**Course Title: Biochemistry II**

**BS(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:**

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.

**IMPORTANT:**

NADH generates more ATP than FADH2. For every NADH molecule that is oxidized, 10 H+ ions are

pumped into the intermembrane space. This yields about three ATP molecules. Because FADH2 enters

the chain at a later stage (Complex II), only six H+ ions are transferred to the intermembrane space.

This accounts for about two ATP molecules.

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

* + 1. Acyl CoA dehydrogenase
    2. Adenosine deaminase
    3. Nucleotidase
    4. Gluconolactonase
    5. Enoyl-CoA hydratase

Ans: **i.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.

**ii.** 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.

**iii.** 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

**iv.** gluconolactonase is an enzyme that catalyzes the chemical reaction

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

**v**. 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**:

It is compound consist of nucleoside linked to a phosphate group . nucleotide from the basic structure unit of nuclic acid such as dna.

**Nucleoside:**

Nucleoside are glycosylamines that can be thought of an nucleotides without phosphate group . a nucleoside consist of simply of nucleobase and five carbon sugar.

Difference between dna and rna :

**DNA:**

1:sugar moiety is deoxyribose.

2:double stand molecules.

3: bases are not modified.

4 : no natural dna is catalytic.

5:the life time od dna is comperatively high.

6: present in the nucleus mitochondria and chloroplast.

**RNA:**

1. Sugar moiety is ribose.
2. Single stand molecule.
3. Bases are modified.
4. Rna can be catalytic.
5. Rna is short lived .
6. Present in mitochondria ribosomes cytosole and nucleus.

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

Ans:

**Reason 1:** **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**: **Function of carnitine shuttle system**:

The carnitine shuttle represent a mechanism by which long chain fatty acid ,which are impermeable to the mitochondrial membrane ,are transpoted in to the mitochondrial matrix for the purpose beta oxidation and energy production.

**STAGES INVOLVED IN BETA OXIDATION:**

Three stages involved in beta oxidation of fatty acid.

1. Activation of fatty acids occurring in the cytoplasm.
2. Transport of fatty acids into mitochondria.
3. Beta-Oxidation in the mitochondrial matrix.

**β-Oxidation Of Activated Fatty Acids:**

These steps are repeated until all the carbons of fatty acyl-CoA are converted to

acetyl-CoA. The 4 steps are:

* **Dehydrogenation**
* **Hydration**
* **Dehydrogenation**
* **Cleavage**