



(University of Choice)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN CAMPUS

**UNIVERSITY EXAMINATIONS
2019/2020 ACADEMIC YEAR**

THIRD YEAR FIRST SEMESTER EXAMINATIONS

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

COURSE CODE: BMB 311

COURSE TITLE: MOLECULAR GENETICS

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: MULTIPLE CHOICE QUESTIONS (20 MKS)

Instructions to the candidate

- The section has twenty (20) multiple choice questions (MCQs)
- Each question has a stem and four (4) completion options, of which only one is correct
- Write your answers on the provided university examination booklet.

1. The gene formed by the joining of DNA segments from two different sources are called as
 - A) Recombinant gene
 - B) Joined gene
 - C) Both A and B
 - D) Chimeric gene
2. Restriction enzymes are also called as
 - A) Biological scissors
 - B) Molecular scalpels
 - C) Molecular knives
 - D) All of these
3. The most important discovery that lead to the development of rDNA technology was
 - A) Double helix model of Watson and Crick
 - B) Discovery of restriction enzymes
 - C) Discovery of ligase enzyme
 - D) Discovery of plasmids
4. Who discovered restriction enzymes
 - A) Nathan, Arber and Smith in 1970
 - B) Watson, Crick and Wilkins in 1970
 - C) Boyer and Cohen in 1975
 - D) Paul Berg in 1975
5. 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
6. The DNA segment to be cloned is called
 - A) Gene segment
 - B) DNA fragment
 - C) DNA insert
 - D) All of these

7. The PCR technique was developed by
 - A) Kary Mullis
 - B) Kohler
 - C) Milstein
 - D) Altman

8. PCR is a
 - A) DNA degradation technique
 - B) DNA amplification technique
 - C) DNA sequencing technique
 - D) All of these

9. Which of the following statements are true regarding PCR
 - A) Billions of copies of desired DNA can be synthesized from microgram quantities of DNA
 - B) Automated PCR machines are called thermal cyclers
 - C) A thermostable DNA polymerase is required
 - D) All of these

10. *Thermus aquaticus* is the source of
 - A) Taq polymerase
 - B) Vent polymerase
 - C) Both A and B
 - D) Primase enzyme

11. All the following are thermostable polymerases except
 - A) Taq polymerase
 - B) Vent polymerase
 - C) DNA polymerase III
 - D) Pfu polymerase

12. The basic requirements of PCR reaction include
 - A) DNA segment to be amplified
 - B) Two oligonucleotide primers
 - C) A heat stable DNA polymerase
 - D) All of these

13. The process of binding of primers to the denatured strand is called
 - A) Denaturation
 - B) Annealing
 - C) Renaturation
 - D) None of these

14. Pfu and Vent polymerase are more efficient than Taq polymerase because
 - A) Of more efficient polymerase activity
 - B) Of proof-reading activity

- C) Both A and B
 - D) None of these
15. The virus mediated gene transfer using genetically modified bacteriophages is called
- A) Transfection
 - B) Transduction
 - C) Transformation
 - D) Conjugation
16. The ability of cells to take up DNA fragments from surrounding called
- A) Transfection
 - B) Transduction
 - C) Transformation
 - D) Conjugation
17. Introduction of DNA into cells by exposing to high voltage electric pulse is
- A) Electrofusion
 - B) Electrofision
 - C) Electrolysis
 - D) Electroporation
18. DNA fingerprinting refers to
- A) Techniques used for identification of fingerprints of individuals
 - B) Molecular analysis of profiles of DNA samples
 - C) Analysis of DNA samples using imprinting devices
 - D) Techniques used for molecular analysis of different specimens of DNA
19. Probiotics are
- A) Cancer inducing microbes
 - B) Safe antibiotics
 - C) New kind of food allergens
 - D) Live microbial food supplement
20. What is true for monoclonal antibodies?
- A) These antibodies obtained from one parent and for one antigen
 - B) These obtained from many parents and for many antigens
 - C) These obtained from different parents and for one antigen
 - D) These obtained from one parent and for many antigens

SECTION B: SHORT ANSWER QUESTIONS (40 MKS)

Instructions

- This section has a total of **FIVE** short answer questions (SAQs), totalling a maximum of forty (40) marks.
 - Answer all questions.
 - Write your answers on the provided university examination booklet.
1. Describe the experimental proof of the function of DNA [8 Marks].
 2. Giving specific examples describe mutant genes and defective proteins [8 Marks].
 3. Briefly discuss organization of the human genome [8 Marks].
 4. Describe the genetic code [8 Marks].
 5. How do retroviruses violate the central dogma? [8 Marks].

SECTION C: LONG ANSWER QUESTIONS (60 MKS)

Instructions

- This section has **TWO** long answer questions (LAQs), totalling a maximum of sixty (60) marks.
 - Answer all questions.
 - Write your answers on the provided university examination booklet.
1. Discuss gene regulation using *lac* and *trp* operons [20 Marks].
 2. Using structures give a detailed description of the DNA structure [20 Marks].
 3. Discuss recombinant DNA technology [20 Marks].