

**INTERNAL SECURITY: CYBERSECURITY [GS-III]****Artificial Intelligence and its Impact on Cybersecurity**

In the era of AI, cybersecurity is paramount to protect against rising threats posed by generative AI misuse, necessitating collaborative solutions for safe digital navigation.

**Cybersecurity**

Cybersecurity encompasses strategies and measures aimed at protecting computer systems, networks, and data from unauthorized access, cyberattacks, and data breaches. It involves safeguarding against threats such as hacking, malware, phishing, and other malicious activities that can compromise digital information and systems.

**Evolving nature and increasing sophistication of cyber threats.**

- New targets: While there has been a decreased trend of attacks on end users attacks on enterprises and SMEs are increasing.
- New forms of technology: New types of malware, such as automated phishing tools and crypto mining software combined with emerging technologies, are expanding the cyber risk landscape.
- A host of digital technologies, such as AI, automated botnets, the Internet of Things (IoT), and cloud computing facilitate sophisticated attacks.
- Potential Unwanted Programs (PUP) and Potentially Unwanted Applications (PUA), masquerading as legitimate apps, are increasingly used to victimize users.
- Using Cryptocurrency: g., In Dec 2021, botnet Phorpiex hijacked hundreds of cryptocurrency transactions in India, Ethiopia and Nigeria. The bot has attacked 969 transactions and has stolen crypto assets worth almost \$0.5 million.
- The botnet used a new attack method called crypto-clipping that steals cryptocurrency including bitcoin, Ethereum and dogecoin during a transaction, by substituting the original wallet address saved in the clipboard with the attacker's wallet address.
- Since many enterprises are shifting their infrastructure to cloud-based platforms, i.e., to data centres, the attackers would target those platforms at an increasing rate.
- For instance – There have already been several reports of attacks or attempted attacks on Microsoft's Office 365 platform.
- Supply chain attacks, such as those used in the NotPetya malware campaign, can be penetrative and lethal.

**AI is impacting cybersecurity in several ways:**

- Increased Phishing Attacks: Phishing emails surged by 1,265%, and credential theft rose by 967% since late 2022 due to AI.
- Voice Cloning for Fraud: Hackers imitated a mother's daughter's voice to extort money, highlighting the risks of AI-based scams.
- Enhanced Hacking Sophistication: AI helps hackers translate code, identify vulnerabilities, and amplify attacks.
- Rising Attacks on Organizations: 75% of professionals reported more cyberattacks last year, while 85% linked the trend to AI.
- Privacy Erosion: Voice-activated toys and biometric systems threaten individual privacy.
- Cybercrime: According to data from CERT-IN, cyber crimes in India have witnessed a 572% increase In the last 3 Years

**Reasons for increasing cyber threats in India from AI:**

- Fragmented cybersecurity infrastructure: Responsibility for cybersecurity in India is spread across various government agencies and private entities, leading to a lack of coordinated strategies.
- Apathy towards data privacy: Despite the Digital Personal Data Protection Act 2023, implementation of secure cyber systems by private and government entities is lacking, as seen in the recent PayTM payments bank ban.
- Large digital divide: Many lack digital literacy, making them vulnerable to phishing attacks and scams.
- Skill shortage: India lacks qualified cybersecurity professionals, hindering effective threat detection and response.

Counter measures taken by India against cyber threats.

- For Critical information infrastructure (CII)- Creation of the National Critical Information Infrastructure Protection Centre, the national nodal agency in respect of CII protection. It was envisaged to act as a 24x7 centre to battle cyber security threats in strategic areas such as air control, nuclear and space.
- Establishment of Defence Information Assurance and Research Agency for cyber security issues of the tri-services and Defence Ministry.
- For the Financial sector – CERT-Fin will work closely with all financial-sector regulators and stakeholders on issues of cyber security.
- Establishment of cyber security infrastructure
- CERT-in – The main function of CERT-In is to provide early security warning and effective incident response. It is also a national agency to collect, analyzes and disseminates information on cyber incidents and takes emergency measures for handling cyber-attacks.
- IT Act 2000 – This act provides a legal framework against cybercrimes related to “electronic commerce”.
- National Cyber Security Policy 2013 has been framed to create a secure cyber ecosystem, ensure compliance with global security systems and strengthen the regulatory framework.
- Others
- I4C (Indian Cyber Crime Coordination Center) was set up in 2016 to look into every kind of cybercrime.
- The Indian Common Criteria Certification Scheme (IC3S) is to evaluate and certify IT Security Products and Protection Profiles.
- Cyber Swachhta Kendra was introduced for internet users to clean their computers and devices by wiping out viruses and malware.
- Cyber Surakshit Bharat Initiative was launched to spread awareness about cybercrime and build capacity for safety measures for Chief Information Security Officers (CISOs) and frontline IT staff across all government departments.

**Global Effort: Bletchley Declaration:**

The Bletchley Declaration, named after the historic code-breaking site, signifies a global commitment to addressing AI's ethical and security challenges, particularly generative AI. Signed at the AI Safety Summit (in 2023), it highlights the increasing global recognition of AI risks and involves major world powers like China, the EU, India, and the US.

**Measures need to be taken:**

**By individuals**

- Apply critical security patches, especially on public-facing servers, and keep end-point security software up-to-date.
- Ignore emails from unknown sources, thus avoiding becoming a victim of phishing and spear phishing attacks.
- Use complex passwords (not to mention, change passwords regularly).

**By government**

- Strengthen cybersecurity agencies and partnerships.
- Invest in AI-driven cybersecurity solutions.
- Promote digital literacy and awareness.
- Establish robust cybersecurity laws.
- Develop cybersecurity skills through training.

Even though the government has taken various measures to curb cyber-attacks, recent cyber threat incidents like the Pegasus cyber-attack, attack on India's COWIN app etc show loopholes in India's cyber security framework. Research and development, Funding and capacity building in cyber security are the need of the hour for GOI.

**GEOGRAPHY [GS-I]**

**Illegal Mining in Aravalli Range**

Recently, the Supreme Court directed Delhi, Haryana, Rajasthan and Gujarat to not accord final permission for mining activities in the Aravalli hill range until further orders to safeguard the Aravalli ecosystem.

### **Illegal Mining in Aravalli Range**

- Impact on Existing Leases: The ban does not affect existing valid mining leases, ensuring continuity for ongoing mining operations.
- However, stringent regulations and monitoring mechanisms to be implemented to mitigate environmental risks.
- Scrutiny and Approval Process: States are allowed to process mining lease applications within the Aravalli region.
- However, final permission for mining activities requires approval from the Supreme Court, ensuring adherence to environmental norms.
- Formation of Committee for Uniform Definition : To tackle the issue of inconsistent definitions of the Aravalli Hills, the Supreme Court ordered the constitution of a committee..
- This committee's task is to establish a unified definition of the Aravalli range across the concerned states.
- The committee shall comprise, among others, the Secretary of MoEF&CC, the secretaries of forest of all these four states and one representative each of the FSI and CEC.
- The aim of this initiative is to streamline regulatory efforts and improve environmental protection measures.

### **About Aravalli Range**

The Aravallis of Northwestern India, one of the oldest fold mountains of the world.

- Formation : These are fold mountains of which rocks are formed primarily of folded crust, when two convergent plates move towards each other by the process called orogenic movement.
- The Aravallis date back to the Proterozoic Era when a pre-Indian subcontinent collided with the mainland Eurasian Plate.
- Extent & Location : It extends from Raisina Hills in New Delhi to Khedbrahma and Palanpur in Gujarat, in a south-west direction, passing through southern Haryana and Rajasthan, and ending in Gujarat.
- The total length is approximately 692 kilometers.
- About 80% of this length, which is approximately 550 kilometers, is located in the state of Rajasthan.
- Two, main ranges – the Sambhar Sirohi Range and the Sambhar Khetri Range in Rajasthan,
- Highest Peak : 1722 m (5656 ft) Guru Shikhar (Munt Abu, Arbuda Mountain Ranges)
- Physiography : Aravalli Range as a rough, rocky, and hilly terrain.
- It is characterized by its rugged topography, with rocky outcrops and hilly landscapes.
- Rivers : Major Flowing rivers Banas, Luni , Sahibi etc
- Minerals : Carbon dating has shown that copper and other metals mined in the ranges date back to at least 5th century BC.
- Major Minerals : Cooper, Zinc, Marble, Lead, Silver etc
- Tribal communities : the Bhil, Bhil-Meena, Meena, Garasia, and others

### **Significance of Aravalli Range**

- Rich Source of Minerals: Non-ferrous minerals like Zinc, Gold, silver and ferrous minerals like Copper ore and lead.
- Nonmetallic minerals and building stones like marble, limestone etc.
- Rich Habitat of Biodiversity: it has rich biodiversity, hosting 300 native plant species, 120 bird species, and various unique animals such as jackals and mongooses. etc.
- Combat Desertification: The hills also moderated the wind velocity and checked the spread of the Indian Desert (Thar) towards eastern Rajasthan, Indo Gangetic plains, Haryana and Western UP.
- Important Drainage System: Aravallis have provided a watershed between the Indus basin in the North West and the Ganga basin in the East.
- Rich Forest acts as Green lungs: Its forested patches have acted as green lungs against the air pollution and soil erosion.
- Cultural: The hills and their forests retain cultural importance for local communities like the Gujjars.

- Mount Abu serves as a pilgrimage site for Jains and is a well-visited tourist destination.
- Concerns of Mining in Aravalli Range
- Environmental Degradation: Over 25% and 31 hill ranges of the Aravallis in Rajasthan have disappeared due to illegal quarrying.
  - Loss of diverse flora and fauna, including leopards, striped hyenas, golden jackals, nilgais, and palm civets.
  - Rivers originating in the Aravalli like Banas, Luni, Sahibi, and Sakhi have become dry.
  - Ecological Impact: Digging or mining to significant depths punctures aquifers, disrupting water flow and resulting in the drying of lakes and the formation of new ones.
  - Man-wild animal conflicts arise as natural forests along the Aravallis are lost.
  - Altered natural drainage patterns threaten the hydrological system and water table in the entire NCR region.
  - Intergenerational Equity:
    - The exploitation of natural resources in the Aravalli range will burden future generations, emphasizing the need for legal frameworks to ensure intergenerational equity.
  - Prevalence and Impact of Mining:
    - In the absence of proper industrialization and sustainable livelihood sources, communities rely on mining and ancillary industries for income.
    - The demand for construction material in NCR and adjacent areas drives mining activities in the Aravalli.
  - Implementational Challenges:
    - Ambiguous law: Regarding inappropriate ownership and the process of privatization of land, No clear defined definition of Forest in particular to the region per se.

#### Way Forward

- Enforcement Measures: Strict implementation of court orders banning indiscriminate mining and construction activities can significantly mitigate the loss of hill ranges in the Aravalli region.
- Reforestation Initiatives: Reforestation efforts can restore the Aravalli to their original vegetation state, similar to the successful restoration undertaken at the Aravalli Biodiversity Park.
- The Great Green Wall Project: Inspired by Africa's 'Great Green Wall' project, India's ambitious plan aims to establish a 1,400km long and 5 km wide green belt stretching from Gujarat to the Delhi-Haryana border.
- This initiative addresses increasing land degradation rates and the eastward expansion of the Thar desert.
- Community Engagement with proactive support of Government: Idea exchanges, wok shop, Awareness campaign etc.

#### PRELIM FACT

##### 1. NGT rejects affidavit of Odisha government on Satkosia tourism

- The National Green Tribunal (NGT) has expressed dissatisfaction over the state government's counter affidavit to a petition alleging harmful tourism activities inside Satkosia Tiger Reserve and Satkosia gorge of Mahanadi river under the garb of eco-tourism.
- The NGT's East Zone bench in Kolkata observed that the counter affidavit was silent with regard to the structures that have been constructed in the ecologically-sensitive area. The petition was filed by Wildlife Society of Orissa.
- According to a petition, more than 16 cottage tents - seven of them having AC facility with attendant dining huts - have been set up during tourist season for eight months from October to May as part of the 'Badmul Sand Resort' in Satkosia. In the resort, bonfires are lit at night and sand sports are organised along with folk music and dance which are extremely disturbing to the wildlife.
- "Construction of tents and sheds for tourists in the ecologically sensitive area will bring irreparable damage to the local environment, biodiversity," the petition stated. Advocates Sankar Prasad Pani and Ashutosh Padhy appeared on the petitioner's behalf.

- Earlier on May 10, the bench had directed the government to file its counter affidavit, particularly with reference to the Satkosia Wildlife Sanctuary and the issues involved in the case.
- Satkosia gorge having a length of almost 14 mile that runs through the Tiger Reserve is one of the largest river gorges of the state. The area was declared as a Ramsar Site in 2021.

**2. Mammoth (World’s largest Direct Air Capture and Storage (DAC+S) plant)**

- The world’s largest Direct Air Capture and Storage (DAC+S) plant, Mammoth, has commenced operations in Iceland.
- This Swiss company Climeworks’ second commercial DAC+S facility surpasses its predecessor, Orca, in size.

What is a Direct Air Capture and Storage (DAC+S) plant?

- Direct Air Capture and Storage (DAC+S) is a technology designed to remove carbon dioxide (CO2) directly from the atmosphere at any location. It is a form of Carbon Dioxide Removal (CDR) technology, distinct from carbon capture methods typically carried out at the point of emissions. The captured CO2 can then be permanently stored in deep geological formations or utilized for various applications. DAC+S plants aim to contribute to efforts to reduce CO2 levels in the atmosphere, addressing climate change concerns.

**3. Hague Convention**

- UNESCO is commemorating the 70th anniversary of the Hague Convention for the Protection of Cultural Property in Armed Conflict
- The Convention is the first legal framework solely dedicated to safeguarding movable and immovable heritage. It shields cultural property during both peace and conflict. With 135 member states, including India, the Convention and its 1954 and 1999 Protocols aim to protect cultural treasures, with the latter introducing the concept of Enhanced Protection for Cultural Properties.

**4. Sonai Rupai Wildlife Sanctuary**

The National Green Tribunal (NGT) has directed the Chief Secretary of Assam to identify officials who permitted the construction of polling stations, schools, and other structures within a wildlife sanctuary and a reserve forest, violating the Forest (Conservation) Act of 1980.

About Sonai Rupai Wildlife Sanctuary

Aspect	Details
Location	1. It is a protected area located in the Indian state of Assam. 2. It is situated in the foothills of the Eastern Himalayas. 3. It is known as the “Jewel of Assam”.
Neighbouring protected areas	It is bordered by the Pachnoi River to the west, Jia Gabharu to the east, the Doimara Reserve Forest in Arunachal Pradesh to the north, and the revenue village and Charduar Reserve Forest of Sonitpur to the south.
Status	It was declared a wildlife sanctuary in 1998.
River flowing through	There are four perennial rivers that flow through the sanctuary: Dolsiri, Gabharu, Gelgeli, and Belsiri. During the rainy season, several wetlands known as “bheels” can also be seen.
Flora	1. The forests type in the sanctuary comprises tropical evergreen, semi-evergreen and moist deciduous forests. 2. Hollang, Mekai, Dhuno, Udiyam, Nahar, Samkothal, Bheer, Hollock, Nahor are found in the sanctuary.
Fauna	1. The sanctuary is primarily known for its Elephant and Indian bison populations. It hosts a variety of other animals including deer, the one-horned rhinoceros, leopards, tigers, and some rare species of cats. 2. The avian life in the sanctuary features endangered species such as the White Winged Wood Duck, along with commonly seen birds like woodpeckers, hill mynas, Indian rollers, nightjars, horned owls, and more.

**5. Foot Rot Disease**

Ludhiana’s Punjab Agricultural University (PAU) has developed a biocontrol agent, *Trichoderma asperellum*, to combat foot rot disease in Basmati rice varieties. Foot rot is a prevalent issue that reduces yields and threatens the state’s export prospects.

Aspects	Description
What is it?	Foot Rot is a fungal disease affecting Basmati rice, most vulnerable at the seedling stage and potentially after transplantation if infected seedlings are used.
Causal Agent	The disease is caused by the fungus <i>Fusarium verticillioides</i> . It is both soil and seed-borne. It spreads through the plant’s roots and colonizes the stem base.
Symptoms	Infected seedlings initially turn pale yellow, then elongate, dry up, and often die.
Current Treatment Methods	a) Biological: Seedlings are treated with <i>Trichoderma harzianum</i> before sowing and transplantation to prevent fungal growth. Note: It is a biocontrol agent that provides an eco-friendly alternative to conventional pesticides, helping in disease management while reducing environmental impact. b) Chemical: Seeds are treated with fungicides such as Sprint 75 WS (a combination of carbendazim and mancozeb) before sowing. However, these chemical treatments can negatively affect the soil and pose toxicity risks to consumers.
Regulatory Action	The fungicide carbendazim has been banned in Punjab due to concerns over high residue levels left in crops.

**6. Hindon River**

The National Green Tribunal has directed the Uttar Pradesh Pollution Control Board (UPPCB) to provide an updated report within two weeks on the pollution of the Hindon river, detailing the actions taken against the responsible municipal bodies.

1. About Hindon River: The Hindon River is a tributary of the Yamuna River, primarily fed by rainwater. It originates from the lower Shivalik ranges in the Saharanpur District of Uttar Pradesh.
2. Course: The river flows through the industrial belt of Western Uttar Pradesh, covering a distance of 400 kilometres before it joins the Yamuna River in Noida.
3. Tributaries: Its main tributaries include the Kali (West) River and Krishni River.
4. Pollution Issues: The Hindon River suffers from significant pollution due to urban, agricultural, and industrial waste being discharged into its waters without adequate treatment. This has made it one of the most polluted stretches in the Ganga basin.
5. Critical Status: In 2015, the Central Pollution Control Board (CPCB) assessed the pollution levels of the Hindon River and declared it a ‘dead river’. It was found to be ‘unfit’ for bathing in several sections due to extreme pollution levels.

**ANSWER WRITING**

**Q. The escalating problem of electronic waste (e-waste) is becoming a major domestic and global issue. What are the essential measures that need to be implemented to ensure responsible and environmentally safe disposal of e-waste on both a domestic and global scale?**

Electronic waste, or e-waste, refers to discarded electronic or electrical devices. It has become a pressing global concern. The Global E-waste Monitor 2020 reported that in 2019 alone, 53.6 million metric tonnes of e-waste was produced worldwide. Alarmingly, the Global Transboundary E-waste Flows Monitor 2022 indicates that almost 10% of this total, or 5.1 Mt, crossed international borders, with a significant portion being shipped without proper controls. These numbers emphasize the urgent need for better e-waste management in the face of its rapid growth and potential environmental and health impacts.

**Challenges of E-Waste:**

- Toxic Elements: E-waste contains toxic elements like lead, mercury, and cadmium which can lead to soil, water, and air contamination if not disposed of properly.

- **Informal Processing:** In countries like India, a substantial amount of e-waste is processed informally, exposing workers to health risks and leading to environmental degradation.
- **Transboundary Movement:** Developed countries often ship e-waste to developing countries, sometimes under the guise of ‘second-hand goods’, leading to dumping in nations ill-equipped to handle it.

**Essential Measures for Responsible and Environmentally Safe Disposal of E-Waste:**

**Domestic Scale:**

- **Legislation and Regulation:** Formulate stringent laws regulating e-waste disposal.
- For example, India’s E-Waste (Management) Rules, 2016 mandates producers to take responsibility for the collection and exchange of e-waste.
- **Promote Formal Recycling:** Encourage setting up of formal recycling units with proper technology to recover metals and reduce hazardous impacts.
- **Public Awareness Campaigns:** Sensitize the public about the harmful effects of e-waste and the importance of proper disposal methods.
- **Producer Responsibility:** Manufacturers should be mandated to take back old products, ensuring they are recycled or disposed of safely.

**Global Scale:**

- **International Agreements:** Strengthen international agreements, like the Basel Convention, that control transboundary movement of hazardous wastes.
- **Standardized Guidelines:** Create standardized e-waste management guidelines ensuring best practices are shared and implemented globally.
- **Transfer of Technology:** Developed countries should assist developing nations in acquiring the technology for safe e-waste disposal.
- For instance, the UNEP’s Solving the E-Waste Problem (StEP) initiative promotes sustainable e-waste handling by facilitating technology and knowledge transfer.
- **Corporate Responsibility:** Global tech companies can play a significant role by designing products that are more durable, easier to repair, and recycle. They can also set up global take-back schemes.
- For example, Apple’s recycling program uses robots to disassemble iPhones and recover valuable materials efficiently.

The escalating problem of e-waste necessitates immediate attention and collective action. Through a combination of domestic initiatives and global cooperation, we can pave the way for sustainable and responsible e-waste management. This will not only protect our environment but also ensure that resources embedded in electronics are efficiently recovered and reused.

**MCQs**

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| <p>1. Consider the following statements about National green tribunal (NGT)</p> <p>1. The NGT is not bound by the procedure laid down under the Code of Civil Procedure, 1908, but shall be guided by principles of natural justice.</p> <p>2. The NGT has the power to hear all civil cases relating to environmental issues and questions that are linked to the implementation of laws listed in Schedule I of the NGT Act.</p> <p>Which of the above statements is/are correct?</p> <p>a) Only 1<br/> b) Only 2<br/> c) <b>Both 1 and 2</b><br/> d) None</p> | <p>2. Which of these phenomena is likely to occur in regions that do not usually encounter a significant Solar Storm?</p> <p>a) Tornadoes<br/> b) <b>Intense auroras</b><br/> c) Heatwaves<br/> d) Snowstorms</p> <p>3. Consider the following statements:</p> <p>1. Free and fair elections are a part of the basic structure of the Constitution.</p> <p>2. Article 324 gives the Election Commission complete authority to ensure a free and fair election.</p> <p>Which of the statement(s) given above is/are correct?</p> <p>a) 1 only<br/> b) 2 only<br/> c) <b>Both 1 and 2</b></p> |
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- d) Neither 1 nor 2
4. Consider the following statements:
1. The Election Commission of India developed the Model Code of Conduct (MCC) based on the Supreme Court decision in *S. Subramaniam Balaji vs. Govt of Tamil Nadu*.
  2. The model code of conduct is legally enforceable.
  3. Neither the Representation of the People Act nor the Conduct of Election Rules makes any provision for the model code of conduct.
- How many of the statements given above are correct?
- a) **Only one**
  - b) Only two
  - c) All three
  - d) None
5. The decision to accept a new member state in the United Nations (UN) ultimately lies with:
- a) The Security Council.
  - b) The Secretary-General.
  - c) **The General Assembly by a two-thirds majority vote.**
  - d) A unanimous vote of all existing member states.
6. 'Bletchley Declaration', which was in the news recently, is associated with which field?
- (a) Global terrorism
  - (b) Plastic pollution
  - (c) **Artificial Intelligence**
  - (d) UNSC reforms
7. Which of the following statements about 'Direct Air Capture and Storage' (DACs) is true?
- (a) DACs is a technology solely used for capturing carbon dioxide emissions from industrial sources.
  - (b) **DACS involves the extraction of carbon dioxide directly from the atmosphere and its subsequent storage or utilization.**
  - (c) DACs is primarily focused on trapping methane emissions from landfills and agricultural activities.
  - (d) DACs is a process that solely relies on natural processes to remove carbon dioxide from the atmosphere.
8. Which of the following statements about the 'Hague Convention' of UNESCO is true?
- (a) The Hague Convention aims to regulate maritime navigation and prevent conflicts over territorial waters.
  - (b) The Hague Convention addresses issues related to international trade and tariffs on agricultural products.
  - (c) **The Hague Convention primarily focuses on the protection of cultural heritage during armed conflicts.**
  - (d) The Hague Convention is concerned with the establishment of diplomatic relations between nations.
9. Which of the following statements about the Cook Islands is correct?
- (a) **The Cook Islands is an independent country in free association with New Zealand.**
  - (b) The Cook Islands is a territory of Australia.
  - (c) The Cook Islands is a part of French Polynesia.
  - (d) The Cook Islands is a sovereign state within the United Nations.
10. Consider the following statements about Hindon River
1. Hindon River is a tributary of the Ganga River, primarily fed by rainwater.
  2. It originates from the lower Shivalik ranges in the Saharanpur District of Uttar Pradesh.
  3. In 2015, the Central Pollution Control Board (CPCB) assessed the pollution levels of the Hindon River and declared it a 'dead river'. It was found to be 'unfit' for bathing in several sections due to extreme pollution levels.
- Which of the above statements is/are incorrect ?
- a) **1 only**
  - b) 2 only
  - c) 1, 2 and 3
  - d) 2 and 3 only