

**1st Continuous Exam,
2nd Semester 1428 H – 29H
Metabolism-1 - 347 BCH**

Name: _____

Number: _____

Q I: _____ /5

Q II: _____ /5

Q III: _____ / 5

Q IV: _____ /5

Total Marks: _____ /20

Q I: Answer the following as true [T] or false [F]

1. Isomerization of glucose-6 phosphate to fructose-6 phosphate is a rate-limiting step in glycolysis. []
2. GluT-4 is the major glucose transporter in skeletal muscles and is increased markedly by insulin. []
3. Hexokinase has low V_{max} for glucose allowing liver to remove glucose from portal blood. []
4. Insulin dephosphorylates pyruvate kinase, so it slows glycolysis. []
5. TCA cycle GTP is formed in a reaction catalysed by succinylCoA synthetase. []
6. In RBC's, glycolysis takes place with no production of ATP. []
7. Glyceralate kinase catalyzes an irreversible reaction in glycolysis. []
8. TCA cycle takes place in the cytosol of all cells in the body. []
9. In TCA cycle malonic acid is a competitive inhibitor of succinate dehydrogenase. []
10. Isocitrate dehydrogenase is one of the rate-limiting enzymes in TCA cycle. []

Q II: Each statement is followed by four related statements. Write T for correct statement and F for incorrect.

1- Absorption of carbohydrates:

- a. Insulin is required for uptake of glucose by intestinal cells. ()
- b. The maximal rate of glucose absorption from intestine is 120 mg/hour. ()
- c. Glucose enters cells by a mechanism in which Na^+ and glucose are co-transported. ()
- d. Fructose and pentoses are absorbed by facilitated diffusion. ()

2 Pyruvate:

- a. Is the end product of aerobic glycolysis. ()
- b. Is a three-carbon compound that is converted into acetyl-CoA before entering the Krebs cycle. ()
- c. Can be converted to lactate only in RBC's. ()
- d. Can be converted to oxaloacetate in the cytosol. ()

3- In glycolysis:

- a. When one molecule of glucose is converted to pyruvate via glycolysis, one carbon is lost as CO_2 . ()
- b. Pyruvate kinase is inactivated when glucagon level is elevated. ()
- c. Hexokinase catalyzes the conversion of fructose-6-phosphate to fructose 1, 6 biphosphate. ()
- d. When one molecule of glucose is converted to pyruvate via glycolysis, one molecule of NAD^+ is reduced. ()

4- Oxidative decarboxylation of pyruvate:

- a. Is allosterically inhibited by NAD^+ . ()
- b. Occurs in the cytosol. ()
- c. The reaction needs thiamin pyrophosphate. ()
- d. Is inactivated when pyruvate dehydrogenase complex is phosphorylated. ()

5- In glyoxylate cycle:

- a. Each turn consumes two molecule of acetyl-CoA. ()
- b. Animals can grow with acetate as its sole source of carbon and energy. ()
- c. It produces two molecules of CO_2 . ()
- d. Isocitrate lyase cleaves isocitrate to glyoxylate and malate. ()

QIII: Choose only one answer (the best suitable one):

1- First oxidation-reduction reaction of glycolysis catalyzes the conversion of:

- a) Dihydroxyacetone phosphate to glyceraldehyde-3 phosphate.
- b) 1,3 bisphosphoglycerate to 3-phosphoglycerate.
- c) 2- phosphoglycerate to phosphoenolpyruvate.
- d) glyceraldehyde-3 phosphate to 1,3 bisphosphoglycerate.

2-The enzyme enolase in glycolysis is inhibited by:

- a) Iodoacetate.
- b) Mercury.
- c) Fluoride.
- d) 2-deoxyglucose.

3- In the TCA cycle FAD is the hydrogen acceptor for :

- a) Succinate dehydrogenase.
- b) α -ketoglutarate dehydrogenase.
- c) Isocitrate dehydrogenase.
- d) Malate dehydrogenase.

4- Phosphofructokinase-1, the most important regulatory enzyme in glycolysis is activated by:

- a) Elevated levels of ATP.
- b) Fructose 1,6 bisphosphate.
- c) Citrate.
- d) Fructose 2,6 bisphosphate.

5- Entry of glucose into cells is insulin-independent in:

- a) Liver cells.
- b) Skeletal muscle.
- c) Adipose tissues
- d) All of the above.

6- In the TCA cycle, fluoroacetyl Co A inhibits:

- a) Citrate synthase.
- b) Succinate dehydrogenase.
- c) Aconitase.
- d) Fumarase.

7- The substrate level phosphorylation in glycolysis occurs during conversion of:

- a) 3- phosphoglycerate to 2- phosphoglycerate.
- b) Phosphoenolpyruvate to pyruvate.
- c) Glyceraldehyde-3-phosphate to 1,3 bisphosphoglycerate.
- d) Fructose 1,6 bisphosphate to dihydroxyacetone phosphate.

8- The major products of hydrolysis of starch by amylase are:

- a. Maltotriose , limit dextrins and glucose..
- b. Maltose, maltotriose and limit dextrins.
- c. Maltose , lactose and limit dextrins.
- d. Glucose , maltose and maltotriose.

9- Oxidation of one mole of glucose by anaerobic glycolysis gives a net of:

- a. 2 moles of lactate and 2 moles of ATP.
- b. 2 moles of lactate , 2 moles of NDAH and 2 moles of ATP.
- c. 2 moles of lactate , 2 moles and 6 moles of ATP.
- d. 2 moles of pyruvate and 2 moles of ATP.

10- The release of second CO₂ in the TCA cycle results from the following reaction:

- a. Isocitrate to α -ketoglutarate.
- b. Fumarate to malate.
- c. Malate to oxaloacetate.
- d. α -ketoglutarate to succinyl Co A.

Q IV: Answer the following questions:

1- Discuss the anabolic functions of TCA cycle?

2- Calculate ATP produced in the following condition:

The conversion of fructose-6-phosphate to acetyl CoA in the glycolytic & oxidative decarboxylation pathways.