



*(University of Choice)*

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

**MAIN CAMPUS**

**UNIVERSITY EXAMINATIONS  
2019/2020 ACADEMIC YEAR**

**THIRD YEAR SECOND TRIMESTER EXAMINATIONS**

**FOR DIPLOMA IN  
MEDICAL BIOTECHNOLOGY  
MAIN EXAM**

**COURSE CODE: BBD 324**

**COURSE TITLE: GENOMIC AND PROTEOMIC TECHNOLOGY**

**DATE: 10<sup>th</sup> December 2020**

**TIME: 2.00 -4.00 PM**

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## **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**). Attempt all the questions

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 MARKS)**

1. The following statements are true about prokaryotic chromosomes except?
  - A. Negative charge is nullified by the  $Mg^{2+}$
  - B. DNA is associated with histone proteins
  - C. Have many origins of replication
  - D. They contain covalently closed circular DNA (cccDNA)
  
2. Which statement best describes a karyotype?
  - A. chromosome count of an organism and what these chromosomes look like under a light microscope
  - B. The length of chromosomes
  - C. Process of pairing and ordering all the chromosomes of an organism,
  - D. All of the above
  
3. Introns are the-----and exons are the -----part of a gene
  - A. Coding, non-coding
  - B. Non-coding, coding
  - C. Exposed, hidden
  - D. Coding, expressed
  
4. A mature mRNA has-----
  - A. Exons
  - B. Introns,
  - C. Exons and introns
  - D. All of the above
  
5. With reference to retrotransposons, LTR stands for :
  - A. Long tandem repeats
  - B. Lost terminal repeats
  - C. Long terminal repeats
  - D. All of the above
  
6. Which one of the following statements is NOT true?
  - A. Transposons are also called transposable elements
  - B. Transposons include a gene encoding the enzyme transposase.
  - C. Transposons are also called “jumping genes,”
  - D. Transposons are molecules of RNA that include special inverted repeat sequences and have a gene encoding the enzyme transposase.
  
7. Select the statement which best suits enhancers
  - A. An enhancer needs to be close to the initiation site of transcription in order to function.
  - B. Enhancers are present and function in eukaryotic cells and not prokaryotic cell.
  - C. Enhancers can be found on introns and not exons.
  - D. An enhancer does not need to be close to the initiation site of transcription in order to function
  
8. Gene expression includes:

- A. Translation
  - B. Transcription
  - C. Transcription and translation
  - D. All of the above
9. CRISPR stands for:
- A. Clustered regularly interspersed short palindromic repeats
  - B. Clustered regularly interspaced short palindromic repeats
  - C. Clustered regularly interspaced short palindromic reacts
  - D. Clustered regularly interspersed shorter palindromic repeats
10. The following are tumor suppressor gene except
- A. BRCA1
  - B. TP53
  - C. HER2
  - D. p53
11. In bacteria, a cluster of genes under control of a single promoter is known as
- A. Operator
  - B. Operon
  - C. Promoter
  - D. Repressor
12. Bacteriophages (phages) are:
- A. bacteria that can kill and lyse the bacteria they infect
  - B. Viruses that can kill and lyse the bacteria they infect
  - C. Bacteria that can kill and lyse the virus they infect
  - D. Viruses of bacteria that can kill and lyse the bacteria they infect.
13. The trp operon is a repressible operon that encodes enzymes for synthesis of the amino acid
- A. Tryptophage
  - B. Tryptophan
  - C. trp
  - D. Trypton
14. HBOC stands for:
- A. human blood of cancer
  - B. human blood and ovarian cancer
  - C. hereditary blood and ovarian cancer
  - D. hereditary breast and ovarian cancer
15. In sexually reproducing organisms, genetic diversity is not introduced during
- A. coming into contact with people physically
  - B. mutations
  - C. crossing over
  - D. independent assortment of individual chromosomes during meiosis
16. All the following refer to retrotransposons except;
- A. They do not induce mutations

- B. Are also called Class I transposable elements
- C. Are also called transposons via RNA intermediates.
- D. They are genetic elements that can amplify themselves in a genome

17. Which one does not make up the spliceosome?

- A. small nuclear RNAs (snRNA)
- B. small nuclear ribonucleo proteins (- snRNPs)
- C. U1, U2, U3, U4
- D. U1, U2, U4, U5

18. Transcription factors

- A. Are proteins that bind to the promoter sequence only to control the transcription of the target gene.
- B. Are proteins that bind to the other regulatory sequences other than the promoter sequence to control the transcription of the target gene.
- C. Are therefore proteins that bind to the promoter sequence and other regulatory sequences to control the transcription of the target gene.
- D. Are proteins that do not bind to the promoter sequence nor any other regulatory sequences to control the transcription of the target gene.

19. The three genes of the DNA operon are not:

- A. Found in a row
- B. Transcribed together to make a single mRNA that has contains sequences coding for all three genes
- C. Under control of more than one promoter
- D. Under control of a single promoter

20. Which of the following proteins is associated with the DNA packaging in prokaryotes?

- A. H2A
- B. H4
- C. H2B
- D. HU

## **SECTION B: SHORT ANSWER QUESTIONS (40 MARKS)**

1. Show the difference between DNA packaging in prokaryotes and Eukaryotes. [4 marks]
2. Differentiate between Chorionic villus sampling (CVS) and amniocentesis [6 marks]
3. State the importance of splicing [2 Marks]
4. Explain how natural transformation occurs in prokaryotic organisms to induce genetic diversity [6 Marks]
5. State any four applications of microsatellites [4 marks]
6. Give any two differences between transcription in prokaryotes and eukaryotes [4 marks]
7. In an experiment, a group of researchers isolated some bacteria, and grew some of them in a monoculture while others were mixed together in diverse populations. The researchers later observed that viruses could persist so much

- easier on monocultures compared to diverse bacterial host populations, explain  
[4 marks]
8. Explain how Tetracyclines as antimicrobials inhibit protein synthesis  
[4 marks]
  9. The lac operon is an inducible operon, give the principle of its operation  
[4 marks]
  10. Differentiate between proto-oncogene and oncogenes  
[2 marks]

### **SECTION C: LONG ANSWER QUESTIONS (60 MARKS)**

1. Explain in details, the lytic cycle of bacteriophages [20 marks]
2. Describe in details how genetic diversity is introduced into prokaryotic organisms through:
  - a. Transduction [10 marks]
  - b. Conjugation [10 marks]
3. Describe in details how gene expression occurs in eukaryotes [20 marks]