MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY

P.O. Box 972-60200 – Meru-Kenya.
Tel: +254(0) 799 529 958, +254(0) 799 529 959, +254 (0)712 524 293
Website: www.must.ac.ke Email: info@mucst.ac.ke

UNIVERSITY EXAMINATIONS 2022/2023

FIRST YEAR, SECOND SEMESTER SPECIAL/SUPPLEMENTARY EXAMINATION
FOR DEGREE OF BACHELOR OF SCIENCE IN NURSING

NND 3124: MEDICAL BIOCHEMISTRY II

DATE: JUNE 2023 **TIME: 3 HOURS**

INSTRUCTIONS: *Answer all questions in the booklet provided*

Ensure that all your answers are properly numbered

Section A: Multiple Choice Questions (MCQs): Write the correct answer on the space provided in the answer booklet.

Section B: Short Answer Questions-Answer questions following each other on the answer booklet

section C: Long Answer Questions-Answer the questions on the answer booklet.

SECTION A (MULTIPLE CHOICE QUESTIONS (20 MARKS)

1. The following molecules are used as indicators of kidney function EXCEPT
   a. Urea
   b. Phosphate
   c. Potassium
   d. Creatinine
2. The functions of the TCA cycle include
   a. Generation of NADPH
   b. Formation of acetyl CoA
   c. The oxidation of acetyl-CoA produced from glycolysis and fatty acid oxidation

d. The utilization of excess ATP generated by glycolysis.

3. Urea is synthesized in
   a. Cytoplasm
   b. Mitochondria
   c. Lysosome
   d. Cytoplasm
4. There is a single intermediate in gluconeogenesis that is not an intermediate in glycolysis. The enzyme that makes this intermediate is
   a. 6-phosphogluconate dehydrogenase
   b. PEP-carboxykinase
   c. Pyruvate kinase
   d. Pyruvate carboxylase
5. The pentose phosphate pathway uniquely produces the following products
   a. Glucose
   b. Glucose-6-phosphate
   c. NADPH
   d. Fructose-6-phosphate
6. Gluconeogenesis and glycolysis
   a. Use the same enzymes for many steps.
   b. Use different enzymes for the irreversible reactions.
   c. Are coordinately regulated at the steps that use similar enzymes
   d. All enzymes are used in both directions
7. Almost all of the oxygen one consumes in breathing is converted to
   a. Acetyl-CoA
   b. Carbon dioxide
   c. Carbon monoxide
   d. Water
8. The nitrogens in urea are derived directly from:
   a. Ornithine
   b. Carbamoyl phosphate
   c. Glutamate
   d. Glutamine
9. Lipolysis involves
   a. Hydrolysis of triacylglycerol

b. Formation of lipids
c. Breakdown of ketone bodies
d. Formation of ketone bodies
e. All of the above

10. Transamination reaction in amino acid synthesis is catalyzed by enzyme
    a. Nitric oxide synthase
    b. Decarboxylase
    c. Aminotransferase
    d. Glutamate decarboxylase
11. Cholesterol is synthesized from:
    a. Acetyl-CoA
    b. Oleic acid
    c. Methyl-malonyl-CoA
    d. Malate
12. The following is required in the reaction catalyzed by glyceraldehyde 3-phosphate dehydrogenase
    a. ATP
    b. $Cu2^{+}$
    c. NADH
    d. NAD^{+}
13. Production of ATP during aerobic metabolism occurs from electrons from
    a. FADH2
    b. H2O
    c. O^{2}
    d. NAD^{+}
14. Purines and pyrimidines are necessary for the synthesis of DNA. The following donates atoms to both the purine base and pyrimidine ring.
    a. CO2
    b. Glycine
    c. Carbamoyl phosphate
    d. Aspartate
15. Name the most active organs in the body which have the ability to synthesize triacylglycerol?
    a. Spleen

b. Kidney
c. Liver
d. Intestines

16. The following are forms that lipids are transported into the blood
    a. Chyme
    b. Apolipoproteins
    c. Chylomicrons
    d. Micelles
17. The following membrane proteins are involved in electron transport chain EXCEPT?
    a. Complex V
    b. Cytochrome Q
    c. Cytochrome C
    d. Complex I
18. In glycogenolysis?
    a. Glucose molecules are cleaved from reducing end of glycogen
    b. Glucose molecules are cleaved from non-reducing end of glycogen
    c. Muscles from free glucose
    d. Glycogen synthase catalyzes the first reaction
19. A 35-year-old man with severe hypercholesterolemia has a family history of deaths at a young age from heart disease and stroke. Which of the following genes is likely to de defective?
    a. Apolipoprotein E
    b. The LDL receptor
    c. Lipoprotein lipase
    d. PCSK9
20. Which of the following is the major product of fatty acid synthase?
    a. Acetyl-CoA
    b. Oleate
    c. Palmitoyl-CoA
    d. Palmitate

SECTION B (SHORT ANSWER QUESTIONS (38 MARKS)

1. Describe the transport of lipids in the human body (6 Marks)
2. Outline the differences between glycolysis and TCA cycle (6 Marks)
3. Explain the factors that promote synthesis of triacylglycerols by the liver. (6 Marks)
4. Describe the urea cycle (8 Marks)
5. Describe energy metabolism during fasting state (8 Marks)
6. Write short notes on the types of glycogen storage diseases (6 Marks)

SECTION C (LONG ANSWER QUESTIONS (38 MARKS)

1. A patient who has no history of alcohol consumption presents with an enlarged liver that is due to abnormal accumulation of lipids. Explain biochemical basis of this condition. (10 Marks)
2. An individual who was buried under a collapsed building for 6 days has been rescued. Describe the metabolic processes that enable his body generate energy to stay alive. (10 Marks)
3. A patient is prescribe with statins drugs to lower blood cholesterol. It is designed to target cholesterol biosynthetic pathway. Describe the stages of cholesterol biosynthesis and explain the mechanism of action of the drug. (10 Marks)