

Biochemistry  
Mid term exam  
Summer class  
DT and RAD

Marks 30

Q1) draw and explain pentose phosphate pathway?

Q2) what is balanced food and what are major food groups and explain the health benefits of a balanced diet?

Q3) explain krebs cycle

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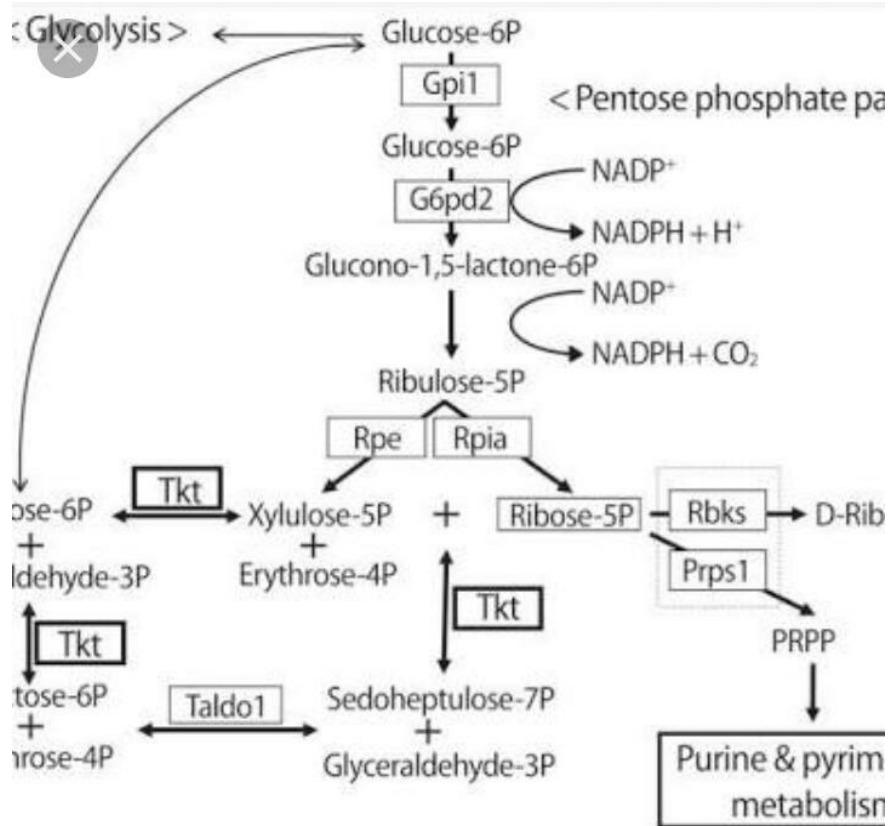
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Ans 1



Draw

● Explain pentose phosphate pathway:

The pentose phosphate pathway (also called the phosphogluconate pathway and the hexose monophosphate shunt) is a metabolic pathway parallel to glycolysis[1]. It generates NADPH and pentoses (5-carbon sugars) as well as ribose 5-phosphate, a precursor for the synthesis of Nucleotides[2]. While the pentose phosphate pathway does involve oxidation of glucose, its primary role is anabolic rather than catabolic. The pathway is especially important in red blood cells (erythrocytes).

There are two distinct phases in the pathway. The first is the oxidative phase, in which NADPH is generated, and the second is the non-oxidative synthesis of 5-carbon sugars. For most organisms, the pentose phosphate pathway takes place in the cytosol; in plants, most steps take place in plastids.[3]

Similar to glycolysis, the pentose phosphate pathway appears to have a very ancient evolutionary origin. The reactions of this pathway are mostly enzyme-catalyzed in modern cells, however, they also occur non-enzymatically under conditions that replicate those of the Archean ocean, and are catalyzed by metal ions, particularly ferrous ions

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**Ans:2**

- **Balance Food:**

A healthy food or balanced food is a food (what you eat) that contains the right amounts of all the food groups. It includes fruit, vegetables, grains, dairy products, and protein. It does not include too much or too little of any kind of food.

- **MAJOR FOOD OF GROUPS :**

A food group is a collection of foods that have nutritional properties or biological classifications that are almost the same. People have written nutrition guides to put different foods into food groups and recommend daily servings of each group for a healthy diet.

Common food groups Edit Dairy, also called milk products and sometimes grouped together with milk alternatives or meat. This is usually a smaller category in nutrition guides. Some examples of dairy products are milk, butter, yogurt and cheese, and most nutrition guides put them in a different place from other food

groups.] Some groups, such as the Harvard School of Public Health (HSPH) have said that dairy products should not be a food group. The HSPH says that "research has shown little benefit, and considerable potential for harm, of such high dairy intakes. Moderate consumption of milk or other dairy products—one to two servings a day—is fine, and likely has some benefits for children. But it's not essential for adults, for a host of reasons."]

Fruits, sometimes grouped together with vegetables, include apples, oranges, bananas, berries and lemons. Fruits are carbohydrates, like sugar, dairy, grains, and starches. Grains, also called cereals and sometimes include potatoes and other starches, is many times the largest group in nutrition guides. Wheat, rice, oats, barley, bread and pasta are grains. Meat, sometimes called protein. This group can sometimes include legumes, eggs, meat analogues and/or dairy. In most nutrition guides, this group is usually a medium- to smaller-sized category. Some examples of meat are chicken, fish, turkey, pork and beef. Sweets, also called sugary foods and sometimes this group includes fats and oils. Sweets is many times a very small group in nutrition guides, and sometimes this group is not included or is put apart from other food groups. Some examples are candy, soft drinks, cake, pie and ice cream. Vegetables, sometimes grouped with fruit and occasionally with legumes. This is usually a large group. Most times, only grains, are a larger group than vegetables in nutrition guides. Some vegetables are spinach, carrots, onions, peppers, and broccoli. Water is treated in very different ways by different nutrition guides. Some nutrition guides do not include water, while

others include it, and yet others make it the most important part or basic part of the guide. Water is sometimes grouped with tea, fruit juice, vegetable juice and even soup ] and is recommended to be drunk in large amounts.

## ● BENEFITS OF BALANCED DIET

Vitamins and minerals in the diet are vital to boost immunity and healthy development, A healthy diet can protect the human body against certain types of diseases, in particular noncommunicable diseases such as obesity, diabetes, cardiovascular diseases, some types of cancer and skeletal conditions. Healthy diets can also contribute to an adequate body weight. Healthy eating is a good opportunity to enrich life by experimenting with different foods from different cultures, origins and with different ways to prepare food. The benefits of eating a wide variety of foods are also emotional, as variety and colour are important ingredients of a balance diet.

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**Ans:3**

● KREBS CYCLE

The citric acid cycle (CAC) – also known as the TCA cycle (tricarboxylic acid cycle) or the Krebs cycle[1][2] – is a series of chemical reactions used by all aerobic organisms to release stored energy through the oxidation of acetyl-CoA derived from carbohydrates, fats, and proteins. In addition, the cycle provides precursors of certain amino acids, as well as the reducing agent NADH, that are used in numerous other reactions. Its central importance to many biochemical pathways suggests that it was one of the earliest components of metabolism and may have originated abiogenically.[3][4] Even though it is branded as a 'cycle', it is not necessary for metabolites to follow only one specific route; at least three segments of the citric acid cycle have been recognized.

The name of this metabolic pathway is derived from the citric acid (a tricarboxylic acid, often called citrate, as the ionized form predominates at

biological pH that is consumed and then regenerated by this sequence of reactions to complete the cycle. The cycle consumes acetate (in the form of acetyl-CoA) and water, reduces  $\text{NAD}^+$  to  $\text{NADH}$ , releasing carbon dioxide. The  $\text{NADH}$  generated by the citric acid cycle is fed into the oxidative phosphorylation (electron transport) pathway. The net result of these two closely linked pathways is the oxidation of nutrients to produce usable chemical energy in the form of ATP.

In eukaryotic cells, the citric acid cycle occurs in the matrix of the mitochondrion. In prokaryotic cells, such as bacteria, which lack mitochondria, the citric acid cycle reaction sequence is performed in the cytosol with the proton gradient for ATP production being across the cell's surface (plasma membrane) rather than the inner membrane of the mitochondrion. The overall yield of energy-containing compounds from the TCA cycle is three  $\text{NADH}$ , one  $\text{FADH}_2$ , and one  $\text{GTP}$ .

The citric acid cycle is a key metabolic pathway that connects carbohydrate, fat, and protein metabolism. The reactions of the cycle are carried out by eight enzymes that completely oxidize acetate (a two carbon molecule), in the form of acetyl-CoA, into two molecules each of carbon dioxide and water. Through catabolism of sugars, fats, and proteins, the two-carbon organic product acetyl-CoA (a form of acetate) is produced which enters the citric acid cycle. The reactions of the cycle also convert three equivalents of nicotinamide adenine dinucleotide (NAD<sup>+</sup>) into three equivalents of reduced NAD<sup>+</sup> (NADH), one equivalent of flavin adenine dinucleotide (FAD) into one equivalent of FADH<sub>2</sub>, and one equivalent each of guanosine diphosphate (GDP) and inorganic phosphate (Pi) into one equivalent of guanosine triphosphate (GTP). The NADH and FADH<sub>2</sub> generated by the citric acid cycle are, in turn, used by the oxidative phosphorylation pathway to generate energy-rich ATP.



One of the primary sources of acetyl-CoA is from the breakdown of sugars by glycolysis which yield pyruvate that in turn is decarboxylated by the pyruvate dehydrogenase complex generating acetyl-CoA

●DRAW

END THE  
PAPER  
THANK  
YOU

