Genetic Engineering

Definition

Genetic engineering is the **direct manipulation of an organism's DNA** using biotechnology to change its traits or produce useful products.

Basic Steps

1. **Identification** – Find the gene of interest.
2. **Isolation** – Remove the desired gene from the source organism.
3. **Insertion** – Introduce the gene into the host organism's DNA (using a vector like plasmid).
4. **Expression** – The host organism produces the desired protein or trait.
5. **Testing & Production** – Check results and produce on a large scale.

Applications

- **Agriculture** – Pest-resistant crops, high-yield varieties.
- **Medicine** – Insulin production, vaccines, gene therapy.
- **Industry** – Enzyme production, biofuels.
- **Animal breeding** – Improved breeds, disease resistance.

Examples

- Bt cotton (pest-resistant plant).
- Genetically modified rice (Golden Rice – rich in Vitamin A).
- Human insulin from genetically modified bacteria.