



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

MAIN CAMPUS

**UNIVERSITY EXAMINATIONS
2022/2023 ACADEMIC YEAR**

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

COURSE CODE: NCD 124

COURSE TITLE: BIOCHEMISTRY II (METABOLISM)

Thursday 13th April 2023

3.00pm-6.00pm

INSTRUCTIONS TO CANDIDATES

All Questions are compulsory.

Time 3hours

MMUST observes ZERO tolerance to examination cheating

Please turn over

SECTION I: MULTIPLE CHOICE QUESTIONS (20mks)

Answer all the questions in this section.

1. The last reaction in gluconeogenesis:
 - a) Occurs in the cell membrane
 - b) Involves the conversion of pyruvate to phosphoenolpyruvate
 - c) Involves the conversion of glucose 6 phosphate to glucose
 - d) Does not require an enzyme
2. Oxygen:
 - a) Acts as the ultimate electron acceptor in the electron transport chain
 - b) Has no role in the electron transport chain
 - c) Receives electrons from NADH directly
 - d) Receives electrons from FADH₂ directly
3. Failure of gluconeogenesis:
 - a) Is not fatal
 - b) Can lead to death
 - c) Cannot occur in adults
 - d) Is not clinically significant
4. The first reaction in Krebs' cycle:
 - a) Is catalyzed by citrate synthase
 - b) Is catalyzed by aconitase
 - c) Is catalyzed by α -ketoglutarate
 - d) Is catalyzed by Succinyl-CoA synthetase
5. Each turn of Krebs' cycle yields:
 - a) 3NADH
 - b) 3FADH₂
 - c) 3 CO₂
 - d) 2GTP
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. Tissues that execute gluconeogenesis for purposes of blood glucose homeostasis include:
- a) Adipose tissue, liver
 - b) The liver, skeletal muscle
 - c) Skeletal muscle, kidneys
 - d) Kidneys, liver
9. Kreb's cycle:
- a) Occurs in the cytoplasm of eukaryotes
 - b) Does not require the presence of oxygen
 - c) Occurs under aerobic conditions
 - d) Is inhibited by low levels of ATP
10. Ketone bodies include:
- a) Acetone, acetoacetate
 - b) Glycerol, acetone
 - c) Glucose, acetone
 - d) Pyruvate, acetoacetate
11. NADPH:
- a) Is generated during gluconeogenesis
 - b) Is not important in red blood cells
 - c) Is important in the synthesis of steroids
 - d) Is not generated in lactating mammary glands
12. In redox reactions:
- a) The electron donating molecule is known as the reducing agent
 - b) Enzymes are not needed
 - c) The electron donating molecule is known as the oxidizing agent
 - d) Transfer of electrons does not occur
13. In the last reaction of the citric acid cycle:
- a) Malate is oxidized, regenerating oxaloacetate
 - b) Acetyl coenzyme A is regenerated
 - c) Succinate is oxidized to fumarate
 - d) Acetyl-CoA and oxaloacetate condense, forming citrate.
14. NADPH from the pentose phosphate pathway is very important in the:
- a) Red blood cells
 - b) White blood cells
 - c) Plateletes

- d) Tissue macrophages
15. The pentose phosphate pathway:
- a) Occurs in the cytoplasm
 - b) Is an alternative pathway for the oxidation of glucose leading to production of ATP and NADPH
 - c) Consumes ADP
 - d) Is responsible for the major share of energy release and supply during aerobic respiration.
16. The oxidative phase of the pentose phosphate pathway:
- a) Occurs in the mitochondrion
 - b) Is reversible
 - c) Leads to the generation of ATP
 - d) Leads to the generation of NADPH
17. The electron acceptors in the TCA cycle are:
- a) FAD and NAD^+
 - b) FAD and NADH
 - c) FAD and oxygen
 - d) NAD^+ and oxygen
18. Beta oxidation of fatty acids:
- a) Occurs in the cytosol of eukaryotes
 - b) Takes place in the mitochondria of eukaryotes
 - c) Leads to the generation of Pyruvate
 - d) Does not to the generation of acetyl-CoA.
19. The process of gluconeogenesis in the kidneys ends at:
- a) The formation of glucose-6-phosphate
 - b) The formation of glucose
 - c) The formation of fructose 1,6-bisphosphate
 - d) The formation of pyruvate
20. Krebs cycle occurs in the:
- a) Mitochondrion
 - b) Cytosol
 - c) Nucleus
 - d) Rough endoplasmic reticulum

SECTION II: SHORT ANSWER QUESTIONS (40mks)

Answer all the questions in this section.

1. Describe the importance of the pentose phosphate pathway (8mks)
2. Explain the conditions under which gluconeogenesis occurs (8mks)
3. Describe any four reactions of Krebs cycle (8mks)
4. Describe any four enzymes that catalyze reactions in the citric acid cycle (8mks)
5. Describe four precursors of gluconeogenesis (8mks)

SECTION II: LONG ANSWER QUESTIONS (40mks)

Answer all the questions in this section.

1. Describe the electron transport chain and oxidative phosphorylation (20mks)
2. Describe the tissues in which NADPH is needed for reductive biosynthetic reactions (20mks)

