**Course Title: Medical Biochemistry II**
**DT 2nd, Sec A**
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**Max Marks: 50**

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**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**

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## 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. ATP is able to power cellular processes by transferring a phosphate group to another molecule (a process called phosphorylation).Although cells continuously break down ATP to obtain energy, ATP also is constantly being synthesized from ADP and phosphate through the processes of cellular respiration.

The free energy derived from the passage of electrons through complexes 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 a proton gradient across the inner mitochondrial membrane.

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

**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:** Any of a group of molecules that, when linked together, form the building blocks of DNA or RNA: composed of a phosphate group, the bases adenine, cytosine, guanine, and thymine, and a pentose sugar, in RNA the thymine base being replaced by uracil.

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.**

**Ans:** Because it will be started from compound called glucose 6 phosphate glucose contains 6 carbon and one phosphate group are attached on carbon no 6.

Enzyme name used in oxidative phase of p.p.

1. Glucose 6 phosphate
2. Gluconotactonse enzymes
3. Phosphocluconate dehydrogenase

**Enzyme name used in Non oxidative phase of p.p pathway.**

1. Isomarase enzyme

2. Epimerase enzyme
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 enzymes of beta-oxidation.

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-Co chain and ends with one acetyl-CoA, one FADH2, one NADH and water, and the acyl-CoA chain become two carbons shorter.