Large Language Models

For Prelims: ChatGPT, Artificial Intelligence, Large Language Models (LLMs), Principal Scientific Advisor, Deep Tech, Department for Promotion of Industry and Internal Trade (DPIIT)

For Mains: Benefits and the prospects of **Large Language Models (LLMs)** on India's scientific and technological prowess.

Source: TH

Why in News?

As per **Principal Scientific Advisor**, India will set up a "**high powered committee"** to explore the development of **Large Language Models (LLMs),** tools that harness **Artificial Intelligence** to create applications that can understand and process human language.

What are Large Language Models ?

- **About:**
  - **LLMs :** LLMs are a specific class of **generative AI** models that are trained to understand and generate human-like text.
    - These models are built using deep learning techniques, particularly using neural networks.
    - They can generate coherent and contextually relevant text given a prompt or input.
    - One of the most well-known examples of LLMs is **OpenAI's GPT (Generative Pre-trained Transformer).**
- **Generative AI:**
  - Generative AI refers to the **subset of artificial intelligence** that focuses on creating systems capable of generating content that is similar to what a human might produce.
  - These systems learn from **patterns in existing data and then use that knowledge to produce new, original content.**
  - This content can take various forms, such as text, images, music, and more.
- **US-India Collaboration:**
  - India and the U.S. have a great relationship now, which is perfect for deep tech cooperation. India's draft policy on deep tech says that Startup India's database lists over 10,000 startups in different deep tech areas, which aligns well with the U.S.-India partnership.

What is Deep Tech?

- **About:**
  - Deep tech or deep technology refers to a **class of startup businesses that develop new offerings** based on tangible engineering innovation or scientific discoveries and advances.
  - Usually, such startups operate on, but are **not limited to, agriculture, life sciences,**

chemistry, aerospace and green energy.
    - Deep tech fields like Artificial Intelligence, advanced materials, **blockchain**, **biotechnology**, robotics, **drones**, photonics, and **quantum computing** are moving more and more quickly from early research to market applications.
- **Characteristics of Deep Tech:**
    - **Impact:** The deep tech innovations are **very radical and disrupt an existing market** or develop a new one. Innovations based on deep tech often change lives, economies, and societies.
    - **Time & Scale:** The time required for deep technology to develop the technology and reach the market-ready maturity is **way more than shallow technology development (like mobile apps and websites).** It took decades for artificial intelligence to develop and it is still not perfect.
    - **Capital:** Deep tech often requires a **lot of early-stage funding for research and development**, prototyping, validating hypotheses, and technology development.

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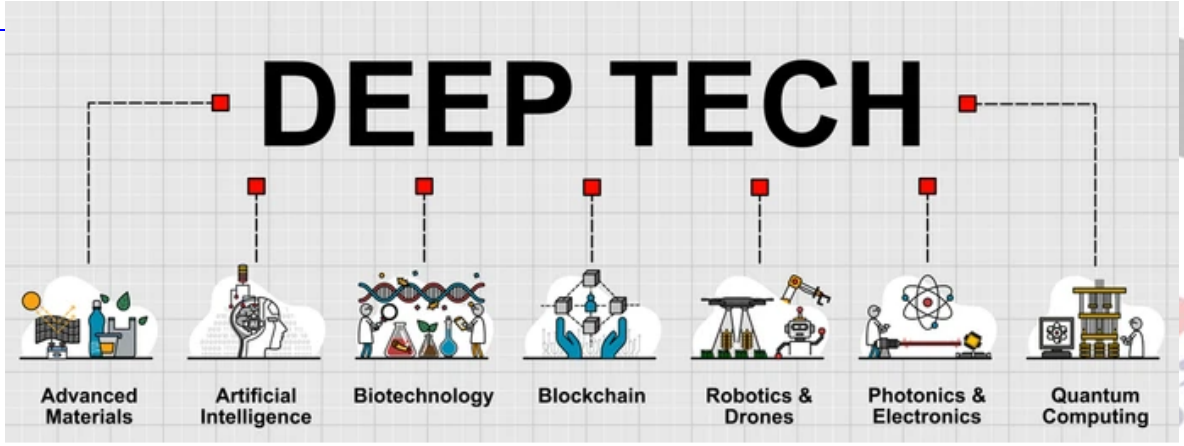

- **Challenges Faced by Deep Tech:**
    - For deep-tech startups, **funding is one of the biggest challenges.** Less than 20% of startups receive financing. Government funds are underutilized, and domestic capital is lacking for such startups.
    - **Talent and market access, research guidance, investors'** understanding of deep-tech, customer acquisition and cost for talent are the major challenges faced by them.

What is the Draft National Deep Tech Startup Policy (NDTSP), 2023?

- **About:**
    - The policy seeks to **bolster research and development in deep tech start-ups, which work on fundamental and technical problems,** unlike firms that monetise technology with distinguished business models.
    - The policy also **seeks to find approaches to provide financing to deep tech start-ups at critical moments**, such as before they go to market with their products or ideas.
- **Facilitate Startups:**
    - The policy seeks to **simplify the intellectual property regime for such start-ups,** ease regulatory requirements, and proposes a slew of measures to promote these firms.
    - NDTSP suggests that an **Export Promotion Board be created to ease barriers** of entry for Indian deep tech start-ups into foreign markets, and that clauses to ease such market access be included in foreign trade agreements.
- **Recommendations:**
    - Policy suggests the creation of an **"Inter Ministerial Deep Tech Committee"** to regularly review the requirements of enabling the deep tech ecosystem to function better.
    - The policy restates the government's **disappointment with international agreements that it argues have left India on the backfoot** in terms of manufacturing and development power.
    - The need of the hour is a **coordinated, comprehensive push** to optimally engage with

international partners and multilateral institutions to **push the Indian Deep Tech Ecosystem.**

Office of the Principal Scientific Adviser (PSA) to the Government of India

- India has had a **Principal Scientific Adviser (PSA)** since 1999. Dr. A.P.J. Abdul Kalam was the first PSA from 1999-2001.
- The PSA's office aims to provide pragmatic and objective advice to the Prime Minister and the cabinet in matters of Science and Technology. The Office of PSA **was placed under the Cabinet Secretariat** in 2018.
- **The Prime Minister's Science, Technology and Innovation Advisory Council (PM-STIAC)** is an overarching Council that facilitates the PSA's Office to assess the status in specific science and technology domains, comprehend challenges in hand, formulate specific interventions, develop a futuristic roadmap and advise the Prime Minister accordingly.
- The Office of PSA, supported by the project management team at Invest India, is facilitating the delivery and progress of **all Nine national missions under PM-STIAC. Four of the nine missions, Deep Ocean Mission, Natural Language Translation mission, AI mission, and Quantum Frontier mission have been approved.**

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Q. With the present state of development, Artificial Intelligence can effectively do which of the following? (2020)

1. Bring down electricity consumption in industrial units
2. Create meaningful short stories and songs
3. Disease diagnosis
4. Text-to-Speech Conversion
5. Wireless transmission of electrical energy

Select the correct answer using the code given below:

(a) 1, 2, 3 and 5 only
(b) 1, 3 and 4 only
(c) 2, 4 and 5 only
(d) 1, 2, 3, 4 and 5

Ans: (b)

Q 2. "The emergence of the Fourth Industrial Revolution (Digital Revolution) has initiated e-Governance as an integral part of government". Discuss. (2020)