NUCLEIC ACIDS

These are polymers of ~~nucleotides present in the nucleus of the~~ cell. These are also called polynucleotides.

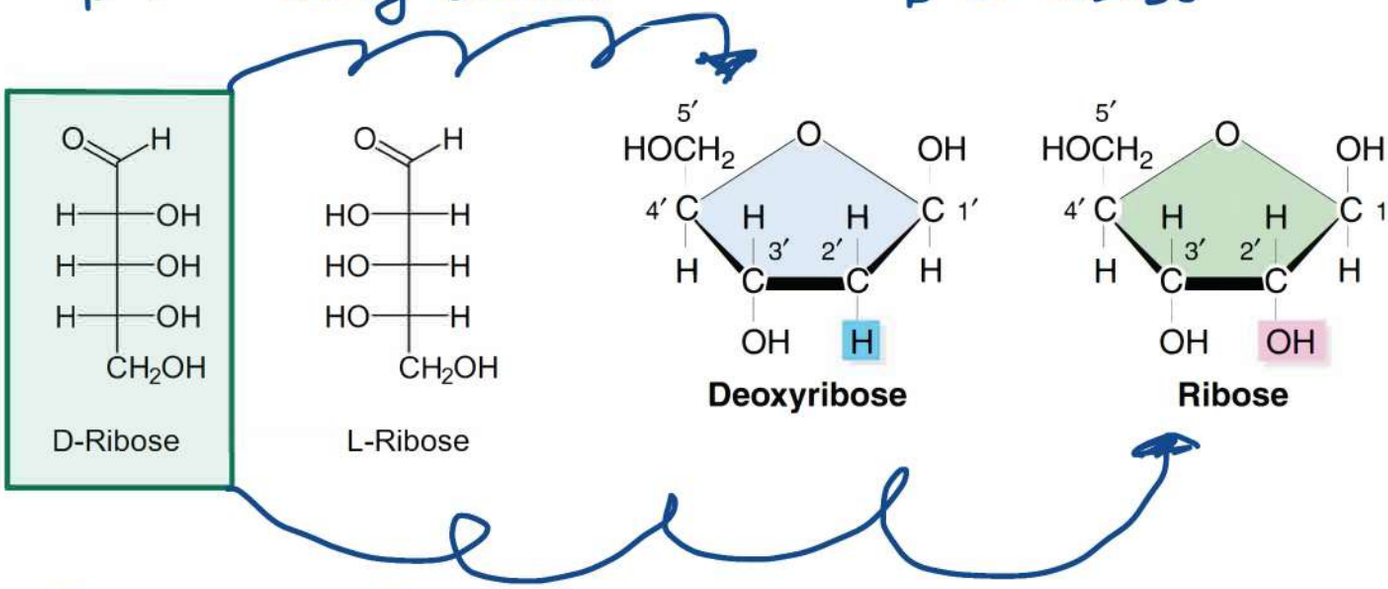
1.) Deoxy ribonucleic acid (D.N.A)

2.) Ribonucleic acid (R.N.A)

COMPOSITION OF NUCLEIC ACID

1.) Pentose sugar 2.) Phosphoric Acid 3.) Nitrogeneous base

- In DNA sugar present is β-D-2-deoxy ribose
- In RNA, sugar present is β-D-ribose

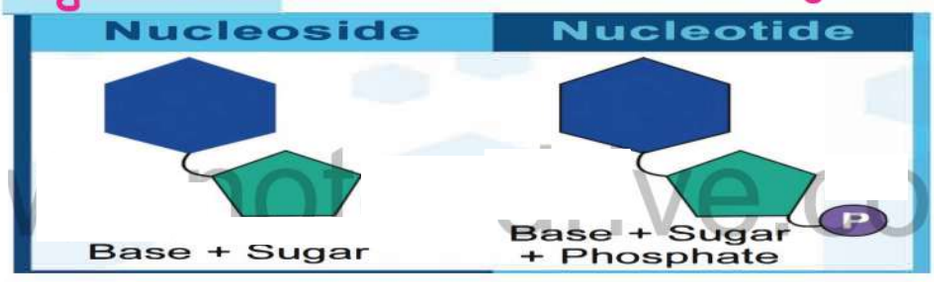


- Base present in Nucleic Acids are adenine (A), guanine (G), Cytosine (C) Uracil (U) and thymine (T).

In DNA → A, G, C, T In RNA → A, G, C, U

NUCLEOSIDE ↳ Sugar + Base

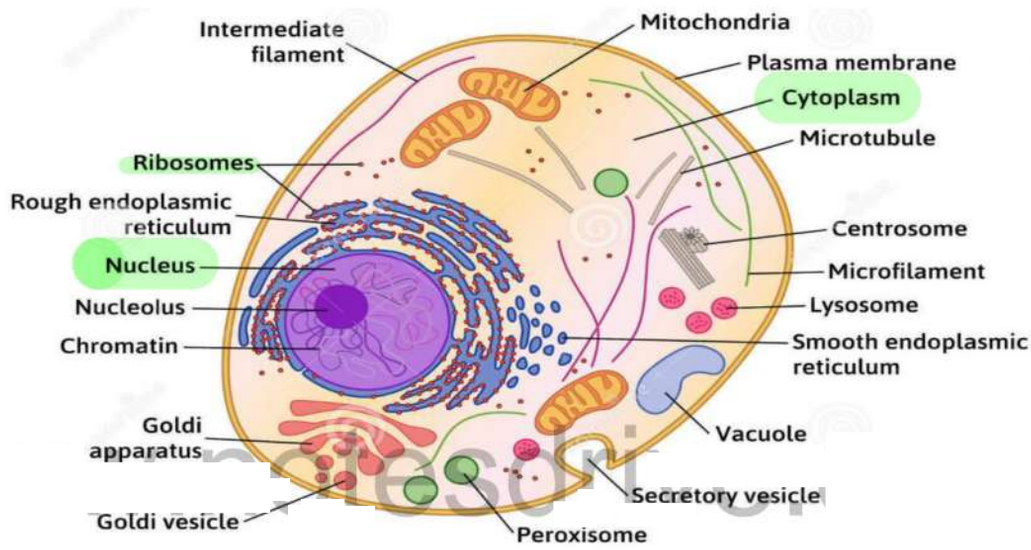
NUCLEOTIDE ↳ Sugar + Base + Phosphoric Acid.



	Nucleoside	Nucleotide
(i)	Nucleoside is a compound formed by the union of a nitrogen base with a pentose sugar.	Nucleotide is a compound formed by the union of a nitrogen base, a pentose sugar and phosphate.
(ii)	It is a component of nucleotide.	Nucleotide is formed through phosphorylation of nucleoside.
(iii)	It is slightly basic in nature.	A nucleotide is acidic in nature.

DIFFERENCE BETWEEN DNA & RNA

DNA	RNA
It is double stranded nucleic acid.	It is single stranded nucleic acid.
It contains deoxyribise sugar.	It contains ribose sugar.
It contains Thymine (T) as a nitrogenous base.	It contains Uracil (U) instead of Thymine.
It is the genetic and hereditary material of the cells.	It is involved in synthesis of proteins.
It is present in the nucleus of the cells.	It is present in both nucleus and cytoplasm.



TYPES OF RNA:

(i) Messenger RNA (m-RNA)

This carries genetic code from DNA to ribosomes where protein is synthesised

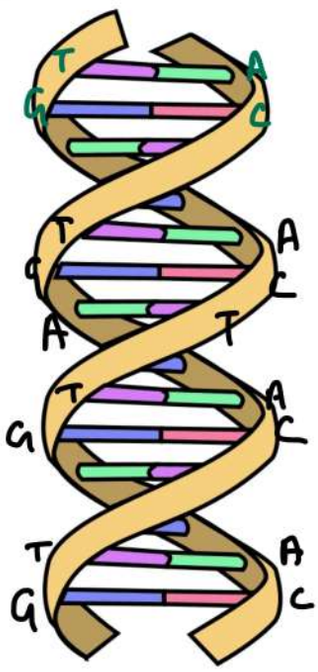
(ii) Ribosomal RNA (r-RNA)

This provide site for Protein Synthesis.

(iii) Transfer RNA (t-RNA)

This transfer amino acid from different parts of cytoplasm to ribosomes during Protein Synthesis

STRUCTURE OF DNA:-



DNA

=Adenine

= Thymine

= Cytosine

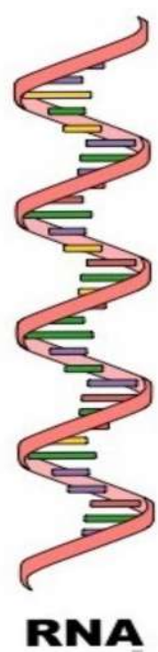
= Guanine

T=A G≡C

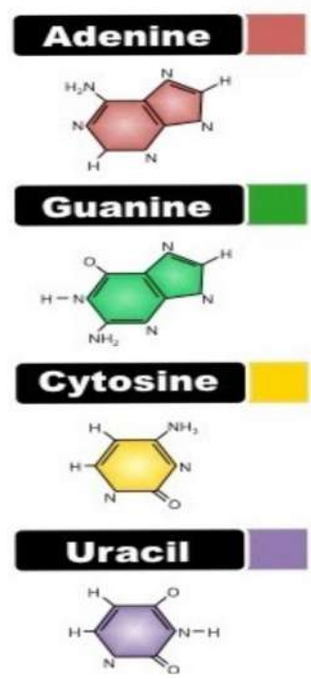
= Phosphate backbone

DNA has a double helical structure with A & T and G & C linked together through two and three hydrogen bond respectively.

STRUCTURE OF RNA: Not Imp.



RNA

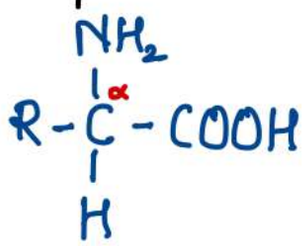


PROTENS

These are the biomolecules from w... living system made up of.

"These are the polymers prepared by the monomers of "α-amino acid by condensation polymerisation.

Str. of α-amino acid.



AMINO ACIDS colourless, water soluble, high melting crystalline solids and behave like salts.

In aqueous solution carboxyl group can lose a proton and amino group can accept one forming **ZWITTER ION** (Amphoteric Nature)

Amino acid ⇌ Zwitter ion

except glycine (R=H) all α-amino acids are optically active and have D and L configuration

▶ CLASSIFICATION OF AMINO ACIDS

↝ ON THE BASIS OF SOURCE

Essential amino acids

Which can't be synthesized in the body and must be supplied through diet.

Leucine	Cysteine
Lysine	Glutamate
Methionine	Glutamine

Non essential amino acids

Which can be synthesised in the body.

ON THE BASIS OF NATURE

NEUTRAL

Equal no. of amino and carboxyl gp.
e.g Glycine, Alanine, Valine

ACIDIC

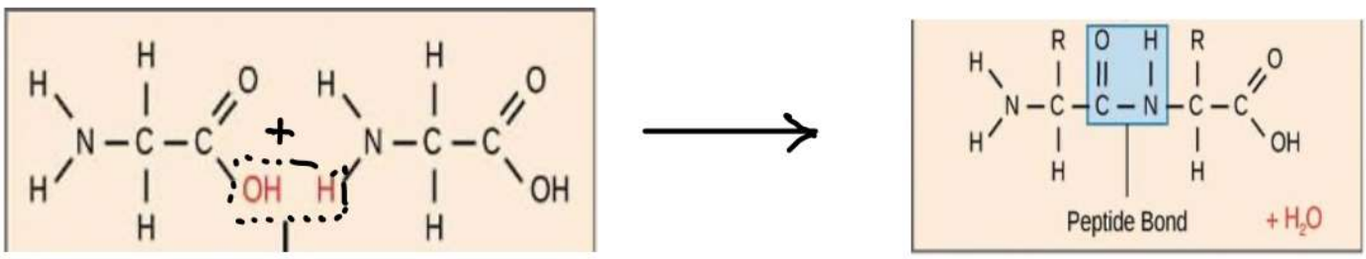
More no. of carboxyl group
e.g Aspartic Acid, Glutamic Acid

BASIC

More no. of amino group.
e.g lysine, Arginine.

PEPTIDE BOND

When two α-amino acids combined together to form peptide by the elimination of water, the bond CO-NH present in peptide is known as peptide bond.



- Peptides are further divided into di, tri, tetra depending upon the number of α-amino acid combined.

ISOELECTRIC POINT:

The pH at which dipolar ion (zwitter ion) exists as neutral ion. i.e +ve and -ve charge is equal and it does not migrate to either electrode is called isoelectric point.

Str. of Proteins

Primary str.

It refers to sequence of amino acid in each polypeptide chain

Secondary str.

It refers to shape in which polypeptide chain exist

(i) α- helix
(ii) β- pleated

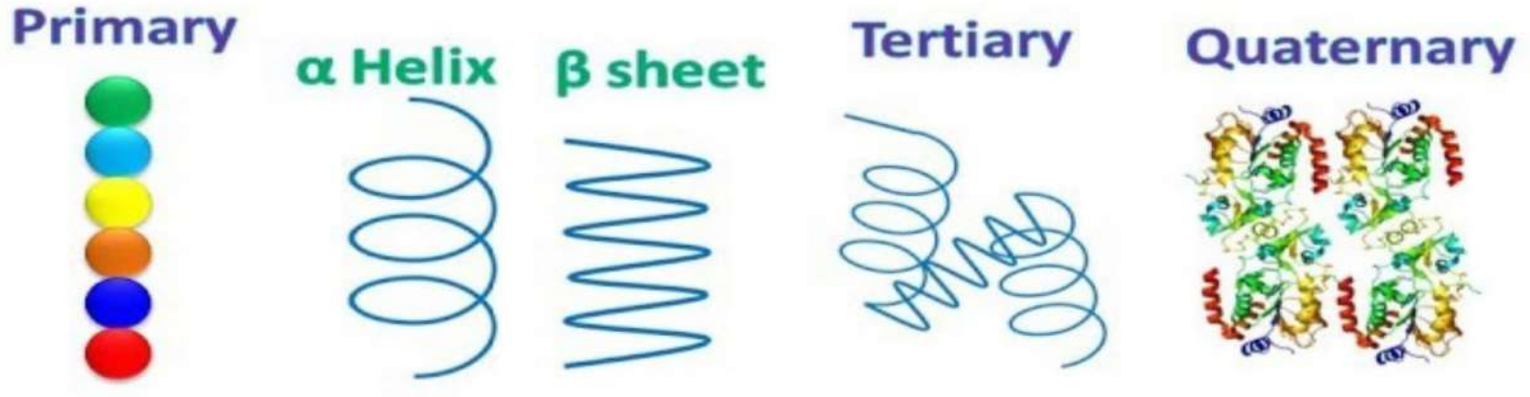
Tertiary str.

It represents the overall folding of polypeptide chain i.e further folding of 2° str.

i) Fibrous (ii) Globular

Quaternary str.

It refers to spatial arrangement of subunits w.r.t each other



DENATURATION OF PROTEIN

- A protein found in a biological system with a unique 3-D str. and biological is called as Native Protein
- When a protein in its native form is subjected to physical change like change in temperature or chemical change like change in pH, the hydrogen bonds are disturbed due to which gloubules unfold and helix get uncoiled and protein loses its biological activity.
- During denaturation, 2° and 3° str. are destroyed but 1° str. remains intact

e.g coagulation of egg white on boiling
curdling of milk.

GLOBULAR PROTIEN

- They have nearly spherical structure.
- These are soluble in water
- Have α-helix str.
- insuline, albumin

FIBROUS PROTIEN

- They have linear thread like str.
- These are insoluble in water
- have β-pleated str.
- Keratin (hair, wool, silk) myosin (muscles)

CARBOHYDRATES

These are optically active polyhydroxy aldehydes or ketones

General formula : $C_x(H_2O)_y$

CLASSIFICATION ON THE BASIS OF HYDROLYSIS

MONOSACCHARIDES

Can not be hydrolysed further

eg glucose, fructose, ribose etc.

OLIGOSACCHRIDES

Give 2-10 molecules of monosaccharides

eg Sucrose, maltose

POLYSACCHARIDES

Give large number of monosaccharides

eg starch, cellulose.

PREPARATION OF GLUCOSE

From Sucrose

$$C_{12}H_{22}O_{11} + H_2O \xrightarrow{H^+} \underset{\text{(Glucose)}}{C_6H_{12}O_6} + \underset{\text{(Fructose)}}{C_6H_{12}O_6}$$

From starch

$$(C_6H_{10}O_5)_n + nH_2O \xrightarrow{H^+} nC_6H_{12}O_6 \text{ (Glucose)}$$

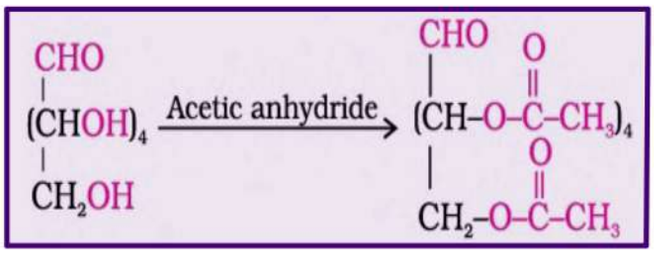
STRUCTURE

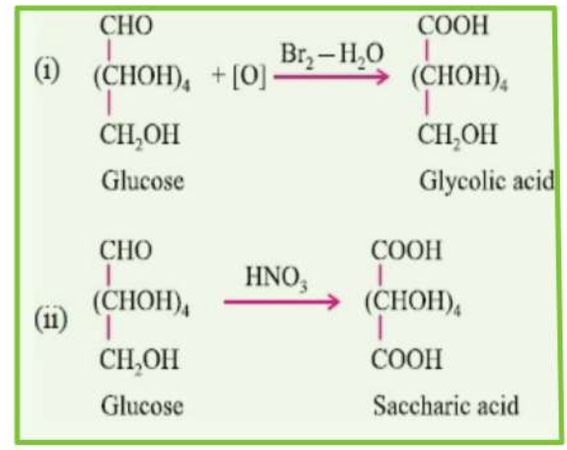
CHO ← one aldehyde group

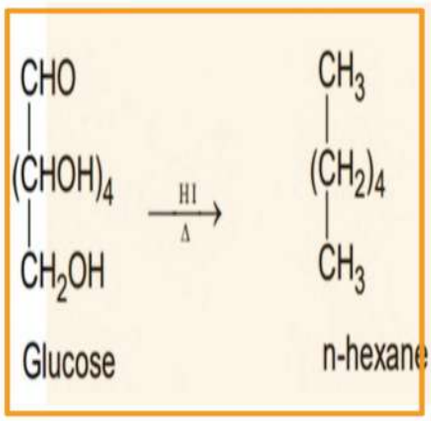
$(CHOH)_4$ ← four 2° alcohol

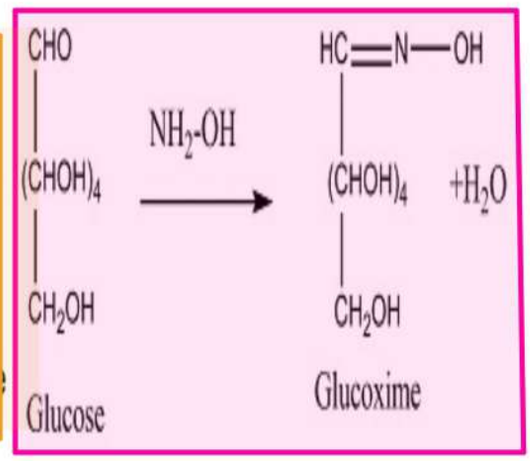
CH_2OH ← one 1° alcohol

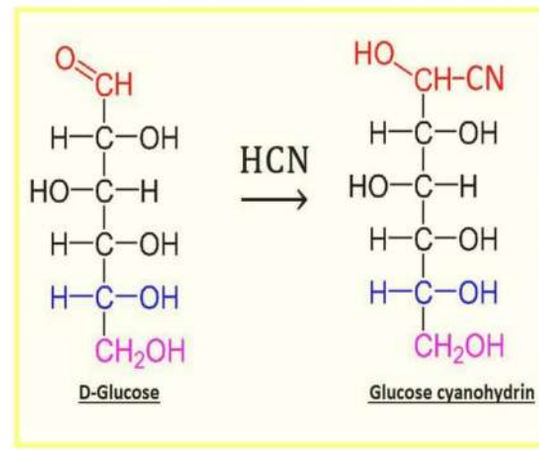
CHEMICAL PROPERTIES OF GLUCOSE





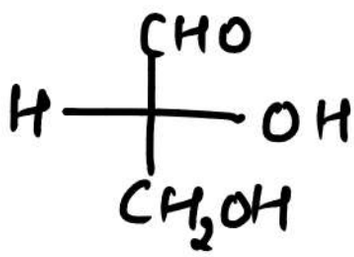






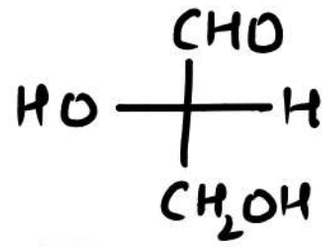
Str.

D-Glyceraldehyde



D means -OH is R.H.S

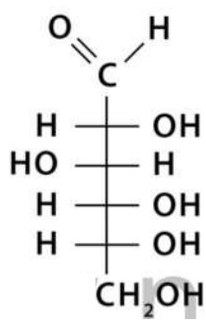
L-Glyceraldehyde



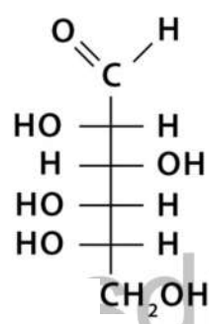
L means -OH in L.H.S

Str. of Glucose

Fischer Projection

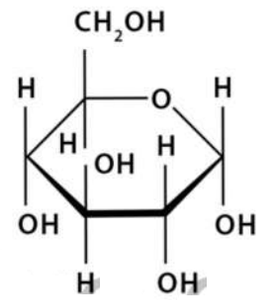


D- Glucose

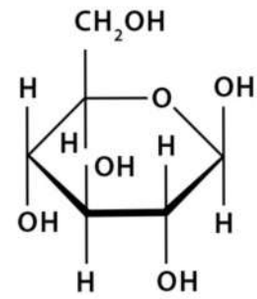


L- Glucose

Haworth Projection



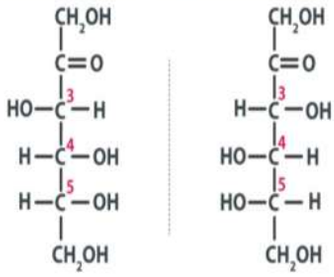
α-D-Glucopyranose



β-D-Glucopyranose

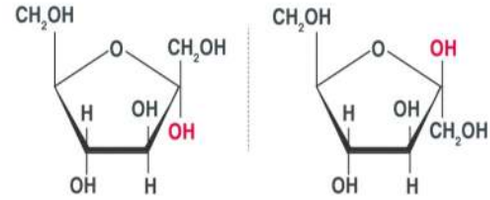
Str. of fructose

Fischer Projection



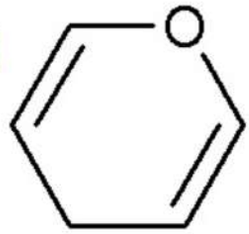
D- Fructose L- Fructose

Haworth Projection

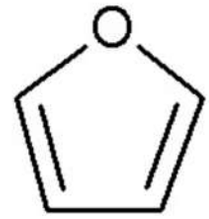


α-D- Fructose β-D- Fructose

Six membered Cyclic ring



Pyran



Furan

five membered Cyclic Ring

Reducing Sugars

- Free aldehydic or ketonic group
- Reduce Fehling Soln and Tollen's Reagent.
- Maltose and Fructose

Non Reducing Sugars

- Do not have free aldehydic or ketonic gp.
- Do not reduce Fehling Soln and Tollens Reagent.