INDEX

1. BIOTECHNOLOGY

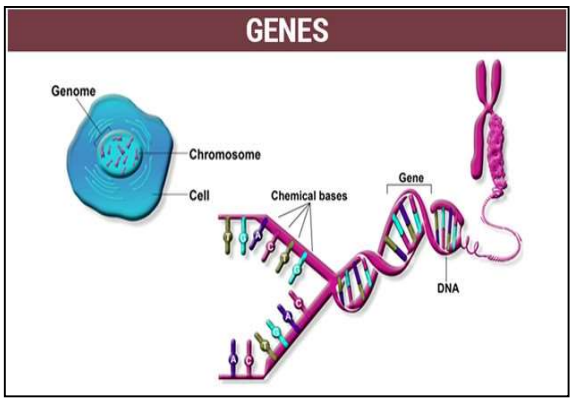
Biotechnology is the use of biological systems found in organisms or the use of the living organisms themselves to make technological advances and adapt those technologies to various fields.

COLOR CLASSIFICATION OF BRANCHES OF BIOTECHNOLOGY:

- **Gold biotechnology or Bioinformatics**: Computational Biology → address biological problems using computational techniques.
- **Red Biotechnology**: Biopharma → relates to medicine and veterinary products.
- **White Biotechnology**: Industrial Biotech → to design more energy efficient, low resource consuming products.
- **Yellow Biotechnology**: Biotech in Food Industry.
- **Grey Biotechnology**: Environmental applications to maintain Biodiversity.
- **Green Biotechnology**: Emphasizes on Agriculture interests.
- **Blue Biotechnology**: based on use of marine resources.
- **Violet Biotechnology**: deals with law, ethical and philosophical issues of biotechnology.
- **Dark Biotechnology**: associated with bioterrorism and biological weapons.

GENE:

- Gene is the basic physical unit of inheritance.
- It is a part of the DNA in a cell that controls the physical development, behaviour, etc. of an individual plant or animal & is passed on from its parents.



GENOME:

- Genome is the complete set of genes or genetic material present in a cell or organisms.
- The human genome is a **complex set of instructions**, like a recipe book, directing organism growth & development.

GENOMIC ORGANIZATION:

- This refers to the linear order of DNA elements and their division into chromosomes.
- Can also refer to the 3D **structure** of chromosomes & the positioning of DNA sequences within the nucleus.

CHROMOSOME:

- These are **thread-like structures** located inside the nucleus of animal & plant cells.
- Each **chromosome** is made of **protein** and a single molecule of Deoxyribose-Nucleic Acid (DNA).
- Chromosomes are a **key part** of the process that **ensures DNA** is **accurately copied** and **distributed in** the vast majority of **cell divisions**.
- **Changes in the number** or structure of chromosomes in **new cells** may lead to serious problems like: Down Syndrome, Turner Syndrome etc.

DEOXYRIBONUCLEIC ACID (DNA):

- DNA is an **organic chemical** that contains genetic information and **instructions for** protein synthesis.
- **DNA** is a **key part of reproduction** in which genetic heredity passed down through **DNA** from parents to offspring.

RIBONUCLEIC ACID (RNA):

- RNA is a nucleic acid principally involved in the **synthesis of proteins**, carrying the messenger (ex: mRNA) **instructions from DNA**, which itself contains the **genetic instruction**s.

DIFFERENCES BETWEEN DNA AND RNA:

DNA	RNA
It has deoxyribose and phosphate backbone having four distinct bases: Adenine, Cytosine, Guanine & Thymine (ACGT).	It has ribose and phosphate backbone with four bases: Adenine, Cytosine, Guanine& Uracil (ACGU).
Found in cell nucleus and Mitochondria.	Found in Cytoplasm, nucleus and Ribosome.
Has 2-deoxyribose.	Has Ribose.
Double stranded molecule with long chain of nucleotides.	Single stranded molecule with shorter chain of nucleotides.
Self-replicating	Synthesize from DNA when required.

CELL

- A Cell is defined as **smallest, basic unit of life** responsible for all life's processes.
- **Robert Hooke** coined the term **Cell** in 1665.
- Cells provide structure and support to the body of an organism.
- **Cells are of 2 types** namely, Prokaryotes & Eukaryotes.

Prokaryotes	Eukaryotes
Size of cell is generally small	Size of cell is generally large.
Nucleus absent.	Nucleus present.
It contains single chromosome	It contains more than one chromosome
Membrane bound cell organelles are absent.	Cell organelles are present.
Cell division takes place by fission or budding.	Cell division takes place by mitosis and meiosis.

STRUCTURE OF A CELL:

A cell consists of three parts:

1. The cell membrane
2. The nucleus, and, between the two,
3. The cytoplasm.

The Cell membrane	• Every cell in the body is enclosed by a cell (Plasma) membrane. • It maintains the integrity of a cell and controls passage of materials into and out of the cell. • All materials within a cell must have access to the cell membrane for the needed exchange.
The Nucleus & nucleolus	• The nucleus determines how the cell will function, as well as the basic structure of that cell. • Threads of chromatin in the nucleus contain Deoxyribonucleic Acid (DNA), the genetic material of the cell. • The nucleolus is a dense region of ribonucleic acid (RNA) in the nucleus and is the site of ribosome formation.
The cytoplasm	• Cytoplasm is a thick solution that fills each cell and is enclosed by the cell membrane. • Within the cytoplasm lie intricate arrangements of fine fibres and hundreds or even thousands of miniscule but distinct structures called organelles.