Science & Technology · GS - III

Critical infrastructure failures in aviation can produce cascading disruptions across transport networks and the economy. Analyse the vulnerabilities of India's aviation infrastructure and suggest measures to strengthen its operational resilience.

EXAM YEAR	PAPER	SUBJECT
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MARKS	WORD LIMIT
10	~150 words

Answer Hint

Aviation infrastructure, air traffic management, ground stop, digital dependence, single point of failure, cybersecurity, redundancy, disaster recovery, DGCA, institutional coordination, resilient infrastructure.

Model Answer

Introduction

Aviation is a critical infrastructure sector whose operations depend on interconnected communication, navigation, surveillance and information technology systems. Technical failures can disrupt flight schedules, passenger movement and economic activity.

Major Vulnerabilities

- **Legacy infrastructure:** Ageing hardware and software may increase technical failures and maintenance challenges.
- **Digital dependence:** Centralised IT systems can create single points of failure.

- **Cybersecurity threats:** Cyberattacks and software vulnerabilities can compromise operational continuity.
- **Interdependence:** Airports, airlines, air traffic control and communication networks depend on coordinated operations.
- **Emergency preparedness:** Inadequate backup arrangements can prolong disruptions.

Measures to Strengthen Resilience

India should modernise air traffic management systems, establish geographically distributed backup facilities and conduct regular disaster-recovery exercises. Cybersecurity audits, real-time monitoring and interoperable communication systems are essential. DGCA, Airports Authority of India and airlines must strengthen coordination and contingency planning.

Conclusion

Aviation safety requires not only preventing accidents but also ensuring continuity during technological disruptions. Resilient, secure and redundant infrastructure is essential for India's growing aviation sector.

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