4. Organoid Intelligence

Why in News?

- Scientists have recently outlined a plan for a potentially revolutionary new area of research called "organoid intelligence", which aims to create "biocomputers", where 3D brain cultures grown in the lab are coupled to real-world sensors and input/output devices

Highlights

- These "mini-brains" (with a size of up to 4 mm) are built using human stem cells and capture many structural and functional features of a developing human brain.
- It is used to study human brain development and test drugs to see how they respond.
- However, Brain organoids developed in the lab are not advanced enough as they lack the required sensory inputs and blood circulation that are necessary for the development of a complex organ like the human brain.
- Moreover, Scientists transplanted human brain organoid cultures into rat brains and observed that they formed connections with the rat brain and showed functional activity.
- This system could provide a way to study brain diseases in a human context.
- However, the organoids are still in the rat-brain microenvironment, which may not be representative of the human brain
- Researchers plan to combine brain organoids with modern computing methods using machine learning to create "bio-computers".
- They will grow organoids inside structures with multiple electrodes that can record the firing patterns of neurons and mimic sensory stimuli.
- Machine-learning techniques will then be used to analyse the effect of neuron response patterns on human behavior or biology.
- Scientists have already grown human neurons on a microelectrode array and trained them to generate electrical activity similar to what electrons would generate while playing table tennis.