



**AMREF INTERNATIONAL UNIVERSITY
SCHOOL OF MEDICAL SCIENCE
DEPARTMENT OF REHABILITATION MEDICINE
BACHELOR OF SCIENCE IN PHYSIOTHERAPY
END OF SEPT-DECEMBER 2024 TRIMESTER EXAMINATIONS**

UNIT CODE: PHT 128 UNIT NAME: Biochemistry (Main Paper)

DATE: Wednesday/ 4th/December
TIME: TWO HOURS
START: 6PM STOP : 8.30 PM

INSTRUCTIONS (physical exams)

- 1. Do not write on this question paper**
(Marks and questions distribution as per program curriculum.)

INSTRUCTIONS (Online examinations)

1. This exam is marked out of 70 marks
2. This Examination comprises 3 Sections
3. This online exam shall take 2 Hours
4. Late submission of the answers will not be accepted
5. Ensure your web-camera is on at all times during the examination period
6. No movement is allowed during the examination
7. Idling of your machine for 5 min or more will lead to lock out from the exam
8. The Learning Management System (LMS) has inbuilt integrity checks to detect cheating
9. Any aspect of cheating detected during and or after the exam administration will lead to nullification of your exam
10. In case you have any questions call the invigilator for this exam on Tel. 0705833434 and or the Head of Department on Tel 0720491032
11. For adverse incidences please write an email to: amiu.examinations@amref.ac.ke

SECTION A: ANSWER ALL QUESTIONS

(30 MARKS)

1. The _____ is the group that includes both the atom to which the hydrogen is more tightly linked and the hydrogen atom itself.
 - A. Hydrogen-bond donor
 - B. Hydrogen-bond acceptor
 - C. Covalent bond
 - D. Van der Waals forces
2. Lactate dehydrogenase is an example of _____ enzymes.
 - A. Transferases
 - B. Oxido-reductases
 - C. Hydrolases
 - D. Isomerases
3. A _____ is a substance of biological origin that is soluble in non-polar solvents. (1 marks)
 - A. Protein
 - B. Lipids
 - C. Nucleic acid
 - D. Carbohydrate
4. Which of the following statements is TRUE about unsaturated fatty acids? (1 marks)
 - A. Do not have double bonds
 - B. Do not have triple bonds
 - C. Contain only single bonds
 - D. Contain one or more carbon-carbon double bonds
5. Weak, noncovalent forces play essential roles in:
 - A. The faithful replication of DNA,
 - B. The folding of proteins into intricate three-dimensional forms,
 - C. The specific recognition of substrates by enzymes, and
 - D. All the above

6. DNA exists in a double-stranded form whereas RNA is mainly a single stranded molecule. What is the likely reason for DNA being double stranded?
- A. RNA strands cannot form base pairs
 - B. Double stranded DNA is a more stable structure
 - C. DNA cannot exist in the single stranded form
 - D. It is easier to replicate double stranded DNA than single stranded RNA
7. Telomeres are usually rich in which nucleotide?
- A. Adenine
 - B. Guanine
 - C. Thymine
 - D. Cytosine
8. The abundantly distributed enzyme in adipocytes is
- (a) Lipase
 - (b) Proteases
 - (c) Cellulase
 - (d) Nuclease
9. Rancidity of lipids of lipid-rich foodstuff is because of
- (a) Reduction of fatty acids
 - (b) Hydrogenation of unsaturated fatty acids
 - (c) Dehydrogenation of saturated fatty acids
 - (d) Oxidation of fatty acids
10. The degree of unsaturation of lipids can be measured as
- (a) Iodine number
 - (b) Saponification number
 - (c) Reichert Meissel number

(d) Polenske number

11. The most important epimer of glucose is

- A. Arabinose
- B. Fructose
- C. Galactose
- D. Xylose

12. Which enzyme is used for hydrolysis of starch?

- A. Glycosylase
- B. Amylase
- C. Polymerase
- D. Helicase

13. Starch is a glucose polymer in which glucopyranose units are bonded by

- A. Alpha linkages
- B. Beta linkages
- C. Gamma linkages
- D. None of above

14. 6 carbon rings have suffix

- A. Glucose
- B. Fructose
- C. Pyranose
- D. Pentose

15. Simplest form of sugars are usually

- A. Colorless
- B. Water soluble
- C. Crystalline
- D. All of above

16. A method of writing structural formula of carbohydrates to represent monosaccharide's cyclic structure with a simple 3D perspective is known as

- A. Haworth projection
- B. Structural formula
- C. Empirical formula
- D. Fischer projection

17. Hydrolysis of glycoside bond involves

- A. breakdown of glycosidic bonds
- B. formation of glycosidic bonds
- C. formation of hydrogen bond
- D. formation of ionic bond

18. What is the outcome on heating starch?

- A. Insoluble in water
- B. Soluble in water
- C. becomes a regular geometrical shape
- D. No effect of heat

19. Which of the following is (are) true for anabolic pathways?

- A) They do not depend on enzymes.
- B) They are usually highly spontaneous chemical reactions.
- C) They consume energy to build up polymers from monomers.

D) They release energy as they degrade polymers to monomers.

20. Which of the following statements is TRUE concerning catabolic pathways?

A) They combine molecules into more energy-rich molecules.

B) They are usually coupled with anabolic pathways to which they supply energy in the form of ATP.

C) They are endergonic.

D) They are spontaneous and do not need enzyme catalysis.

21. Which of the following statements is (are) true about enzyme-catalyzed reactions?

A) The reaction is faster than the same reaction in the absence of the enzyme.

B) The free energy change of the reaction is opposite from the reaction in the absence of the enzyme.

C) The reaction always goes in the direction toward chemical equilibrium.

D) A and B only

22. Which of the following statements regarding enzymes is true?

A) Enzymes decrease the free energy change of a reaction.

B) Enzymes increase the rate of a reaction.

C) Enzymes change the direction of chemical reactions.

D) Enzymes are permanently altered by the reactions they catalyze.

23. According to the induced fit hypothesis of enzyme catalysis, which of the following is correct?

A) The binding of the substrate depends on the shape of the active site.

B) Some enzymes change their structure when activators bind to the enzyme.

C) A competitive inhibitor can outcompete the substrate for the active site.

D) The binding of the substrate changes the shape of the enzyme's active site.

24. Which of the following is true of enzymes?

- A) Enzymes may require a nonprotein cofactor or ion for catalysis to take speed up more appreciably than if the enzymes act alone.
 - B) Enzyme function is increased if the three-dimensional structure or conformation of an enzyme is altered.
 - C) Enzyme function is independent of physical and chemical environmental factors such as pH and temperature.
 - D) Enzymes increase the rate of chemical reaction by lowering activation energy barriers
25. How many Adenosine Triphosphate energy carrier molecules are produced from the citric acid cycle?
- A. 2
 - B. 12
 - C. 24
 - D. 38
26. What is the source of most Acetyl CoA used in fatty acid synthesis?
- A. Carbohydrates via glycolytic pathway
 - B. Carbohydrates TCA cycle
 - C. Carbohydrates via citric malate pyruvate shuttle
 - D. Carbohydrates hexose monophosphate shunt
27. What is the name of the process that converts glycogen to glucose and other small molecules?
- A. Glycogenolysis
 - B. Glycogenesis
 - C. Gluconeogenesis
 - D. Glycolysis
28. Which site of the mitochondria does oxidative decarboxylation of pyruvate to form acetyl CoA occur?
- A. Mitochondrial Matrix
 - B. Inner mitochondrial membrane
 - C. Outer Mitochondrial membrane
 - D. Mitochondrial Matrix and Inner mitochondrial membrane
27. Which of the following enzymes is not involved in allosteric regulation of glycolysis?

- A. Hexokinase
- B. Phosphofructokinase
- C. Pyruvate kinase
- D. Phosphoglycerate kinase

28. Which of the following is the first amino acid in a polypeptide chain?

- A. Serine
- B. Valine
- C. Alanine
- D. Methionine

29. Which of the following are aromatic amino acids?

- A. Phenylalanine, tyrosine and tryptophan
- B. Phenylalanine, serine and tryptophan
- C. Threonine, tyrosine and tryptophan
- D. Asparagine, tyrosine and tryptophan

30. Which of the following are positively charged basic amino acids?

- A. Lysine and arginine
- B. Lysine and asparagine
- C. Glutamine and arginine

SECTION B: ANSWER ALL QUESTIONS

(40 MARKS)

- 29. Calculate the pH of a solution with a hydrogen ion activity of 4×10^{-6} . (3 marks)
- 30. Describe the roles of enzymes involved in DNA replication. (3 marks)
- 31. Explain the sources, roles and deficiency of vitamin D in the body (3 Marks)
- 32. Describe the nomenclature of fatty acids. (4 marks)
- 33. Describe key regulatory steps in glycolysis (3 marks)
- 34. Enumerate roles of proteins in transport and immunity. (4 marks)

SECTION C: ANSWER ANY TWO QUESTIONS

(30 MARKS)

- 35. Describe the process of DNA replication in eukaryotes. (10 marks)
- 36. Discuss levels of protein structure. (10 marks)

37. Discuss glycolysis stepwise and its significance in cells.

(10 marks)

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