



**KISII UNIVERSITY**  
**UNIVERSITY EXAMINATIONS**

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SECOND YEAR EXAMINATION FOR THE AWARD OF THE DEGREE OF  
BACHELOR OF SCIENCE IN MEDICAL LABORATORY  
FIRST SEMESTER, 2015/2016  
(SEPTEMBER - DECEMBER, 2015)

**STREAM:** MELS 131; PROTEINS AND ENZYMES  
Y2 S1 **TIME:** 3 HOURS

**DAY:** TUESDAY, 2.00-5.00 PM **DATE:** 08/12/2015

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**INSTRUCTIONS**

1. Do not write anything on this question paper.
2. Answer ALL questions in section A and B and C1. Then choose ONE from Q2 OR Q3 in section C.

## SECTION - A

LIPID

1. Alcohol dehydrogenase converts ethanol into  
Enzymes involved (A) Acetyl CoA (B) Acetaldehyde  
 (B) Acetate (D) CO<sub>2</sub> and H<sub>2</sub>O
2. Lipids are stored in the body mainly in the form of  
 (A) Phospholipids (B) Glycolipids  
 (B) Triglycerides (D) Fatty acids
3. Lipid stores are mainly present in  
 (A) Liver (B) Brain  
 (B) Muscles (D) Adipose tissue
4. Glycerol is converted into glycerol-3-phosphate by  
 (A) Thiokinase (B) Triokinase  
 (B) Glycerol kinase (D) All of these
5. In adipose tissue, glycerol-3-phosphate required for the synthesis of triglycerides comes mainly from  
 (A) Hydrolysis of pre-existing triglycerides  
 (B) Hydrolysis of phospholipids  
 (C) Dihydroxyacetone phosphate formed in glycolysis  
 (D) Free glycerol
6. Glycerol released from adipose tissue by hydrolysis of triglycerides is mainly  
 (A) Taken up by liver  
 (B) Taken up by extrahepatic tissues  
 (C) Reutilised in adipose tissue  
 (D) Excreted from the body
7. Free glycerol cannot be used for triglyceride synthesis in  
 (A) Liver (B) Kidney  
 (B) Intestine (D) Adipose tissue
8. Adipose tissue lacks  
 (A) Hormone-sensitive lipase  
 (B) Glycerol kinase  
 (C) cAMP-dependent protein kinase

9. A digestive secretion that does not contain any digestive enzyme is  
(A) Saliva (B) Gastric juice  
(C) Pancreatic juice (D) Bile
10. Saliva contains a lipase which acts on triglycerides having  
(A) Short chain fatty acids  
(B) Medium chain fatty acids  
(C) Long chain fatty acids  
(D) All of these
11. Salivary lipase hydrolyses the ester bond at  
(A) Position 1 of triglycerides  
(B) Position 2 of triglycerides  
(C) Position 3 of triglycerides  
(D) All of these
12. Salivary lipase converts dietary triglycerides into  
(A) Diglycerides and fatty acids  
(B) Monoglycerides and fatty acids  
(C) Glycerol and fatty acids  
(D) All of these
13. Pancreatic lipase requires for its activity:  
(A) Co-lipase (B) Bile salts  
(C) Phospholipids (D) All of these
14. Pancreatic lipase converts triacylglycerols into  
(A) 2, 3-Diacylglycerol  
(B) 1-Monoacylglycerol  
(C) 2-Monoacylglycerol  
(D) 3-Monoacylglycerol
15. Oxidation of fatty acids occurs  
(A) In the cytosol  
(B) In the matrix of mitochondria  
(C) On inner mitochondrial membrane  
(D) On the microsomes
16. Activation of fatty acids requires all the following except  
(A) ATP (B) Coenzyme A  
(C) Thiokinase (D) Carnitine
17. Mitochondrial thiokinase acts on  
(A) Short chain of fatty acids  
(B) Medium chain fatty acids  
(C) Long chain fatty acids  
(D) All of these
18. Carnitine is required for the transport of  
(A) Triglycerides out of liver  
(B) Triglycerides into mitochondria  
(C) Short chain fatty acids into mitochondria  
(D) Long chain fatty acids into mitochondria

19. Carnitine acylcarnitine translocase is present
- (A) In the inner mitochondrial membrane
  - (B) In the mitochondrial matrix
  - (C) On the outer surface of inner mitochondrial membrane
  - (D) On the inner surface of inner mitochondrial membrane
20. Net ATP generation on complete oxidation of stearic acid is
- (A) 129 (B) 131
  - (B) 146 (D) 148
21. Propionyl CoA formed oxidation of fatty acids having an odd number of carbon atoms is converted into
- (A) Acetyl CoA
  - (B) Acetoacetyl CoA
  - (C) D-Methylmalonyl CoA
  - (D) Butyryl CoA

**SECTION B [20 MARKS]**

Answer all questions

1. Frequently used in shampoos. The detergent sodium dodecyl sulfate (SDS) denatures proteins. Suggest how SDS destroys protein structure. (4 marks)
2. In the course of purifying an enzyme, a researcher performs a purification step that results in an increase in the total activity to a value greater than that present in the original crude extract. Explain how the amount of total activity might increase. (4 marks)
3. State and explain 5 clinical importance of enzymes (4 marks)
4. Define the following; (4 marks)
  - a. Electrophoresis
  - b. Spectrometry
  - c. Chromatography
  - d. Isozymes
5. State four uses of enzymes as therapeutic agents (4 marks)

**SECTION C [30 MARKS]**

(In this section, question ONE is compulsory, then choose either question 2 or 3)

1. (a) Proteins treated with a sulfhydryl reagent such as  $\beta$ -mercaptoethanol and dissolved in sodium dodecyl sulfate have the same charge-to-mass ratio. Explain.  
(b) Under what conditions might the statement in part a be incorrect?  
(c) Some proteins migrate anomalously in SDS-PAGE gels. For instance, the molecular weight determined from an SDS-PAGE gel is sometimes very different from the molecular weight determined from the amino acid sequence. Suggest an explanation for this discrepancy. (15 Marks)
  2. In the course of purifying an enzyme, a researcher performs a purification step that results in an increase in the total activity to a value greater than that present in the original crude extract. Explain how the amount of total activity might increase. (15 Marks)
- OR**
3. (a) Give the allosteric enzymes regulation mechanism.  
(b) Discuss the kinetic aspects of allosteric inhibition.  
(c) Write the importance of enzyme kinetics. (15 Marks)