Defence & Security · GS - III

The proliferation of low-cost drones and coordinated swarm attacks is challenging the traditional cost-effectiveness of air defence systems. Analyse the implications of this development for national security and examine how India can build a resilient counter-drone architecture.

EXAM YEAR	PAPER	SUBJECT
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MARKS	WORD LIMIT
15	~250 words

Answer Hint

Drone warfare, swarm technology, asymmetric warfare, saturation attacks, air defence systems, electronic warfare, radar surveillance, directed-energy weapons, artificial intelligence, critical infrastructure, indigenous defence production, multi-layered security.

Model Answer

Introduction

The Russia-Ukraine conflict has demonstrated how relatively inexpensive unmanned aerial vehicles (UAVs) can be deployed in large numbers to overwhelm conventional air defence systems. Drone warfare is transforming modern military operations.

Security Implications

1. **Asymmetric warfare:** Low-cost drones enable technologically weaker actors to challenge expensive military infrastructure.
2. **Saturation attacks:** Coordinated swarms can overwhelm radar networks and exhaust interceptor missiles.

3. **Economic asymmetry:** Using expensive missiles against inexpensive drones creates an unfavourable cost-exchange ratio.
4. **Critical infrastructure vulnerability:** Military bases, energy installations, communication networks and civilian infrastructure face increased risks.
5. **Operational uncertainty:** Small drones, low-altitude flight and autonomous navigation complicate detection and interception.

Building India's Counter-Drone Architecture

- **Integrated surveillance:** Combine radar, electro-optical sensors and electronic intelligence for continuous threat detection.
- **Layered interception:** Develop a combination of guns, short-range missiles, electronic warfare and directed-energy weapons.
- **AI-based systems:** Use artificial intelligence for rapid threat classification, swarm tracking and coordinated responses.
- **Indigenous capabilities:** Strengthen domestic production of counter-drone technologies, sensors and electronic components.
- **Critical infrastructure protection:** Establish specialised security protocols for airports, defence installations and strategic facilities.
- **International cooperation:** Exchange intelligence and technological expertise to address evolving drone threats.

Conclusion

Drone warfare requires a shift from conventional air defence towards integrated, adaptive and cost-effective counter-UAV systems. India's preparedness must combine technological innovation, indigenous manufacturing and coordinated security institutions.

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