

Navrachana University
 School of Liberal studies and Education
 B.Sc.Program
 End-Semester Examination November 2017
 SY BSc Semester III
 Metabolism & Enzymology (BC202)

Date: 22/11/2017

Marks: 40

Time: 3:30 PM – 5:30 PM

Instructions:

- All the Questions are Compulsory
- Please read the questions carefully and answer accordingly
- Draw a neat and labeled diagram wherever necessary

Q1. Multiple choice questions:**(1× 7= 7M)**

1. Which of the following statements about the transport of fatty acyl-CoA derivatives (activated fatty acids) into the mitochondria is correct?

- a) Only the acyl groups of fatty acyl-CoA derivatives are attached to carnitine.
- b) Fatty acyl-CoA derivatives can diffuse into the mitochondrial matrix because they are hydrophobic.
- c) Fatty acyl-CoAs are carried into the mitochondrial matrix by a carnitine shuttle.
- d) Fatty acyl-CoAs are oxidised in the mitochondrial matrix because most of the ATP generated is needed there.

2. A 28-year-old professional cyclist has been training for an opportunity to go for a long race. His coach strongly suggests the intake of carbohydrates after the work out to ensure a muscle glycogen storage that can endure the 28-day race. The activity of muscle glycogen synthase in resting muscles is increased by the action of which of the following?

- a) Epinephrine b) Glucagon c) Insulin d) Phosphorylation
- e) Fasting and starvation.

3. A 15-year-old male presents with increased thirst, hunger, urination, and weight loss. His fasting blood glucose level is 400 mg/dl and is diagnosed with type 1 diabetes mellitus. What is the reason for this patient's inability to maintain a normal blood glucose level ?

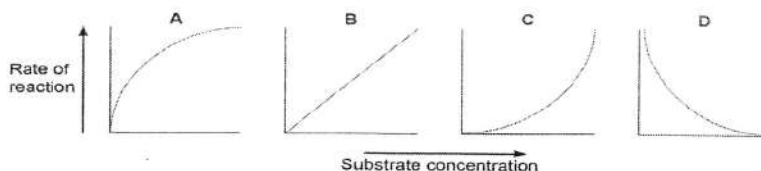
- a) Decreased uptake of glucose by peripheral cells
- b) Abnormal response to glucagon
- c) Decreased glucagon to insulin ratio
- d) Decreased glucose output by the liver
- e) Increased ketone body production.

4. Which of the following descriptions best describes an induced fit?

- a) The process by which an active site alters shape such that it is ready to accept a substrate.
- b) The process by which a substrate adopts correct binding conformation before entering an active site.
- c) The process by which a substrate binds to an active site and alters the shape of the active site.
- d) The process by which an active site alters the shape of the substrate such that it can adopt the necessary active conformation for binding

5. Which of the diagrams illustrates the way in which the rate of an enzyme-controlled reaction depends on substrate concentration?

- a) A b) B
c) C d) D



6. Which of the following statements best describes the β -oxidation of fatty acids?

- a) One Acetyl co A is produced in each turn of the β -oxidation spiral
b) β -oxidation of fatty acids is an extra mitochondrial process
c) The enzymes present in the form of multienzyme complexes
d) The intermediates are carried by Acyl carrier protein
e) 129 ATP are required for the formation of one mol of Palmitic acid.

7. Which one of the following conditions is least likely to denature an enzyme?

- a) a high temperature b) an extreme pH
c) heavy metal ions d) a low temperature

Q2. State whether following statement is true or false with justification.

(2 × 3 = 6M)

- Competitive inhibitor molecules slow down reaction rates.
- Pyruvate kinase is a rate limiting enzyme in glycolysis.
- To initiate FA biosynthesis, malonyl and acetyl groups are need to be activated.

Q3. Match the following words with their definitions.

(0.5 × 6 = 3 M)

a	Product	i	Amount of energy required for a chemical reaction to occur.
b	Active site	ii	Substances that bring about a chemical reaction without being changed itself.
c	Enzymes	iii	Substance that enzymes act upon.
d	Catalyst	iv	Regions on the surface of enzymes that fit the substrate
e	Substrate	v	Substance formed from the substrate at the end of a chemical reaction with an enzyme.
f	Activation energy	vi	Proteins that speed up chemical reactions.
		vii	Region of surface of enzyme where regulating molecule bind specifically.
		viii	Sunstance formed from the substrate under the influence of modulator.

Q4. Fill in the blank as given below.

(1 × 5 = 5 M)

- Both aerobic and anaerobic respiration begin with _____.
- _____ oxidation does not require any prior activation of the fatty acid.
- _____ hormone stimulates lipogenesis process by increasing acetyl-CoA carboxylase activity whereas _____ hormone inhibit the enzyme activity for negative feedback.
- The non-protein component, tightly bound to the apoenzyme by covalent bonds is called _____.
- _____ is a precursor of the long chained fatty acid.

Q5. Answer the following questions in brief (any 4)

(2 × 4 = 8M)

1. State differences between Cofactor and coenzyme.
2. Why does glycogen storage in liver has crucial role over fat storage in adipose tissue ?
3. Draw a graph indicating glucose and glycogen metabolism after 72 hours (Concentration Vs Time) and inteprete the graph for analysis.
4. Explain EC number with suitable example.
5. Glucose 6 phosphate plays can enter multiple pathway in glucose metabolism. Justify the statement.

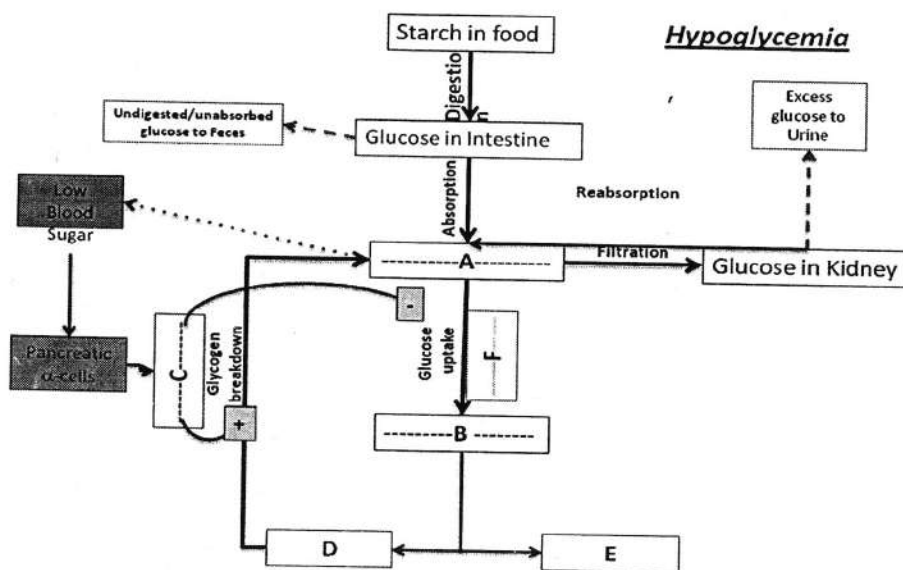
Q6. Answer the following questions in detail (any 3)

(3X3=9M)

1. "Liver is the major source of blood glucose for energy balance in system". Justify the statement with respect to glucose metabolism with suitable examples.
2. Draw a graph of enzyme activity Vs (a. Temperature, b. pH, c. Substrate concentration) to study the effect of environmental factors on enzymes.
3. Name enzymes involved in fatty acid synthesis and explain fatty acid synthesis cycle in brief.
4. Differentiate between reversible and irreversible inhibition of enzyme and explain any one of them in detail with suitable example.

Q7 Name the key molecules (A to F) involved in given flow chart of glucose metabolism.

(0.25X6=2M)



*****ALL THE BEST*****