Indian Economy · GS - III

Examine the significance of developing domestic critical mineral processing capabilities for India's economic and strategic security. What challenges must be addressed to build resilient critical mineral supply chains?

EXAM YEAR	PAPER	SUBJECT
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MARKS	WORD LIMIT
10	~150 words

Answer Hint

Critical minerals, lithium and nickel, electric vehicles, clean energy transition, defence manufacturing, import dependence, mineral processing, technology gaps, environmental sustainability, supply-chain resilience

Model Answer

Introduction

Critical minerals such as lithium and nickel are essential for electric vehicles, battery storage, electronics, defence equipment and clean energy technologies. Their availability and processing capacity influence industrial competitiveness and strategic autonomy.

Significance for India

Domestic processing can reduce dependence on imported materials, strengthen manufacturing ecosystems and support the energy transition. Capital subsidies can encourage private investment, technological development and the establishment of large-scale processing facilities. Such capabilities can also improve supply-chain resilience

against geopolitical disruptions.

Major Challenges

India faces limited domestic reserves of certain minerals, technological constraints in extraction and refining, high capital requirements and dependence on imported processing technologies. Mining and processing may also create environmental concerns involving water consumption, waste and pollution.

Way Forward

India should promote research and development, international mineral partnerships, recycling of batteries, transparent investment frameworks and environmentally responsible processing. Skill development and collaboration between industry and research institutions are equally important.

Conclusion

Building domestic critical mineral capabilities is essential for India's industrial growth, clean energy transition and strategic autonomy. A sustainable and diversified supply chain should remain the central objective.

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