**Course Title: Basic Biochemistry**

**Summer Semester**

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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 from any source, as it may deduct your marks.**

**Q1: Define Dickens and Horecker’s Pathway also explain irreversible phase of HMP pathway. Enlist the enzymes used in non-Oxidative phase of HMP Pathway.hos**

**Ans.** Dickens Shaut Secondary Pathway for the oxidation d-glucose generating reducing Power in the Cytoplasm outside the mitochondria and Syuthesized Pentuses and a few other Sugars Synonym, pentose phosphate patheway: Lipmann – Dickens Horeckser Shunt.

**Irreversible Phase Of HMP Pathway :**

steps involed in irreversible pathway

>Glucose -6.phosphate>6-phosphogluconolactone –

>6 phosphogluconolactone 6- phosphogluconate –

>6- Phosphagluconald > Ribulese -5- Phosphate.

The oxidative " words of this Phase comes from the process of oxidation .

Oxidation is the breakdown of a Molecules os it loses of least one of its electron.

**Step1:** Glucose =6 phosphate is oxidized to form =6 phosphogluconolactone.

NADPH is roduced as a producut of this reaction is catalyzed by enzyme known is Glucose=6 hoshate dehydrogenase.

**Step2:** 6= phosphogluconolactones is converted into 6= phosphogluconate in the presence of an enzyme known as 6= phosphogluconolactones hydrolase.

**Step3:** 6= phosphogluconate in the presence of an enzymes known a 6= phosphogluconate dehydrogens is converted into ribose=5= phosphate.

NADPH is also roduced as a byroducted in this reaction while Cor is also formed.

**Enlist Enzymes Used In Non=Oxiditive HMP Pathway.**

1. Isomerse enzyme
2. Eimerase enzyme
3. Transketolse

**Q2: What are the steps and enzymes involved in Glycolysis.**

**Ans.** **Step** **oxidation Invilved In Glycolysis:**

1. Glucose > Glucose=6=phosphate
2. G6p > Fructose1,6=bisphophate
3. F6p > Fructose1,6=bisphate
4. Fructose, 6=bisphosphate > Dihydroxyacetone phosphate “DHAP ” ” + Glyceraldehyde 3 phosphate “GAP ”
5. DHAP > Glyceraldehyde 3= phosphate “GAP ”
6. Glyceraldehyde 3 - phosphate → 1,3 - bisphosphoglycerate.
7. 1,3 – bisphosphoglycerate > 3 - phosphoglycerate.
8. 3 – phosphoglycerate> 2 - phosphoglycerate.
9. 2 - Phosphoglycerute → Phosphoenolpyruvic acid (PEP).
10. Phosphoenolpyruvate (PEP) → Pyruvic acid.

**Enzymes Involved In Glycolysis:**

**Step 1:** Hexokinase

**Step 2:** Phosphoglucose Isomerase

**Step 3:** Phosphofructokinase

**Step 4:** Aldolase

**Step 5:** Triose phosphate isomerase

**Step 6:** Glyceraldehyde - 3 - Phosphate Dehydrogenase

**Step 7:** Phosphoglycerate Kinase

**Step 8:** Phosphoglycerate Mutase

**Step 9:** Enolase

**Step 10:** Pyruvate Kinase

**Step 1: Hexokinase:**

The first step in glycolysis is the conversion of glucose into glucose - 6 phosphate. The enzyme that catalyzes this reaction is hexokinase.

**Step 2: Phosphoglucose Isomerase :**

The second reaction of glycolysis is the rearrangement of glucose 6 - phosphate (G6P) into fructose 6 - phosphate (F6P) by glucose phosphate isomerase (Phosphoglucose **Isomerase).**

**Step 3: Phosphofructokinase**

Phosphofructokinase, with magnesium as a cofactor, changes fructose 6 - phosphate into fructose 1, 6 bisphosphate.

**Step 4: Aldolase :**

The enzyme Aldolase splits fructose 1, 6 - bisphosphate into two sugars that are isomers of each other. These two sugars are dihydroxyacetone phosphate (DHAP) and glyceraldehyde 3 - phosphate (GAP)

**Step 5: Triose phosphate isomerase**

The enzyme triose phosphate isomerase rapidly inter-converts the molecules dihydroxyacetone phosphate (DHAP) and glyceraldehyde 3-phosphate (GAP). Glyceraldehyde phosphate is removed used in the next step of Glycolysis.

**Step 6: Glyceraldehyde - 3 - phosphate dehydrogenase**

Glyceraldehyde - 3 - phosphate dehydrogenase (GAPDH) dehydrogenates and adds an inorganic phosphate to glyceraldehyde 3 - phosphate, producing 1,3 - bisphosphoglycerate.

**Step 7: Phosphoglycerate Kinase**

Phosphoglycerate kinase transfers a phosphate group from 1,3 - bisphosphoglycerate to ADP to form ATP and 3 - phosphoglycerate.

**Step 8: Phosphoglycerate Mutase**

The enzyme phosphoglycerate mutase relocates the P from 3- phosphoglycerate from the 3rd carbon to the 2 - phosphoglycerate. 3 phosphoglycerate 2 phosphoglycerate .

**Step 9: Enolase**

The enzyme enolase removes a molecule of water from 2 - phosphoglycerate to form phospho enol pyruvic acid (PEP) .

**Step 10: Pyruvate Kinase**

The enzyme pyruvate kinase transfers a P from phosphoenolpyruvate (PEP) to ADP to form pyruvic acid and ATP Result in step 10.

**Q3: Discuss digestion and absorption of Carbohydrates.**

**Ans. Digestion And Absorption of Carbohydrates**

* The digestion of carbohydrates begins in the mouth. The salivary enzyme amylase begins the breakdown of food starches into maltose, a disaccharide.
* As the food travels through the esophagus to the stomach, no significant digestion of carbohydrates takes place. The esophagus produces no digestive enzymes but does produce mucous for lubrication.
* The acidic environment in the stomach stops the action of the amylase enzyme.
* The next step of carbohydrate digestion takes place in the duodenum. The food from the stomach enters the duodenum and mixes with the digestive secretion from the pancreas, liver, and gallbladder.
* Pancreatic juices also contain amylase, which continues the breakdown of starch and glycogen into maltose, a disaccharide.
* The disaccharides are broken down into monosaccharides by enzymes called maltases, sucrases, and lactases, which are present in the small intestinal wall.
* Maltase breaks down maltose into glucose. Other disaccharides, such as sucrose and lactose are broken down by sucrase and lactase, respectively.
* Sucrase breaks down sucrose (or “table sugar”) into glucose and fructose, and lactase breaks down lactose into glucose and galactose.
* The monosaccharides (glucose) thus produced are absorbed and then can be used in metabolic pathways to produce energy. The monosaccharides are transported into the bloodstream to be transported to the different cells in the body.

**Q4: Explain step by step the Tricarboxylic acid cycle.**

**Ans: Regulation Of TCA Cycle:**

**Step 1.** Oxaloacetate is converted to citrate in this reaction Acetyl - CoA enzyme is convert to COA - SH in the reaction the reaction H2o is added **Step 2.** Citrate is converted to Cis - aconitate with the help of Aconitase enzyme in this reaction H2o is remove.

**Step 3.** Cis - acesitate converted to the (socitrale with the help of Aconitase enzyme in the added H2o + Fe 2+.

**Step 4**. Isocitrale is converted oxalosuccinale with the help Isotrate dehydrogenase, enzymos this reaction NAD Converted to NADH + H. **Steps 5.** Oxalosaccinale is converted d- ketoglutamle with the help of AsoCitrate dehydrogenak enzyme.In this reaction mn21 IS added and is remove engymo.

**Step 6**. d-Ketoglatotarale is Converted saccinyl. A with the help of alehyarogenas enzyme.In this reaction NAP is converted to NADH + H. **Step 7.** Sucemyl -CGA is converted Succinate with the help of succinate throkinase enzyme.

**Step 8.** Succinate is converted to Fumarte.

**Step 9.** Fumate is converted to L=Matate.

**Step 10.** t - malate is Converted to Oxaloacateine with the help of do hydrogenase enzyme In this reaction NAD+ is converted to NADH + H+ .

**Q5: Differentiate between fat and oil also explain “solid fat is beneficial for health or oil”.**

**Ans. Fat.** Fats are Substauses that help the body use some vitamins and keen the skin healthy. They are also the main way the body store energy.

**Oil.** Oil is a non polar chmical substance that is a various liquid at ambient temperature and is both hydrophic and lipophilics .

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| --- | --- |
| **Fats** | **Oil** |
| 1.Fats are usually derived from animals. | 1.Oil are usually derived from plants. |
| 2.Fats tends to be solids at room temperature. | 2.Oil tends to be liquid at room temp. |
| 3.Fats are saturated. | 3.Oil is unsaturated. |
| 4.Fats have no double bond. | 4.Oil have double bond. |
| 5.Fats melting point is high. | 5.Oil melting point is low. |
| 6.Fats more stable. | 6.Oil less stable. |

Solid fats and oils provide the same number of Calories per gram. However, oils are generally better for your Health. Then Solid fats become contain less Saturated fats and or Trons fots.

**THE END**