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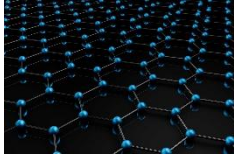
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WHAT IS GRAPHENE?



- It is an **allotrope of carbon**, along with diamond and graphite.
 - It is a **two-dimensional material** consisting of a **single layer of carbon atoms arranged in a honeycomb structure**.
 - The **stacked form of graphene is graphite**.
 - Graphene was first isolated in 2004. Since then, it has utilised in various innovative **applications, from sensors and electronics to energy storage and healthcare**.
 - **Properties:**
 - **Thickness:** Graphene is the **world's thinnest material** – it is only one atom thick, one million times thinner than a human hair.
 - **Strength:** It is **200 times stronger than steel** but **six times lighter**.
 - **Flexibility:** It is **extremely flexible and stretchable**.
 - **Conductivity:** It is an **excellent electrical and thermal conductor**.
 - **Transparency:** It is **almost perfectly transparent** since it only absorbs 2% of light.
 - It is **impermeable to gases**, even those as light as hydrogen or helium.
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CIVIL LIABILITY FOR NUCLEAR DAMAGES ACT (CLNDA), 2010



- It is the legal foundation that influences India's response to nuclear incidents. It was adopted by Parliament of India in 2010.
- It is based on the international principles of civil nuclear liability laid down in the **Vienna Convention, Paris Convention and Brussels Supplementary Convention**.

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- It created a **mechanism for compensating victims** from damage caused by a nuclear accident, allocating liability and specifying procedures for compensation.
 - **Features:**
 - The CLNDA provides for **strict and no-fault liability on the operator** of the nuclear plant, where it will be held liable for damage regardless of any fault on its part.
 - This Act establishes the **operator's liability** for nuclear catastrophes **up to 1,500 crores**, which **requires insurance or financial security**.
 - **In case the damage claims exceed ₹1,500 crore**, the CLNDA expects the **government to step in**.
 - The Act has **limited the government liability** amount to the rupee equivalent of 300 million Special Drawing Rights (SDRs) or **about ₹2,100 to ₹2,300 crore**.
 - In addition to establishing a timeline for compensation claims, the act authorises the **Atomic Energy Regulatory Board** to report incidents within 15 days.
 - In addition, the Act **establishes a Nuclear Damage Claims Commission** to facilitate equitable compensation and conflict resolution.
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ALGORITHMIC TRADING



- It is a method of **executing trading orders** by providing a predefined set of rules **to a computer program**.
- This helps in placing share orders at a speed and frequency not possible for human traders.
- Algo trading is already prevalent in India among both **institutional as well as retail investors**.

New Algo Trading Framework by SEBI:

- It is aimed at spelling out the **rights and responsibilities of the main stakeholders** of the trading ecosystem such as investors, brokers, algo providers/vendors and Market

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Infrastructure Institutions (MIIs) so that the retail investors can avail algo facilities with requisite safeguards.

- Under the framework, **retail investors will get access** to the approved algos **only from the registered brokers**.
- The facility of algo trading would be provided by the stock broker **only after obtaining requisite permission** from the stock exchange for each algo.
- All algo orders shall be **tagged with a unique identifier** provided by the exchange in order to establish audit trail and the broker shall seek approval from the exchange for any modification or change to the approved algos,"
- **Brokers** will be solely responsible for **handling investor grievances** related to algo trading and the monitoring of APIs for prohibited activities.
- Algos will be categorised **into two categories**:
 - **White box algos**, where logic is disclosed and replicable i.e. execution algos.
 - **Black box algos**, where the logic is not known to the user and is not replicable.

BOMBAY BLOOD GROUP



- The Bombay, also known as HH, blood group is a **rare blood group** first discovered in Mumbai in 1952 by Y.M. Bhende.
- The Bombay blood group lacks A, B and H antigens, which are found in the common ABO blood groups.
- In normal individuals, the H antigen serves as the base structure for **building A and B antigens**. In Bombay blood group individuals, the **gene responsible for producing the H antigen is mutated or absent**, so neither A nor B antigens can be formed.
- Consequently, the people with Bombay Blood Group are **incompatible with all standard blood types**, including O-negative, complicating both transfusions and organ transplants.



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- They can only receive blood from another Bombay blood group donor. Its prevalence is about 0.0004% (one in 4 million) of the total human population.
- While it drops to **one in a million in the European population** and **one in 10,000 in Mumbai**, the act of finding a donor is still daunting.

KASHMIR HAND-KNOTTED CARPET



- The origin of hand knotted carpets, locally known as "**Kal baffi**" dates back to 15th century after which it progressively attained the high degree of perfection.
- It is said that **Sultan Zain-ul-Abidin** brought carpet weavers **from Persia and central Asia** in to Kashmir to train the local inhabitants.
- The loom used in Kashmir carpet weaving is composed of **two horizontal wooden beams** between which the wrap threads are stretched, one beam in front of the weaver and the second behind the first.
- The difference between a carpet and other hand woven rugs lies in the fact that short **lengths of the thread** or yarn are tied to wrap chains to form the pile of the carpet. These are commonly called knots though it is a loop rather than an actual knot.
- In Kashmir, the primary type of knot used in carpet weaving is called the "**Farsi baff**" or the "Sehna" knot, which is a Persian system of knotting.
- Very simple tools are used to thread these knots - **a wood or a metal comb** to push knots and weft tightly together and a **pair of short scissors** to cut the pile of the carpet to an even form once it is finished.

Other GI tagged Kashmir crafts:

- Apart from the hand-knotted carpet, six other crafts have already been GI registered, which include **Papier Mache, Kashmir Pashmina, Kani, Sozni, Khatamband** and **Walnut Wood Carving**.

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PRIVATE PROPERTY AND THE STATE'S RIGHT TO ACQUIRE ACCORDING TO LAW

Eminent Domain and Historical Background:

- The concept of **eminent domain** refers to the authority of the state to acquire private land for public use, with or without compensation.
- The term traces back to **Hugo Grotius in 1625**, who described the idea that a sovereign can take private property for public necessity.

Global Perspective on Property Rights:

- **United Kingdom:**
 - **Magna Carta (1215)** was the first instance where limits were placed on the King's power to arbitrarily take property.
 - It required that land could only be taken "by the law of the land."
- **United States:**
 - **The Fifth Amendment (1791)** states that private property cannot be taken for public use without just compensation.
- **India:**
 - The Constitution **initially** recognized the right to property as a **fundamental right under Article 19**.
 - In addition, **Article 31** ensures that the property could not be taken into possession or acquired for public purpose unless the law provides for the compensation of such properties.
 - However, the **44th Constitutional Amendment (1978)** removed it from the list of fundamental rights.
 - It is now a **legal right under Article 300A**, which ensures that property cannot be taken without legal authority.

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Land Acquisition in India:

- **Pre-2013 framework:**
 - Governed by the **Land Acquisition Act, 1894**.
 - Allowed the government to acquire land for a “public purpose” with compensation.
 - Did not consider the impact on affected families beyond the landowner.
- **Right to Fair Compensation and Transparency in Land Acquisition Act, 2013:** It came into force to ensure:
 - Humane, participatory, and transparent land acquisition.
 - Social Impact Assessment (SIA) to evaluate the impact on affected communities.
 - Compensation, rehabilitation, and resettlement measures.

Conclusion:

- **Balancing public interest with private property rights is crucial.**
 - Different countries have evolved laws to regulate land acquisition, ensuring compensation and legal safeguards.
 - **In India**, post-2013 reforms aimed at making the land acquisition process more just and transparent.
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INDIA'S OPPORTUNITY AT THE AI ACTION SUMMIT

- The **upcoming AI Action Summit, co-chaired by India and France** in Paris on February 10-11, 2025, marks a **significant milestone in global AI governance**.
- This **summit follows earlier AI safety discussions in the United Kingdom (2023) and South Korea (2024)**, expanding the discourse beyond risk management to include innovation, AI governance, and the future of work.
- **For India, this event presents a crucial opportunity to further the interests of the Global South** in the evolving AI landscape while positioning itself as a leader in international AI policy discussions.

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India's Growing Influence in AI Governance

- India has been an active participant in global AI discussions.
- The country played a key role in the Bletchley Park meeting, which focused on frontier AI models and safety concerns, and in the Seoul summit, which emphasised multilateral collaboration on AI risk management.
- India's establishment of its own AI Safety Institute aligns with these global efforts, demonstrating its commitment to AI safety and governance.
- Beyond safety, India has been a strong advocate for the Global South, emphasising equitable access to AI infrastructure.
- Under its presidency of the G20 in 2023, India promoted a 'pro-innovation regulatory/governance approach' that sought to balance innovation with necessary safeguards.
- Similarly, at the Global Partnership on Artificial Intelligence (GPAI) meeting in December 2023, India highlighted the importance of equitable access to AI research and innovation resources.
- These initiatives underscore India's ambition to shape the global AI discourse, ensuring that developing nations are not left behind.

India's Potential Role as a Future AI Summit Host

- As a co-chair of the Paris Summit, India has a strategic opportunity to solidify its leadership in AI governance.
- By championing the Global South's interests, India can position itself as a frontrunner to host the next AI Action Summit.
- This would allow it to further influence global AI policymaking, bridging the gap between AI superpowers and developing nations.

Conclusion

- By advocating for democratised AI access, region-specific AI applications, and contextualised AI risk assessments, India can ensure that AI benefits are shared equitably across the world.
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WHAT ARE NEUTRINOS?



Chinese scientists recently placed special detectors deep in the South China Sea to explore the possibility of building a huge underwater observatory to find neutrinos.

- Also called **ghost particles**, neutrinos are **nearly massless, electrically neutral subatomic particles** that **interact extremely weakly with matter**.
 - Their tendency not to interact very often with other particles **makes detecting them very difficult**.
 - First predicted in 1930, they weren't discovered in experiments until 1956, and scientists thought they were massless until recently.
 - They **belong to the family of particles called leptons**, which are not subject to the **strong force**. Rather, neutrinos are **subject to the weak force** that underlies certain processes of radioactive decay.
 - **Source**: Neutrinos come from all kinds of different sources and are often the **product of heavy particles turning into lighter ones**, a process called "decay."
 - They are the **most common particles in the universe**.
 - Approximately 100 trillion neutrinos pass completely harmlessly through your body every second.
 - Neutrinos play crucial roles in the **standard model of particle physics**, in stellar physics and black holes, and even in cosmology and the nature of the Big Bang.
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JAGANNATH TEMPLE



- It is a **Hindu temple** located in **Puri, Odisha**.
- It is dedicated to **Lord Jagannath**, a form of the **Hindu deity**

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Vishnu.

- It is believed to have been **built during** the reign of **King Anantavarman Chodaganga Deva, of the Eastern Ganga dynasty, in the 12th century.**
 - However, the completion of the temple happened in 1230 AD under Anangbheema Deva III, who also installed the deities in the shrine.

Architecture:

- It is a striking example of **Kalinga architecture**, a distinct Nagara style prevalent in Odisha.
 - The temple complex includes shrines, gardens and sacred tanks, creating a serene atmosphere for devotion.
 - The main temple is located at the center of the inner courtyard on a raised platform.
 - The main temple is constructed in such a way that no shadow of the temple falls on the ground at any time of the day.
 - The temple's main structure, the sanctum sanctorum, or the garbhagriha, houses the idols of **Lord Jagannath, Balabhadra and Subhadra.**
 - At the pinnacle of the temple, **there is a 20-foot-high chakra (wheel)** that is positioned in a way to be visible from any part of the city.
 - **Ratha Yatra** is a Hindu festival associated with **Lord Jagannath temple.**
 - It is **one of the four** sacred pilgrimage sites, known as the **Char Dhams**, that hold great significance for Hindus.
 - It is also a **UNESCO World Heritage Site.**
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