RAMA UNIVERSITY

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FACULTY OF ENGINEERING &TECHNOLOGY
DEPARTMENT OF BIOTECHNOLOGY

The Structure and Function of Genes

- The complete set of instructions for making an organism is called its genome. It contains the master blueprint for all cellular structures and activities for the lifetime of the cell or organism.

- The genome consists of tightly coiled threads of deoxyribonucleic acid (DNA) and associated protein molecules, organized into structures called chromosomes.

- For each organism, the components of these slender threads encode all the information necessary for building and maintaining life, from simple bacteria to remarkably complex human beings.

- An organism has some form of nucleic acid which is the chemical carrier of its genetic information.

- There are two types of nucleic acids, *deoxyribonucleic acid* (DNA) and *ribonucleic acid* (RNA) which code for all the information that determines the nature of the organism's cells.

- DNA codes for all the instructions needed for the cell to perform different functions. Human DNA contains enough information to produce about 100,000 proteins..

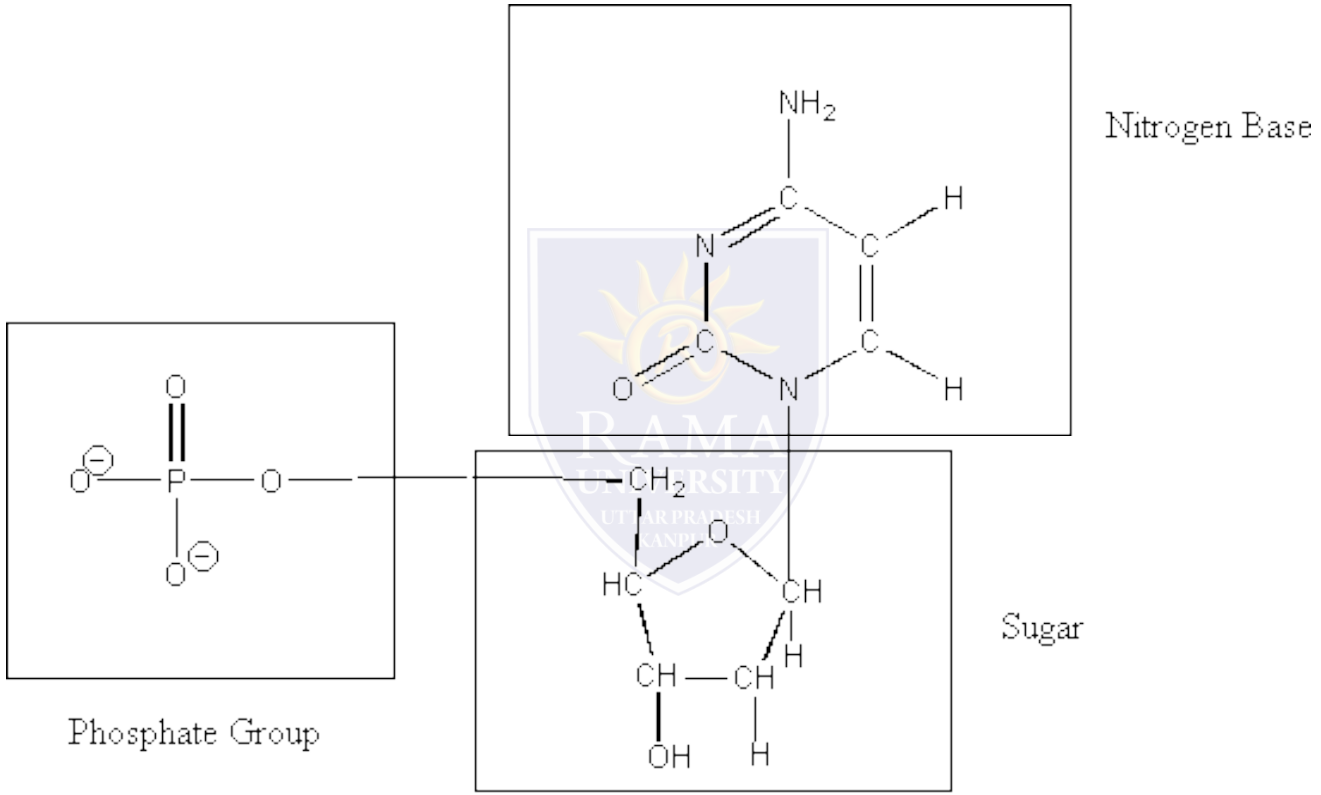
COMPOSITION OF NUCLEIC ACIDS

- Nucleic acids are one of several ***macromolecules*** in the body in addition to fats, proteins and carbohydrates.

- Nucleic acids are polymers made up of four nucleotides linked together in long chains known as ***polynucleotides***.

- A nucleotide can itself be further broken down to yield three components:

- a pentose sugar,
- a nitrogenous base, and
- Phosphate group

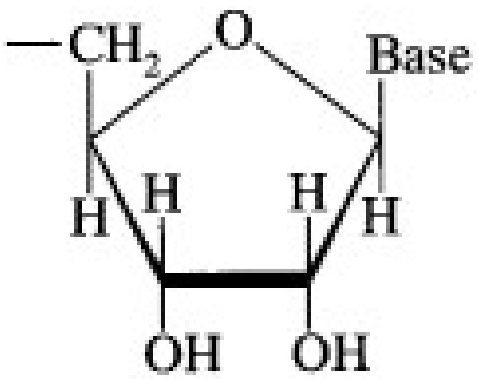


NUCLEOTIDE

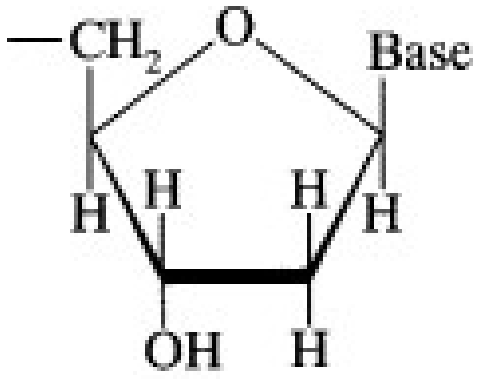
- When a sugar bonds together with a Nitrogenous base, it forms a structure known as a ***nucleoside***.

- There are two types of nucleic acids: DNA and RNA. DNA stores genetic information, and RNA allows that information to be used in the cell.

- Both DNA and RNA contain nucleotides with similar components. In RNA, the sugar component is ***ribose***, as indicated by the name "***ribo***nucleic acid". In DNA, or ***deoxyribo***nucleic acid, the sugar component is ***deoxyribose***. The prefix *deoxy* means that an oxygen atom is missing from one of the ribose Carbon atoms.



Ribose



Deoxyribose

- Nucleotides containing ribose are known as ribonucleotides, and those containing deoxyribose are known as deoxyribonucleotides.
- There are Four Nitrogen bases that are found in DNA: Adenine, Guanine, Thymine and Cytosine.
- The same bases are also found in RNA, except that there is Uracil instead of Thymine.
- These bases are divided into two categories (purines and pyrimidines) based on their molecular structure.

Problems:

Q1. What is Nucleic acid ?

Q2. Write down the composition of nucleotide.

Q3. Write Short notes on
1. Ribose sugar
2. Genes