Science & Technology · GS - III

Why is there so much activity in the field of biotechnology in our country? How has this activity benefitted the field of biopharma?

EXAM YEAR	PAPER	SUBJECT
2018	GS - III	Science & Technology

MARKS	WORD LIMIT
15	~250 words

Answer Hint

Research and development; skilled workforce; public funding; biotechnology startups; pharmaceutical innovation; biosimilars; vaccines; regulatory and infrastructure challenges

Model Answer

Introduction

India's biotechnology sector has expanded due to its scientific workforce, pharmaceutical manufacturing base, research institutions, public investment and growing demand for affordable healthcare solutions.

Reasons for Increased Biotechnology Activity

1. **Scientific talent:** Universities and research institutes provide expertise in molecular biology, genetics, microbiology and bioinformatics.
2. **Pharmaceutical base:** India's established generic-drug industry offers manufacturing expertise and commercial networks.
3. **Government support:** The Department of Biotechnology and Biotechnology Industry Research Assistance Council (BIRAC) support research, innovation and entrepreneurship.
4. **Growing demand:** The need for affordable diagnostics, vaccines, biologics and treatments encourages investment.
5. **Startup ecosystem:** Biotechnology incubators and public-private partnerships facilitate translation of research into products.

6. **Global integration:** International collaborations and clinical research create opportunities for technology transfer and exports.

Benefits to Biopharma

1. **Biologics and biosimilars:** Biotechnology supports the development of therapeutic proteins, monoclonal antibodies and biosimilars.
2. **Vaccines:** Indian firms have strengthened vaccine development and manufacturing capabilities.
3. **Diagnostics:** Molecular techniques enable faster and more accurate detection of infectious and genetic diseases.
4. **Affordable medicines:** Biosimilars and biotechnology-based manufacturing can improve access to complex therapies.
5. **Personalised medicine:** Genomics and biomarker research can support more targeted treatment.
6. **Exports and employment:** Biopharmaceutical innovation creates skilled jobs and strengthens India's position in global healthcare markets.

Challenges

High research costs, limited late-stage funding, dependence on imported equipment, regulatory complexity and weak industry-academia links can slow innovation. Biosimilars also require rigorous evidence of quality, safety and efficacy.

Conclusion

Biotechnology can move India beyond conventional generics towards innovation-driven biopharmaceuticals. Sustained research funding, robust regulation and stronger technology transfer are crucial to realising this potential.