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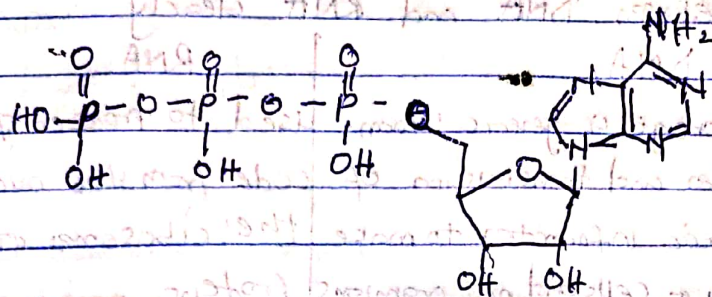
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Department: Medical Laboratory Science

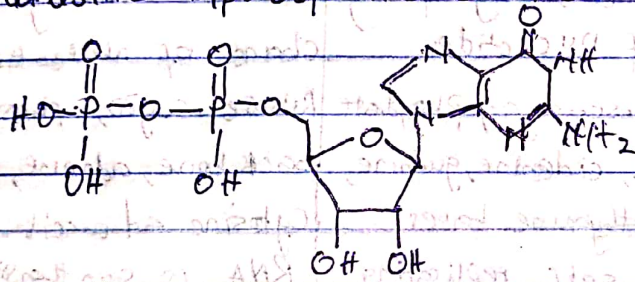
Course code: Bch 202

1) Draw the structure of the following:

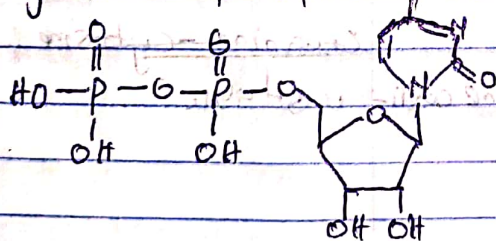
i) Adenosine Triphosphate (ATP)



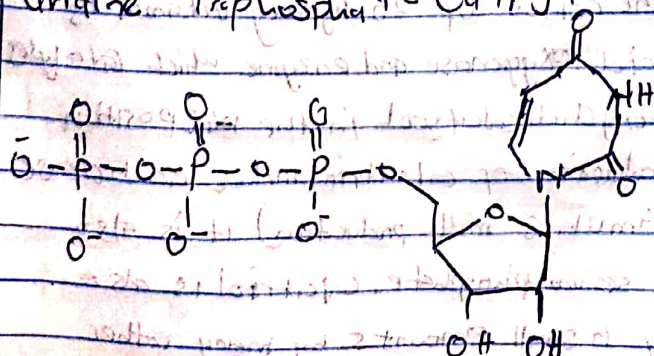
ii) Guanosine Diphosphate (GDP):



iii) Cytidine Diphosphate (CDP)

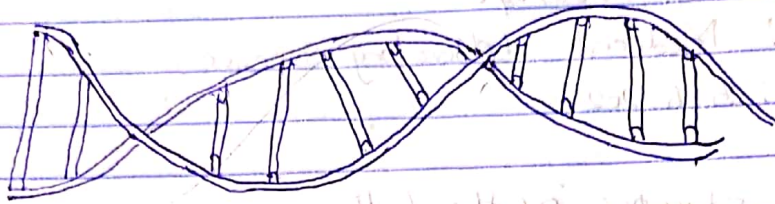


iv) Uridine Triphosphate (UTP)



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1 Double stranded DNA



2 Differentiate between DNA and RNA clearly

Differences	DNA	RNA
Functions	storage of genetic information and transmission of genetic information to make other cells and new organisms	used to transfer genetic code from the nucleus to the ribosomes to make proteins
Structure features	DNA is a double stranded molecule consisting of long chain of nucleotides	RNA is a single stranded helix consisting of short chains of nucleotides
Composition of Bases and sugars	Deoxyribose sugar, phosphate backbone, adenine, guanine, cytosine, thymine bases	Ribose sugar, phosphate backbone, adenine, guanine, cytosine and uracil bases
Propagation	DNA is self replicating	RNA is synthesised from DNA
Base pairing	Adenine - Thymine Guanine - Cytosine	Adenine - Uracil Guanine - Cytosine
Reactivity	stable under alkaline conditions	unstable

3 Explain the biosynthesis of Calcitriol:

Calcitriol is produced in the cells of the proximal tubule of the nephron in the kidneys by the action of 25-hydroxy vitamin D₃ 1- α hydroxylase, a mitochondrial oxygenase and enzyme which catalyses the hydroxylation of 25-hydroxycholecalciferol in the ~~100~~ position. Additional effect on the production of calcitriol include an increase by prolactin (enzyme that stimulates milk production), it is also decreased by high levels of serum phosphate. Calcitriol is also produced outside the kidney in small amounts by many other tissues including placenta and activated macrophages.

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4. Write on coenzymes and the coenzyme form of riboflavin
Coenzymes are small organic molecules that bind tightly to an enzyme's active site or loosely as a co-substrate to an enzyme as they participate in catalysis. They are also essential organic compounds that attach to enzymes to help them catalyze. There are several ways co-enzymes assist in enzyme's function including changing their shape to activate enzymes or aiding in chemical reactions by acting as carriers of energy or molecular groups.

b. The coenzyme form of Riboflavin (Vitamin B₂)

* Flavin mononucleotide (FMN): Also known as riboflavin 5' phosphate by the enzyme riboflavin kinase and functions as the prosthetic group of various oxidoreductases including NADH dehydrogenase, FMN is a stronger oxidizing agent than NAD, and is particularly useful because it can take part in both one- and two electron transfers.

* Flavin Adenine Dinucleotide (FAD): It is a dinucleotide also referred to as riboflavin 5'-adenosine diphosphate. It is a biomolecule with riboflavin at its core. FAD also acts as an oxidizing agent. One of the most crucial reactions FAD is involved with is in the citric acid cycle (Krebs's cycle). It also acts as a cofactor in redox reactions, and can form certain "flavoproteins" when conjugated with certain proteins.

5. Write on the characteristic components of nucleotides and nucleotide units on RNA

i. A nitrogenous base which could be, Adenylate, Guanylate, Uridylate or cytidylate

ii. A five carbon sugar molecules

iii. A phosphate molecule.

- Nucleoside units on RNA

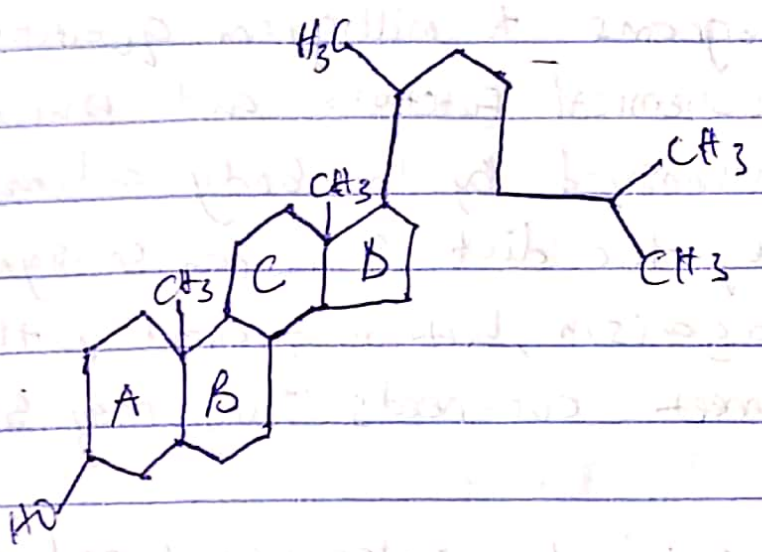
i. A nitrogenous base, Adenosine, Guanosine, Cytidine and uracine

ii. A five carbon sugar ribose

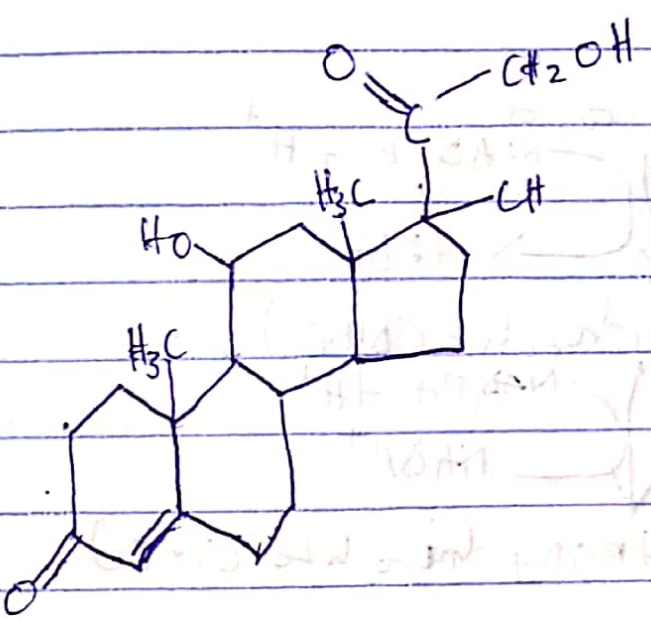
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Structure of cholesterol and cortisol

A Cholesterol



B Cortisol



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7 Review vitamins and different form, write or metabolism of one known vitamin to its active form.

* Vitamins are organic nutrients that are required in small quantities (in micrograms to milligram quantities per day) for a variety of biochemical functions and which generally cannot be synthesized by the body and must therefore be supplied by the diet. Some can be synthesized by the intestinal microorganisms, but in quantities that are not sufficient to meet our needs they may be waste of fat soluble.

vitamins are classified into two categories based on their solubility

1 Water soluble vitamin (B and C)

2 Fat soluble vitamin (A, D, E, K)

* Folic acid

* Folic acid

Folate reductase

Folic acid $\xrightarrow{\text{NADPH} + \text{H}^+}$ NADP⁺

Dihydrofolate (DHF)

Folate reductase $\xrightarrow{\text{NADPH} + \text{H}^+}$ NADP⁺

Tetrahydrofolate (THF)

Tetrahydrofolate (THF) is the active form of folic acid. Folate is enzymatically reduced in a two stage process in tissues to yield the dihydro and then tetrahydrofolate which requires vitamin C.

8 Glycolipids, its various form and structure.

1 Cerebrosides!

Structure: Ceramide

Sphingosine - fatty acid

Glucose or galactose

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2 Sulfatide:

Structure:

Ceramide

Sphingosine - fatty acid

Monosaccharide - Sulfate

3 Globosides:

Structure:

Ceramide

Sphingosine - fatty acid

Oligosaccharide

4 Ganglioside:

Structure:

Ceramide

Sphingosine - fatty acid

Glucose - galactose - N-acetylgalactosamine - galactose

NAHA

9 Detail write up on cell and functions of important cell organelles

Cell is the basic structural, functional, and biological unit of all known organisms. A cell is the smallest unit of life. Cells are often called the "building blocks of life". Cells consist of cytoplasm enclosed within a membrane, which contains many biomolecules such as proteins and nucleic acids. Most plant and animal cells are only visible under a microscope. Numbers of cells in plants and animals varies from species to species. The human ~~cell~~ brain accounts for around 80 billion of these cells.

Cell was discovered by Robert Hooke in 1665.

We have 2 types of cell

1. Eukaryotic: which contains a nucleus.
2. Prokaryotic which does not contain nucleus. Prokaryotes are single celled organisms; while eukaryote can be either single-celled or multicellular.

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18/MHS 06/046

b Function of important cell organelles

Cell organelles	Functions
1 Cell membrane	separate the interior of all cells from the outside environment (the extracellular space) which protects the cell from its environment.
2 Chloroplast	photosynthesis, traps energy from sunlight
3 Flagellum	Locomotion, sensory
4 Mitochondrion	Energy production from the oxidation of glucose substance and the release of adenosine triphosphate
5 Vacuole	storage, transportation, helps maintain homeostasis
6 Golgi Apparatus	Sorting, packaging, processing and modification of proteins
7 Cell wall	The cell wall is composed of peptidoglycan and is rigid, provides shape to the cell, helps to keep the organelles inside the cell, and does not let the cell burst due to change in osmotic pressure
8 Nucleus	DNA maintenance, controls all activities of the cell, RNA transcription