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UNIVERSITY EXAMINATIONS 2023/2024

FIRST YEAR SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF
SCIENCE IN NURSING

NND/NU 3124: MEDICAL BIOCHEMISTRY II

DATE: APRIL 2024

TIME: 3 HOURS

INSTRUCTIONS: *All questions are compulsory*

Ensure that all your answers are properly numbered

Part 1 Multiple Choice Questions (MCQs): Write the correct answer on the space provided in the answer booklet. Each MCQ is one mark.

Part 11: Short Answer Questions-Answer questions following each other on the answer booklet

Part 111: Long Answer Questions-Answer the questions on the answer booklet.

SECTION A: Multiple Choice Questions (20 MARKS)

- The enzyme that catalyzes the first reaction in the catabolism of most amino acids once they have reached the liver is
 - Glutamine synthase
 - Glutamate dehydrogenase
 - Glutaminase
 - Amino transferase
- Activated fatty acid is transported into the mitochondria for Beta Oxidation pathway via
 - Diffusion
 - Cori shuttle system
 - Carnitine shuttle system

- D. None of these
3. The degradative processes in metabolism are also known as
- A. Anabolism
 - B. Catabolism
 - C. Metabolism
 - D. Amphibolism
4. Enzymes that are involved in catalysis in electron transport chain are present mainly in the
- A. Ribosomes
 - B. Endoplasmic reticulum
 - C. Lysosomes
 - D. Inner mitochondrial membrane
5. Fructose-2, 6-biphosphate is formed by the action of
- A. Phosphofructokinase-1
 - B. Phosphofructokinase-2
 - C. Fructose biphosphate isomerase
 - D. Fructose-I, 6-biphosphatase
6. In the adipose tissue, lipolysis is increased by
- A. Glucagon
 - B. Epinephrine
 - C. Glucocorticoids
 - D. Insulin
7. Uridine diphosphate glucose is
- A. Required for metabolism of glucose
 - B. Required for synthesis of pyruvate
 - C. A substrate for glycogen synthetase
 - D. All of the above
8. Dihydroxyacetone phosphate and glyceraldehyde-3-phosphate are interconverted by enzyme
- A. Triose isomerase
 - B. Phosphotriose isomerase
 - C. Diphosphotriose isomerase
 - D. Dihydroxyacetone phosphorylase
9. The metabolic pathway that leads to conversion of alanine to glucose is known as
- A. Glycolysis
 - B. Oxidative decarboxylation

- C. Glycogenolysis
 - D. Gluconeogenesis
10. Oxidative decarboxylation of pyruvate requires
- A. NADP+
 - B. Cytochrome C
 - C. pyridoxal phosphate
 - D. COASH
11. The following enzyme is required for the hexose monophosphate shunt pathway:
- A. Glucose-6-phosphatase
 - B. Phosphorylase
 - C. Aldolase
 - D. Glucose-6-phosphate dehydrogenase
12. The carbon chain of fatty acids is shortened by 2 carbon atoms at a time. This involves successive reactions catalysed by 4-enzymes that act in following order:
- A. Acetyl CoA dehydrogenase, acyl CoA dehydrogenase, enoyl hydratase, thiolase
 - B. Acyl CoA dehydrogenase, enoylhydratase, AcylCoA ehydroginase, Thiolase
 - C. Acyl CoA dehydrogenase, thiolase, enoyl hydratase, acyl CoA dehydrogenase
 - D. Enoyl hydratase, acyl CoA dehydrogenase, acyl CoA dehydrogenase, thiolase
13. The pentose phosphate pathway uniquely produces the following product
- A. Glucose
 - B. Glucose-6-phosphate
 - C. NADPH
 - D. Fructose-6-phosphate
14. 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 form free glucose
 - D. UDP glucose forms one of the intermediates
15. Transfer of the carbamoyl moiety of carbamoyl phosphate to ornithine is catalysed by a liver mitochondrial enzyme:
- A. Carbamoyl phosphate synthetase
 - B. Ornithine transcarbamoylase
 - C. N-acetyl glutamate synthetase
 - D. N-acetyl glutamate hydrolase

16. During diagnosis of liver disease, a test that measures the levels of enzyme aspartate transaminase (AST) and Alanine transaminase (ALT) in serum is performed. Both of these enzymes
- A. Catalyse irreversible reactions
 - B. Require thiamine pyrophosphate as a cofactor
 - C. Transfer ammonia to α keto acids to form amino acid
 - D. Convert α -ketoglutarate to glutamate
17. Erythrocytes generate energy via which of the following
- A. TCA cycle
 - B. Oxidative phosphorylation
 - C. Glycolysis under anaerobic conditions
 - D. Oxidation of glucose to carbon dioxide and water
18. Carbamoyl phosphate required for urea synthesis is formed in
- A. Cytosol
 - B. Mitochondria
 - C. Both (A) and (B)
 - D. None of these
19. A patient with diabetes has a specific odor to the breath. Which of the following compounds is responsible for the odor?
- A. Acetoacetate
 - B. Acetone
 - C. β -hydroxybutyrate
 - D. Acetyl COA
20. Amino acids are an important substrate for gluconeogenesis during fasting. Which one of the following is the major gluconeogenic amino acid received by the liver?
- A. Alanine
 - B. Glycine
 - C. Cysteine
 - D. Pyruvate

PART II SHORT ANSWER QUESTIONS (40 MARKS)

1. Explain the difference between prehepatic and hepatic jaundice (6marks)
2. Describe the transport of triglyceride in the human body (7marks)
3. Outline the four stages of cholesterol biosynthesis (6 marks)
4. Describe the citric acid cycle (8 marks)
5. Explain four disorders of glycogen metabolism (6marks)
6. Describe the process of detoxification of ammonia in the liver (7marks)

PART III: LONG ANSWER QUESTIONS (40 MARKS)

1. An elderly woman with poorly managed Diabetes Mellitus shows elevated levels of ketones in her urine and abnormally high blood glucose levels during her visit to Meru Teaching and Referral Hospital.
 - a. Describe the process of formation of ketone bodies. (10 marks)
 - b. Explain the metabolic pathways that cause elevated blood glucose levels (10 marks)
2. A young alcoholic male patient is diagnosed with fatty liver.
 - a. Describe the metabolic cause of the fatty liver (10 marks)
 - b. Explain non—alcoholic causes of fatty liver (10 marks)

