Science & Technology · GS - III

Explain the role of Public Key Infrastructure (PKI) and digital certificates in securing India's digital ecosystem. Examine the challenges associated with cybersecurity governance, independent audits and accountability of digital trust service providers.

EXAM YEAR	PAPER	SUBJECT
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MARKS	WORD LIMIT
10	~150 words

Answer Hint

Explain PKI, encryption, authentication and certificate authorities; examine key-management failures, audit limitations and trust vulnerabilities; recommend independent assessments, secure key generation, prompt revocation and regulatory oversight.

Model Answer

India's expanding digital ecosystem depends on secure online transactions, electronic signatures and trusted communication. Public Key Infrastructure (PKI) supports this ecosystem through cryptographic keys, digital certificates and Certificate Authorities (CAs), enabling authentication, encryption and data integrity.

The recent eMudhra security incident, involving weak private keys associated with intermediate certificate authorities, highlights vulnerabilities in digital trust infrastructure. The company's appointment of KPMG as an independent external reviewer demonstrates the importance of examining technical failures, internal controls and governance arrangements. Browser trust programmes also play a critical role by withdrawing trust from affected certificates.

However, cybersecurity cannot depend solely on periodic audits. Weak key-generation procedures, inadequate monitoring, supply-chain dependencies and delayed incident reporting can undermine trust.

India should strengthen regulatory supervision, secure key-management practices, independent technical assessments and mandatory incident-response procedures. Greater coordination among CERT-In, the Controller of Certifying Authorities and industry stakeholders is also necessary.

Ultimately, digital trust requires continuous security assurance, transparent accountability and resilient technological infrastructure.

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