

Synthetic Biology:

Interdisciplinary field that is a combination of biology, engineering and computer science to design and construct new biological parts, devices, system or re-design the existing biological system for useful purpose.

E.g: Enzymes, Genetic circuits and cells.

→ Synthetic Microbes:

Scientists engineer microorganisms to produce valuable chemicals, fuels and pharmaceuticals.

E.g: GM bacteria can convert sugar into ethanol

- Insulin production by using E. coli
- Yeast strains are used to produce different drugs
- Bioremediation i.e. cleaning up to environmental pollutants

→ Gene Editing:

- Modification of DNA to correct genetic disorders in humans
- Enhance agricultural crops
- Improve livestock health
- Advance biological research
- Conservation efforts for endangered species

E.g: engineering of golden rice to produce β -carotene for producing vitamin A

→ Bio-Sensing Devices:

- Helps in detecting specific molecules or environmental conditions.
- Devices use genetically engineered cells that produces detectable signals in response to target substances.

Example:

- Bio sensors are used to:

- 1) detect contaminant in water source,
- 2) Monitor glucose levels in diabetic patients.

→ Biological Computers:

- Devices that use biological components like cell and proteins
- Used for mimicking biological processes
- Scientists exploring their potential for:
 - 1) medical diagnostics
 - 2) environmental monitoring
 - 3) enhancing and understanding of biological systems
- They have many advantages with some limitations such as they can be designed to function like the biological systems.