



(University of Choice)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN CAMPUS

**UNIVERSITY EXAMINATIONS
2018/2019 ACADEMIC YEAR**

THIRD YEAR FIRST SEMESTER EXAMINATIONS

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

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. Which of the following enzyme is used to synthesize DNA using a mRNA template.
A) Taq polymerase
B) Alkaline phosphatase
C) Reverse transcriptase
D) Nuclease
2. Which of the following enzymes is used to cut DNA molecule internally
A) Restriction enzymes
B) Restriction endonuclease
C) Restriction exonuclease
D) Ribonuclease H
3. Which type of restriction enzymes are commonly used in rDNA technology
A) Type I
B) Type II
C) Type III
D) Type IV
4. Which of the following enzyme is used to join two DNA molecule
A) Nuclease
B) Restriction enzymes
C) Lyases
D) Ligases
5. Which is the enzyme used to remove phosphate group from the 5' end of the DNA
A) Restriction enzymes
B) Alkaline phosphatase
C) Polynucleotide kinase
D) Ribonuclease H
6. The enzymes that adds mononucleotide triphosphates to the 3' OH group of a DNA fragment is
A) Polynucleotide kinase
B) Terminal nucleotidyl transferase
C) Terminal phosphoryl transfrase
D) All of these

7. The RNA strand in the RNA-DNA hybrid is removed by
 - A) RNase
 - B) RNase-H
 - C) Nuclease
 - D) None of these

8. Klenow enzyme is the product of enzymatic breakdown of
 - A) DNA polymerase I
 - B) DNA polymerase II
 - C) DNA polymerase III
 - D) RNA polymerase

9. Selective degradation of single stranded DNA is carried out by the enzyme
 - A) Nuclease
 - B) Ribonuclease
 - C) SI nuclease
 - D) Deoxyribonuclease

10. Which of the following is an RNA dependent DNA synthetase
 - A) DNA polymerase I
 - B) DNA polymerase II
 - C) Reverse transcriptase
 - D) All of these

11. Which of the following is a thermo stable DNA polymerase
 - A) Taq polymerase
 - B) Vent polymerase
 - C) Pfu polymerase
 - D) All of these

12. 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

13. Restriction enzymes are also called as
 - A) Biological scissors
 - B) Molecular scalpels
 - C) Molecular knives
 - D) All of these

14. The most important discovery that led 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
15. 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
16. 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
17. The DNA segment to be cloned is called
- A) Gene segment
 - B) DNA fragment
 - C) DNA insert
 - D) All of these
18. The PCR technique was developed by
- A) Kary Mullis
 - B) Kohler
 - C) Milstein
 - D) Altman
19. PCR is a
- A) DNA degradation technique
 - B) DNA amplification technique
 - C) DNA sequencing technique
 - D) All of these
20. 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

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. With the aid of a diagram, describe the chromosomal structure [8 Marks].
 2. Describe mRNA processing [8 Marks].
 3. Briefly discuss organization of the human genome [8 Marks].
 4. Describe the process of translation [8 Marks].
 5. How do retroviruses violate the central dogma? [8 Marks].

SECTION C: LONG ANSWER QUESTIONS (40 MKS)

Instructions

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