



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

MAIN CAMPUS

**UNIVERSITY SUPPLEMENTARY/SPECIAL EXAMINATIONS
2020/2021 ACADEMIC YEAR**

**FOR THE DEGREE
OF
BACHELOR OF SCIENCE IN NURSING (DL)**

COURSE CODE: Ncd 124

COURSE TITLE: BIOCHEMISTRY II: METABOLISM

Friday 7th October 2022

3.00pm-6.00pm

INSTRUCTIONS TO CANDIDATES

All Questions are compulsory. In section I, cycle the correct response using. In section II and III, write the answers in the answer booklets provided.

MMUST observes ZERO tolerance to examination cheating

Please turn over

SECTION I: MULTIPLE CHOICE QUESTIONS (20mks)

1. Gluconeogenesis:

- a) Takes place in the nucleus
- b) Takes place in the mitochondrion
- c) Takes place in the ribosomes
- d) Entails the formation of glucose from noncarbohydrate sources

2. The first reaction in Kreb's cycle:

- a) Is irreversible
- b) Can be reversed
- c) Entails the conversion of pyruvate into acetyl coA
- d) Is not catalyzed by any enzyme

3. Failure of gluconeogenesis

- a) Leads to hyperglycemia
- b) Can be fatal
- c) Does not have any consequences
- d) Leads to hypoxemia

4. Citrate synthase:

- a) Catalyses one of the reversible reactions in the Kreb's cycle
- b) catalyzes the condensation of acetyl-CoA and oxaloacetate to form Citrate in Kreb's cycle
- c) Catalyses the first reaction in gluconeogenesis
- d) Catalyses the last step in Kreb's cycle

5. The terminal electron acceptor in the respiratory chain is:
- a) Oxygen
 - b) Hydrogen
 - c) NADH
 - d) Water
6. Pyruvate carboxylase:
- a) Is a mitochondrial enzyme
 - b) Is a cytoplasmic enzyme
 - c) Catalyses the conversion of phosphoenolpyruvate into pyruvate
 - d) Catalyses the last reaction in gluconeogenesis
7. Fructose 1, 6-bisphosphatase:
- a) Is a mitochondrial enzyme
 - b) Catalyses the conversion of fructose 6 phosphate to fructose 1,6 phosphate
 - c) Is involved in the formation of fructose 6 phosphate from fructose 1,6 phosphate
 - d) Catalyses the formation of glucose from glucose 6 phosphate
8. Glucose 6-phosphatase is present in:
- a) Adipose tissue
 - b) The liver
 - c) Skeletal muscle
 - d) The brain
9. Gluconeogenesis is turned on:
- a) During starvation
 - b) In the fed state
 - c) When the diet is composed of a lot of carbohydrates
 - d) By insulin

10. Ketone bodies include:
- Acetone, acetoacetate
 - Glycerol, acetone
 - Glucose, acetone
 - Pyruvate, acetoacetate
11. In humans, the pentose phosphate pathway is most active in:
- Adrenal cortex, liver
 - Mammary glands, the myocardium
 - Skeletal muscle, adrenal cortex
 - Red blood cells, abdominal muscles
12. The electron-accepting molecule in a redox reaction is known as the:
- Reducing agent
 - Enzyme
 - Oxidizing agent
 - Conjugate
13. ATP synthase:
- Is located in the cytoplasm
 - Is located in the inner mitochondrial membrane
 - Is an enzyme involved in the breakdown of the energy storing molecule ATP to form ADP
 - Is an enzyme that catalyses the first reaction in the Krebs cycle
14. Glucose-6-phosphate dehydrogenase deficiency leads to:
- Pernicious anemia
 - Lactose intolerance
 - Hemolytic anemia
 - Exercise intolerance
15. Foodstuffs feed into the citric acid cycle as:
- Acetyl-CoA
 - Pyruvate
 - Glucose
 - Amino acids

16. Krebs cycle occurs in the:
- Cytoplasm
 - Nucleus
 - Mitochondrion
 - Ribosomes
17. The electron acceptors in the TCA cycle are:
- FAD and NAD⁺
 - FAD and NADH
 - FAD and oxygen
 - NAD⁺ and oxygen
18. Oxidative phosphorylation:
- Occurs in the cytoplasm
 - Occurs in the nucleus
 - Occurs in the plasma membrane
 - Takes place in the mitochondrion
19. The process of gluconeogenesis in the kidneys ends at:
- The formation of glucose-6-phosphate
 - The formation of glucose
 - The formation of fructose 1,6-bisphosphate
 - The formation of pyruvate
20. The last reaction in Krebs cycle:
- Malate is oxidized, regenerating oxaloacetate
 - Acetyl coenzyme A is regenerated
 - Succinate is oxidized to fumarate
 - Acetyl-CoA and oxaloacetate condense, forming citrate.

SECTION II: SHORT ANSWER QUESTIONS (40mks)

Answer all the questions in this section

1. Explain three sources of acetyl-CoA that is used in the citric acid cycle (6mks)
2. Explain the importance of the pentose phosphate pathway in the human body (8mks)
3. Describe the three reactions of gluconeogenesis that are irreversible (6mks)
4. Describe any four enzymes that catalyse reactions in gluconeogenesis (8mks)
5. Explain conditions under which gluconeogenesis takes place (8mks)
6. State four precursors of glucose in gluconeogenesis (4mks)

SECTION II: Long Answer Questions (40mks)

Answer all the questions in this section

1. Describe the electron transport chain (20mks)
2. Describe gluconeogenesis (20mks)