

- AI adoption can make healthcare more reliable, affordable and accessible, thereby, help achieve universal healthcare and improve India's prospects in medical tourism.
- It can help augment revenue of businesses through better-targeted offers, reduction of demand-supply mismatch, etc.
- It can improve the efficiency of Indian armed forces in areas like logistics, surveillance etc.

Challenges faced by India regarding AI

- **Regulatory challenges** for ensuring data security, protection, privacy, and ethical use via enabling frameworks.
- **Social disruption:** due to impact in areas such as employment concerns, changing preference of an AI empowered middle class, negative social attitude leading to slow adoption of AI etc.
- **International competition:** Currently, India lags behind USA and China in AI building capabilities mostly due to the lack of large internet companies like Google and Baidu that harness users' data.
- **Absence of widespread expertise in AI technologies:** due to largely out-dated education system and acquiring of obsolete skills.
- **Lack of research:** due to paucity of funds in both public and private institutions as well as lack of policy support
- **Inadequate physical infrastructure** such as poor Internet access etc. impedes technology delivery.
- **Technological Competence:** Strength of Indian Software and IT lies in support services. R&D and skills for core solutions and basic research in AI is still nascent.

Measures to address the challenges include:

- India must formulate a policy to drive AI innovation, adaptation and proliferation in multiple sectors. Data policy should be formulated to establish sharing rights, data ownership, data usage policies etc.
- AI should be a critical component of programmes like Make in India, Skill India, Digital India, etc.
- Human Resource Development: through developing an AI Education strategy and recommending AI-based curriculums. This also includes reskilling via identification of skill sets required for AI as well as creating an AI Readiness Index for states
- Evolving standard guidelines for the design, development and deployment of AI based systems to enhance regulation.

Recent developments like the inauguration of Wadhvani Institute of Artificial Intelligence, creation of a Task Force on AI for Economic Transformation by Ministry of Commerce & Industry and signing of Statement of Intent (SoI) by NITI Aayog and Google to help grow AI ecosystem in India are welcome steps to overcome some of the above challenges.

12. *Briefly explain the concept of Additive Manufacturing as well as its advantages and challenges in comparison with conventional manufacturing methods. Also, comment on its potential in terms of revolutionising organ replacement in humans.*

Approach:

- Introduce the concept of additive manufacturing / 3D Printing.
- Highlight its merits/demerits.
- Give examples of its contribution to the field of prosthetics, organ transplants and medicines.

Answer:

Additive manufacturing or 3-D printing is the process of creating an object by building it one layer at a time. From increasing cost-effectiveness and efficiency to spurring innovation, the technology has made a significant impact on the manufacturing industry.

Additive manufacturing (AM) is breaking grounds in sectors such as automobiles industries, aerospace, genetics etc. Organizations such as Boeing and General Electric have begun using additive manufacturing as integral parts of their business processes.

Advantages

- **Speed and cost of production:** Complex designs can be uploaded from a CAD model and printed in a single step. Its adoption will possibly make assembly line obsolete in future, giving greater flexibility and autonomy to labour along with reducing machine and labour cost.
- **Customization:** 3D printing allows more design freedom. For example, it is possible to create different materials on the inside and outside using AM. Varied applications include high-level