactless transactions, access digital content, and connect electronic devices with a single touch.

Bluetooth wireless technology was designed to replace cables between cell phones, laptops, and other computing and communication devices within a 10-meter range.

Wi-Fi technology was designed and optimized for Local Area Networks (LAN); it provides an extension or replacement of wired networks for dozens of computing devices within a +100-meter range.

ZigBee wireless technology is a standard enabling control and monitoring capabilities for industrial and residential applications within a +100-meter range.

IrDA is a short range (< 1 meter), line-of-sight communication standard for exchange of data over infrared light. IrDA interfaces are frequently used in computers and mobile phones.

RFID (Radio Frequency Identification) is an automatic identification method, relying on storing and remotely retrieving data using devices called RFID tags. An RFID tag is a small object that can be attached to or incorporated into a product. RFID tags contain silicon chips to enable them to receive and respond to queries from an RFID reader/writer.

Contactless smart cards incorporate a chip (microprocessor) that communicates with a card reader through RFID technology. Examples of contactless smart card communications are ISO/IEC 14443 and FeliCa, which allow communications at distances up to 10 cm.

NFC *v/s* *Bluetooth*

NFC and Bluetooth are both short-range communication technologies which are integrated into mobile phones.

Parameter	NFC	Bluetooth
Operation Speed	Slower	Faster
Power Consumption	Less	More
Device-Pairing	Not Needed	Needed

Set Up Time	< 0.1 seconds. Faster than Bluetooth (Standard: < 6 seconds) but Slower than Bluetooth (Low Energy: 0.006 seconds).	
Connection b/w Devices	Automatically established and quickly	Has to be manually Established
Data Transfer Rate	Maximum 424 kbits/sec (Slower)	For V2.1: Max 2.1 Mbits/Sec (Faster)
Power Requirement	< 15mA. Comparatively low power. But NFC power consumption is greater than that of Bluetooth V4.0 Low Energy, this is because illuminating the passive tag needs extra power	< 15 mA. Comparatively Higher (Varies with Class)
Can work with Un-Powered Device	Yes	No
Frequency	13.56 MHz (Lower)	2.4-2.5 GHz (Higher)
Range	< 0.2 m. Shorter: Max. 20 cm. Helps as reduces the likelihood of unwanted interception making NFC particularly suitable for crowded areas where correlating a signal with its transmitting physical device (and by extension, its user) becomes difficult.	~10 m (class 2)
Cryptography	not with RFID	available
Network Type	Point-to-point	WPAN

Network Standard	ISO 13157 etc	IEEE 802.15.1
Standardization body	ISO/IEC	Bluetooth SIG
RFID compatible	ISO 18000-3	active

NFC-enabled device versus NFC tag

An NFC-enabled device can operate in reader/writer and peer-to-peer mode, and may operate in card emulation mode. An NFC tag is typically a passive device (for example, integrated in a smart poster) that stores data that can be read by an NFC-enabled device. A card and a tag are technically the same. However, contactless cards used in ticketing and payment today include additional technology to store secure data.

Neptune Cruise Missile

Recently, Ukraine claimed that it has damaged the **Russian Black Sea Fleet Flagship 'Moskva' by Neptune Anti-Ship Cruise Missiles.**

Neptune

- The Neptune is a coastal **anti-ship cruise missile** that is capable of the **destruction of naval vessels in a range of 300 km.**
- The Missile system was inducted into the **Ukrainian Defence Forces in March 2021** after being in development for six years.

Ukraine's anti-ship weapons

<p>Neptune missile launched from mobile land vehicles</p> <p>Origin country: Ukraine Entered service: 2021 Length: 5 m Diameter: 0.38 m Weight: 870 kg Range: up to 280 km</p>		<p>Harpoon missile launched from land, ships, submarines, aircraft</p> <p>Origin country: US Entered service: 1977 Length: 4.6 m Diameter: 0.34 m Weight: 690.8 kg Range: up to 124 km</p>	
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- The cruise missile was developed in haste by the military as the Russian threat to the coastal areas of Ukraine was growing rapidly since the **occupation of Crimea in 2014**.
- The design of this missile is based on a **Russian Kh-35** cruise missile which goes by the **North Atlantic Treaty Organization (NATO) name of AS-20 Kayak**.
- The cruise missile attack was **carried out using TB-2 drones** as decoys along with other measures toward saturation of the cruiser's **Air Defence systems**.

Moskva

- Moskva is a **guided missile cruiser** of the Russian Navy named after the city of Moscow.
- A cruiser is a **large surface warship** built for high speed and great cruising radius, capable of not only defending its own fleet and coastlines but also threatening those of the enemy.
- The Moskva was originally commissioned as the Slava in **1983**.
- It was **recommissioned in 2000** as the Moskva with refurbished weapon systems and electronics.
- It has a displacement of **12,490 tons**.
- It is the **flagship of the Black Sea Fleet of the Russian Navy** and carries a crew of around 500 personnel.

Key characteristics of ballistic and cruise missiles

Characteristics	Ballistic missiles	Cruise missiles
Range	From low to very high <i>Up to 15 000 km</i>	Mostly around 1 000 km <i>Up to 4 000 km</i>
Altitude	High <i>Easily detectable</i>	Low <i>Hard to detect</i>
Precision	Low – around a few hundred metres <i>Fit for large targets</i>	High – a few metres <i>Fit for small and mobile targets</i>
Speed	Up to 25 000 km/h at impact <i>Very hard to intercept</i>	Around 1 000 km/h <i>Possibility to intercept</i>

Time-lapse imaging, or Embryoscope

While **in-vitro fertilisation** has significantly improved the chances of helping people with **fertility problems** start a family, it's still **only successful around 24% of the time**. This is why some people trying to conceive via IVF may decide to look into so-called **add-on treatments** in the hopes of increasing their chances of having a baby.

There are a range of **add-on procedures** that may be offered to patients by both private and public health providers. But the problem with these procedures is that **there's currently little evidence** that they actually improve the chances of having a baby. Despite this, health providers, including the **UK's NHS**, continue to market these costly procedures to patients.

So if you've been considering an **IVF add-on**, it's very important you understand exactly what they are, and **why they may not increase your chances of conceiving**. Here are four of the most common procedures:

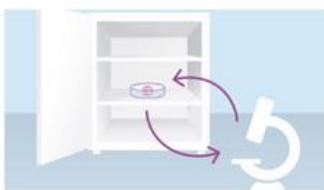
Time-lapse imaging

Time-lapse imaging is a **non-invasive technology**. This involves growing the embryo in a specially designed **incubator fitted with a camera**.

This camera takes pictures of each embryo at frequent intervals, allowing embryologists to select an embryo that's most likely to develop into a baby. This allows embryologists to choose **suitable embryos with no additional harm to the embryo** or patient.

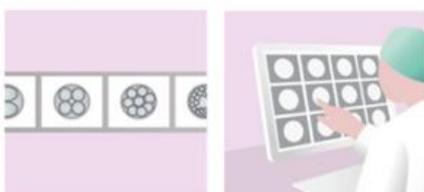
During **conventional IVF procedures**, the embryo needs to be removed from the incubator and examined under a **microscope**. So the advantage of time-lapse imaging is that embryos can be left undisturbed in the incubator until embryo transfer.

Unfortunately, there's currently no evidence to suggest this technology will improve the chances of having a baby compared to **conventional IVF methods**.



Conventional Way

The embryologist removes the embryos from the incubator to perform assessments, about 3 to 5 times over the entire course of the culture. Conventional 'snap-shots' evaluations miss critical embryo development patterns.



Advanced Way

The embryologist monitors the embryos throughout the full course of development without removing them from the safe environment of the incubator. This is viewed through software.

Embryo screening

PGT-A (aneuploidy screening after embryo biopsy) is an **invasive procedure** that involves taking several cells from an embryo and assessing the number of chromosomes. This analysis can be used to show if the embryo has a normal or abnormal set of chromosomes.

Traditionally, this treatment is offered to **women who are older**, typically over the age of 37, as there's a higher chance of **chromosome abnormalities in her embryos**. PGT-A is also offered to patients with a history of miscarriages or those with a family history of **aneuploidy** (having missing or extra chromosomes).

The **advantage of PGT-A** is that it allows people **to have an embryo transferred that's genetically normal**. Traditional methods of assessment, which would only view the embryo under a microscope prior to transfer, won't be able to detect this.

However, there are currently questions over the reliability of the procedure. So while it's more likely that an embryo with a **normal set of chromosomes will be transferred**, the procedure has not been shown to increase the chances of having a baby.

Endometrial scratching

In order to become pregnant, **the embryo needs to implant itself into the lining of the womb**.

But to improve the chance of **this happening in an IVF cycle**, some clinics offer a procedure called "**endometrial scratching**". It's thought that by "**scratching**" the endometrial lining with a **small, sterile plastic tube**, the body will help trigger repair mechanisms where it was scratched.

The **hormones and proteins** needed to repair the lining are said to improve the chances of the **embryo implanting itself**. The treatment is invasive and can cause discomfort for some patients. **It's also unknown whether there's any risk** to the embryo with this procedure.

Embryo scratching is typically only offered to women who have **failed repeated implantation attempts**. There's currently no evidence showing it to be better than conventional IVF methods in helping women conceive.

Embryo glue

Embryo glue works by placing embryos in a culture dish with the **liquid hyaluronan up to 30 minutes** before an embryo transfer. **Hyaluronan is abundant in our body** and is similar to the fluid found between our joints. It's thought that doing this will improve the chances of the embryo implanting itself in the womb.

Researchers aren't entirely sure **how hyaluronan works**, but many believe it helps embryos better stick to other cells during implantation. However, to date, no large studies have shown **embryo glue** to have a significant benefit on improving conception.

While these aren't the only add-on treatments out there, it's worth noting that no add-ons have been given a "**green light**" rating by the **Human Fertilisation and Embryology Authority (HFEA)**. Green light ratings are only given to add-on procedures shown to be safe and effective at improving chances of conception beyond conventional IVF.

While **fertility clinics** can help people struggling to conceive, it's important to understand add-ons largely have no benefit over traditional IVF techniques – especially considering how costly these treatments can be. Often, **a standard IVF cycle will offer the best chance of success on its own.**

The Indian Antarctic Bill and its various provisions

Recently, the government has introduced the '**Antarctic Bill**' in the **Lok Sabha**, which **envisages regulating visits and activities to Antarctica** as well potential disputes that may arise among those present on the continent.

- The Bill is **applicable to Indian citizens as well as foreign citizens.**
- In October 2021, **India extended its support for protecting the Antarctic environment** and for co-sponsoring the proposal of the **European Union** for designating East Antarctica and the Weddell Sea as **Marine Protected Areas (MPAs)**.
- Earlier, a 100-km long body of ice in Antarctica, which has been experiencing rapid melting, was formally **named Glasgow** after the Glasgow climate summit.

Provisions under the Bill

- **Regulate Visiting:**
- The bill has listed **strict guidelines and a system of permits**, which will be issued by a government-appointed committee, without which any expedition or individual will not be allowed to enter Antarctica.
- The bill has **provision to establish a committee on Antarctic governance and environmental protection** to monitor, implement and ensure compliance with the relevant international laws, emissions standards and rules of protection.
- **Protecting Mineral Resources:**
- The Bill further **prohibits drilling, dredging, excavation or collection of mineral resources** or even doing anything to identify where such mineral deposits occur.
- The only exception is for **scientific research with a permit**.
- **Protecting Native Plants:**
- There will be strict **prohibition on damaging native plants, flying or landing helicopters or operating vessels** that could disturb birds and seals, using firearms that could disturb the birds and animals, remove soil or any biological material native to Antarctica, engage in any activity that could adversely change the habitat of birds and animals, or harm them.
- **Prohibition on introducing Birds not Native to Antarctica:**
- Introduction of animals, birds, plants or **microscopic organisms** that are not native to Antarctica are also prohibited.
- **Violators can face imprisonment** as well as penalties.
- **Provisions for Indian Tour Operators:**
- The Bill **also provides for Indian tour operators** to be able to operate in Antarctica after acquiring a permit.
- There are **40 permanent research stations in Antarctica** of which two - **Maitri and Bharati – are Indian**.

Objective of the Bill

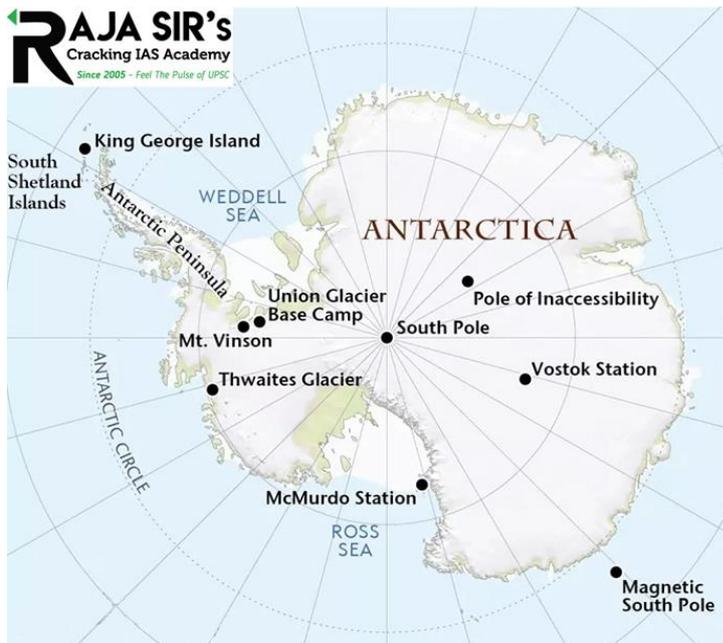
- To **provide a harmonious policy framework for India's Antarctic activities** through a well-established legal mechanism, facilitate activities of the Indian Antarctic programme, including management of Antarctic tourism and sustainable development of fisheries.

Need of Such Law

- **To Fulfill Provisions under the Antarctica Treaty:**
- **India had been a signatory to the Antarctica Treaty since 1983** and that **encumbered India to specify a set of laws governing portions** of the continent where it had its research bases.
- The **Treaty made it mandatory for the 54 signatory countries to specify laws** governing territories on which their stations are located.
- **Preserve the Pristine Nature of the Continent:**
- India is **also signatory to treaties such as the Convention on the Conservation of Antarctic Marine Living Resources** and the **Commission for Conservation of Antarctic Marine Living Resources**.
- Both the conventions **enjoin India to help preserve the pristine nature of the continent**.

Antarctica

- Antarctica is **uninhabited except for those manning the nearly 40 permanent stations** established by several countries, including India, for carrying out scientific research.
- India maintains **two research stations on the continent**: 'Maitri' (commissioned in 1989) at Schirmacher Hills and 'Bharati' (2012) at Larsemann Hills.
- It has also **launched 41 scientific expeditions every year** thus far. Together with **'Himadri' station in Svalbard**, above the Arctic circle, India is among an **elite group of countries with multiple research** in the polar regions.
- Antarctica is **Earth's southernmost continent**. It contains the **geographic South Pole** and is situated in the **Antarctic region of the Southern Hemisphere**.
- At 14,000,000 square kilometers, it is the **fifth-largest continent**.
- The **Indian Antarctic Programme** is a multi-disciplinary, multi-institutional programme under the control of the National Centre for Antarctic and Ocean Research, Ministry of Earth Sciences.
- India officially **acceded to the Antarctic Treaty System in August 1983**.



What Is 'J' Form and How Will It Benefit Farmers?

The Punjab Mandi Board has decided to send a **'digital form J'** on the WhatsApp number of farmers from this **Rabi procurement season**.

'J form'

- **'J form'** is the **sale receipt** of a **farmer's agricultural produce** in mandis (grain market).
- These **forms were earlier** issued **manually by arthiyas** (commission agents) because in Punjab, a majority of farmers **sell their crops through such agents only**.
- Several arthiyas had the habit of **keeping these forms with themselves**, instead of providing it to the farmers, which was their right.
- But by **getting digitised J form**, **farmers will now have a clear record** of the crop **sold and income received in lieu** of that and it will save their time as well, ensuring that **they do not need to run to arthiyas to get copies of their sale**.
- These forms will be delivered **directly on a farmer's WhatsApp number immediately** after a sale is confirmed on the system by the arthiyas and buyers, who are mainly government procurement agencies

Benefits for Farmers

-
- The move, aimed at **bringing transparency** as well as empowering farmers, will make Punjab the first state in the country to provide digitised form J in real-time.

- The move is **expected to benefit** around 9 lakh registered farmers who will be looking to sell their crop (wheat) at MSP during this procurement season.
- The '**J form**' can be used for raising finance from financial institutions, IT waivers, subsidy claims, and farmer's insurance.
- It can also help farmers get admission for their wards in educational institutes abroad.

How will the government benefit?

-
- The **government will have a proper record** of the land under cultivation for both the **wheat and paddy crops** in the state as well as an idea of their average per acre yield.
- People who are doing sales/purchases in the mandis for the other crops can be asked to **log their purchases through the J form to have the accuracy of total land and production.**
- The system can to a large extent check the **sale of crops from other states in the mandis of Punjab.**
- The J forms will **ensure that the government** has an idea of the total land under cultivation and total yield.
- In case of unusual procurements, the government will be able to **identify accounts from which the fraudulent transaction was made.**

J form

Details

- The sale receipt of farmers' agricultural produce in mandis is termed as J form.
- The J forms are proof of farmers' income.

Why in news?

A digitized 'J form' will be sent to WhatsApp numbers of farmers by the Punjab Mandi Board.

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Benefits for government

- The government will have record of total land under cultivation, which will help in estimating the total yield.
- It can also track if produce from other states are illegally sold in Punjab.

Benefits for farmers

- It is a legal document to obtain loans, get subsidy claims, get IT waivers, and obtain insurance.
- The move will prevent theft of grains by arthiyas.

Availability

- The J form will be sent to the WhatsApp number of farmers when the sale of their produce is confirmed.
- In case of change of WhatsApp number, the receipt will be sent to the digilocker.

What a truly complete human genome tells us?

Scientists had **published the map of the human genome for the first time** nearly two decades ago which was hailed as a breakthrough.

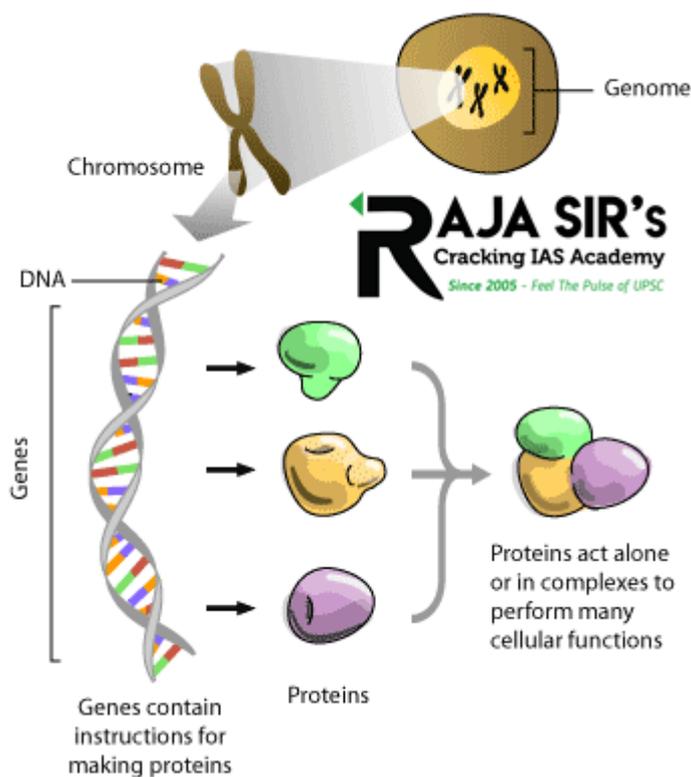
Genome

Genome represents the complete hereditary information of an organism encoded in its DNA. Genome comprises both the genes and the non-coding sequences of the DNA. It covers the entire gamut of building, running, maintaining an organism and passing life on to next generation. The word Genome was coined for the first time by Hans Winkler. He was working as a professor of Botany at the University of Hamburg in Germany.

In almost all living things on earth, genome is made of a chemical called DNA. The Genome contains genes which affect the characteristics of the living organism. Genome contains chromosome, these chromosomes contain genes, and these genes are made up of DNA. All living things are made of different unique genomes. Humans, animals, birds, all have different genomes, and no two humans have the same genome.

The difference in the genome between 2 people is smaller than the genome difference between a human and a chimpanzee.

Human genome comprises of 23 chromosome pairs with a total of 3 billion DNA base pairs. There are 24 different types of human chromosomes, out of these 22 are autosomal chromosomes in addition there are X and Y Chromosomes that determines the sex. The number of human protein-coding genes are estimated to be in the range of 20,000 - 25,000. As the genome sequencing quality and gene finding methodologies have kept improving over time, the estimated number of genes in human body has been steadily decreasing from initial predictions of 1,00,000 and above.



DNA

DNA stands for Deoxyribonucleic acid (DNA). It is a molecule which is made up of biological instructions which result in the uniqueness of each species. DNA is passed from adult organisms to their offspring at the time of reproduction.

<p><u>Gene</u> A gene is a part of a DNA molecule. Hereditary element of genetic information. Encodes proteins synthesis Length is about a few hundreds of bases A Higher organism has about thousands of genes Variations of the gene named alleles can be naturally selected</p>	<p><u>Genome</u> - The genome is the total DNA in a cell All set of nuclear DNA Encodes both proteins and regulatory elements for proteins synthesis Length of the genome of a higher organism is about billion base pairs Each organism has only one genome Horizontal gene transfer & duplication cause large variations in the genome</p>
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LANDMARKS

1869: Swiss chemist Friedrich Miescher identifies "nuclein" (later defined as DNA) inside the nuclei of human white blood cells

1953: Following the work of Russian scientist Phoebus Levene and the Austrian Erwin Chargaff on Miescher's discovery, American scientist James Watson and English physicist Francis Crick propose the three-dimensional, double-helix structure for DNA

2003: Human genome completely decoded under HGP

The Human Genome Project

- As early as the 1980s, momentum was gathering behind activities that supported, and would eventually define, the Human Genome Project.
- Conversations had turned into workshops that likened characterization of the human genome to characterization of the human anatomy that had centuries earlier revolutionized the practice of medicine.
- In 1990, with continued support from the US and widespread international collaboration and cooperation, the \$3 billion dollar Human Genome Project was launched.
- The project aimed to determine the sequence of the human genome within 15 years.

- By 2000 (well ahead of schedule) a working draft of the human genome was announced.
- This was followed by regular updates and refinements and today we all have access to a human “reference genome sequence”.

It took 20 years

- Much of the newly sequenced material is the “heterochromatic” part of the genome.
- This is more “tightly packed” than the euchromatic genome and contains many highly repetitive sequences that are very challenging to read accurately.
- These regions were once thought not to contain any important genetic information but they are now known to contain genes that are involved in fundamentally important processes such as the formation of organs during embryonic development.
- Among the 200 million newly sequenced base pairs are an estimated 115 genes predicted to be involved in producing proteins.

Two key factors made the completion of the human genome possible:

1. Choosing a very special cell type
2. The new sequence was created using human cells derived from a very rare type of tissue called a complete hydatidiform mole, which occurs when a fertilized egg loses all the genetic material contributed to it by the mother.
3. Most cells contain two copies of each chromosome, one from each parent and each parent's chromosome contributing a different DNA sequence.
4. A cell from a complete hydatidiform mole has two copies of the father's chromosomes only, and the genetic sequence of each pair of chromosomes is identical.
5. This makes the full genome sequence much easier to piece together.
6. Advances in sequencing technology
7. A new method called “shotgun sequencing”, involved breaking the genome into very small fragments of about 200 base pairs, cloning them inside bacteria, deciphering their sequences, and then piecing them back together like a giant jigsaw.
8. This was the main reason the original draft covered only the euchromatic regions of the genome – only these regions could be reliably sequenced using this method.
9. The latest sequence was deduced using two complementary new DNA-sequencing technologies.

Is the genome now completely sequenced?

- Well, no. An obvious omission is the Y chromosome, because the complete hydatidiform mole cells used to compile this sequence contained two identical copies of the X chromosome.
- However, this work is underway and the researchers anticipate their method can also accurately sequence the Y chromosome, despite it having highly repetitive sequences.
- Even though sequencing the (almost) complete genome of a human cell is an extremely impressive landmark, it is just one of several crucial steps towards fully understanding humans' genetic diversity.

Applications & Benefits of Human Genome Project

1. **understand diseases** including genotyping of specific viruses to direct appropriate treatment,
2. in the **identification of mutations** linked to different forms of cancer,
3. understand the design of medication & more accurate prediction of their effects,
4. in the advancement of forensic applied sciences, biofuels, animal husbandry, etc.
5. understand evolution much more accurately.
6. Another proposed benefit is the commercial development of **genomics research related to DNA based products**, a multibillion-dollar industry.

Genome India Project

- **Taking inspiration** from the **Human Genome Project**, the **Department of Biotechnology (DBT)** initiated the ambitious **Genome India Project" (GIP) in 2020**.
- It aims to collect **10,000 genetic samples** from citizens **across India**, to build a reference genome.
- Gene Mapping project involves **20 leading institutions of the country** with the **Centre for Brain Research of Indian Institute of Science (IISc) Bangalore** as the **nodal point**.

IndiGen: India's Genome Sequencing Project

- The Council of Scientific and Industrial Research (CSIR) concluded the six-month-long exercise of conducting a "**whole-genome sequence**" of a 1,008 Indians that belonged to diverse ethnicities.

- The project is part of a programme called “**IndiGen**” and is a precursor to **Genome India Project**” (GIP).
- The project involved the **Hyderabad-based Centre for Cellular and Molecular Biology (CCMB)** and the **CSIR-Institute of Genomics and Integrative Biology (IGIB)**.

What is a look out notice, and when is it issued?

Delhi High Court on 1 April 2022 sought the Enforcement Directorate's (ED's) response on journalist Rana Ayyub's challenge to its action of restraining her from leaving the country. Ayyub was stopped in Mumbai based on a **look out circular (LOC)** issued by the ED, which is investigating her in a case of **alleged money laundering**.

What is it, when is it issued?

An **LOC is issued** to make sure that an individual who is absconding or wanted by law enforcement agencies is **not able to leave the country**. It is mostly used at **immigration checkpoints** at international airports and seaports by the immigration branch.

In certain cases, the police can approach a court asking for the **restriction of a person's movement outside the country**, when that person is a suspect and there is an apprehension that they may not join the investigation at a later stage. The subject of an LOC can challenge the circular and **get relief from a court**.

Who can issue an LOC?

An **LOC can be initiated by a large number of authorised officers**, including an officer not below the **rank of deputy secretary**, an officer not below the rank of joint secretary in the state government, a district magistrate or superintendent of police, designated officers of various law enforcing and security agencies, a designated officer of Interpol, an officer not below the rank of additional director in the Serious Fraud Investigation Office, and the Ministry of Corporate Affairs.

In 2018, the government also **empowered the heads of public sector banks** to directly request the authorities **to issue an LOC** against **wilful defaulters** to prevent

them from leaving the country. So now, an officer not below the rank of chairman/managing director/chief executive of any public sector bank can make a request.

An **LOC can be modified/deleted/withdrawn by the Bureau of Immigration only** on the specific request of the authorised originator on whose request the LOC was issued.

Does an LOC lead to arrest?

Not necessarily. LOCs can be of several types. They can seek to **merely stop a person against whom the circular has been issued** from travelling outside the country, to prevent a person from entering the country, or inform the concerned investigation agencies. The **proforma of the LOC** also contains a request to detain the individual at the **local police/investigation agency**, which generally leads to arrest.

What is liquid nano urea?

Liquid Nano Urea(LNU)

1. Urea is a chemical nitrogen fertiliser, white in colour, which artificially offers nitrogen, a prime nutrient required for plants.
2. LNU is basically urea in the state of a nanoparticle.
3. It is sprayed directly at the leaves and gets absorbed by the plant.
4. Fertilisers in nano state offer a targeted supply of nutrients to crops, as they're absorbed through the stomata, pores located at the epidermis of leaves.
5. According to IFFCO, liquid nano urea consists of four per cent overall nitrogen (w/v) uniformly dispersed in water.
6. The size of a nano nitrogen particle varies from 20-50 nm. (A nanometre is equivalent to a billionth of a metre.)

Significance of LNU

1. This patented product is predicted not only as an alternative to imported urea, however to also produce higher results in farms.

2. Apart from decreasing the country's subsidy bill, it is aimed toward decreasing the unbalanced and indiscriminate use of traditional urea.
3. It will assist in growth of crop productivity, and decrease soil, water, and air pollution.
4. The liquid nano urea produced by Indian Farmers Fertiliser Cooperative (IFFCO) Limited is available in a half-litre bottle priced at Rs 240, and includes no burden of subsidy currently.
5. By contrast, a farmer will pay around Rs 300 for a 50-kg bag of heavily subsidised urea.
6. According to IFFCO, a bottle of nano urea can efficiently replace at least one bag of urea.

Efficiency of LNU

1. While traditional urea has an efficiency of about 25 per cent, the efficiency of liquid nano urea can be as excessive as 85-90 per cent.
2. Conventional urea fails to have the favoured effect on vegetation as it's far regularly implemented incorrectly, and the nitrogen in it is vaporised or released as a gas.
3. A lot of nitrogen is also washed away at the time of irrigation.
4. Liquid nano urea has a shelf life of a year, and farmers need not be concerned about "caking" while it comes in contact with moisture.
 - LNU is ready to revolutionise farming with its high efficiency and minimal environmental effect.
 - LNU will also significantly bring down the cost of logistics and warehousing as well as it will be effective in increasing farmers' income.

Prostitution as profession

Recently, in a significant order, **Supreme Court** has recognised sex work as a "profession" and observed that its practitioners are entitled to dignity and equal protection under law.

- The court invoked its special powers under **Article 142 of the Constitution**. Article 142 provides discretionary power to the Supreme Court as it states that the Supreme Court in the exercise of its jurisdiction may pass such decree or make such order as is necessary for doing complete justice in any cause or matter pending before it.
- In 2020, the **National Human Rights Commission (NHRC)** recognised sex workers as informal workers.

Highlights of the Supreme Court Judgment

- **Criminal Law**
- Sex workers are **entitled to equal protection of the law and criminal law must apply equally in all cases**, on the basis of 'age' and 'consent'.
- When it is clear that the **sex worker is an adult and is participating with consent**, the **police must refrain from interfering or taking any criminal action**.
- **Article 21** declares that **no person shall be deprived of his life or personal liberty** except according to procedure established by law. This right is available to both citizens and non-citizens.
- **Sex workers should not be "arrested or penalised or harassed or victimised"** whenever there is a raid on any brothel, "since voluntary sex work is not illegal and only running the brothel is unlawful".
- **Right of Child of a Sex Worker:**
- A child of a sex worker **should not be separated from the mother merely on the ground that she is in the sex trade**.
- Basic protection of human decency and dignity extends to sex workers and their children.
- Further, **if a minor is found living in a brothel or with sex workers**, it should not be presumed that the child was trafficked.
- In case the **sex worker claims that he/she is her son/daughter**, tests can be done to determine if the claim is correct and if so, the minor should not be forcibly separated.
- **Medical Care:**
- Sex workers who are victims of sexual assault **should be provided every facility including immediate medico-legal care**.
- **Role of Media:**

- **Media should take “utmost care not to reveal the identities of sex workers**, during arrest, raid and rescue operations, whether as victims or accused and not to publish or telecast any photos that would result in disclosure of such identities.

Provisions/Supreme Court Views in India

- **Immoral Traffic (Prevention) Act**
- The legislation governing sex work in India is the **Immoral Traffic (Prevention) Act**.
- The Suppression of Immoral Traffic in Women and Children Act was enacted in 1956.
- Subsequent amendments were made to the law and the name of the Act was changed to **Immoral Traffic (Prevention) Act**.
- The **legislation penalises acts** such as keeping a brothel, soliciting in a public place, living off the earnings of sex work and living with or habitually being in the company of a sex worker.
- **Justice Verma Commission (2012-13):**
- The Justice Verma Commission had also **acknowledged that there is a distinction between women who are trafficked** for commercial sexual exploitation and adult, consenting women who are in sex work of their own volition.
- **Budhadev Karmaskar Vs State of West Bengal (2011) Case:**
- The Supreme Court, in Budhadev Karmaskar v. State of West Bengal (2011), opined that sex workers have a right to dignity.

Challenges Faced by Sex Workers

- **Discrimination and Stigmatisation**
- The **rights of sex workers are non-existent**, and those doing such work face discrimination due to their criminalised status.
- These individuals are **looked down upon and have no place in society**, and most times are treated harshly by their landlords and even the law.
- Their fight to be given the **same human, health, and labour rights as others**, continues as they are not deemed as falling under the same category as other workers.
- **Abuse and Exploitation:**

- Most times, **sex workers are exposed to a slew of abuses** that range from physical to mental attacks.
- They would **face harassment from clients, their own family members**, the community, and even from people who are supposed to uphold the law.

Road ahead

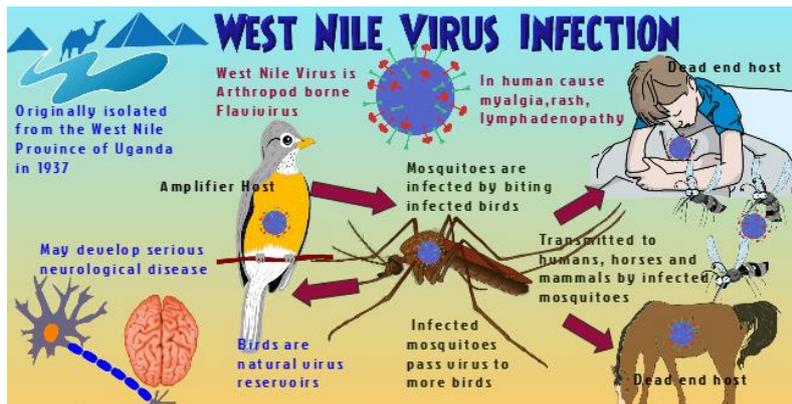
- It is time to recognise sex work as work and assign morality to their work.
- Adult men, women and transgender persons in sex work have the right to earn through providing sexual services, live with dignity, and remain free from violence, exploitation, stigma and discrimination.
- It is time we **rethink sex work from a labour perspective**, where we recognise their work and guarantee them basic labour rights.
- **Parliament must also take a re-look at the existing legislation** and do away with the 'victim-rescue-rehabilitation' narrative.
- During these times of crisis especially, this is all the more important.

West Nile Virus (WNV)

West Nile Virus(WNV)

1. The West Nile Virus is a mosquito-borne, single-stranded RNA virus.
 - RNA virus is the virus that has single-stranded as well double-stranded RNA as its genetic material.
 - Noticeable sickness because of RNA virus is (severe acute respiratory syndrome) SARS, influenza, common cold, Hepatitis B and C.
2. It is a flavivirus associated with the viruses that cause St. Louis encephalitis, Japanese encephalitis, and yellow fever.
 - The Flaviviridae are a cluster of positive, single-stranded, enveloped RNA viruses. Members of this cluster belong to a single genus, Flavivirus.
 - They are observed in arthropods, (mainly ticks and mosquitoes), and can sometimes infect people.

Transmission



1. Culex species of mosquitoes act as the main vectors for transmission.
2. It is transmitted by infected mosquitoes among and between people and animals, together with birds, which might be the reservoir host of the virus.
 - Mosquitoes emerge as infected once they feed on infected birds, which circulate the virus in their blood for some days.
 - The virus subsequently gets into the mosquito's salivary glands.
 - When mosquitoes bite, the virus can be injected into human beings and animals, in which it could multiply and probably cause illness.
3. It also can spread through blood transfusion, from an infected mom to her child, or through exposure to the virus in laboratories.
4. It isn't always known to spread through contact with infected people or animals.

Symptoms

1. The disease is asymptomatic in 80% of the infected people.
2. The rest develop what's known as the West Nile fever or severe West Nile disease. For them, the signs and symptoms include:
 - fever, headache, fatigue, body aches, nausea, rash, and swollen glands.
 - It usually turns deadly in people with comorbidities and immuno-compromised people (like in transplant patients).
3. Severe contamination can result in neuroinvasive disease such as West Nile encephalitis or meningitis or West Nile poliomyelitis or acute flaccid paralysis.
 - Neuroinvasive diseases are capable of infecting the nervous system and particularly the central nervous system.
4. WNV-associated Guillain-Barré syndrome and radiculopathy have also been reported.

- Guillain-Barre syndrome is an unprecedented ailment in which the immune system of one's body attacks its own nerves.
- Radiculopathy is a mechanical compression of a nerve root usually on the exit foramen or lateral recess

Cases in India

- In India, antibodies against WNV were first detected in humans in Mumbai in 1952 and virus activity has since been reported in southern, central, and western India.
- WNV has been remoted in India:
 1. from Culex vishnui mosquitoes in Andhra Pradesh and Tamil Nadu,
 2. from Culex quinquefasciatus mosquitoes in Maharashtra, and
 3. from people in Karnataka.

Precaution against WNV

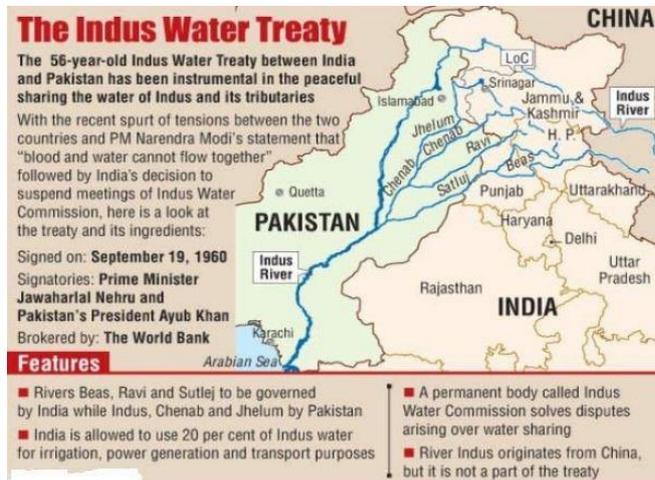
1. Since WNV outbreaks in animals precede human cases, the status quo of an active animal health surveillance system is beneficial in offering early warning.
2. The peak for WNV infections usually coincides with the duration when mosquito vectors are most active and the ambient temperature is adequately high for virus multiplication.
3. Hence, health agencies and authorities globally advice for personal protective measures to reduce the risk of mosquito bites including
 - the use of mosquito repellents, and
 - for public health departments to ensure larval source reduction particularly at breeding and resting sites for the mosquito vectors. Treatment No WNV-specific prophylaxis, remedy or vaccine is available. So, most effective supportive treatments are given to neuroinvasive WNV patients.

What to do?

- The best way to avoid WNV is to prevent mosquito bites as well as to keep the surrounding in a neat and mosquito free state
- There are no specific vaccines or treatments for human WNV disease in this case scenario , there is a need for collective precautionary measures to be taken by the institutions as well as the individuals to prevent the spread.

India, Pakistan conclude Indus water talks in cordial atmosphere

The meeting is held annually under the Indus Water Treaty (IWT) 1960.



Indus Water Treaty

In September 1960, the Indus Waters Treaty (IWT) was signed by former Prime Minister Jawaharlal Nehru and then President of Pakistan, Ayub Khan.

Key Provisions of the Treaty

- The treaty prescribed how water from the six rivers of the Indus River System could be shared among India and Pakistan.
- Treaty prescribes sharing of water of 6 rivers:
 - Pakistan: Ravi, Beas, Sutlej.
 - India : Indus, Chenab, Jhelum.
- Main issue is disbalanced decision as 80% of water goes to Pakistan and rest 20% to India
- **Permanent Indus Commission** on both sides serving as a forum for exchange of statistics on the rivers, for continued cooperation and as a first stop for resolution of conflicts.

Hydropower Projects

- While Pakistan has rights over the waters of Jhelum, Chenab and Indus, Annexure D permits India to build 'run of the river' hydropower projects on these rivers, which means projects not requiring live storage of water.
- It additionally offers certain layout specifications which India has to comply with while developing such projects.
- The treaty also allows Pakistan to raise objections over such projects being constructed by India, if it does not find them to be compliant with the specifications.
- India has to share data at the project layout or alterations made to it with Pakistan, which is required to reply with objections, if any, within 3 months of receipt.

Dispute Resolution Mechanism

- The IWT also offers a 3 step dispute resolution mechanism, under which "questions" on both sides may be resolved at the Permanent Commission, or also can be taken up at the inter-government level.
- In case of unresolved questions or "differences" among the nations on water-sharing, both sides can approach the World Bank to appoint a Neutral Expert (NE) to come to a decision.
- And eventually, if both parties aren't satisfied with the NE's decision or in case of "disputes" in the interpretation and volume of the treaty, subjects may be stated at a Court of Arbitration.

Need of IWT Renegotiation

- Every now and then, there's a clamour in India for abrogating the IWT as a reaction to Pakistan's cross-border terrorism and intransigence.
- There had been numerous times of terror assaults which can have induced India, in the Vienna Convention on the Law of Treaties, to withdraw from the IWT.
- With abrogation an option that India is hesitant to take, there's a growing debate to modify the existing IWT.
- While the treaty may have served a few purposes at the time it was signed, now with a new set of hydrological realities, advanced engineering techniques in dam construction and de-siltation, there's an urgent need to look at it afresh.

Arguments in favour of renegotiation of IWT

- Poor water development projects have allowed 2-3 MAF of water to effortlessly flow into Pakistan which needs to be urgently utilised.
- Further, out of the total expected capacity of 11,406 MW of electricity that can be harnessed from the 3 western rivers in Kashmir, only 3034 MW has been tapped so far.
- However, Article XII of the Treaty says that the agreement can be modified only by a duly ratified treaty concluded for that purpose between the two governments.
- Pakistan will see no benefit in any modification having already got a good deal in 1960.
- India's best option, therefore, would be to optimise the provisions of the treaty in its present form.
- IWT does not have a unilateral exit provision, and is supposed to remain in force until both the nations ratify another jointly agreed pact.

Road ahead

- The role of India, as an accountable upper riparian abiding by the provisions of the treaty, has been incredible however the country is under pressure to reconsider the extent to which it could continue to be committed to the provisions, as its overall political relations with Pakistan becomes intractable.
- IWT is often stated as an example of the possibilities of peaceful coexistence that exist despite the troubled relationship among both neighbouring countries.

Surrogacy for Single Men??

Recently, a petition was filed in the High Court of Delhi requesting the exclusion of single men and women, from having a child through surrogacy, and demanding the non-criminalization of commercial surrogacy. The petitioner objected to the exclusion of surrogacy under the Assisted Reproductive Technology (Regulatory) Act of 2021 and the Surrogacy (Regulatory) Act of 2021. The Petitioner argued that the personal decision of a single person about the birth of a baby through surrogacy, i.e., the right of reproductive autonomy is a facet of the right to privacy guaranteed under Article 21 of the Constitution. Therefore, the right to the privacy of all citizens or individuals to

be freed from unjustified state intervention in issues that fundamentally influence the decision to give birth or father a child through surrogacy, should not be restricted.

What is the 2021 Surrogacy (Regulation) Act?

Regulations:

- Under the Surrogacy Act 2021, widowed or divorced women between the ages of 35 and 45, or couples defined as legally married women and men, who suffer from any medical conditions that prevent them from having a baby of their own, are eligible for availing surrogacy.
- Commercial surrogacy is banned with a jail term for 10 years and fine up to 100,000 rupees.
- The law only allows altruistic surrogacy, where no money exchange takes place, and the surrogate is genetically associated with the child

Challenges

Exploitation of surrogate mothers and children: Some may argue that the state must stop the exploitation of poor women through surrogacy and protect the right to have children. However, the current Act fails to balance these two interests.

Reinforces Patriarchal Norms: The Act reinforces traditional patriarchal norms of our society that attributes no economic value to women's work and, directly affects the fundamental rights of the women to reproduce under Article 21 of the constitution.

Denies Legitimate income to Surrogates: Banning commercial surrogacy also denies a legitimate source of income of the surrogates, further limiting the number of women willingly to surrogate. Overall, this step indirectly denies children to the couples choosing to embrace parenthood.

Emotional Complications: In an altruistic surrogacy, a friend or relative as a surrogate mother may lead to emotional complications not only for the intending parents but also for the surrogate child as there is a great deal of risking the relationship in the course of surrogacy period and post birth. Altruistic surrogacy also

limits the couple's choices intended when choosing a surrogate mother. Because few relatives are willing to go through the process.

No third party involvement: There is no third party involvement in altruistic surrogacy. The involvement of a third party ensures that the target couple will bear and support medical and other costs during the surrogacy process. Overall, having a third party helps both the intended couple and the surrogate to navigate the complex process. This may not be possible in the case of altruistic surrogacy.

What is surrogacy?

Surrogacy is an arrangement in which a woman (surrogate) agrees to carry and give birth to a child on behalf of another person or couple (intended parent).

A surrogate mother sometimes referred to as a gestational carrier, is a woman who conceives, carries, and gives birth to a child for another person or couple (intended parent).

Altruistic surrogacy:

It does not include financial compensation to the surrogate mother other than medical expenses and insurance coverage during pregnancy.

Commercial surrogacy:

This includes surrogacy or related procedures performed for monetary gains or rewards (cash or in-kind) beyond the scope of basic medical expenses and insurance.

What is Assisted Reproductive Technology(ART)?

ART is used to treat infertility. This includes fertility treatments that treat both female eggs and male sperm. It works by removing eggs from a woman's body and mixing them with sperm to make an embryo. The embryo is then reinserted into the female body. In vitro fertilization (IVF) is the most common and effective form of ART. ART procedures may use donor eggs, donor sperm, or previously frozen embryos. It can also be a replacement carrier.

Law:

- The 2021 Assisted Reproductive Technology Act (ART) Regulation provides a system for implementation of the law on surrogacy through the establishment of the National Assisted Reproductive Technology and Surrogacy Board.
- The law aims to regulate and supervise ART clinics and assisted reproductive technology banks, prevent abuse and ensure safe and ethical practice of ART services.

Shortcomings-:

Exclusion of unmarried and heterosexual couples:

- The Act excludes unmarried men, divorced men, widowed men, unmarried yet cohabiting heterosexual couples, trans persons and homosexual couples (whether married or cohabiting) from availing ART services.
- This exclusion is relevant because the surrogacy law also excludes the above individuals from resorting to surrogacy as a method of reproduction.

Reduce reproductive options:

- The law is also limited to commissioning couples who are infertile- who were unable to become pregnant one year after unprotected sexual intercourse.
- As such, it has limited application and significantly reduces reproductive choices of those excluded.

Unregulated price:

- The price of the service is not regulated. This can certainly be fixed with a few simple steps.

Way Forward

- India is one of the main centers of these practices, and the law is certainly a step in the right direction.
- However, dynamic oversight is needed to keep the law up to the rapidly evolving technology, moral demands, and social changes.