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(*University of Choice*)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

UNIVERSITY EXAMINATIONS (MAIN PAPER) 2023/2024 ACADEMIC YEAR

THIRD YEAR FIRST SEMESTER EXAMINATIONS

FOR THE DIPLOMA IN MEDICAL BIOTECHNOLOGY

COURSE CODE: BBD 314

COURSE TITLE: ENZYMOLOGY AND CO-ENZYME TECHNOLOGY

DATE: 5TH DECEMBER 2023 **TIME: 2.00-4.00PM**

INSTRUCTIONS TO CANDIDATES

This paper is divided into three sections, **A B** and **C,** carrying respectively: Multiple Choice Questions (**MCQs**), Short Answer Questions (**SAQs**) and Long Answer Questions (**LAQs**). Answer all questions. **DO NOT WRITE ON THE QUESTION PAPER**

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 4 Printed Pages. Please Turn Over

SECTION A: Multiple Choice Questions (20Marks)

1. A reaction where a water molecule is eliminated is----------
   A. Hydrolysis
   B. Condensation
   C. Phosphorylation
   D. Deamination
2. Peptide bonds can be broken or hydrolysed by the action of_____
   A. Phosphotases
   B. Endopeptidases
   C. Catalases
   D. Proteinases
3. Which one of the following is true about a tertiary structure of a protein:
   A. It is two dimensional in shape
   B. It is one dimensional in shape
   C. It is three dimensional in shape
   D. None of the above
4. One of the most powerful techniques for probing the atomic structures of proteins is_____
   A. Ultrasound
   B. CT-Scan
   C. Magnetic resonance imaging
   D. X-ray crystallography
5. The protein comprises of:----------
   A. A hydrophobic surface and a hydrophilic core
   B. A hydrophobic surface and core
   C. A hydrophilic surface and a hydrophobic core
   D. A hydrophilic surface and core
6. An enzyme is_____
   A. Vitamin
   B. Lipid
   C. Carbohydrate
   D. Protein
7. Which one of the following is not an example of a structural protein?
   A. Keratin
   B. Collagen
   C. Silk fibroin
   D. Haemoglobin
8. Enzymes increase reaction rate by----------
   A. Decreasing the activation barrier of the reaction
   B. Increasing the activation barrier of the reaction
   C. Increasing the pH of the reaction
   D. Increasing the temperature of the reaction
9. At high temperature the rate of enzyme action decreases because the increased heat
   A. Changes the pH of the system
   B. Alters the active site of the enzyme
   C. Neutralize acids and bases in the system
   D. Increases the concentration of enzymes

10. The site on an enzyme where the substrate binds is called-------
    A. A domain
    B. An inactive site
    C. An active site
    D. An attachment site
11. The following is a property of an enzyme----------
    A. Sensitive to temperature change
    B. Resistant to temperature change
    C. Resistant to change in pH
    D. Decomposes during a biological reaction
12. The following describes best an apoenzyme
    A. It is a protein portion of an enzyme
    B. It is a non-protein group
    C. It is a complete, biologically active conjugated enzyme
    D. It is a prosthetic group
13. Which one of the following Enzymes has a "proof reading" mechanism?
    A. Helicase
    B. Catalase
    C. Topoisomerase
    D. DNA polymerase
14. Which one of the following reactions is catalyzed by enzyme lyase?
    A. Breaking of bonds
    B. Formation of bonds
    C. Intramolecular rearrangement of bonds
    D. Transfer of phosphate groups
15. The model that explains the specificity of an Enzyme is referred to as----------
    A. Lock and Key model
    B. Ionic bond model
    C. Compatibility model
    D. Substrate binding model
16. Which one of the following statements about enzymes is **true**?
    A. Enzymes accelerate reactions by lowering the activation energy
    B. Enzymes are proteins whose three-dimensional form is key to their function
    C. Enzymes do not alter the overall change in free energy for a reaction
    D. All of the above
17. Enzymes accelerate reactions by----------
    A. Lowering the activation energy
    B. Increasing the activation energy
    C. Reducing the reaction temperature
    D. Reducing the concentration of the substrate
18. Small organic molecules that can loosely or tightly bind to an enzyme are called_____
    A. Co factors
    B. Apoenzymes
    C. Co enzymes
    D. Holoenzymes
19. An enzyme that joins the ends of two strands of nucleic acid is a_____
    A. Polymerase
    B. Ligase

C. Synthetase
D. Helicase

20. Which one of the following is not a clinical application of enzymes?
A. Signal transduction
B. Energy generation
C. Cell regulation
D. Cell division

SECTION B: Short Answer Questions (40Marks)

1. Explain the following
   i) Activation energy (4 marks)
   ii) Effect of temperature on activation energy (4 marks)
2. Explain the Michaelis- Menten equation (8 marks)
3. Explain the difference between Non-competitive inhibition and uncompetitive inhibition.
   (8 marks)
4. Explain the following:

   i) Bi substrate, Bi product reactions (4 marks)

   ii) Bi substrate, Uniport reactions (4 marks)
5. Explain any four advantages of immobilized enzymes (8 marks)

SECTION C: Long Answer Questions (60marks)

1. Discuss any five ways through which enzyme activity is used in diagnostic testing (20marks)
2. Discuss the various classes of enzymes and the type of reactions they catalyse (20marks)
3. Discuss FIVE ways in which enzyme inhibitors are used as therapeutics (20 marks)