



(University of Choice)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN CAMPUS

**UNIVERSITY EXAMINATIONS
2019/2020 ACADEMIC YEAR**

FIRST YEAR FIRST SEMESTER EXAMINATIONS

**FOR THE DEGREE
OF
BACHELOR OF SCIENCE MEDICAL BIOTECHNOLOGY.
MAIN EXAMINATION**

COURSE CODE: **BMB 111**

COURSE TITLE: FOUNDATIONS OF MEDICAL BIOTECHNOLOGY

DATE:

TIME:

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**).

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 5 Printed Pages. Please Turn Over.

SECTION A

Answer All Questions- Multiple Choice Questions (1 Mark Each)

1. In which organisms did Gregor Mendel make a discovery of genes
 - A. Yeast
 - B. Peas
 - C. *Escherichia coli*
 - D. *Mus musculus*

2. In a DNA molecule, which base would you expect to find paired with cytosine?
 - A. Guanine
 - B. Uracil
 - C. Adenine
 - D. Thymine

3. The following statements accurately define the term “biotechnology” **EXCEPT** one.
 - A. The branch of molecular biology that studies the use of microorganisms to perform specific industrial processes.
 - B. The use of biological processes; and *technology* to solve problems or make useful products.
 - C. Biotechnology is a collection of technologies that capitalize on the attributes of cells, such as their manufacturing capabilities, and put biological molecules, such as DNA and proteins, to work for us.
 - D. It is the use of genetically modified plants and animals to produce therapeutic molecules.

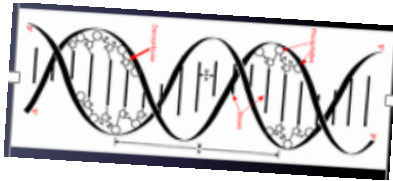
4. The non-coding regions in mRNA are referred to as:
 - A. Introns
 - B. Exons
 - C. Splice joints
 - D. Silencers

5. To which of the following medical biotechnology units would you submit a sputum specimen for Tuberculosis (TB) investigation?
 - A. Histopathology
 - B. Microbiology
 - C. Chemical pathology
 - D. Immunohaematology

6. Which of the following molecular sieves is mostly used in the gel electrophoresis of DNA.
 - A. SDS PAGE
 - B. Polyacrylamide
 - C. Agarose

- D. *Thermus aquaticus*
- 7. Who among the following scientists invented the DNA blotting technique
 - A. Fredrick Sanger
 - B. Craig Venter
 - C. James Watson
 - D. Edward Southern
- 8. Which blotting technique would you use to study the product of an insulin gene
 - A. Western Blotting
 - B. Eastern Blotting
 - C. Northern Blotting
 - D. Southern Blotting
- 9. Which discovery did Anton von Leeuwenhoek make
 - A. The microscope
 - B. Cells
 - C. Bacteria and Protozoa
 - D. Viral Vaccine
- 10. Which of the following amino acids is translated from a start codon in mRNA?
 - A. Methionine
 - B. Glycine
 - C. Proline
 - D. Isoleucine

11. The figure below represents a DNA double helix who first described the structure



- A. Jacob and Manod
- B. Nathan and Smith
- C. Watson and Crick
- D. Redman and Methodman
- 12. Which of the following genes are literally inherited by a child from the mother?
 - A. All Nucleic genes
 - B. Genes carried on the X chromosome
 - C. All Mitochondrial genes
 - D. Genes carried on the Y chromosome
- 13. The following statements are true about cDNA EXCEPT one

- A. It lacks introns
 - B. It lacks exons
 - C. Its shorter than DNA
 - D. It is made by reverse transcription
14. The following are RNA strands, which one represents mRNA
- A. 5'-UUAACGUCCCGGGAGAUAGGCC-3'
 - B. 5'-CCAGAGCGGCAUUAUUUUUUUUUU-3'
 - C. 5'-TACTACTTTTUATTUAAACGCGCCA-3'
 - D. 5'-AAATGACCTACGATAAAUAAGGAC-3'
15. Which of the following terms refers to experimental designs using a computer
- A. *In vivo*
 - B. *Ex vivo*
 - C. *In silico*
 - D. *In vitro*
16. Which among the following is a DNA sequencing technique
- A. Gel electrophoresis
 - B. GWAS/454 next generation
 - C. Dot Blot probe hybridization
 - D. Microarray
17. Gel electrophoresis resolves double stranded DNA fragments based on which of the following
- A. Molecular weight
 - B. Sequence
 - C. Isoelectric point
 - D. Frequency of CTG repeats
18. The cell organelle that contains the cell's genetic material is
- A. Peroxisome
 - B. Ribosomes
 - C. Nucleus
 - D. Plasma membrane
19. Which of the following single DNA strands has a splice site
- A. 5'-AAATGGGGACACAACGGGCCCA-3'
 - B. 5'-ACCGACTCGCGCATCCAAGGAC-3'
 - C. 5'-TACCGCGCGCGAAAGATAAGCG-3'
 - D. 5'-CAATGTTTTAACACACATTCCGA-3'
20. Which one of the following arrangements represents a nucleotide in an mRNA molecule?
- A. Guanine-deoxyribose-phosphate
 - B. Uracil-deoxyribose-phosphate
 - C. Thymine-ribose-phosphate
 - D. Adenine-ribose-phosphate

SECTION B:

Answer All Questions: - Short Essay (40 Marks)

1. Define the following terms (8mks).
 - a) Palindrome (2 Marks)
 - b) Splicing (2 Marks)
 - c) Gene (1 Mark)
 - d) Polyadenylation (1 Mark)
 - e) Recombinant DNA (2 Marks)
2. Briefly describe how the central dogma theory is violated by retroviruses (8mks).
3. Briefly explain the use of hybridoma technology in production of medical products (8 Marks).
4. Discuss DNA replication in a eukaryotic cell (8 Marks).
5. Using relevant examples two in each case, show how restriction endonucleases cleave DNA molecules to produce 'sticky' and 'blunt' ends (8 Marks).

SECTION C:

Answer All Questions: - Long Essay (60 Marks)

1. Describe recombinant DNA technology. (20 Marks).
2. Citing relevant examples, explain how biotechnology can be/is employed to improve health outcomes of patients. (20 Marks).
3. Discuss career options in medical biotechnology. (20 Marks).