



DAILY CURRENT AFFAIRS-

1. Kudankulam Nuclear Power Plant Data Leak
2. Iran's Disruptive Strategy and Its Global Consequences
3. India–UK Comprehensive Economic and Trade Agreement (CETA)
4. Semicon India Programme 2.0
5. IIT Bombay's Breakthrough in Sustainable Drug Discovery

1. Kudankulam Nuclear Power Plant Data Leak

Why in News?

Over **19,000 sensitive files** related to the **Kudankulam Nuclear Power Plant (KKNPP)** were reportedly leaked after the ransomware group **World Leaks** breached a contractor's server. The **NPCIL** clarified that the compromised data pertains only to **conventional (non-nuclear) infrastructure**, while investigations by **CERT-In** and NPCIL are underway.

Key Highlights

Aspect	Details
Plant	Kudankulam Nuclear Power Plant (Tamil Nadu)
Data leaked	Over 19,000 files (2016–2025)
Source of leak	Contractor's server hosted by Yotta

Ransomware group	World Leaks
Investigation	NPCIL & CERT-In
NPCIL clarification	Nuclear reactor safety systems remain unaffected

What Was Leaked?

- Engineering drawings of **control, cooling and ventilation systems**.
- Vendor and supplier details.
- Infrastructure-related documents for **Reactors 3 & 4**.
- Data related to **Balance of Plant (BoP)** facilities, not reactor core systems.

Balance of Plant (BoP): Auxiliary systems supporting plant operations such as cooling, ventilation, water supply, power distribution and administrative infrastructure.

Why is the Leak a Concern?

- Exposure of critical infrastructure layouts.
- Mapping of vendors and supply chains may facilitate future cyberattacks.
- Increased vulnerability to ransomware and espionage.
- Highlights cybersecurity risks arising from **third-party contractors**.

About Kudankulam Nuclear Power Plant (KKNPP)

Feature	Details
Location	Tirunelveli District, Tamil Nadu
Operator	Nuclear Power Corporation of India Limited (NPCIL)
Technology	Russian VVER-1000 Pressurised Water Reactors
Collaboration	India–Russia (Rosatom)
Operational Units	Units 1 & 2 (1000 MW each)
Under Construction	Units 3, 4, 5 & 6
Significance	India's largest nuclear power station

What are VVER Reactors?

- **VVER (Water-Water Energetic Reactor)** is a Russian-designed **Pressurised Water Reactor (PWR)**.

- Uses **light water** as both coolant and moderator.
- Equipped with **multiple passive and active safety systems**.
- Widely deployed in Russia, India, China and several European countries.

India's Nuclear Cybersecurity Framework

Institution	Role
NPCIL	Operates nuclear power plants and cyber protection measures
CERT-In	National nodal agency for cybersecurity incident response
National Critical Information Infrastructure Protection Centre (NCIIPC)	Protects Critical Information Infrastructure under the IT Act, 2000
Atomic Energy Regulatory Board (AERB)	Regulates nuclear safety and security
Department of Atomic Energy (DAE)	Overall policy and administration of India's nuclear programme

Challenges

- Cyber risks from third-party vendors and contractors.
- Supply-chain vulnerabilities.
- Increasing ransomware attacks on critical infrastructure.
- Balancing digitalisation with national security.

Way Forward

- Strengthen **Zero Trust Cybersecurity** architecture.
- Conduct regular third-party security audits.
- Enhance supply-chain cybersecurity standards.
- Increase real-time threat monitoring and incident response.
- Improve coordination among NPCIL, CERT-In and NCIIPC.

UPSC Prelims MCQ

Q. With reference to the Kudankulam Nuclear Power Plant (KKNPP), consider the following statements:

1. Kudankulam Nuclear Power Plant uses Russian-designed VVER Pressurised Water Reactors.
2. The plant is operated by the Nuclear Power Corporation of India Limited (NPCIL).
3. CERT-In is the statutory nuclear safety regulator in India.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 1 and 2 only
- (c) 2 and 3 only
- (d) 1, 2 and 3

Answer: (b)

Explanation: Statement 3 is incorrect. **AERB** is the nuclear safety regulator, while **CERT-In** is India's nodal cybersecurity incident response agency.

UPSC Mains Question (10 Marks)

Cybersecurity has emerged as a critical component of national security in the nuclear energy sector. Discuss the implications of the recent Kudankulam Nuclear Power Plant data leak and suggest measures to strengthen cybersecurity for India's critical infrastructure.

2.Iran's Disruptive Strategy and Its Global Consequences

Why in News?

Iran's recent actions in the **Strait of Hormuz**, including threats to shipping and preferential transit proposals, have renewed concerns over **global energy security, maritime trade, and regional stability**. The developments also highlight contrasting foreign policy approaches adopted by **Iran and India**.

Key Highlights

Aspect	Details
Immediate Trigger	Iran's actions in the Strait of Hormuz during the West Asia crisis

Core Issue	Impact on global energy security, maritime trade and regional stability
India's Position	Strategic restraint, diplomacy and support for international law
Major Concern	Threat to one of the world's busiest energy trade routes

Iran's Strategy of Disruption

Iran has pursued a strategy of **deterrence through asymmetric warfare**, expanding regional influence without engaging in full-scale conventional wars.

Key Features

- Supports the **Axis of Resistance**, comprising **Hezbollah, Hamas and Houthis**.
- Relies on proxy warfare, missile capability and maritime coercion.
- Uses strategic waterways such as the **Strait of Hormuz** to exert geopolitical pressure.
- Projects itself as a challenger to Western and Israeli influence in West Asia.

Objectives

- Counter the United States and Israel.
- Expand regional strategic influence.
- Strengthen deterrence against external intervention.
- Preserve regime security.

Strategic Costs for Iran

Short-term Gains	Long-term Costs
Increased regional leverage	Diplomatic isolation
Pressure on adversaries	Economic sanctions
Proxy influence	Reduced foreign investment
Strategic deterrence	Weak integration into global economy

Strait of Hormuz: Strategic Importance

Particular	Details
Location	Connects the Persian Gulf with the Gulf of Oman and Arabian Sea

Global Significance	One of the world's busiest oil shipping chokepoints
Share of Global Oil Trade	Around 20% of global crude oil passes through the Strait
Importance for India	Major route for crude oil and LNG imports from Gulf countries

Concerns

- Disruption of global energy supplies.
- Increase in crude oil prices.
- Higher freight and insurance costs.
- Threat to freedom of navigation.

Way Forward

- Promote diplomatic engagement and confidence-building measures.
- Ensure freedom of navigation under international law.
- Strengthen multilateral cooperation in West Asia.
- Diversify global energy supply chains.
- Encourage peaceful resolution of disputes through dialogue.

UPSC Prelims MCQ

Q. With reference to the Strait of Hormuz, consider the following statements:

1. It connects the Persian Gulf with the Gulf of Oman.
2. It is bordered by Iran and Oman.
3. Nearly one-fifth of global crude oil trade passes through it.

Which of the statements given above is/are correct?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) **1, 2 and 3**

Answer: (d)

UPSC Mains Question (10 Marks)

Recent developments in the Strait of Hormuz highlight the growing significance of maritime security and energy geopolitics. Discuss the implications of Iran's disruptive strategy for regional stability and India's energy and strategic interests. (150 words)

3.India–UK Comprehensive Economic and Trade Agreement (CETA)

Why in News?

The **India–UK Comprehensive Economic and Trade Agreement (CETA)** came into force on **15 July 2026**, marking **India's first comprehensive Free Trade Agreement (FTA) with a developed economy**. The agreement provides duty-free market access for most Indian exports while opening India's market to selected UK products through phased tariff reductions.

Key Highlights

Particular	Details
Agreement	India–UK Comprehensive Economic and Trade Agreement (CETA)
Came into Force	15 July 2026
Nature	Comprehensive Free Trade Agreement (FTA)
India's First	Comprehensive trade agreement with a developed country
Coverage	Goods, Services, Investment, Mobility, Government Procurement, Digital Trade, Intellectual Property

Major Provisions

Market Access

India's Exports to UK	UK's Exports to India
99% of Indian exports become duty-free	Around 90% of UK tariff lines receive tariff reduction/elimination

Key Indian Sectors Benefited

- Textiles & Garments
- Leather & Footwear
- Gems & Jewellery
- Marine Products
- Engineering Goods
- Pharmaceuticals
- Agricultural & Processed Food Products
- MSMEs and Labour-intensive industries

Benefits for India

- Greater market access for labour-intensive exports.
- Boost to **MSMEs**, farmers and manufacturing.
- Increased employment in export-oriented sectors.
- Improved competitiveness of Indian products.
- Easier mobility for Indian professionals.
- Diversification of export markets beyond traditional destinations.
- Strengthening India-UK strategic and economic partnership.

About Free Trade Agreement (FTA)

A **Free Trade Agreement (FTA)** is an agreement between two or more countries to reduce or eliminate tariffs and non-tariff barriers, facilitating trade in goods and services while promoting investment and economic cooperation.

Way Forward

- Improve export competitiveness through quality standards and logistics.
- Help MSMEs utilize FTA benefits through awareness and capacity building.
- Expand cooperation in technology, innovation and services.
- Pursue early conclusion of FTAs with the **European Union** and **Gulf Cooperation Council (GCC)**.
- Address emerging trade issues such as carbon taxes and digital trade regulations.

UPSC Prelims MCQ

Q. With reference to the India–UK Comprehensive Economic and Trade Agreement (CETA), consider the following statements:

1. It is India's first comprehensive trade agreement with a developed country.
2. Under the agreement, 99% of Indian exports to the UK receive duty-free market access.
3. India secured a complete exemption from the UK's proposed Carbon Border Adjustment Mechanism (CBAM).

Which of the statements given above is/are correct?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

Answer: (a)

UPSC Mains Question (10 Marks)

The India–UK Comprehensive Economic and Trade Agreement (CETA) marks a significant milestone in India's trade policy. Discuss its key features, potential economic benefits, and challenges for India's manufacturing sector and MSMEs. (150 words)

4.Semicon India Programme 2.0

Why in News?

The Union Cabinet has approved **Semicon India Programme 2.0** with an outlay of **₹1.27 lakh crore** to develop a complete semiconductor ecosystem by promoting chip manufacturing, design, packaging, materials, equipment and R&D. The scheme aims to make India a global semiconductor hub and strengthen technological self-reliance.

Key Highlights

Particular	Details
Scheme	Semicon India Programme 2.0

Approved by	Union Cabinet
Approval Date	15 July 2026
Total Outlay	₹1.27 lakh crore
Duration	6 Years
Nodal Agency	India Semiconductor Mission (ISM), MeitY
Expected Investment	₹4 lakh crore

What is Semicon India Programme 2.0?

Semicon 2.0 is the **second phase** of India's semiconductor mission, expanding support beyond fabrication plants to the **entire semiconductor value chain**.

Six Strategic Pillars

Pillar	Focus Area
Chip Design	Indigenous chip design & IP creation
Semiconductor Materials & Equipment	Chemicals, gases, wafers, manufacturing equipment
Fabrication Units (Fabs)	Silicon, compound semiconductor & display fabs
ATMP/OSAT	Assembly, Testing, Marking & Packaging
Research & Development	Semiconductor innovation and advanced technologies
Talent Development	Skilled workforce and semiconductor education

Objectives

- Reduce dependence on imported semiconductor chips.
- Develop an end-to-end domestic semiconductor ecosystem.
- Promote **Atmanirbhar Bharat**, **Digital India** and **Make in India**.
- Enhance supply-chain resilience.
- Generate high-skilled employment.
- Position India among the world's leading semiconductor nations by **2035**.

India Semiconductor Mission (ISM)

Particular	Details
Launch	2021
Ministry	Ministry of Electronics & Information Technology (MeitY)
Function	Implementation of India's semiconductor programmes
Objective	Build a globally competitive semiconductor ecosystem

Way Forward

- Develop semiconductor manufacturing clusters.
- Strengthen semiconductor R&D and innovation.
- Promote domestic design startups.
- Build skilled manpower through academia-industry collaboration.
- Diversify global semiconductor supply chains with trusted partners.

UPSC Prelims MCQ

Q. With reference to the Semicon India Programme 2.0, consider the following statements:

1. It aims to promote the entire semiconductor value chain, including chip design, fabrication and packaging.
2. The India Semiconductor Mission (ISM) under the Ministry of Electronics and Information Technology is the nodal implementing agency.
3. Silicon fabrication units are eligible for a 40% capital expenditure subsidy under the programme.

Which of the statements given above is/are correct?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

Answer: (d)

UPSC Mains Question (10 Marks)

India's semiconductor strategy has evolved from attracting fabrication plants to building an end-to-end semiconductor ecosystem. Discuss the significance of the Semicon India

Programme 2.0 in achieving technological self-reliance and strengthening India's position in global semiconductor value chains. (150 words)

5.IIT Bombay's Breakthrough in Sustainable Drug Discovery

Why in News?

Scientists at **IIT Bombay** have developed a novel chemical method to convert **simple straight-chain carbon compounds into complex ring-shaped molecules** in a single efficient process. The breakthrough, published in **Nature**, has the potential to make **drug discovery** faster, cheaper and environmentally sustainable.

Key Highlights

Particular	Details
Institution	IIT Bombay
Lead Scientist	Prof. Debabrata Maiti
Collaborating Institution	Bhabha Atomic Research Centre (BARC)
Published In	Nature Journal
Major Achievement	Direct conversion of straight-chain carbon compounds into cyclic (ring) molecules

What is the Breakthrough?

- Researchers developed a **new catalytic chemical process** that converts **simple saturated carbon chains (fatty acids)** into **complex cyclic molecules**.
- Traditionally, synthesizing such ring molecules required **multiple reaction steps**, expensive chemicals and generated significant waste.

- The new method enables **selective activation of specific carbon atoms**, producing ring structures in **fewer steps with higher efficiency**.

Why are Ring Molecules Important?

- Most **pharmaceutical drugs**, natural products and agrochemicals contain **cyclic (ring-shaped) molecular structures**.
- Ring molecules provide:
 - Greater chemical stability.
 - Improved biological activity.
 - Better interaction with biological targets.

Examples include antibiotics, anticancer drugs and anti-inflammatory medicines.

Significance of the Discovery

- Accelerates drug discovery by reducing synthesis time.
- Lowers production costs for pharmaceutical industries.
- Minimizes chemical waste, supporting **Green Chemistry**.
- Enables rapid synthesis of biologically active molecules.
- Successfully synthesized **more than 10 biologically important compounds**, including **Muricatacin**, a natural bioactive molecule.

Potential Applications

Sector	Applications
Pharmaceuticals	Drug discovery and development
Biotechnology	Synthesis of bioactive compounds
Ayurveda Research	Scientific validation and modification of natural compounds
Fine Chemicals	Production of specialty chemicals
Agrochemicals	Development of pesticides and crop-protection molecules

What is Green Chemistry?

Green Chemistry is the design of chemical products and processes that **reduce or eliminate hazardous substances, waste generation and energy consumption**, making industrial production more sustainable.

Challenges

- Scaling up the laboratory process for industrial production.
- Commercial validation across different drug molecules.
- Cost-effective adoption by pharmaceutical industries.
- Regulatory approval for new synthesis methods.

Way Forward

- Promote industry-academia collaboration for commercialization.
- Integrate the technology into pharmaceutical R&D.
- Encourage research under India's biotechnology and pharmaceutical missions.
- Expand applications in drug discovery and natural product chemistry.

UPSC Prelims MCQ

Q. Consider the following statements regarding the recent IIT Bombay research published in Nature:

1. The method converts straight-chain carbon compounds into complex ring-shaped molecules.
2. The breakthrough is expected to reduce the cost and time involved in drug discovery.
3. The process supports the principles of Green Chemistry by reducing chemical waste.

Which of the statements given above is/are correct?

- (a) 1 and 2 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) **1, 2 and 3**

Answer: (d)

UPSC Mains Question (10 Marks)

Recent advances in synthetic chemistry have the potential to transform pharmaceutical innovation. Discuss the significance of IIT Bombay's new chemical synthesis method in promoting affordable, sustainable and indigenous drug discovery in India. (150 words)

