



*(University of Choice)*

**MASINDE MULIRO UNIVERSITY OF  
SCIENCE AND TECHNOLOGY  
(MMUST)  
MAIN CAMPUS  
UNIVERSITY EXAMINATIONS  
2021/2022 ACADEMIC YEAR  
MAIN EXAM  
FIRST YEAR SECOND SEMESTER EXAMINATIONS  
FOR  
DIPLOMA OF MEDICAL BIOTECHNOLOGY**

**COURSE CODE                    BBD 225**

**COURSE TITLE:                INTERMEDIARY METABOLISM**

**DATE: 19/04/2022**

**TIME: 8.00 -10.00AM**

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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.
- Write your answers on the provided university examination booklet.
- **TIME:** 2 Hours

**SECTION A (MCQs) 20mks**

1. Pyruvate is the precursor for \_\_\_\_\_
  - a) Alanine
  - b) Glutamate
  - c) Serine
  - d) Proline
2. The cyclized derivative of glutamate is \_\_\_\_\_
  - a) Proline
  - b) Arginine
  - c) Glutamine
  - d) Serine
3. Which of the following is a non-essential amino acid?
  - a) Methionine
  - b) Threonine
  - c) Lysine
  - d) Cysteine
4. The carbon atom source while producing urea in the urea cycle is \_\_\_\_\_
  - a) CO<sub>2</sub>
  - b) Glucose
  - c) Aspartic acid
  - d) Arginine
5. Glutamate is metabolically converted to α-ketoglutarate and NH<sub>4</sub><sup>+</sup> by a process \_\_\_\_\_
  - a) Oxidative deamination
  - b) Transamination
  - c) Reductive deamination
  - d) Deamination
6. Free ammonia combined with glutamate to yield glutamine by the action of \_\_\_\_\_
  - a) Glutaminase
  - b) Glutamine synthase
  - c) Glutamate dehydrogenase
  - d) Amino transferase
7. Urea cycle converts \_\_\_\_\_
  - a) Keto acids into amino acids
  - b) Amino acids into keto acids
  - c) Ammonia into a less toxic form
  - d) Ammonia into a more toxic form
8. What is the necessary coenzyme for transamination reactions?
  - a) Pyridoxal phosphate
  - b) Thiamine pyrophosphate
  - c) NAD
  - d) Coenzyme A
9. Which is the first step in the catabolism of most L-amino acids once they have reached the liver is promoted?
  - a) Amino transferases
  - b) Glutaminase
  - c) Glutamine synthase
  - d) Glutamate dehydrogenase
10. The combined action of aminotransferase and glutamate dehydrogenase is referred as \_\_\_\_\_
  - a) Oxidative deamination
  - b) Transamination
  - c) Reductive deamination
  - d) Transdeamination
11. Glutamine is converted to glutamate and NH<sub>4</sub><sup>+</sup> by \_\_\_\_\_
  - a) Amino transferases
  - b) Glutaminase

- c) Glutamine synthase  
d) Glutamate dehydrogenase
12. Which of the following operates at an important intersection of carbon and nitrogen metabolism?  
a) Amino transferases  
b) Glutaminase  
c) Glutamine synthase  
d) Glutamate dehydrogenase
13. Which of the following hydrolyzes successive amino-terminal residues from short peptides?  
a) Aminopeptidase  
b) Enteropeptidase  
c) Glutamine synthase  
d) Glutamate dehydrogenase
14. Which of the following yields acetyl coA directly?  
a) Phenylalanine  
b) Isoleucine  
c) Lysine  
d) Alanine
15. Which of the following produces pyruvate?  
a) Leucine  
b) Isoleucine  
c) Lysine  
d) Alanine
16. Which of the following produces  $\alpha$ -ketoglutarate?  
a) Leucine  
b) Threonine  
c) Methionine  
d) Proline
17. Which of the following produce succinyl co-A?  
a) Leucine  
b) Isoleucine  
c) Arginine  
d) Alanine.
18. Urea cycle converts \_\_\_\_\_  
a) Keto acids into amino acids  
b) Amino acids into keto acids  
c) Ammonia into a less toxic form  
d) Ammonia into a more toxic form
19. Urea production occurs almost exclusively in \_\_\_\_\_  
a) Kidneys  
b) Liver  
c) Blood  
d) Urine
20. What are the products of urea cycle?  
a) One molecule of urea, one molecule of ammonia, one molecule of ATP and one molecule of fumaric acid  
b) One molecule of urea, one molecule of AMP, two molecules of ADP and one molecule of fumaric acid  
c) One molecule of aspartic acid, one molecule of ammonia, one molecule of ATP and one molecule of fumaric acid  
d) Two molecules of urea, two molecules of ammonia, one molecule of ATP and one molecule of fumaric acid.

### SECTION B

1. Differentiate metabolism, catabolism and anabolism (8mks)
2. Discuss the major metabolic disorders (8mks)

3. Describe the glutamate synthesis with an aid of a diagram (8mks)
4. a. Name 3 main coenzymes (3mks)  
b. Explain the functions of coenzymes (5mks)
5. Compare and contrast between purine and pyrimidine biosynthesis (8mks)

**SECTION C**

1. Describe the urea cycle (20mks)
2. Explain the regulation of metabolic pathways (20mks)