

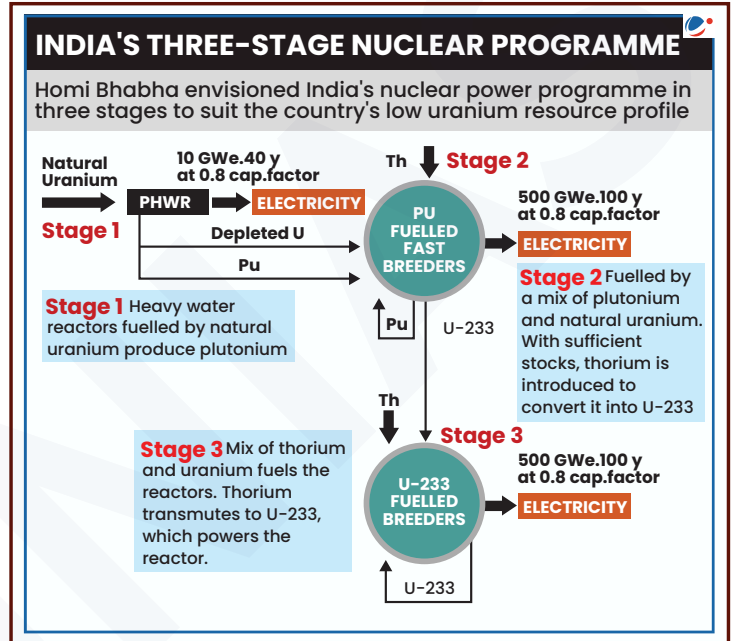
## Unit 4 of Indigenous 700 MWe Kakrapar Nuclear Power Plant (KAPP 4) Starts Working at Full Capacity

KAPP-4 (in Gujarat) is a **Pressurised Heavy Water Reactor (PHWR)** that use **natural uranium as fuel and heavy water as moderator**.

- In 2023, it had achieved its first **criticality** (when **each fission event** releases a sufficient number of neutrons to **sustain an ongoing series of reactions**).
- **700MWe PHWR unit** addresses the issue of **excess thermal margins**, and **14 more such unit** are expected to commence operations progressively by **2031-32**.
  - ⊕ 'Thermal margin' refers to the extent to which the **operating temperature** of the reactor is **below its maximum operating temperature**.

### Enhanced safety features incorporated in 700MWe unit

- **Thin-walled pressure tubes:** It can **lower the severity** of an **accidental rupture** of the pressure boundary.
- **Passive Decay Heat Removal System:** It can remove decay heat from the reactor core without requiring any operator actions.
  - ⊕ It is on lines of similar technology adopted for **Generation III+ plants to negate the possibility of Fukushima type accidents** (happened in Japan in 2011).
- **Containment: Steel-lined containment** to reduce any leakages, and a **containment spray system** to reduce the containment pressure in case of a loss of coolant accident.



## Commerce and Industry Minister Raised Concern Over Adverse Impact of e-Commerce on Economy in Long-Term

The concern was raised while launching a report '**Net Impact of E-Commerce on Employment and Consumer Welfare in India**' which shows positive impact of e-commerce on Indian economy (refer to the box).

- "e-commerce" means **buying or selling of goods or services** including digital products **over digital or electronic network**.

### Adverse Impact of e-commerce

- **Predatory pricing:** e-commerce platforms can offer **deep discount to get rid of competitors** and take over the market.
  - ⊕ When competition is reduced **consumer may lose the benefit of cost effectiveness** of e-commerce platform.
- **Reduced options for consumers:** Fewer local shops may lead to higher travel costs or fewer shopping choices if they avoid online shopping.
- **Loss of employment:** Due to less competition and impediment of traditional retail sector.
- **Privacy issue:** Abuse of consumer data and consumer privacy.
- **Breach of law:** For example, currently some e-commerce platforms (like amazon) in India are engaged in direct sales to consumer sales, despite regulatory restrictions on B2C transactions.

### Regulations of E-commerce in India

- Consumer Protection (E-Commerce) Rules, 2020
- Consumer Protection Act 2019

### Positive impact of e-Commerce

According to the report released recently:

- **e-commerce**, comprising **7.8% of total retail sales in 2022** is growing at a **CAGR of 27% between 2018 and 2030**.
- It does not have any **negative impact on traditional retail, results in Consumer welfare gain** (due to convenience, cost effectiveness, etc.)
- It has also **increased employment particularly for women**.

## Indian Researchers Develop 4D-Printed Artificial Blood Vessels for Advanced Medical Grafts

### About 4D printing

- 4D printing evolves from **3D printing by adding the dimension of time.**
  - ⊕ **3D printing, or Additive Manufacturing,** constructs a three-dimensional object from a digital model by adding material layer by layer, unlike subtractive manufacturing, which cuts away material from a solid block.
- 4D printed objects **can change shape or function over time in response to environmental stimuli** such as heat, light, or moisture etc.

### Applications:

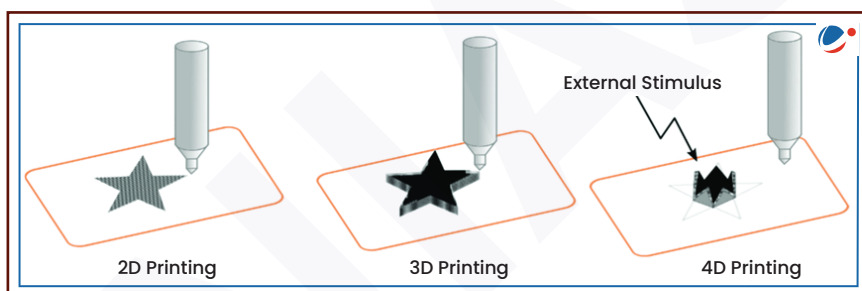
- **Medical Application:** Drug delivery, tissue fabrication, and organ regeneration etc.
- **Soft Robotics:** Due to its Flexibility, deformability with respect to Environment.
- **Aerospace:** By enabling low-cost, durable parts that adapt to extreme conditions. E.g. Nitinol alloy manufacturing.
- **Others:** sensors and flexible electronics, active origami art, self-evolving structures etc.

### Advantages:

- **Dynamic Functionality:** By creating adaptive structures beyond the capabilities of traditional 3D printing.
- **Material Efficiency:** By reducing wastages.
- **Complex Design fabrication:** Stereo lithography 4D technique fabricates complex designs efficiently.

### Challenges:

- **Unavailability of Technologies:** Limited to few research institutes in the world
- **Material Limitations:** For e.g. Degradation issues on continuous deformation.



4D printing advances 3D printing by enabling dynamic,

**continued material innovation and broader adoption are crucial for unlocking its full potential.**

## Union Finance Minister chairs Review Meeting of the Regional Rural Banks (RRBs)

Key suggestions included focus on improving **business performance, upgrading digital technology services and tapping business growth potential in MSME clusters.**

### About RRBs

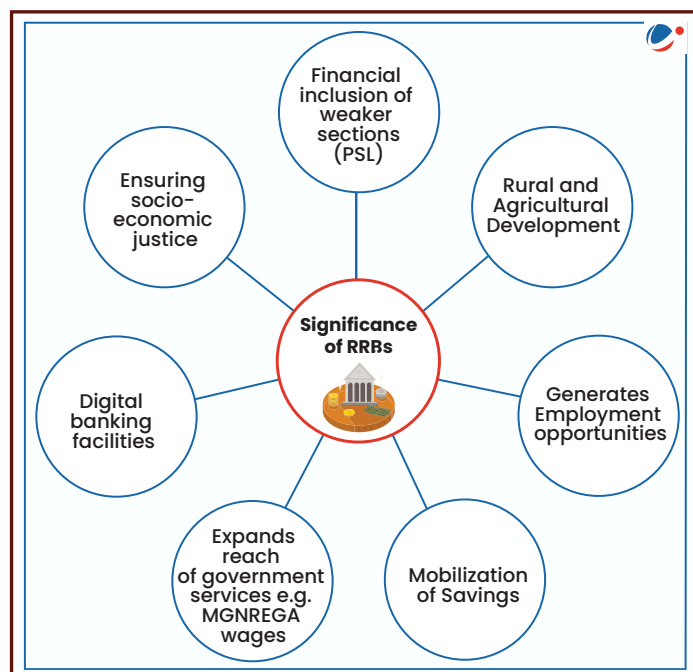
- They are established under the **RRB Act, 1987 based on the recommendation of Narasimham Working Group (1975).**
- **Aim:** To provide **banking and credit facilities for agriculture and other rural sectors.**
  - ⊕ There are **43 RRBs** presently in India.
- They are **jointly owned by Government of India, State Governments and Sponsoring Commercial Banks (50:15:35).**
- They are **Scheduled Commercial Banks (Government Banks) regulated by RBI and supervised by NABARD.**
- Created primarily for **rural areas, however, may also set up branches in urban areas.**

### Issues with RRBs

- **Lack of coordination in Branch expansion:** Results in inequitable distribution.
- **Difficulties in Deposit mobilization:** Practical **exclusion of the richer rural population** restricts deposit mobilization.
- **Issues with human resource:** **High attrition rate** due to availability of more **attractive jobs. (urban orientation)**
- **Loans by Commercial Banks** are more attractive due to **lower interest rates for weaker sections.**

### Way Forward

- **Structural consolidation** to improve efficiency.
- **Recapitalization of RRBs** for capital augmentation.
- **Periodic review and capacity building** of human resources.



## ICAR develops a Miniature Plant Genome Editing Tool 'ISDra2TnpB'

'ISDra2TnpB' is being seen as a next-generation tool for genome editing in plants that can **overcome the limitations of Cas9 and Cas12 of CRISPR**.

- **CRISPR** allows **precise genome editing** but has limitations due to the size of commonly used proteins Cas9 and Cas12 (consisting of 1,000–1,350 amino acids).
  - ⊖ The large size poses challenges for **effective delivery inside cells**, especially through viral vectors.
- **TnpB** proteins are considered the **evolutionary ancestors of Cas12 nucleases** and consist of only around **350–500 amino acids**.

### About Genome editing tool ISDra2TnpB

- It is derived from bacteria called **Deinococcus radiodurans** (it can survive extreme environmental conditions).
- It belongs to a family of **transposons or jumping genes** that can move **within the genome, targeting specific DNA sequences** with the help of RNA.

### Significance

- TnpB can **target unique regions in the genome that Cas9 cannot**.
- It **facilitates the creation of fusion proteins**, broadening the scope of genome engineering applications.
  - ⊖ A fusion protein (chimeric protein) is created by joining two or more genes that originally coded for separate proteins.
- It was **effective on both types of flowering plants** monocots (like rice, which have one seed leaf) and dicots (like Arabidopsis).

**Note:** Kindly refer News Today document of 9th & 10th June, 2024 to know more about 'CRISPR' gene editing.

## India in touch with US for extradition of 26/11 plotter

### About Extradition

- According to Supreme Court of India, Extradition is the delivery on **the part of one State to another of those whom it is desired to deal with for crimes of which they have been accused or convicted** and are justifiable in the Courts of the other State.
  - ⊖ An Extradition request for an accused can be initiated in the **case of under-investigation, under-trial and convicted criminals**.

### Extradition framework in India

- **The Extradition Act 1962** (substantially modified in 1993) consolidated the law relating to the **extradition of criminal fugitive from India to foreign states** and it is administered by **Ministry of External Affairs**.
- Government of India finally decides on extradition and this decision **can be appealed in a higher court**.
- At present, India has an **Extradition treaty with 48 countries** (including Bangladesh) and agreement with 12 countries.

### Global Framework for Extradition

- **United Nations Model Treaty on Extradition (1990)**
- **UN Model Law on Extradition (2004)**
- **United Nations Convention against Transnational Organized Crime (2000)** includes provisions on extradition for offenses related to organized crime.

### Major principles of extradition

- Extradition applies only with respect to offences clearly stipulated as such in the bilateral treaty;
- **Principle of dual criminality** requires that the offence for which the extradition is sought be an offence under the national laws of the extradition requesting as well as the requested country;
- **Rule of speciality:** the extradited person must be proceeded only against the offence for which his extradition was requested
- He must be **accorded a fair trial**.

## Also in News



### Waterspout

Waterspout was **reported near the coast of Sicily (Italy)**.

### About Waterspout

- A waterspout is a **column of cloud-filled wind rotating over a water body**.
- Despite its name, it is **not filled with water from the ocean or lake**.
  - ⊖ Instead, it **descends from a cumulus cloud**.
  - ⊖ The water inside it is formed by **condensation in the cloud**.
- **Types:**
  - ⊖ **Tornadic** waterspouts (the most powerful and destructive type)
  - ⊖ **Fair-weather** waterspouts (rarely dangerous).
- **Conditions for formation:** High levels of humidity and relatively warm water temperatures compared to the overlying air.
- **Regions for formation:** Most common in tropical and subtropical waters.



### EU Nature Restoration Law

Recently, the **EU Nature Restoration Law** came into force.

### About the Law

- **EU's first continent-wide legislation for nature restoration**.
- **Aim:** Restore 20% of degraded ecosystems by 2030 and all by 2050.
- Requires Member States to prepare **National Restoration Plans** by 1 September 2026.
- **Prioritizes** conservation of **Natura 2000 network areas**.
  - ⊖ **Natura 2000** is a network of protected areas in EU.
- **Legally binding targets:**
  - ⊖ **Restore 30% of terrestrial, coastal, freshwater, drained peatlands, and marine ecosystems** by 2030.
  - ⊖ **Restore 25,000 km of rivers** to free-flowing status.
  - ⊖ **Plant three billion additional trees** by 2030.





### Legislators with Criminal Cases against Women

Association for Democratic Reforms (ADR) released report on sitting MPs/MLAs with Declared Cases Related to Crimes against Women 2024.

#### About the report:

- Overall, 151 MPs/MLAs have such charges, with one-third from the ruling party at the center.
- There are 16 sitting MPs and MLAs who have declared cases related to rape.

**Recommendations of ADR:** Political parties to refrain from giving tickets, fast-tracking of court cases against MPs and MLAs etc.



### International Criminal Court (ICC)

Ukraine parliament votes in favour of joining the ICC.

#### About ICC

- It is an independent judicial body.
- It may exercise jurisdiction over persons charged with **genocide, crimes against humanity, war crimes and the crime of aggression.**
- It is **not part of the UN.**
  - ⊕ However, it is governed by the **Rome Statute negotiated within the UN.**
  - ⊕ Also, the **UN Security Council can refer certain situations** to the Prosecutor of the ICC.
    - ◆ The **International Court of Justice** is the principal judicial organ of the UN.
- **Members: 124 countries** (India, China, Russia, and the US are not members)



### Hayflick limit

Leonard Hayflick passed away recently.

- He introduced the 'Hayflick limit' that fundamentally changed the understanding of aging.

#### About Hayflick limit

- It is the number of times a **cell population can divide** until it attains a **cell cycle arrest.**
- It **depends on the length of chromosomal telomeres**, which decreases in standard cells with every cell division.
  - ⊕ The telomere is the **region of repetitive DNA sequences at the end of a chromosome.**
- The "Hayflick limit", is **around 125 years for humans.**
  - ⊕ Beyond this, no amount of diet, exercise, or genetic tweaking against diseases can extend the human lifespan.



### Findings of Chandrayaan-3

The Alpha Particle X-ray Spectrometer (APXS) instrument on **Pragyan Rover of Chandrayaan-3** provided evidence supporting the **Lunar Magma Ocean (LMO) Hypothesis.**

#### About LMO hypothesis

- Related to the **early evolution of the Moon**, it states that the Moon was a **molten ocean of magma on formation.**
- On cooling, the **heavier minerals (silicon and magnesium-rich minerals like Olivine and Pyroxene) sank to form the inner layers**
- Whereas, the lighter minerals (Calcium, sodium) formed the outer layer.

#### Chandrayaan-3 (2023)

- It is a **follow-on mission to Chandrayaan-2** to demonstrate end-to-end capability in **safe landing and roving on the lunar surface.**



### Tera Hertz (THz) waves

TRAI has recommended establishing **Tera Hertz Experimental Authorisation** to develop innovative **new technologies and services** in the Tera Hertz band.

#### About Tera Hertz (THz)

- THz radiation generally refers to **electromagnetic waves** at the frequency of **0.1–10 THz**, which **lies between the microwave and infrared** regions of the spectrum.
- **Applications of THz**
  - ⊕ **Space-based communication** like Earth Exploration-Satellite Service (EESS), radio astronomy service, etc.
  - ⊕ **Short-range** wireless communication
  - ⊕ **Security applications** (like solid explosive material detection).
  - ⊕ **Biomedical imaging** and body surface diagnoses.



### Global Finance Central Banker Report Cards 2024

RBI Governor is rated "A+", for the second time in a row, in Global Finance Central Banker Report Cards 2024.

#### About Central Banker Report Cards

- Published **annually by US-based Global Finance since 1994.**
- Grades **central bank governors** of nearly 100 countries.
  - ⊕ **Grades are based on a scale from A to F** for success in inflation control, economic growth goals, currency stability and interest rate management.
- It **honours bank leaders whose strategies outperformed their peers** through originality, creativity and tenacity.

## Place in News



### Kamchatka Peninsula

Powerful earthquake in **Russia's Far East** triggered **Shiveluch volcano** in **Kamchatka Peninsula.**

#### About Kamchatka Peninsula

- **Political Features:** Part of the Far Eastern Federal District of Russian Federation.
  - ⊕ **Kuril Archipelago extends from the southern tip of Russia's Kamchatka Peninsula** to the northeastern coast of Japan's Hokkaido Island.
  - ⊕ **Kuril Island is disputed between Russia and Japan.**
- **Geographical Features:**
  - ⊕ **Location:** Lies between the Sea of Okhotsk on the west and the Pacific Ocean and Bering Sea on the east.
  - ⊕ **Mountain ranges:** Sredinny and Vostochny.
  - ⊕ **River:** Kamchatka River
- **Climate:** Mostly Tundra Climate
- **Tribes:** Koryak, Chukchi, and Kamchadal.

