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***Dept:- BS Dental Semester:- 2nd***

***Paper:- Biochemistry***

Q No 1:-

Answer:- Process of ATP synthesis coupled with electron flow

 ATP synthesis coupled with electron flow to respiratory electron flow. The enzyme ATP synthase, which is directly responsible for ATP synthesis, is the equivalent of an F-type ATP-dependent proton pump working in reverse; the flow proton down their electrochemical gradient through this pump drives the condensation of Pi and ADP. The free energy derived from the passage of electrons through complex I,III, and IV is harvested by being coupled to the synthesis of ATP. Instead the energy derived from electron transport is coupled to the generation of proton gradient across the inner mitocgrdondrial membrane

Q No 2:

Answer (1) Acyl CoA dehyrdrogenase

Dehydrogenation occurs between the alpha and beta carbons (C2 and C3) in a FAD-linked reaction catalyzed by acyl CoA dehydrogenase. The oxidation power of FAD is required to oxidize the alkyl chain, much as it is in the succinate dehydrogenase reaction of the tricarboxylic acid cycle. The product contains a trans- double bond. Involvement of the beta-carbon in this and subsequent steps gives the pathway its name.



There are three fatty acyl CoA dehydrogenases. Each is specific for a different acyl chain length, so different enzymes are involved in different stages of beta-oxidation.

* Long chain fatty acyl CoA dehydrogenase (LCAD) acts on chains greater than C12.
* Medium chain fatty acyl CoA dehydrogenase (MCAD) acts on chains of C6 to C12.
* Short chain fatty acyl CoA dehydrogenase (SCAD) acts on chains of C4 to C6.

Answer (2):- Adenosine Deaminase

 **Adenosine deaminase** (also known as **adenosine aminohydrolase**, or **ADA**) is an [enzyme](https://en.wikipedia.org/wiki/Enzyme) involved in [purine metabolism](https://en.wikipedia.org/wiki/Purine_metabolism%22%20%5Co%20%22Purine%20metabolism). It is needed for the breakdown of [adenosine](https://en.wikipedia.org/wiki/Adenosine) from food and for the turnover of [nucleic acids](https://en.wikipedia.org/wiki/Nucleic_acid) in tissues.

Answer (3):- Nucleotidase

 A **nucleotidase** is a [hydrolytic enzyme](https://en.wikipedia.org/wiki/Hydrolase) that catalyzes the [hydrolysis](https://en.wikipedia.org/wiki/Hydrolysis) of a [nucleotide](https://en.wikipedia.org/wiki/Nucleotide) into

a [nucleoside](https://en.wikipedia.org/wiki/Nucleoside) and a [phosphate](https://en.wikipedia.org/wiki/Phosphate).

 A [nucleotide](https://en.wikipedia.org/wiki/Nucleotide) + H2O = a [nucleoside](https://en.wikipedia.org/wiki/Nucleoside) + [phosphate](https://en.wikipedia.org/wiki/Phosphate)

For example, it converts [adenosine monophosphate](https://en.wikipedia.org/wiki/Adenosine_monophosphate) to [adenosine](https://en.wikipedia.org/wiki/Adenosine), and [guanosine monophosphate](https://en.wikipedia.org/wiki/Guanosine_monophosphate) to [guanosine](https://en.wikipedia.org/wiki/Guanosine%22%20%5Co%20%22Guanosine).

In enzymology, a gluconolactonse is an enzyme that catalyzes the chemical reaction.

D-glucono-1,5-lactone + H2O {\displaystyle \rightleftharpoons } D-gluconate

Thus, the two [substrates](https://en.wikipedia.org/wiki/Substrate_%28biochemistry%29) of this enzyme are [D-glucono-1,5-lactone](https://en.wikipedia.org/wiki/D-glucono-1%2C5-lactone) and [H2O](https://en.wikipedia.org/wiki/Water), whereas its [product](https://en.wikipedia.org/wiki/Product_%28chemistry%29) is [D-gluconate](https://en.wikipedia.org/wiki/D-gluconate).

This enzyme belongs to the family of [hydrolases](https://en.wikipedia.org/wiki/Hydrolase), specifically those acting on carboxylic [ester](https://en.wikipedia.org/wiki/Ester) bonds. The [systematic name](https://en.wikipedia.org/wiki/List_of_enzymes) of this enzyme class is **D-glucono-1,5-lactone lactonohydrolase**. Other names in common use include **lactonase**, **aldonolactonase**, **glucono-delta-lactonase**, and **gulonolactonase**. This enzyme participates in 3 [metabolic pathways](https://en.wikipedia.org/wiki/Metabolism): [pentose phosphate pathway](https://en.wikipedia.org/wiki/Pentose_phosphate_pathway), [ascorbate and aldarate metabolism](https://en.wikipedia.org/w/index.php?title=Ascorbate_and_aldarate_metabolism&action=edit&redlink=1), and [caprolactam degradation](https://en.wikipedia.org/wiki/Caprolactam_degradation).

Enoyl-CoA hydratase (ECH) catalyzes the second step in the physiologically important beta-oxidation pathway of fatty acid metabolism. This enzyme facilitates the syn-addition of a water molecule across the double bond of a trans-2-enoyl-CoA thioester, resulting in the formation of a beta-hydroxyacyl-CoA thioester

 ***Q No 3:-***

***Answer:- Nucleotide***

  A **nucleotide** is an organic molecule that is the building block of DNA and RNA. A **nucleotide** is made up of three parts: a phosphate group, a 5-carbon sugar, and a nitrogenous base. The four nitrogenous bases in DNA are adenine, cytosine, guanine, and thymine

Nucleoside

A **nucleotide** is the **basic** building block of nucleic acids. RNA and DNA are polymers made of long chains of **nucleotides**. A **nucleotide** consists of a sugar molecule (either ribose in RNA or deoxyribose in DNA) attached to a phosphate group and a nitrogen-containing base

Difference between DNA and RNA

|  |  |
| --- | --- |
| DNA | RNA |
| It is a long polymer. It has a deoxyribose and phosphate backbone having four distinct bases: thymine, adenine, cytosine, and guanine. | Is a polymer with a ribose and phosphate backbone with four varying bases: uracil, cytosine, adenine, and guanine |
| It is located in the nucleus of a cell and in the mitochondria. | It is found in the cytoplasm, nucleus, and in the ribosome. |
| It has 2-deoxyribose. | It has Ribose. |
| DNA is functional is the transmission of genetic information. It forms as a media for long-term storage. | RNA is functional is the transmission of the genetic code that is necessary for the protein creation from the nucleus to the ribosome. |
| The DNA is a double-stranded molecule that has a long chain of nucleotides. | The RNA is a single-stranded molecule which has a shorter chain of nucleotides. |

Q No 4:-

Answer:-

 Sugar utilisation through EMP patway is not carried out by all microorganism.some alternative pathways which initially operates for sugar break downin microorganism are the pentose phosphate pathway (PPP),the entner doudoroff pathway(EDP) or 2-keto-3-deoxy-6-phosphogluconate(KDPG) pathway.hexose monophosphate pathway(PPP),Warburg dickens-horecker pathway etc.

Enzyme used in PPP pathway.

* Glucose-6- phosphate
* 6-phosphogluconolactone
* 6-phosphluconolactone
* Ribulose 5 phosphate

Q No 5:-

Ans:- Carnitine shuttle system

 The carnitine shuttle is responsible for transferring long chain fatty acids across the barrier of the inner mitochondrial membrane to gain access to the enymes of beta-oxdidation. The carnitine shuttle represents a mechanism by which long-chain fatty acids, which are impermeable to the mitochondrial membranes, are transported into the mitochrondrial matrix for the purpose β- oxidation and energy production.

There are four steps

* Dehydrogenation
* Hydration
* Oxidation
* Thyolisis

 There are three stages involved in beta oxidation of fatty acid.

* Activation of fatty acids occurring in the cytoplasm
* Transport of fatty acids into mitochondria
* Beta-oxidation matrix