**Course Title: Medical Biochemistry II**

**DT 2nd, Sec A**

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**Max Marks: 50**

**Note: There are FIVE questions, each carry 10 marks with grand total of 50 marks**

**ATTEMPT all questions**

**Avoid copy paste material, as it may deduct your marks**

Q1. Explain the process of “ATP synthesis coupled with electron flow”.

Ans:ATP synthase moves H+ ions that were pumped out of the matrix by the electron transport chain back into the matrix. The energy from the influx of protons into the matrix is used to generate ATP by the phosphorylation (addition of a phosphate) of ADP. The movement of ions across the selectively permeable mitochondrial membrane and down their electrochemical gradient is called chemiosmosis.

Electron flow : The electron transport chain is a series of protein complexes found in the inner membrane of the mitochondria. Electrons are passed from one member of the transport chain to another in a series of redox reactions.

Q2. Write the reactions that are catalyzed by the following enzymes.

* + 1. Acyl CoA dehydrogenase

Acyl-CoA dehydrogenases (ACADs) are a class of enzymes that function to catalyze the initial step in each cycle of fatty acid β-oxidation in the mitochondria of cells

* + 1. Adenosine deaminase

Adenosine deaminase involved in purine metabolism. ADA irreversibly deaminates adenosine, converting it to the related nucleoside inosine by the substitution of the amino group by a keto group.

* + 1. Nucleotidase

Nucleotidase plays a catalytic role in the hydrolysis process, and it converts a number of different nucleotide molecules. When nucleotidase is involved in catalysing the hydrolysis of a nucleotide, this creates a reaction as follows: a nucleotide + H2O forms a nucleoside and a phosphate

* + 1. Gluconolactonase

gluconolactonase is an enzyme that catalyzes the chemical reaction

D-glucono-1,5-lactone + H2O D-gluconate

* + 1. Enoyl-CoA hydratase

Enoyl-CoA hydratase catalyzes the second step beta-oxidation pathway of fatty acid metabolism

Q3. Define nucleotide, nucleoside and differentiate between DNA and RNA.

Ans:

Nucleotide:

are building blocks of nucleic acids DNA and RNA. Nucleotide are composed of a nitrogenous base, a five-carbon sugar (ribose or deoxyribose), and at least one phosphate group.

Nucleoside :are the structural subunit of nucleic acids such as DNA and RNA.

Difference between DNA and RNA:

DNA is a double-stranded molecule, while RNA is a single-stranded molecule. DNA and RNA base pairing is slightly different since DNA uses the bases adenine, thymine, cytosine, and guanine; RNA uses adenine, uracil, cytosine, and guanine. Uracil differs from thymine in that it lacks a methyl group on its ring.

Q4. Why Dickens and Horecker’s Pathway is called HMP pathway. Enlist the enzymes used in PPP Pathway.

Because it will be started from a compound called glucose 6 phosphate. Glucose contain 6 carbon and one phosphate group are attach on carbon no

Reason 2:

Dickens frank English biochemist 1899:

Dickens shunt a secondary pathway for the oxidation of D-glucose(not occurring in skeletal muscle ) generating reducing power in the cytoplasm out side the mitochondria and synthesizing pentose and a few other sugar synonym ,pentose phosphate pathway,.

Enzyme name used in oxidative phase of ppp pathway:

1: glucose 6 phosphate enzymes.

2: gluconotactonase enzymes.

3:6 phosphogluconate dehydrogenase .

Enzymes name used in non oxidative phase of ppp pathway:

1: isomerase enzyme

2: epimerase enzymes.

3: transketolase enzyme.

Q5. What is the function of carnitine shuttle system? Write down the stages and steps involved in Beta oxidation of Lipids.

Ans : The carnitine shuttle is responsible for transferring long-chain fatty acids across the barrier of the inner mitochondrial membrane to gain access to the enzyme of beta-oxidation.

Beta oxidation of lipids:

Beta oxidation  takes place in four steps dehydrogenation, hydration, oxidation and thyolisis. Each step is catalyzed by a distinct enzyme. Briefly, each cycle of this process begins with an acyl-CoA chain and ends with one acetyl-CoA, one FADH2, one NADH and water, and the acyl-CoA chain becomes two carbons shorter.