

THE CATHOLIC UNIVERSITY OF EASTERN AFRICA

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MAIN EXAMINATION

SEPTEMBER –DECEMBER 2021

FACULTY OF SCIENCE

DEPARTMENT OF COMMUNITY HEALTH AND DEVELOPMENT

REGULAR PROGRAMME

CHD 122 AND HBMS 104: MEDICAL BIOCHEMISTRY

Date: DECEMBER 2021

Duration: 3 Hours

INSTRUCTIONS: ANSWER ALL QUESTIONS IN THE BOOKLET PROVIDED

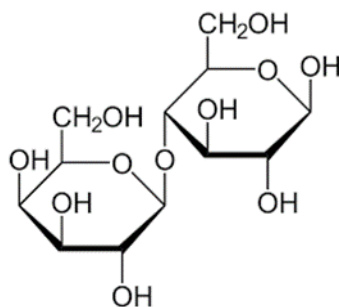
SECTION A: MULTIPLE CHOICE QUESTIONS

(20 MARKS)

1. Lactose intolerance is due to:
 - A. ADH deficiency
 - B. Deficiency of bile
 - C. Lactase deficiency
 - D. Malabsorption syndrome
2. All of the statements about the nature of the hydrogen bond are true except:
 - A. The donor is a hydrogen atom bonded to a carbon
 - B. The acceptor is a weakly electronegative atom containing a nonbonding pair of electrons
 - C. It is a type of non-covalent bond
 - D. A hydrogen bond is stronger than van der Waals forces
3. Enantiomers:
 - A. Have hydroxyl groups on the anomeric carbon oriented in opposite directions
 - B. Are also known as epimers
 - C. Have chiral carbon atoms
 - D. Have superimposable mirror images
4. Which of the following is a component of biological membranes?

- A. Nucleic acids
 - B. Hormones
 - C. Neurotransmitters
 - D. Sterols
5. A carbohydrate found in DNA is:
- A. Ribose
 - B. Deoxyribose
 - C. Ribulose
 - D. Mannose
6. Indicate which is not a hexose:
- A. Glucose
 - B. Ribose
 - C. Galactose
 - D. Mannose
7. Cori cycle is:
- A. Synthesis of glucose
 - B. Reuse of glucose
 - C. Uptake of glyucose
 - D. Uptake of fats
8. β - oxidation of long chain fatty acids occur primarily in which of the following locations?
- A. Cytosol
 - B. Peroxisomes
 - C. Mitochondria
 - D. Endoplasmic reticulum
9. Before pyruvate enters the TCA cycle it must be converted to:
- A. Acetyl CoA
 - B. Lactate
 - C. α -ketoglutarate
 - D. Citrate
10. An aromatic amino acid is:
- A. Lysine
 - B. Tyrosine
 - C. Glycine
 - D. Arginine

11. The protein digestive enzyme of the pancreatic phase is activated by trypsin by releasing two dipeptides:
- Pepsinogen
 - Chymotrypsinogen
 - Proelastase
 - Procarboxypeptidase
12. The common reaction involved in the removal of amino acid nitrogen from the body is by:
- Transamination reaction
 - Hydrolytic deamination by asparaginase
 - Oxidative deamination by glutamate dehydrogenase
 - Dehydrative deamination of serine
13. An essential amino acid in man is:
- Aspartate
 - Tyrosine
 - Methionine
 - Serine



14. In the figure above, name the disaccharide and the glycosidic link found in the structure shown:
- β (1,3)
 - Fructose α (1,4)
 - Lactose β (1,4)
 - Maltose α (1,6)
15. Which of the following statements regarding fatty acids is not correct?
- They are considered as aliphatic carboxylic acids, occurring mainly as esters in natural fats and oils
 - Most are usually long-chain containing an even number of carbon atoms
 - Most naturally occurring unsaturated fatty acids has cis double bonds
 - Their melting points decrease with chain length and increases according to unsaturation

16. In aldehydes, the carbonyl group is attached to _____
- A. one hydrogen and one oxygen
 - B. one hydrogen and one alkyl group
 - C. two alkyl groups
 - D. one oxygen and one alkyl group
17. D-glyceraldehyde and dihydroxyacetone are _____
- A. Disaccharides
 - B. Epimers
 - C. D and L isomers
 - D. Aldose-ketose pair
18. The function of insulin in the liver cells is in:
- A. Inhibiting the enzyme glucokinase
 - B. Inhibiting the enzyme glucose phosphatase
 - C. Permeating the entry of glucose into the liver cells
 - D. Enhancing the process of gluconeogenesis
19. When bile does not reach the duodenum the lipid fraction to be found in stool will be:
- A. Neutral fat
 - B. Free fatty acid
 - C. Free cholesterol
 - D. Glycerol
20. Which of the following is a predisposing factor of atherosclerosis?
- A. Obesity
 - B. Elevated HDL
 - C. Elevated LDL
 - D. Diabetes Insipidus

SECTION B: SHORT ANSWER QUESTIONS

(40 MARKS)

1. State four differences between DNA and RNA **(8 marks)**
2. State the products of: **(8 marks)**
- a) Glycolysis
 - b) Gluconeogenesis
 - c) Krebs's cycle
 - d) Electron Transport Chain
3. Differentiate between: **(8 marks)**
- a) Aldoses and ketoses
 - b) Anomers and Epimers
 - c) Type 1 and Type 2 Diabete mellitus
 - d) Essential and non-essential amino acids

4. Draw the general formula of an amino acid **(2 marks)**
5. Give the name of an amino acid with a side chain with the following characteristics **(4 marks)**

Characteristic	Amino acid
Hydrophobic (non-polar) and aromatic	
Polar but uncharged	
Aromatic ring	
Acidic	

6. Explain why unsaturated fatty acids are healthier as compared to saturated fatty acids. **(2 marks)**
7. Describe four (4) levels of organization of proteins **(8 marks)**

SECTION C: ESSAY (40 MARKS)

1. Concerning water:
- Discuss four (4) functions of water in humans **(8 marks)**
 - Calculate the pKa of lactic acid given that when the concentration of lactic acid is 0.010M and the concentration of lactate is 0.087M, the pH is 4.80. **(12 marks)**
2. Concerning nutrients:
- Describe the process of eliminating ammonia from the body **(10 marks)**
 - Summarize the metabolism of fatty acids **(10 marks)**

END