



(University of Choice)

**MASINDE MULIRO UNIVERSITY OF  
MASINDE MULIRO UNIVERSITY OF  
SCIENCE AND TECHNOLOGY  
(MMUST)**

**MAIN CAMPUS**

**UNIVERSITY EXAMINATIONS**

**2022/2023 ACADEMIC YEAR**

**THIRD YEAR SECOND SEMESTER MAIN EXAMINATIONS**

**FOR THE DEGREE  
OF  
BACHELOR OF SCIENCE IN MEDICAL BIOTECHNOLOGY**

**COURSE CODE: BMB 423**

**COURSE TITLE: GENOMICS, PROTEOMICS & PROTEIN**

**DATE: 21<sup>ST</sup> APRIL 2023**

**TIME: 8.00 – 10.00AM**

**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 (20 marks)**

1. What properties of a protein does hydrophobic interaction chromatography exploit for purification?
  - a. Charged amino acids
  - b. Hydrophobic amino acids on the protein surface
  - c. Molecular weight
  - d. Enzyme activity
2. Which of the following methods could be used to check the molecular weight of your purified protein?
  - a. SDS-PAGE only
  - b. Mass spectrometry only
  - c. Analytical SEC only
  - d. All of the above
3. The precise biochemical activity of a protein is described in \_\_\_\_\_
  - a. Phenotypic function
  - b. Cellular function
  - c. Molecular function
  - d. Structural genomics
4. Sequencing of genomic DNA is included in \_\_\_\_\_
  - a. Phenotypic function
  - b. Cellular function
  - c. Molecular function
  - d. Structural genomics
5. Polyacrylamide gel electrophoresis uses \_\_\_\_\_ to separate proteins.
  - a. pressure difference
  - b. temperature difference
  - c. electric field
  - d. magnetic field
6. Proteins interacting with specific substances can be separated using \_\_\_\_\_
  - a. ion-exchange chromatography
  - b. paper chromatography
  - c. affinity chromatography
  - d. gel-filtration chromatography
7. What is the main enzyme component of Sanger sequencing?
  - a. Helicase
  - b. Polymerase
  - c. Nuclease
  - d. Gyrase
8. Which of the following is used by DNA polymerase as a substrate?
  - a. Sucrose
  - b. Lactose
  - c. Nucleotide
  - d. Nucleoside
9. Which of the following act as chain terminator?
  - a. Exogenous
  - b. DNA
  - c. Deoxynucleotides

- d. Dideoxynucleotides
10. \_\_\_\_\_ is a chemically synthesized oligonucleotide.
- Klenow fragment
  - DNA
  - Primer
  - RNA
11. Which of the following analytical technique can be used to identify a chemical substance by the sorting of gaseous ions in electric and magnetic fields according to their mass-to-charge ratios?
- Raman spectroscopy
  - Atomic spectroscopy
  - NMR spectroscopy
  - Mass spectroscopy
12. Which of the following is not a component of mass spectrometric technique?
- Ion source
  - Analyzer
  - Detector
  - X – ray source
13. Which component of the mass spectrometers separates the ion beams into its components?
- Sample handling system
  - Ion source
  - Detector
  - Analyzer
14. What is functional genomics is?
- The study of how the genome, transcripts (genes), proteins and metabolites work together to produce a particular phenotype
  - The study of how gene expression relates to phenotype
  - The study of how genotype relates to phenotype
  - The study of how protein expression relates to phenotype
15. Imagine you are working on identifying RNAs that are bound by a RNA binding protein (RBP) of interest. Which strategy would you choose?
- Both RIP-chip and RIP-seq could be appropriate
  - None of the above
  - RNA immunoprecipitation(RIP)-chip
  - RIP-seq
16. If DNA is digested by endonucleases in four sites giving rise to fragments of which two are equal in length how many bands would be seen after electrophoresis?
- 3
  - 4
  - 5
  - 6
17. Electrophoresis cannot be used to separate \_\_\_\_\_
- DNA
  - RNA
  - Amino acid
  - Protein

18. Which of the following statement is Incorrect about SnRNA?
- It is small nuclear RNA
  - It helps in RNA splicing
  - It is also called snurps
  - It functions in RNA editing
19. What is the role of snoRNA in eukaryotes?
- Chemical modification
  - RNA splicing
  - Act as adaptor RNA
  - Forms component of the ribosome
20. Name the class of RNA which takes part in RNA Editing?
- snRNA
  - tRNA
  - gRNA
  - SiRNA

**SECTION B: Short Answer Questions (40 marks)**

- Describe proteomics under the following titles
  - Definition (2marks)
  - Types of proteomics (3 marks)
  - Application of proteomics (5marks)
- Explain the categories of mutagenesis in genomics (8marks)
- Outline the procedure for Restriction fragment Length Polymorphism test in DNA renaturation techniques (8marks)
- Explain the stages of proteome analysis (6 marks)
- Explain the functional parts of Nuclear Magnetic Resonance (8marks)

**SECTION C: Long Answer Questions (60 marks)**

- Explain different nucleic acid blotting techniques (20 marks)
- Describe methods used for protein complex analysis (20 marks)
- Explain the process CRIPR-Cas9 gene editing in DNA manipulation (20 marks)