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University Examinations 2019/2020

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

NND 3124: MEDICAL BIOCHEMISTRY II

DATE: MARCH 2020

TIME: 3 HOURS

INSTRUCTIONS:

Answer All questions

Ensure that all your answers are properly numbered

Part I Multiple Choice Questions (MCQ): 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.

PART 1: MULTIPLE CHOICE QUESTIONS (20 MARKS)

- Which of the following is not a class of biomolecules:
 - Nucleic acid
 - Minerals
 - Carbohydrates
 - Proteins
- Which of the following is false about glycogen:
 - It is also a branched polymer of glucose residues
 - It contains the same types of linkages found in amylopectin but the branches in glycogen are smaller and more frequent, occurring every 8-12 residues.

- c) Its molecules are larger than starch molecules.
 - d) It is not synthesized by healthy humans
3. Proteoglycans are:
- a) Complexes of proteins and a class of polysaccharides called glycosaminoglycans
 - b) Unbranched heteroglycans of repeating disaccharide units
 - c) Complexes of proteins and a salt
 - d) Complexes of proteins and other proteins
4. Which one is untrue about the H antigen:
- a) It can be modified the addition of a GAINAc residue in $\alpha - (1 \rightarrow 3)$ linkage
 - b) The addition of a GaINAc residue in $\alpha - (1 \rightarrow 3)$ linkage is catalyzed by enzyme A.
 - c) It can be modified by the addition of Gal in $\alpha - (1 \rightarrow 3)$ linkage
 - d) The addition of Gal in $\alpha - (1 \rightarrow 3)$ linkage is catalyzed by enzyme A.
5. The simplest lipids are the fatty acids that have the general formula $R - COOH$, where R represents:
- a) A hydrocarbon chain composed of various lengths of CH_2 groups
 - b) A hydrocarbon chain composed of various lengths of NH_2 groups
 - c) A hydrocarbon chain composed of various lengths of NH_3 groups
 - d) A hydrocarbon chain composed of various lengths of CH_3 groups
6. It is true that:
- a) Cholesterol is not a steroid
 - b) Steroids contain four fused rings
 - c) Humans do not synthesize steroids

- d) Estrogen is not a steroid hormone
7. One of the following is not a constituent of RNA:
- a) Adenine
 - b) Uracil
 - c) Thymine
 - d) Guanine
8. Which statement about anabolic reactions is false:
- a) They are responsible for the synthesis of all compounds needed for cell maintenance, growth, and reproduction.
 - b) They produce simple metabolites such as amino acids, carbohydrates, coenzymes, nucleotides, and fatty acids.
 - c) They cannot produce larger molecules such as proteins, polysaccharides, nucleic acids, and complex lipids.
 - d) They produce larger molecules such as proteins, polysaccharides, nucleic acids, and complex lipids.
9. The net reaction of glycolysis is:
- a) $\text{Glucose} + \text{ADP} + 2\text{NAD}^+ + 2\text{P}_i \rightarrow 2\text{Pyruvate} + \text{ATP} + 2\text{NADH} + 2\text{H}^+ + 2\text{H}_2\text{O}$
 - b) $\text{Glucose} + 2\text{ADP} + \text{NAD}^+ + 2\text{P}_i \rightarrow 2\text{Pyruvate} + 2\text{ATP} + \text{NADH} + 2\text{H}^+ + 2\text{H}_2\text{O}$
 - c) $\text{Glucose} + 2\text{ADP} + 2\text{NAD}^+ + 2\text{P}_i \rightarrow 2\text{Pyruvate} + 2\text{ATP} + 2\text{NADH}$
 - d) $\text{Glucose} + 2\text{ADP} + 2\text{NAD}^+ + 2\text{P}_i \rightarrow 2\text{Pyruvate} + 2\text{ATP} + 2\text{NADH} + 2\text{H}^+ + 2\text{H}_2\text{O}$
10. One of the following is not a fate of pyruvate:
- a) In humans pyruvate can be converted to ethanol

- b) Pyruvate can be converted to acetyl CoA and acetyl CoA can be used in various metabolic pathways.
- c) Pyruvate can be carboxylated to produce oxaloacetate
- d) In some species, pyruvate can be reduced to lactate

11. Which of statement is untrue about the relevance of gluconeogenesis:

- a) Humans have a pathway for gluconeogenesis
- b) Humans that have not eaten for 16 to 24 hours deplete their glycogen liver glycogen reserve and must synthesize glucose to stay alive.
- c) Humans remain healthy even after depleting their glycogen stores without the need for gluconeogenesis.
- d) In fasting conditions, gluconeogenesis supplies most of the body's glucose.

12. Glycogen storage diseases are:

- a) Caused by too much glycogen consumption
- b) Metabolic disorders caused by enzyme deficiencies affecting either glycogen synthesis, glycogen breakdown or glycolysis
- c) Caused by too much glucose consumption
- d) Are metabolic disorders that do not affect glucose levels.

13. Which of the following correctly defines the relationship between the number of double bonds and fatty acid melting point:

- a) The greater the number of double bonds the lower the melting point
- b) The greater the number of double bonds the higher the melting point
- c) The higher the number of carbons the lower the melting point
- d) The number of carbons and number of double bonds do not affect melting point

14. Which one of the following is a start codon:

- a) UGA

- b) UAG
- c) AUG
- d) UAA

15. Eicosanoids are lipids that:

- a) Do not participate in a variety of physiological processes
- b) Cannot mediate various pathological responses
- c) Are not important modulators of human health
- d) Are oxygenated derivatives of C20 polyunsaturated fatty acids such as arachidonic acid

16. It is not true that Glutamate and aspartate:

- a) Are amino group donors in many transamination reactions
- b) Are required in the urea cycle
- c) Are required as precursors in both purine and pyrimidine biosynthesis
- d) Are required as precursors only in pyrimidine biosynthesis

17. Gaucher disease is a disorder caused by:

- a) Deficient activity of the enzyme sphingomyelinase
- b) Deficient activity of the enzyme beta-glucocerebrosidase
- c) Deficient activity of the enzyme lysosomal acid lipase
- d) Deficient activity of the enzyme alpha-galactosidase A

18. One of the following is false about DNA:

- a) A nitrogenous base + a sugar + a phosphate = a nucleoside
- b) A nitrogenous base + a sugar + a phosphate = a nucleotide
- c) A nitrogenous base + a sugar = a nucleoside

d) Adenine (A), Thymine (T), Guanine (G) and Cytosine (C) are nitrogenous bases

19. Which one is not involved in cholesterol biosynthesis:

- a) HMG – CoA
- b) HMG – CoA reductase
- c) HMG – CoA oxidase
- d) Geranyl transferase

20. Which statement about blood urea nitrogen is false:

- a) High blood urea nitrogen are associated with impaired renal function
- b) High blood urea nitrogen levels are associated with increased protein catabolism
- c) High blood urea nitrogen levels are associated with nephritis
- d) High blood urea nitrogen levels are associated with amyloidosis

PART II: SHORT ANSWER QUESTIONS (40 MARKS)

- 1. Discuss pyruvate kinase deficiency. (5 marks)
- 2. Outline the steps involved in gluconeogenesis. (5 marks)
- 3. Explain the clinical relevance of cholesterol. (5 marks)
- 4. Discuss the measurement of iron as a test for blood disorders. (5 marks)
- 5. Describe the process of transcription termination. (5 marks)
- 6. Explain the clinical relevance of lipid metabolism. (5 marks)
- 7. Enumerate the characteristics of disorders in gluconeogenesis (5 marks)
- 8. Discuss the classes of amino acids required by the human body (5 marks)

PART III: ESSAY QUESTIONS (40 MARKS)

- 1. Describe the process of RNA transcription (20 marks)
- 2. Discuss the steps of glycolysis (20 marks)