UPSC MAINS · ANSWER PRACTICE

Current Affairs · Essay

Technology as the silent factor in international relations

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प्रौद्योगिकी

EXAM YEAR

2020

PAPER

Essay

SUBJECT
Current Affairs

MARKS

125

WORD LIMIT

~1200 words

Answer Hint

Technology and national power; technological competition among states; artificial intelligence and diplomacy; cyber warfare and cybersecurity; space technology and strategic autonomy; digital infrastructure and global influence; technology in trade and economic relations; technological dependence and inequality; international cooperation and governance; India's technological diplomacy and strategic interests.

Model Answer

Introduction

International relations are shaped by geography, military strength, economic capacity, diplomacy and political ideology. Yet beneath these visible forces lies another factor that increasingly determines the distribution of global power: technology. From communication networks and satellite systems to artificial intelligence, semiconductor manufacturing and cyber capabilities, technology influences how states defend themselves, conduct diplomacy, compete economically and exercise international influence.

Technology is often described as a silent factor because its influence may operate without the dramatic visibility of military conflict or diplomatic negotiations. A satellite network can transform battlefield awareness, a digital payment system can expand a country's international economic reach, and control over semiconductor supply

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chains can influence the strategic choices of other states. Technology has therefore become an important instrument of national power, international competition and global cooperation.

Understanding Technology as a Silent Factor

1. Technology as an instrument of power

Traditional measures of national power include military capabilities, population, natural resources and economic output. Technology strengthens these capabilities by improving productivity, intelligence, communication, logistics and defence.

A technologically advanced state may achieve strategic advantages even without possessing the largest population or the greatest natural resources.

2. Technology as a source of influence

States that provide digital infrastructure, telecommunications equipment, satellite services or advanced industrial technologies can develop economic partnerships and strategic relationships with other countries.

Technological influence may create long-term dependence because the receiving country may rely on the provider for maintenance, software updates, technical standards or critical components.

3. Technology as a factor of interdependence

Modern technology depends on complex international supply chains. Semiconductor production, for example, involves specialised equipment, materials, software and manufacturing capabilities distributed across multiple economies.

This interdependence encourages cooperation but also creates vulnerabilities when geopolitical tensions disrupt access to critical technologies.

Technology and the Changing Nature of Global Power

1. Artificial intelligence and strategic competition

Artificial intelligence can improve military planning, intelligence analysis, logistics, industrial productivity and public administration. Countries investing in advanced computing, data infrastructure and AI research may gain economic and strategic advantages.

At the same time, AI creates concerns regarding autonomous weapons, misinformation, surveillance, algorithmic bias and the speed of military

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decision-making.

International relations will increasingly depend on how states balance innovation with safety, accountability and strategic stability.

2. Semiconductors and supply-chain diplomacy

Semiconductors are essential to smartphones, vehicles, communication systems, industrial equipment and advanced defence platforms.

Concentrated manufacturing capabilities and dependence on specialised suppliers have made semiconductors a major geopolitical concern. Export controls, industrial subsidies and technology partnerships are increasingly used to protect national interests.

This demonstrates that economic interdependence can become a source of strategic leverage.

3. Cybersecurity and digital conflict

Cyber capabilities allow states and state-linked actors to target networks, critical infrastructure, financial systems and government information.

Cyber operations may create disruption without conventional military confrontation, making attribution and retaliation difficult. The security of electricity grids, banking systems, communication networks and public databases has therefore become an important element of national security.

International cooperation is essential because cyber threats can cross borders within seconds.

4. Space technology and strategic autonomy

Satellites support navigation, weather forecasting, communications, disaster management, intelligence and military operations.

Space technology has consequently become an important component of strategic competition. The growing number of satellites and the possibility of interference with space-based systems also raise concerns about congestion, debris and the militarisation of outer space.

International norms and responsible behaviour are necessary to preserve the long-term usability of space.

Technology in Diplomacy and International Communication

1. Digital diplomacy

Governments increasingly use digital platforms to communicate foreign-policy positions, engage international audiences and respond to global

events.

Digital diplomacy can expand the reach of public communication and enable faster engagement. However, misinformation, cyberattacks and the rapid spread of inflammatory content can also intensify diplomatic tensions.

2. Technology in crisis management

Satellite imagery, secure communication systems and real-time data can help governments assess natural disasters, humanitarian emergencies and security developments.

These tools can support coordination between countries and international organisations, improving the effectiveness of humanitarian assistance.

3. Scientific diplomacy

Scientific collaboration can create channels of cooperation even when political relations are strained. Joint research in public health, climate science, space exploration and clean energy can generate shared benefits and build mutual confidence.

Technology thus functions not only as an instrument of competition but also as a means of peaceful engagement.

Economic Diplomacy and Technological Interdependence

1. Digital trade and services

Digital technologies have expanded cross-border trade in software, professional services, financial products and digital content. Countries with strong digital capabilities can access global markets without relying exclusively on traditional physical exports.

2. Infrastructure partnerships

Countries compete to provide telecommunications networks, digital platforms, energy systems and transport technologies to developing economies.

Such partnerships can strengthen diplomatic relations, but they also raise questions about debt sustainability, data protection, interoperability and long-term dependence.

3. Technology transfer

Access to technology can help developing countries improve productivity, healthcare, education and industrial capabilities.

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However, unequal access to research, intellectual property and financing may widen the technological gap between developed and developing economies. Fair partnerships and local capacity-building are therefore important for inclusive global development.

4. Standards and rule-setting

Technical standards determine how devices communicate, how data are exchanged and how digital systems operate across borders.

States and international organisations that influence standard-setting can shape the future direction of global markets. Participation in technical institutions has therefore become an important dimension of economic diplomacy.

Technology and India's International Relations

India's foreign policy increasingly combines technological cooperation with strategic autonomy, economic development and national security.

1. Digital public infrastructure

India's experience with digital identity, interoperable payments and digital service delivery has attracted international interest. Through knowledge-sharing and partnerships, India can contribute to the development of accessible digital systems in other countries.

However, successful cooperation requires attention to privacy, cybersecurity, inclusion and local institutional capacity.

2. Space diplomacy

India's space programme contributes to satellite communication, navigation, weather forecasting and disaster management. Cooperation through satellite services, scientific missions and capacity-building can strengthen India's relationships with developing countries.

India's space capabilities also support its scientific standing and strategic autonomy.

3. Semiconductor and electronics manufacturing

India is seeking to strengthen domestic semiconductor and electronics capabilities. Greater domestic capacity can improve supply-chain resilience, attract investment and reduce certain strategic vulnerabilities.

At the same time, semiconductor ecosystems require substantial investment, skilled workers, reliable infrastructure and access to international technology and markets. Domestic development and global

partnerships must therefore complement each other.

4. Cybersecurity cooperation

As India's digital economy expands, protecting critical infrastructure and sensitive information becomes increasingly important.

Cooperation with other countries on cybercrime, threat intelligence, technical standards and capacity-building can improve resilience. India must also contribute to international discussions on responsible state behaviour in cyberspace.

5. Technology partnerships and strategic autonomy

India's partnerships with countries such as the United States, France, Japan and Australia include areas of technological cooperation, defence, research and supply-chain resilience.

Such cooperation can strengthen capabilities, but India must retain the ability to make independent decisions based on its national interests. Strategic autonomy requires diversified partnerships and stronger domestic capacity rather than complete technological isolation.

Challenges in the Global Technological Order

1. The digital divide

Unequal access to broadband, devices, digital literacy and reliable electricity can exclude individuals and countries from technological opportunities.

2. Technological protectionism

Export controls, sanctions and restrictions on technology transfer can disrupt trade and limit the development opportunities of less technologically advanced countries.

3. Cyber threats and espionage

Digital dependence creates vulnerabilities involving intellectual property theft, espionage, ransomware and attacks on essential infrastructure.

4. Ethical concerns

AI-based surveillance, autonomous weapons and algorithmic discrimination raise questions about human rights, accountability and the protection of civilians.

5. Data sovereignty and privacy

Countries increasingly debate where data should be stored, who may access it and which laws should govern its use. Differences in regulation can create friction in international economic relations.

6. Concentration of technological power

A small number of states and corporations possess significant control over advanced technologies, platforms and critical infrastructure. This concentration can influence global markets and limit the choices available to other countries.

7. Environmental costs

Data centres, semiconductor manufacturing, electronic waste and the extraction of critical minerals can impose environmental costs. Sustainable technology policy must address these effects alongside economic and strategic objectives.

Technology and Global Governance

The growing role of technology requires international institutions to develop rules and cooperation mechanisms that balance innovation with security and human welfare.

The United Nations provides a platform for discussions on responsible behaviour in cyberspace and the peaceful uses of outer space. The International Telecommunication Union contributes to global telecommunications standards, while other multilateral and regional forums address AI governance, digital trade and cybersecurity.

However, differences in political systems, economic interests and security priorities make agreement difficult.

Effective global governance should promote transparency, protect fundamental rights, prevent dangerous escalation and ensure that developing countries have a meaningful role in shaping technological rules.

Way Forward

1. Strengthen domestic technological capabilities: Invest in research and development, skilled human resources, resilient supply chains and domestic innovation.

2. Diversify international partnerships: Avoid excessive dependence on a single country or supplier for critical technologies.

3. Promote responsible AI governance: Develop appropriate safeguards for transparency, accountability, safety and human oversight.

4. Enhance cyber resilience: Strengthen critical infrastructure protection, incident response, international cooperation and cyber awareness.

5. Support inclusive digital development: Expand affordable connectivity, digital literacy and access to technology in underserved communities.

6. Build international norms: Encourage dialogue on cyber conflict, autonomous weapons, space security and responsible technological competition.

7. Protect data and privacy: Establish clear legal safeguards, secure data management practices and effective accountability mechanisms.

8. Integrate sustainability: Promote energy-efficient digital infrastructure, responsible mineral sourcing, repair and recycling of electronic products.

Conclusion

Technology has become a silent but powerful determinant of international relations because it influences military capability, economic competitiveness, diplomatic reach and the strategic choices available to states. Its impact often extends beyond visible political events, shaping the structures of global dependence and cooperation.

For India, technological progress offers opportunities to strengthen national security, expand economic influence and contribute to international development. Realising these opportunities requires investment in domestic capabilities, diversified partnerships, responsible innovation and effective global governance.

Ultimately, technology is neither inherently peaceful nor inherently destabilising. Its consequences depend on the purposes for which it is developed, the institutions that govern it and the values that guide its use. A stable international order will require countries to treat technology not merely as a tool of power, but also as a means of shared progress and human welfare.

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