

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN NURSING

NURS 116: MEDICAL BIOCHEMISTRY II

STREAMS: BSC NURS

TIME: 2 HOURS

DAY/DATE: MONDAY 22/03/2021

8.30 A.M. – 10.30 A.M.

INSTRUCTIONS:

- **All questions are compulsory. Ensure that all your answers are properly numbered.**
- **Part I: Multiple Choice Questions (MCQs): Write the correct answer on the space provided in the answer booklet. Each MCQ is one mark.**
- **Part II: Short Answer Questions- Answer questions following each other on the answer booklet.**
- **Part III: Long Answer Questions: Answer each question on the answer booklet.**

SECTION A: MULTIPLE CHOICE QUESTIONS (20 MARKS)

1. A patient has large deposit of liver glycogen, which after an overnight fast had shorter than normal branches. This abnormally could be caused by a defective form of which of the following proteins?
 - (A) Amylo 1,6 glucosidase
 - (B) Amylo 4,6 transferase
 - (C) Glycogen phosphorylase
 - (D) Glycogenin

2. All are conditions of ketos except one.
 - (A) Uncontrolled diabetes mellitus
 - (B) High carbohydrate diet
 - (C) Starvation
 - (D) Von Gierke's disease

3. In skeletal muscles, increased hydrolysis of ATP during muscular contraction leads to which of the following?
- (A) The activation of phosphofructokinase-1 (PFK-1)
 - (B) The activation of glycogen synthesis
 - (C) A decrease in the rate of palmitate oxidation of Acetyl CoA
 - (D) A decrease in the rate of NADH oxidation by the electron transport chain.
4. Which of the following statement is not true about chylomicrons?
- (A) Transport exogenous dietary fats and cholesterol from intestines to tissues.
 - (B) Transport endogenous dietary fats and cholesterol from tissues to liver.
 - (C) Consists of triglycerides, phospholipids, cholesterol and proteins.
 - (D) Travel into the bloodstream via lymph system.
5. A common intermediate in the conversion of glycerol and lactate to glucose is which of the following
- (A) Pyruvate
 - (B) Oxaloacetate
 - (C) Phosphoenolpyruvate
 - (D) Glucose 6-phosphate
6. Which of the following enzyme is not involved in gluconeogenesis?
- (A) Hexokinase
 - (B) Glucose 6-phosphatase
 - (C) PEP Carboxykinase
 - (D) Pyruvate carboxylase
7. Glucagon and epinephrine stimulate glycogen breakdown to glucose 6-phosphate
- (A) Directly by binding to glycogen phosphorylase
 - (B) Indirect by first stimulating adenylate cyclase to make cAMP
 - (C) Only in the liver
 - (D) Only in muscle cell
8. The first step in the β -oxidation of fatty acyl CoA is catalyzed by
- (A) Succinate dehydrogenase
 - (B) Pyruvate dehydrogenase
 - (C) Acyl CoA dehydrogenase
 - (D) β -hydroxyacyl CoA dehydrogenase

9. Key regulatory enzyme of fatty acid synthesis is?
- (A) Acetyl CoA synthetase
 - (B) Keto acyl synthetase
 - (C) Thioesterase
 - (D) Acetyl CoA carboxylase
10. The main function of pentose phosphate pathways is to;
- (A) Give the cell an alternate pathway should glycolysis fail
 - (B) Supply pentose and NADPH
 - (C) Provide mechanism for utilization of the carbon skeletons of excess amino acids
 - (D) Supply glyceraldehydes 3-phosphate for glycolysis
11. A 50 year-old man has been fasting for religious reason for several days. His brain has reduced its need for glucose by using which of the following substances as an alternate source of energy?
- (A) Fatty acids
 - (B) Acetyl CoA
 - (C) Glycerol
 - (D) β -hydroxybutyrate
12. Which of the following statements correctly describes an aspect of glycolytic pathways?
- (A) ATP is formed by oxidative phosphorylation.
 - (B) 2 ATP are used in the beginning of the pathway.
 - (C) Pyruvate kinase is the rate-limiting enzyme.
 - (D) One pyruvate and three CO_2 are formed from the oxidation of one glucose molecule.
13. The degradation of amino acids can be classified into families, which are named after the end product of the degradative pathway. Which of the following is such an end product?
- (A) Citrate
 - (B) Glyceraldehyde-3-phosphate
 - (C) Fructose-6-phosphate
 - (D) Succinyl- CoA
14. How many moles of ATP are generated by the complete aerobic oxidation of 1 mole of glucose to 6 moles of CO_2 ?
- (A) 2 – 4
 - (B) 18 – 22
 - (C) 30 – 32

- (D) 36 – 40
15. Gout can result from a reduction in activity of which one of the following enzymes?
- (A) Glutamine phosphoribosyl amidotransferase
 - (B) Glucose 6-phosphatase
 - (C) Glucose 6-phosphate dehydrogenase
 - (D) Purine nucleoside phosphorylase
16. Lesch-Nyhan syndrome is due to an inability to catalyze which of the following reactions?
- (A) Adenine to AMP
 - (B) Adenosine to AMP
 - (C) Guanine to GMP
 - (D) Guanosine to GMP
17. Allopurinol can be used to treat gout because of its ability to inhibit which one of the following reactions?
- (A) AMP to XMP
 - (B) Xanthine to uric acid
 - (C) Inosine to hypoxanthine
 - (D) IMP to XMP
18. A patient presented with a bacterial infection that produced an endotoxin that inhibits phosphoenolpyruvate carboxykinase. In this patient, then, under these conditions, glucose production from which of the following precursors would be inhibited?
- (A) Alanine
 - (B) Glycerol
 - (C) Even-chain-number fatty acids
 - (D) Phosphoenolpyruvate
19. A person with phenylketonuria cannot convert
- (A) Phenylalanine to tyrosine
 - (B) Phenylalanine to isoleucine
 - (C) Phenylalanine to lysine
 - (D) Phenol to ketones
20. Which of the following amino acids is considered as both ketogenic and glucogenic ?
- (A) Alanine
 - (B) Tryptophan
 - (C) Lysine
 - (D) Leucine

PART II: SHORT ANSWER QUESTIONS (40 MARKS)

1. Describe degradative pathways of aromatic chain amino acids. (8 marks)
2. Define ketogenesis and explain its functions. (4 marks)
3. Using an illustration, describe the special transport mechanism of long fatty acids into the mitochondrial matrix? (5 marks)
4. Define gluconeogenesis. Name key enzymes of gluconeogenesis. (4 marks)
5. Describe biochemical basis of atherosclerosis. (8 marks)
6. List six human genetic disorders associated with defective amino acid catabolism. (6 marks)
7. Outline clinical significance of purine metabolism. (5 marks)

PART III: LONG ANSWER QUESTIONS (40 MARKS)

1. Discuss major types of jaundice highlighting their clinical manifestations and diagnosis. (20 marks)
 2. What is the role of glycogenolysis in liver of humans? Discuss the etiology and clinical manifestations of glycogen storage diseases. (20 marks)
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