NAST 2025-26 - Research Questions

The Network for Advanced Study of Technology Geopolitics (NAST) aims to build high-quality scholarship in India at the intersection of technology and geopolitics. Discussions around emerging and critical technologies often lack a prudent understanding of how emerging technologies, geoeconomics, and geopolitics interact and can play a pivotal role in shaping India's national power. Furthermore, specific aspects of technology geopolitics are severely understudied, and papers exploring these questions will likely have higher chances of making an impact.

Therefore, the research proposals **must be** from one of the technology domains mentioned below. Please note that priority will be given to proposals that align closely with the identified themes and questions in each technology domain.

The sample research questions for some domains have been provided but are not exhaustive. Applicants can explore other research questions if they align closely with the identified themes and questions below.

List of Technology Domains

A. Open Technologies

Open technologies and FOSS play a strategic role in digital sovereignty. This sector examines how India can leverage open-source software for defense, cybersecurity, and innovation. Proposals can focus on reducing strategic vulnerabilities, policy incentives for open-source adoption, and India's role in global open technology collaborations.

1. How can India leverage open-source technologies for national security and innovation?
2. What role does open-source software play in reducing dependency on foreign tech? Can promoting Open Technologies be a means to achieve strategic autonomy?
3. What policies can incentivise the adoption of open technologies in governance and defence?
4. How accurately is the contribution of open-source software factored into assessments of innovation and value creation within the Indian tech industry?
5. How does the emigration of academic talent affect the advancement of deep technology and foundational research in India?
6. How can India use open-source technologies to mitigate risks from global supply chain dependencies in critical sectors?
7. How do open-source cybersecurity frameworks influence India's digital sovereignty in an increasing cyber threat and surveillance era?
8. How can India advance software and technology sovereignty through open-source collaboration and global innovation ecosystems rather than focusing on independently replicating existing solutions?

B. Artificial Intelligence

This theme explores AI's geopolitical impact, focusing on its military applications (e.g., autonomous defense systems), cybersecurity risks (AI-driven cyberattacks, misinformation), and economic implications. Key research areas include AI policy frameworks, global regulatory dynamics, India's AI innovation ecosystem, ethical concerns in warfare, and strategic uses of AI in national security.

1. What are the implications of AI compute restrictions on countries like India? How should India respond to the AI Diffusion rules?
2. What should be the governance mechanisms and policies around agentic AI? Is Agentic AI to be considered separately for governance from other forms of AI uses?
3. What role does AI play in traditional warfare, cyber warfare and national security?

4. What are the specific properties of AI, or specifically genAI, that make it different from other general-purpose technologies, and what do these properties tell us about why and how AI should be treated differently regarding governance?
5. What are the geopolitical implications of AI-driven military applications?
6. What does AI sovereignty mean? How can India balance AI regulation with innovation and economic growth?
7. The AI ecosystem in India is scaling up on research, innovation, and participation from start-ups. What are the dynamics of the AI ecosystem and interdependencies in India?

C. Space

With increasing militarisation and commercialisation of space, this theme examines India's space policy, defense applications (e.g., anti-satellite weapons, ISR capabilities), and the role of private players in satellite and launch vehicle development. Research can also cover international space governance, space situational awareness, and India's position in global space alliances.

1. Impact of global data communication services like 'starlink' and 'one web' entering the Indian market.
2. How can India use outer space capabilities to pursue its economic and military goals?
3. How can India leverage space technologies for defence and economic growth?
4. What are the strategic implications of private-sector involvement in India's space programme?
5. Effect of small satellite mega-constellations on space security and sustainability. Are there other options? Are we getting drawn into a fascination for LEO constellations?
6. How should India engage in global space governance and security frameworks?

D. Technology, Geopolitics and National Power

This theme examines how emerging technologies reshape India's security, influence, and strategic positioning. It considers self-reliance in key sectors, balancing international cooperation with competition, effective policy frameworks, managing Chinese tech, leveraging digital infrastructure, refining alliances, and adjusting trade and governance to boost national power amid evolving global tech rivalries.

1. How do emerging technologies shape India's national security and global influence? How should India navigate global tech regulations and standard-setting bodies?

2. How can India balance technological development with international cooperation and competition?
3. What policy frameworks are needed to govern critical and emerging technologies?
4. What lessons can India learn from other countries in technology governance?
5. How should our alliances change in an era when technology is a primary constituent of power?
6. How does technology create a national power? What are the mechanisms to enhance national power? Is sovereignty such a mechanism?
7. What should India's approach be towards Chinese tech investment, talent, and products?
8. How should international trade policies and agreements evolve to address the geopolitical implications of a rapidly progressing high-tech sector?
9. How can India govern social media platforms that are now increasingly linked with the political systems of their original countries?
10. How do strategic alliances and rivalries influence technology development and deployment?

E. Cybersecurity

Cyber threats are evolving with AI-driven hacking, ransomware, and state-sponsored cyber warfare. This area explores India's cyber resilience, policies for critical infrastructure protection, strategies to counter misinformation campaigns, and participation in global cybersecurity frameworks. It also includes research on data localisation, digital sovereignty, and emerging cyber threat landscapes.

1. How do recent and emerging trends of deglobalisation impact the internet and global digital commons?
2. What are the impacts on the integrity of the internet architecture due to local and regional controls placed by national regulators and governments? And what is the net effect on confidentiality, integrity, and availability, which are the three pillars on which information rests?
3. How should India strengthen its cyber resilience against state-sponsored threats?
4. What are the risks of AI-enabled cyberattacks and misinformation campaigns?
5. What global frameworks can India adopt to secure cyberspace?

F. Supply Chain Resilience and Security

This theme explores India's strategic dependencies on rare earth elements and other critical minerals vital for defense, semiconductors, and clean energy. Research areas include trade partnerships, global resource competition, supply chain diversification, China's dominance in rare earth exports, and domestic mining and processing strategies to ensure supply security.

1. As geopolitical and global capacity factors stress electronic and software supply chains, how can hardware supply chain security be enhanced?
2. How can India enhance supply chain security in semiconductors and critical minerals?
3. What are the vulnerabilities in India's hardware supply chain, and how can they be addressed?
4. How do global trade restrictions impact India's access to key technologies?
5. How can India secure critical mineral supply chains for strategic technologies?
6. What role do trade agreements play in ensuring India's access to rare earth elements?
7. How can nations diversify or tackle the dominance of single or a few players in the global critical minerals market? How can India manage its dependency on China for critical minerals?
8. What could be some global, multilateral deterrence (governance, etc.) mechanisms to de-escalate the hysteria around hardware supply chain security (and related to tech wars in general)?

G. Semiconductors

Semiconductors are crucial for technological sovereignty. This theme examines India's domestic manufacturing potential, supply chain vulnerabilities, dependency on imports, geopolitical constraints (e.g., U.S.-China tensions), and policy interventions such as incentives for chip fabrication. It also explores India's role in global semiconductor alliances and how it can enhance self-reliance.

1. Which semiconductor technologies are crucial for defence and strategic applications? How do global supply chains operate for such semiconductors?
2. How can India develop a competitive semiconductor manufacturing ecosystem?
3. What policy interventions can boost India's semiconductor industry?

H. Lethal Autonomous Weapons and Drones

Autonomous weapons and drone warfare are transforming modern conflict. This sector examines India's policy on LAWs, ethical considerations in their deployment, counter-drone technologies, and military applications of UAVs for surveillance, reconnaissance, and border security. Research can also assess India's role in international arms control discussions on autonomous weapons.

1. What ethical and strategic considerations should guide India's policies on autonomous weapons?
2. How can India counter the proliferation of drone warfare in its security strategy?

3. What role do drones play in border surveillance and military operations?
4. What are the lessons India can draw from drone warfare in the ongoing Russia- Ukraine war? Do ascendant drones make fifth and subsequent generation high-tech fighter aircraft redundant?

I. Biotechnology

Biotech is a key driver of security and economic growth. This theme includes research on biosecurity (e.g., bioterrorism threats, pandemic preparedness), synthetic biology, regulatory challenges in genetic engineering, and India's biotechnology industry. Other areas of interest include global bioeconomy trends, India's role in pharma innovation, and strategic biotech partnerships.

1. What is the role of advanced biotechnologies in national or health security?
2. How should India balance biosecurity concerns with biotechnology innovation?
3. What are the implications of synthetic biology for national security?
4. How can India strengthen its bioeconomy to enhance global competitiveness?

J. Quantum Technologies

Quantum computing and cryptography have profound national security and economic implications. This theme includes research on India's quantum R&D landscape, strategic collaborations, quantum-resistant encryption for cybersecurity, potential military applications (e.g., secure communications), and global competition in quantum supremacy. It can also cover how India can accelerate breakthroughs in quantum networking.

1. In what ways can the global race for technological supremacy in areas like AI and quantum computing reshape power dynamics among nations?
2. What are the national security implications of quantum computing advancements?
3. How can India accelerate research and development in quantum communication?
4. What role does quantum cryptography play in securing critical infrastructure?

K. Nuclear

This theme explores how nuclear technologies can reshape global geopolitics, national security, and alliances. It investigates emerging nuclear advancements' effects on deterrence, arms control, and energy policies while assessing proliferation risks. Also worth examining is how nuclear innovations broadly influence international diplomacy, partnerships, and regional stability. Additionally, one can consider the role of nuclear technology in shaping defense strategies, deterrence,

and balancing power dynamics. Overall, these questions provide insights into leveraging nuclear capabilities responsibly for peaceful purposes while navigating complex global power structures.

1. How would the commercialisation of nuclear fusion impact energy geopolitics?
2. What are the stressors to the global nuclear nonproliferation regime? How likely is it that the world would witness the rise of new nuclear powers?

L. Geospatial Technologies

Geospatial intelligence is crucial for national security, infrastructure, and disaster response. This theme examines satellite-based surveillance, digital mapping regulations, data privacy concerns, and India's geospatial policy reforms. Research can also explore dual-use applications of geospatial tech in economic planning, urban development, agriculture, and climate resilience.

1. What role do geospatial technologies play in national security and disaster response?
2. How can India leverage satellite data for economic and defence applications?
3. How can India regulate and manage geospatial data from external open sources to safeguard its territorial integrity, data accuracy, and strategic interests?
4. How can AI-powered GEOINT enhance India's strategic decision-making?
