



**MASINDE MULIRO UNIVERSITY OF  
SCIENCE AND TECHNOLOGY  
(MMUST)**

**MAIN CAMPUS**

**UNIVERSITY EXAMINATIONS  
2018/2019 ACADEMIC YEAR**

**MAIN PAPER**

**FOR THE DEGREE  
OF  
BACHELOR OF MEDICAL LABORATORY SCIENCES (DIRECT ENTRY AND  
UPGRADING)**

**COURSE CODE: BML 221**

**COURSE TITLE: METABOLISM**

**DATE: 20<sup>th</sup> MAY 2019**

**TIME: 3.00 -5.00PM**

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**INSTRUCTIONS TO CANDIDATES**

This paper is divided into three sections, **A B** and **C**, carrying respectively: Multiple Choice Questions (**MCQs**), Short Answer Questions (**SAQs**) and Long Answer Questions (**LAQs**). **ANSWER ALL QUESTIONS**

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 4 Printed Pages. Please Turn Over

## **SECTION A**

1. Cori's cycle transfers
  - a) Glucose from muscle to liver
  - b) Lactate from muscle to liver
  - c) Lactate from liver to muscle
  - d) Pyruvate from liver to muscle
2. What molecule results when ATP undergoes an exergonic reaction with water?
  - a. adenine triphosphate      b. adenine phosphate
  - c. adenosine diphosphate      d. adenosine triphosphate
3. Phosphofructokinase 1, the major flux-controlling enzyme of glycolysis is allosterically inhibited by \_ and activated by\_.
  - a. AMP, Pi      b. ADP, AMP
  - c. Citrate, ATP      d. ATP, AMP
4. Glucose is converted to which of the following high energy intermediates in glycolysis?
  - a. phosphoenolpyruvate      b. 2,3-bisphosphoglycerate
  - c. glucose-6-Phosphate      d. fructose-6-Phosphate
5. Which of the following enzymatic reactions is an example of substrate phosphorylation?
  - a. hexokinase      b. glucokinase
  - c. phosphofructokinase      d. phosphoglycerate kinase
6. Which of the following reactions is not a control point in the citric acid cycle?
  - a. Malate dehydrogenase
  - b. Isocitrate dehydrogenase
  - c.  $\alpha$ -Ketoglutarate dehydrogenase
  - d. Citrate synthase
7. What do the enzymes citrate synthase, isocitrate dehydrogenase, and ketoglutarate dehydrogenase have in common?
  - a. All are enzymes that release carbon dioxide.
  - b. All are enzymes that utilize NAD<sup>+</sup>.
  - c. All are enzymes that catalyze reduction reactions.
  - d. All are enzymes with large negative free energies.
8. During electron transport, protons are pumped out of the mitochondrion at each of the major sites except for:
  - a. *Complex I.*
  - b. *Complex II.*
  - c. *Complex III.*
  - d. *Complex IV.*
9. Each cycle of  $\beta$ -oxidation produces
  - a. 1 FAD, 1 NADH, and 1 acetyl-CoA.

- b. 1 F ADH<sub>2</sub>, 1 NADH, and 1 acetyl-CoA.
- c. 1 FAD, 1 NAD<sup>+</sup>, and 2CO<sub>2</sub> molecules.
- d. 1 F ADH<sub>2</sub>, 1 NADH, and 2CO<sub>2</sub> molecules.

10. When it functions as a "second messenger", cAMP
- a. acts outside the cell to influence cellular processes.
  - b. acts "second in importance" to AMP.
  - c. activates all cytosolic protein kinases.
  - d. activates the cAMP-dependent protein kinase.
11. The percent of cytosine in a double-stranded DNA is 21. What is the percent of thymine in that DNA?
- a. 21
  - b. 29
  - c. 50
  - d. 79
12. During starvation, ketone bodies are used as a fuel by
- a. Erythrocytes
  - b. Brain
  - c. Liver
  - d. All of these
13. The number of ATP required for urea synthesis is
- a. 4
  - b. 1
  - c. 2
  - d. 3
14. The amino acid which is detoxicated by benzoic acid to form hippuric acid is
- a. Glycine
  - b. Alanine
  - c. Serine
  - d. Glutamic acid
15. Protein anabolism is stimulated by
- a. ACTH
  - b. Testosterone
  - c. Glucagon
  - d. Epinephrine
16. Activation of fatty acids requires all the following except
- a. ATP
  - b. Coenzyme A
  - c. Thiokinase
  - d. Carnitine
17.  $\alpha$ -Oxidation of fatty acids occurs mainly in
- a. Liver
  - b. Brain
  - c. Muscles
  - d. Adipose tissue
18. De novo synthesis of fatty acids is catalyzed by a multi-enzyme complex which contains
- a. One-SH group
  - b. Two-SH groups
  - c. Three-SH groups
  - d. Four-SH groups
19. In the purine nucleus, carbon 6 is contributed by
- a. Glycine
  - b. CO<sub>2</sub>

- c. Aspartate    d. Glutamine
20. An allosteric inhibitor of PRPP glutamyl amido transferase is  
a. AMP            b. ADP  
c. GMP            d. All of these

### **SECTION B**

21. a. Explain the **pathogenesis of acute pancreatitis** (4mks)  
      b. Describe the role and significance of **glutamine synthetase** (4mks)
22. Discuss **diabetic ketoacidosis** (8mks)
23. Write a note on **Physiological fatty liver** (8mks)
24. Describe  **$\beta$ -oxidation of fatty acids** (8mks)
25. Discuss how **pyruvate dehydrogenase complex** is regulated (8mks)

### **SECTION C**

26. Discuss the Hexose monophosphate shunt (**HMP-shunt**) (20mks)
27. Describe  
      a) Regulation of purine nucleotide biosynthesis (8mks)  
      b) Biosynthesis of cholesterol (12mks)

**GOOD LUCK !!!**