(*University of Choice*)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS
2019/2020 ACADEMIC YEAR

FIRST YEAR FIRST TRIMESTER EXAMINATIONS

FOR THE DEGREE
OF
BACHELOR OF SCIENCE MEDICAL BIOTECHNOLOGY
SUPPLEMENTARY/SPECIAL EXAM.

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 order for a gene to be transcribed, RNA polymerase must have access to the DNA helix and be able to bind to the genes
   a) Activator
   b) Regulator
   c) Promote
   d) Operator

2. The elongation of the leading strand during DNA synthesis
   a) Progresses away from the replication folk
   b) Occurs in 3' to 5' direction
   c) Produces okazaki fragments
   d) Depends on the action of DNA polymerase

3. When DNA replication starts
   a) The phosphodiester bonds between the adjacent nucleotides breaks
   b) The bond between the nitrogen base and deoxyribose sugar breaks
   c) The leading strand produce okazaki fragments
   d) The hydrogen bond between the nucleotides of two strands breaks

4. Which of the following factor is essential for promoter sequence recognition
   a) A
   b) B
   c) β'
   d) Ơ

5. The enzyme RNA polymerase is
   a) RNA dependent RNA polymerase
   b) DNA dependent RNA polymerase
   c) RNA dependent DNA polymerase
   d) None of the above

6. Which form of RNA has a structure resembling the clover leaf
   a) rRNA
   b) tRNA
   c) mRNA
   d) hnRNA

7. Enzyme peptidyl transferase helps in
   a) Catalyzing bonding between adjacent amino acid
   b) Transferring amino group from one amino acid to the other
   c) Shifting ribosomes on mRNA
   d) Removal of tRNA after formation of peptide bond between amino acids.

8. Which of the following statements is true
   a) A vector should have an origin of replication
   b) A vector should have a selectable marker
   c) A vector should have a unique restriction site
   d) All of the above

9. Which of the following enzymes is used to cut DNA molecule in rDNA technology
   a) Ligase
   b) Phosphatase
   c) Ribonuclease
   d) Restriction enzymes

10. The DNA molecule to which the gene of insert is integrated for cloning is called
   a) Carrier
   b) Transformer
   c) Vector
   d) None of these

11. Which of the following processes is the equivalent replication in an *in vitro* experiment.
   a) Translation
   b) Transcription
   c) Polymerase Chain Reaction
   d) Post-translational modification

12. The following statements define accurately the "medical 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.

13. The non-coding regions in mRNA are referred to as:
   a) Introns
   b) Exons
   c) Splice joints
   d) Silencers

14. The following amino acids are essential which one is not?
    a) Histidine
    b) Glutamate
    c) Leucine
    d) Methionine
15. Which of the following amino acids is translated from a start codon in mRNA?
    a) Methionine
    b) Glycine
    c) Proline
    d) Isoleucine

16. Which of the following is found on a ribosome?
    a) 28s subunit.
    b) D- arm.
    c) 60s subunit.
    d) Anti-codon arm.

17. The Central Dogma Theory involves.
    a) Replication……> Transcription……> Translation.

    b) Reverse Transcription……> DNA……>Transcription……> RNA……>Translation.

    c) DNA……$^{\text{Transcription}}$……> mRNA……..$^{\text{Translation}}$…….> Polypeptides.

    d) Gene…..$^{\text{Gene}}$ Expression……>DNA……$^{\text{Transcription}}$……> mRNA……..$^{\text{Translation}}$…….> Polypeptide.

18. To which of the following medical laboratory units would you submit a sputum specimen for Tuberculosis (TB) investigation?
a) Histopathology
b) Microbiology
c) Chemical pathology
d) Immunoheamatology

19. For storage and handling of strongly alkaline solutions the best laboratory ware to use is
a) One made of borosilicate
b) A conical flask made of sodalime glass
c) One made from pyrex glass
d) A flat bottomed flask made from borosilicate

20. The organelle that contains the cell's genetic material is
    A. Ribosomes on rough Endoplasmic Reticulum.
    B. Peroxisomes
    C. Lysosomes
    D. Nucleus

SECTION B:
Answer All Questions: - Short Essay (8 Marks Each)

1. Explain the process of somatic cell nuclear transfer (8mks).
2. Why is *E.coli* used commonly used in cloning? (8mks).
3. Using structures describe purines and pyrimidines (8mks).
4. Explain the importance of microbiology in "medical biotechnology" (8mks).
5. Describe the major classes of proteins involved in DNA replication (8mks).

SECTION C:
Answer All Questions: - Long Essay (20 Marks Each)

1. Describe how you would produce recombinant HBV vaccine (20mks).
2. You have been appointed as a head of medical biotechnology section in a clinical research laboratory, discuss the improvement you can implement to boost diagnosis of diseases. (20mks)
3. Discuss hybridoma technology. (20mks)