

**I. Choose the best answer:-**

- 1- **Enzymes for electron transport reactions are most active and concentrated in which of the following structures of the cell?**
  - A. Nuclei
  - B. Lysosomes
  - C. Microsomes
  - D. Mitochondria
  - E. All of the above
  
- 2- **Which of the following liver enzymes, absent from other tissues, gives the liver an advantage over other cells in taking up glucose after a meal?**
  - A. Glucokinase
  - B. Aldolase
  - C. Hexokinase
  - D. Enolase
  - E. Glucose-6-phosphatase
  
- 3- **What linkages occur in glycogen at branch points between glucose units?**
  - A. Alpha-1,4
  - B. Alpha-1,6
  - C. Beta-1,3
  - D. Beta-1,4
  - E. Beta-1,6
  
- 4- **The carbohydrate in highest concentration in resting muscle is**
  - A. glucose.
  - B. lactose.
  - C. sucrose.
  - D. glycogen.
  - E. inositol
  
- 5- **A common intermediate of metabolism of carbohydrates, fatty acids and amino acids is**
  - A. glycerol.
  - B. acetyl CoA.
  - C. acetoacetate.
  - D. oxaloacetate.
  - E. acetylcholine.
  
- 6- **In the glycolytic sequence, the enzyme that brings about the transition from 6-carbon metabolites to 3-carbon metabolites is**
  - A. phosphoglucoisomerase.
  - B. phosphofructokinase.
  - C. phosphorylase.
  - D. hexokinase.
  - E. aldolase.

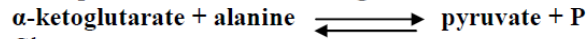
*Group A*

- 7- Beta oxidation of a mole of an 18 carbon fatty acid under physiologic conditions produces**
- A. one mole of acetic acid.
  - B. nine moles of acetyl CoA.
  - C. nine moles of acetic acid.
  - D. one mole of acetoacetic acid.
  - E. one mole of hydroxybutyric acid.
- 8- Under strict anaerobic conditions, the catabolism of one glucose molecule would yield a net of**
- A. 2 ATP and 2 lactic acid molecules.
  - B. 4 ATP and 2 lactic acid molecules.
  - C. 2 ATP and 2 pyruvic acid molecules.
  - D. 4 ATP and 2 pyruvic acid molecules.
- 9- Muscle glycogen does not yield blood glucose directly but liver glycogen does because**
- A. hexokinase is not present in liver.
  - B. muscle cells are impermeable to glucose.
  - C. muscle does not contain phosphoglucomutase.
  - D. muscle glycogen differs in structure from liver glycogen.
  - E. glucose-6-phosphatase is not present in muscle.
- 10- Energy for ATP synthesis is derived from the electron transport system by which of the following processes?**
- A. Transamination
  - B. Aldolization
  - C. Reductive synthesis
  - D. Oxidative deamination
  - E. Oxidative phosphorylation
- 11- Functions of the hexose monophosphate shunt include the production of**
- (1) NADP for lactate oxidation.
  - (2) NADPH for fatty acid synthesis.
  - (3) glucuronic acid for heparin synthesis.
  - (4) D-ribose for nucleic acid synthesis.
  - (5) ATP for anaerobic muscle contraction.
- A. (1), (3), and (5)
  - B. (1) and (4)
  - C. (2), (3), and (5)
  - D. (2) and (4)
  - E. (3) only
- 12- Which of the following statements is NOT true about ammonia and the  $\alpha$ -amino group of amino acids?**
- A.  $\text{NH}^{+4}$  is formed from glutamine in the kidney.
  - B. The amino group in carbamyl phosphate is directly donated by aspartate in a transamination reaction.
  - C. Cellular levels of ammonia must be maintained at low concentrations because of its toxicity.

Group A

D. Glutamate dehydrogenase can catalyze the formation of glutamate from ammonia and  $\alpha$ -ketoglutarate using NADPH as a cofactor.

13- What is the product P in the following reaction?



- A. Glutamate
- B. Glutamine
- C. Aspartate
- D. Succinate
- E. Pyridoxine phosphate

14- In relative insulin insufficiency, acetyl CoA is usually channeled into

- A. ketone-body formation.
- B. cholesterol synthesis.
- C. fatty-acid synthesis.
- D. gluconeogenesis.
- E. the Krebs cycle

15- The final step in the complete metabolism of fat is carried out by means of

- A. anaerobic glycolysis.
- B. the tricarboxylic acid cycle.
- C. the reductive fixation of  $\text{CO}_2$ .
- D. the hexose monophosphate shunt.
- E. the Krebs-Henseleit (urea) cycle.

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**II. Match:**

A- Lipogenesis		Emulsification
B- Glucogenic		excrete uric acid
C- Bile salt		Lipid degradation
D- Ureotelic		TCA cycle intermediates
E- Uricotelic		excrete urea
		Triglycerides formation

**III. True or False: -**

- 1- If protein is catabolized for energy, then MOST of the energy is derived from cleavage of peptide bonds. **T/ F**
- 2- Fats are hydrolysed by acidic pH in the stomach. **T/ F**
- 3- Lactate and alanine, produced by skeletal muscle and RBCs are the major fuels for gluconeogenesis. **T/ F**
- 4- A high insulin level in the blood increases the enzymatic capacity for gluconeogenesis. **T/ F**
- 5- Phosphoglycerate kinase converts 1,3 bisphosphoglycerate to 3-phosphoglycerate. **T/ F**

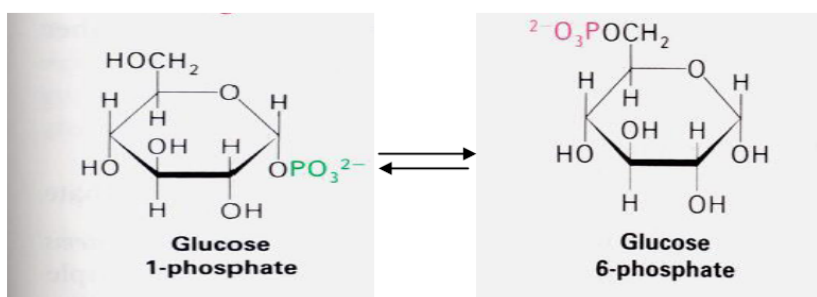
**IV. Completion**

1-



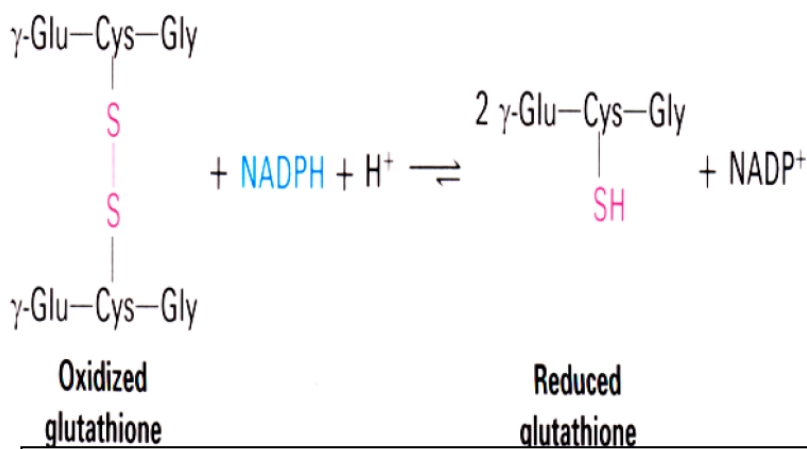
Enzyme	Belonging group	Location of reaction

2-



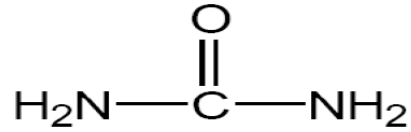
Enzyme	Belonging group	Which pathway

3-



Enzyme	Source of reducing power	Location of reaction
.....	.....	.....

Group A



- a) Name the above structure? .....
- b) Name the main sources of nitrogen incorporated in the above compound.  
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.....
- c) What is the key enzyme responsible of the synthesis of above compound?  
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- d) How many ATP is required If 20 mol of the above structure are excreted by kidney?  
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**V. Short questions: -**

- 1- How many (**Spirals- Cycles**) of  $\beta$ -oxidation are needed to convert palmitic acid to acetyl CoA?  
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- 2- What are the two ways to shuttle electrons of NADH across the inner mitochondrial membrane?  
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**Best Wishes for All**