



19GET277-Biology For Engineers UNIT-3

NUCLEIC ACIDS AS GENETIC MATERIAL

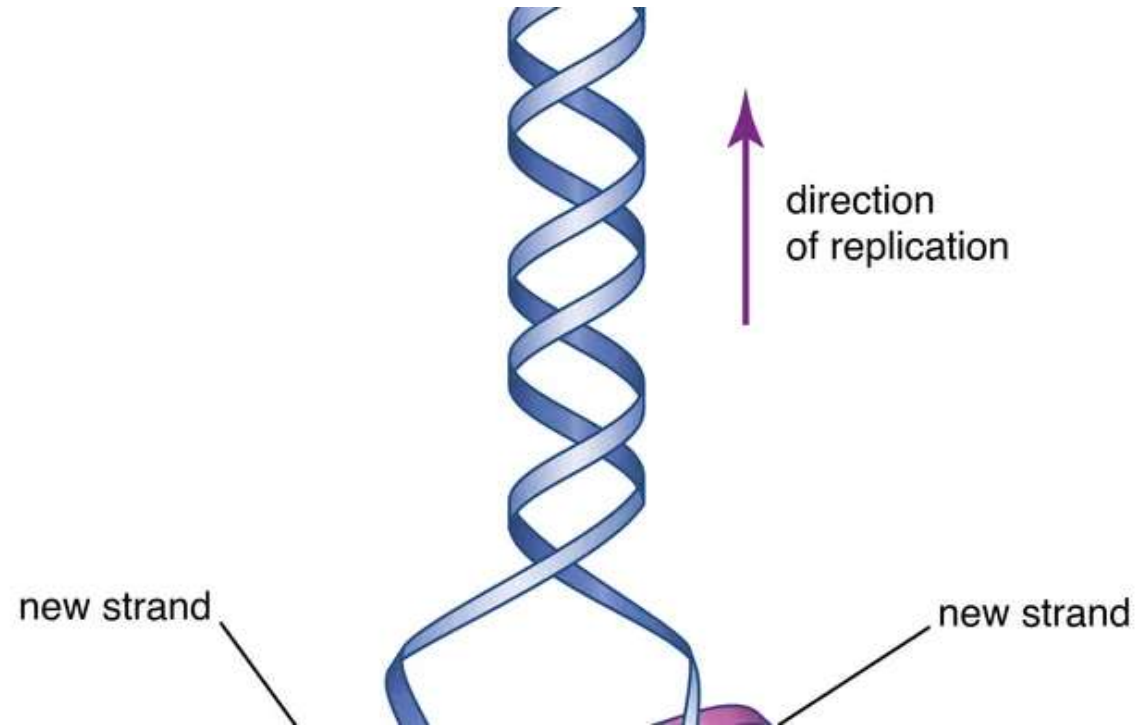
NUCLEIC ACIDS

nucleic acid, naturally occurring chemical compound that is capable of being broken down to yield phosphoric acid, sugars, and a mixture of organic bases (purines and pyrimidines). Nucleic acids are the main information-carrying molecules of the cell, and, by directing the process of protein synthesis, they determine the inherited characteristics of every living thing. The two main classes of nucleic acids are deoxyribonucleic acid (DNA) and ribonucleic acid (RNA).

Deoxyribonucleic acid (DNA)

- ▶ DNA is a polymer of the four nucleotides A, C, G, and T, which are joined through a backbone of alternating phosphate and deoxyribose sugar residues. These nitrogen-containing bases occur in complementary pairs as determined by their ability to form hydrogen bonds between them
- ▶ A always pairs with T through two hydrogen bonds, and G always pairs with C through three hydrogen bonds. The spans of A:T and G:C hydrogen-bonded pairs are nearly identical, allowing them to bridge the sugar-phosphate chains uniformly.

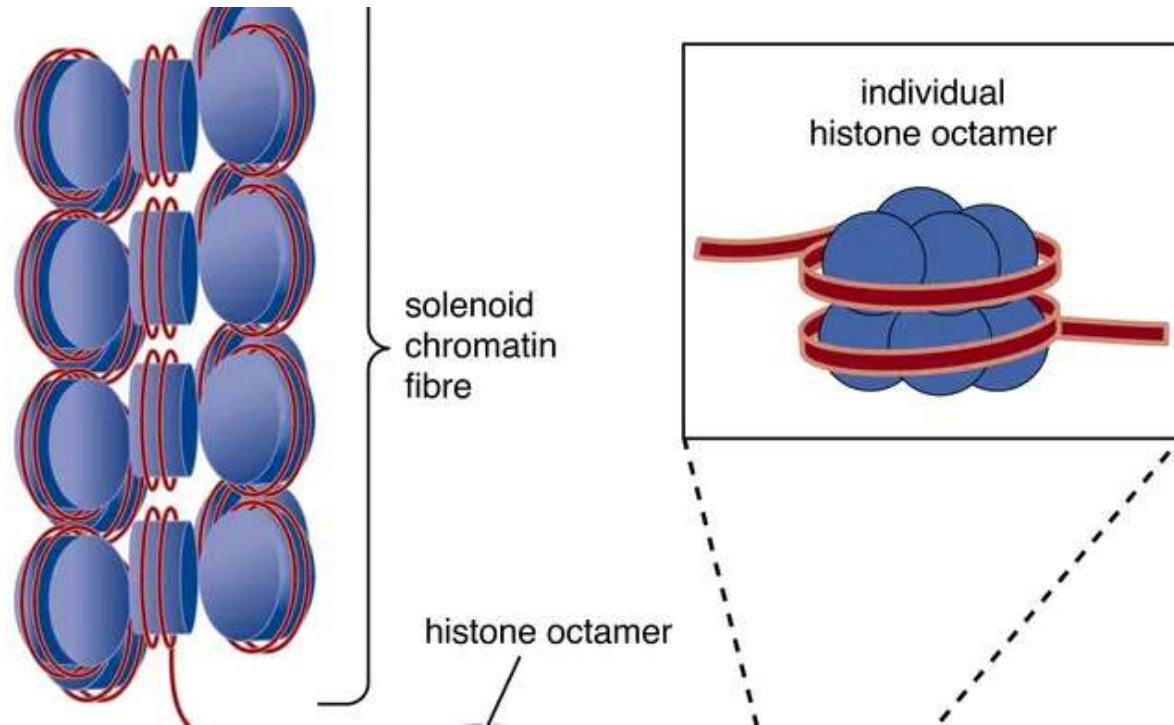
Deoxyribonucleic acid (DNA)



Biochemical properties for Denaturation

- ▶ The strands of the DNA double helix are held together by hydrogen bonding interactions between the complementary base pairs. Heating DNA in solution easily breaks these hydrogen bonds, allowing the two strands to separate—a process called denaturation or melting.
- ▶ The two strands may reassociate when the solution cools, reforming the starting DNA duplex—a process called renaturation or hybridization. These processes form the basis of many important techniques for manipulating DNA.

Biochemical properties for Denaturation



Ribonucleic acid (RNA)

- ▶ RNA is a single-stranded nucleic acid polymer of the four nucleotides A, C, G, and U joined through a backbone of alternating phosphate and ribose sugar residues. It is the first intermediate in converting the information from DNA into proteins essential for the working of a cell.
- ▶ Some RNAs also serve direct roles in cellular metabolism. RNA is made by copying the base sequence of a section of double-stranded DNA, called a gene, into a piece of single-stranded nucleic acid. This process, called transcription, is catalyzed by an enzyme called RNA polymerase.

Types of RNA

- ▶ MESSENGER RNA (mRNA)
- ▶ Ribosomal RNA (rRNA)
- ▶ Transfer RNA (tRNA)
- ▶ **Ribozymes**
- ▶ **Antisense RNAs**
- ▶ **Viral genomes**



Thank You!