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Daily News Analysis

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1. Light-Based Computing

- **Prelims -** Light-Based Computing
- **Mains** - GS 3 - Science and Technology (ICT)

Why in the news?

- Researchers have reported a chip called LightGen based on Light-Based Computing

Light-Based Computing

- **What is it?:** Light-based computing, also known as **optical or photonic computing**, uses photons (light particles) instead of electrons for data processing, promising faster speeds and lower energy use than traditional electronic systems.

- **Core Principles:**
  - ➔ Light signals travel through optical fibers or waveguides, where nonlinear interactions transform data—such as converting images into light pulses for instant processing via spectrum changes.
  - ➔ Unlike silicon chips generating heat from electron flow, photonic systems enable parallel operations using different light wavelengths, achieving up to 91-93% accuracy in tasks like image recognition in picoseconds.

- **Applications:**
  - ➔ **AI and machine learning** for rapid neural network training and real-time recognition.
  - ➔ **Energy-efficient supercomputing** in data centers for climate modeling and genomics.
  - ➔ **Telecom latency reduction** and defense surveillance via high-speed data processing.

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2. Sashastra Seema Bal (SSB)

- **Prelims -** Sashastra Seema Bal (SSB)
- **Mains -** GS 3 - Internal Security (Border Security)

Why in the news?

- Prime Minister greets the personnel of the Sashastra Seema Bal on the occasion of their Raising Day.

Sashastra Seema Bal (SSB)

- **Establishment:** In **1963**, in the aftermath of the **1962 Sino–Indian War**
- **Mandate and Jurisdiction:** Entrusted with guarding India's **international borders with Nepal and Bhutan**, operating mainly in sensitive border areas with significant people-to-people movement.
- **Administrative Control:** One of the **Central Armed Police Forces (CAPFs)**, functioning under the **Ministry of Home Affairs (MHA)**.
- **Organizational Structure:**
    → Headed by a **Director General** (IPS or senior CAPF officer).
    → It comprises **Infantry-style battalions, Specialized wings** such as Engineering, Signals, Medical units and Dog squads as well as **Dedicated training institutions.**
- **Key Functions and Roles:**
    → Ensures **security and protection of designated border areas**.
    → Prevents **smuggling, illegal immigration, and trans-border crimes**.
    → Checks **unauthorised entry and exit** across the international borders.
    → Implements **civic action and social responsibility programmes** such as Construction of schools, toilets, roads, and community infrastructure.
    → Performs **additional duties** as assigned by the Central Government, including **UN peacekeeping missions, Law and Order duties, Counter-insurgency operations and Election security.**

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3. Project Cheetah and Tigers Outside Tiger Reserves (TOTR) Project

- **Prelims -** Project Cheetah, Tigers Outside Tiger Reserves (TOTR) Project
- **Mains** - GS 3 - Environment (Wildlife Conservation Efforts)

Why in the news?

- The Union Environmental Minister released a publication highlighting the progress of Project Cheetah and Tigers Outside Tiger Reserves (TOTR) project in India.

Project Cheetah

- **What is it?:** Project Cheetah is an initiative by the **Union Ministry of Environment, Forest & Climate Change** in coordination with **National Tiger Conservation Authority.**
- **Aim:** To **reintroduce the cheetah**, a species that went extinct in India in 1952
- **Features:**
  - ➔ The cheetahs being used are African subspecies (southern/eastern African cheetahs) **sourced from** countries such as **Namibia, South Africa etc.**
  - ➔ The project was formally **kick-started in September 2022** with the first batch of cheetahs arriving in India to India's first site.
  - ➔ **Site selection:** Choose large protected areas with adequate prey base, minimal human-disturbance, connectivity possibilities and appropriate habitat for open-terrain carnivores (cheetah prefers open/grassland/woodland mosaic).
  - ➔ **Genetic diversity:** Use cheetahs from multiple source populations to maintain genetic health of the reintroduced population.
  - ➔ **Monitoring & management:** Use collars, field monitoring, prey base augmentation, habitat management, community involvement.
  - ➔ **Phased expansion:** After initial pilot site(s), plan other sites and scale up to create a metapopulation structure (i.e., multiple sites connected via corridors).

Tigers Outside Tiger Reserves (TOTR) Pjoject

- **What is it?:** The Tigers Outside Tiger Reserves (TOTR) is a new national-level initiative by the Ministry of Environment, Forest and Climate Change (MoEFCC) and the National Tiger Conservation Authority (NTCA).

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- **Aim:**
  - ➔ To reduce human–tiger conflicts in non-reserve landscapes by ensuring safe coexistence between people and dispersing tigers.
  - ➔ To protect tigers that move beyond reserve boundaries due to habitat fragmentation, growing populations, and shrinking corridors.
  - ➔ To foster a landscape-level conservation approach, balancing ecological sustainability with human safety and livelihoods.
- **Period:** The project will be implemented over 2025–28

4. Prelims Pointers

- **Autophagy:**
  - ➔ It is a **cellular housekeeping and survival mechanism meaning Self Eating**.
  - ➔ It involves the **degradation and recycling of damaged organelles, misfolded proteins, and pathogens** through the lysosomal system.
  - ➔ It maintains **cellular quality control** and plays a key role in **development, immunity, and aging**.