



# **MAASAI MARA UNIVERSITY**

**REGULAR UNIVERSITY EXAMINATIONS  
2023/2024 ACADEMIC YEAR  
FIRST YEAR SECOND TRIMESTER**

**SCHOOL OF PURE, APPLIED AND HEALTH  
SCIENCES  
BACHELOR OF SCIENCE IN NURSING**

**COURSE CODE: NUR 1205**

**COURSE TITLE: MEDICAL BIOCHEMISTRY II**

**DATE: 20/5/2024**

**TIME: 0830-1130 HRS**

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**INSTRUCTION TO CANDIDATES**

**Section A: Multiple Choice Questions. Answer ALL Questions**

**Section B: Short Answer Questions. Answer ALL Questions**

**Section C: Long Answer Questions. Answer Question ONE and any other ONE question.**

*This paper consists of **xxxx** printed pages. Please turn over.*

**SECTION A: MULTIPLE CHOICE QUESTIONS (20 MARKS) SELECT THE CORRECT ANSWER.**

1. Which statement **BEST** describes the differences between chylomicrons and VLDLs?
  - A. Chylomicrons contain apoproteins, VLDLs do not.
  - B. Chylomicrons are synthesized in the intestine, VLDLs are synthesized in the liver.
  - C. Chylomicrons transport triacylglycerol, VLDLs transport cholesterol.
  - D. VLDLs are another term for chylomicron remnants; they differ in age.
2. After five weeks of starvation, which of the following statements would **CORRECTLY** describe the changes in levels of circulating fuel compared to the well-fed state?
  - A. Lactate, pyruvate, and alanine are higher
  - B. Glucose is higher
  - C. Overall ATP equivalents of circulating fuel is lower
  - D. Fatty acids are higher
3. Pyrimidine nucleotides are catabolized.....
  - A. To the respective bases, which are primarily salvaged
  - B. To carbon skeletons that are used for other metabolic pathways
  - C. Extensively in patients with gout
  - D. To uric acid, which is excreted
4. What is the function of LCAT?
  - A. LCAT catalyses the production of cholesteryl esters.
  - B. LCAT catalyses the production of cholesterol.
  - C. LCAT catalyses the breakdown of cholesteryl esters.
  - D. LCAT catalyses the breakdown of cholesterol.
5. You have just sequenced a piece of DNA that reads as follows:  
$$5'—TCTTTGAGACATCC—3'$$
What would the base sequence of the mRNA transcribed from this DNA be?
  - A.  $5'—AGAAACUCUGUAGG—3'$
  - B.  $5'—GGAUGUCUCAAGA—3'$
  - C.  $5'—AGAACTCTGTAGG—3'$
  - D.  $5'—GGATCTCTCAAAGA—3'$
6. The four repeated steps of  $\beta$ -oxidation of fatty acids, respectively, are:

- A. Condensation, reduction, dehydration, reduction
  - B. Dehydrogenation, dehydration, dehydrogenation, cleavage
  - C. Oxidation, hydration, oxidation, cleavage
  - D. Reduction, hydration, reduction, cleavage
7. The inhibition of the synthesis of DNA by methotrexate results from direct inhibition of.....
- A. The reduction of dihydrofolate to tetrahydrofolate
  - B. The reduction of ribonucleotides to deoxyribonucleotides
  - C. The synthesis of S-adenosylmethionine
  - D. Thymidylate synthetase
8. The most important natural antioxidant is .....
- A. Vitamin D
  - B. Vitamin E
  - C. Vitamin B12
  - D. Vitamin K
9. Digestion and absorption of proteins .....
- A. Occurs only in the presence of bile salts
  - B. Is more effective if the protein has a high content of essential amino acids
  - C. Occurs by hydrolysis of peptide bonds by proteases that are stored as zymogens
  - D. Occurs only by removal of amino acids from the ends of chains (N-terminal or C-terminal)
10. What role does peptidyl transferase play in protein synthesis?
- A. It transports the initiator aminoacyl-tRNA complex.
  - B. It helps the ribosome to advance three nucleotides along the mRNA in the 5' to 3' direction.
  - C. It holds the protein in its tertiary structure.
  - D. It catalyses the formation of a peptide bond.
11. Topoisomerases are enzymes involve in.....
- A. DNA replication and transcription.
  - B. Posttranscriptional processing.
  - C. RNA synthesis and translation.
  - D. Posttranslational processing.
12. What is the "activated" form of a fatty acid used during the synthesis of triacylglycerol from glycerol 3- phosphate?
- A. ATP-linked fatty acid
  - B. Acyl-CoA
  - C. CDP-linked fatty acid

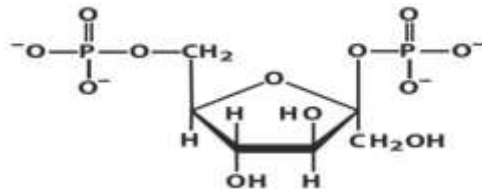
D. Acetyl-CoA

13. A long distance runner is several hours into a race. His metabolism is dominated by the influence of epinephrine and glucagon. Which of the following **CORRECTLY** describes metabolism occurring in the liver, muscle, and adipose tissue?
- A. Concentrations of cAMP are decreased in both the liver and muscle.
  - B. Muscle tissue increases glucose uptake from the blood.
  - C. HMG CoA reductase is active in the liver.
  - D. Glycogen phosphorylase is phosphorylated and active in both liver and muscle.
14. Ring closure of formimidoimidazole carboxamide ribosyl-5-phosphate yields the first purine nucleotide:
- A. AMP
  - B. IMP
  - C. XMP
  - D. GMP
15. Vitamin K is involved in posttranslational modification of the blood clotting factors by acting as cofactor for the enzyme:
- A. Carboxylase
  - B. Decarboxylase
  - C. Hydroxylase
  - D. Oxidase
16. What is the "activated" form of glucose used during the lengthening of a glycogen primer?
- A. Pyrophosphate
  - B. CDP-glucose
  - C. Malonyl Co-A
  - D. UDP-glucose
17. Carnitine is synthesized from
- A. Lysine and methionine
  - B. Glycine and arginine
  - C. Aspartate and glutamate
  - D. Proline and hydroxyproline
18. An important reaction for the synthesis of amino acid from carbohydrate intermediates is transamination which requires the cofactor:
- A. Thiamine
  - B. Riboflavin

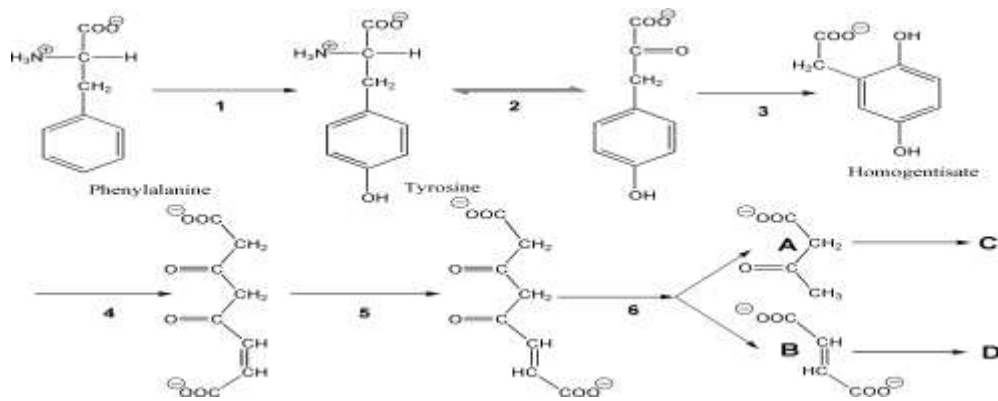
- C. Niacin  
D. Pyridoxal phosphate
19. Both Wernicke's disease and beriberi can be reversed by administering
- A. Retinol  
B. Thiamine  
C. Pyridoxine  
D. Vitamin B12
20. Clinical symptom in urea cycle disorder is
- A. Mental retardation  
B. Drowsiness  
C. Diarrhoea  
D. Oedema

**SECTION B (SHORT ANSWER QUESTIONS): Answer ALL questions (40 mrks)**

1. Use the structure below to answer questions that follow



- a. Draw the structure of the sugar precursor molecule(s) that immediately lead to the formation of the above compound (1 mrk)
- b. Outline the following:
- Enzyme that converts compound in b into the above compound (1/2 mrks)
  - Enzyme that reverse the reaction in (i) above (1/2 mrks)
  - Inhibitors of the enzyme in (i) above (2 mrks)
- c. Illustrate the biochemical events during the oxidation of pyruvate (3 mrks)
- d. State the fates of acetyl CoA in metabolism (3 mrks)
2. The catabolic pathway for phenylalanine and tyrosine is shown below. Use it to answer the questions that follow:



a. Name the following compounds as indicated in the diagram (2 mrks)

A.....B.....

C.....D.....

b. State the following:

- i. Any four inborn errors diseases associated with this pathway (2 mrks)
- ii. Two compounds produced in the alternative pathway as a result of enzyme 1 to convert phenylalanine into Tyrosine (2 mrks)

c. Elucidate symptoms associated with a disease due to failure of enzyme 1. (3 mrks)

3. a. What are the roles of each site in the ribosome? (3 mrks)

A site... ..

P site: .....

E site:.....

b. Show diagrammatically different sites that are targeted in gene Regulation at the transcription level in eukaryotes (4 mrks)

4. a. State the components involved in coagulation cascade (3 mrks)

b. Illustrate the role of thrombin in homeostasis (4 mrks)

5. Elucidate the mechanism of action of the antibiotics that target the following metabolic processes

a. Inhibitors of cell wall synthesis (3 mrks)

b. Inhibitors of protein synthesis (4 mrks)

**SECTION C: LONG ANSWER QUESTIONS. QUESTION ONE IS COMPULSORY, THEN CHOOSE EITHER QUESTION 2 OR 3.**

**QUESTION ONE**

Amino acid anabolism is the reverse process of its catabolism. Illustrate the common intermediates involved in the anabolism of amino acids (20 mrks)

## **QUESTION TWO**

Physiological buffers act as the second line of defence against pH shift. Describe the three mechanisms involved in renal regulation of pH (20 mrks)

## **QUESTION THREE**

Vitamins are organic compounds that are required in minute amount through dietary intake for good health. Based on this fact discuss the following (20 mrks)

- a. Biochemical functions of calcitriol
- b. Clinical significance of Vitamin B12 deficiency diseases

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