(*University of Choice*)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS
2019/2020 ACADEMIC YEAR

THIRD YEAR SECOND SEMESTER MAIN EXAMINATIONS

FOR THE DIPLOMA OF MEDICAL BIOTECHNOLOGY & LABORATORY SCIENCES (MAIN)

COURSE CODE: BBD 321

COURSE TITLE : GENETIC TECHNOLOGY

DATE: 8th December 2020 **TIME: 8.00 – 10.00 AM**

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 4 Printed Pages. Please Turn Over.

SECTION A

Answer All Questions (20 Marks).

1. Direct delivery of therapeutic gene into target cell into patient's body?
   a) In vivo
   b) Ex vivo
   c) In vitro
   d) Ex vitro

2. ----------is a technique for correcting defective genes responsible for disease development.

   a) Gene therapy
   b) Gene engineering
   c) Gene editting
   d) Gene cloning

3. Which one of the restriction enzymes below cleaves ds DNA to produce blunt ends?

   a) BamH I
   b) Mssp I
   c) Haee III
   d) Hindi III

4. Which one of the following is a genetic disease

   a) Cystic fibrosis
   b) Heart attack
   c) Malaria
   d) Tuberclosis

5. Which among the following properties is desirable for a good cloning host.

   a) It should not have restriction and methylase activities.
   b) It should contain at least one selectable marker.
   c) It should have unique restriction enzyme site.
   d) It should be preferably small in size for easy handling.

6. Which of the following sets of reagents are required in the Sanger technique for DNA sequencing?

   a) Deoxyribonucleotides, *Taq* polymerase, DNA primer.
   b) Dideoxyribonucleotides, deoxyribonucleotides, template DNA.
   c) Dideoxyribonucleotides, DNA primer, reverse transcriptase.
   d) Two DNA primers, template DNA, *Taq* polymerase.

7. Lac Y a structural gene of the operon encodes for.

   a) β- galactosidase.
   b) Lac permease.
   c) transacetylase.
   d) Lac- repressor.

8. Which of the following is found on a ribosome?

   a) 28s subunit.
   b) D- arm.
   c) 60s subunit.
   d) Anti-codon arm.

9. 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.

10. The nomenclature of restriction enzymes was given by.
    a) Janssen and Jenner.
    b) Hooke.
    c) Smith and Nathans.
    d) Jacob and Monod.

11. The best method to determine whether albumin is transcribed in the liver of a mouse of hepato-carcinoma is the following?
    a) Genomic library screening.
    b) Genomic southern blot.
    c) Tissue northern blot.
    d) Tissue western blot.

12. If the DNA strand shown below serves as a template for the synthesis of RNA, which of the following choices gives the sequence and direction of the RNA?

    5’ -GCT ATGCATCGTGATCGAATTGGGT-3’
    a) 5’-ACGCAATTCGATCACGATGCATAGC-3’
    b) 5’-UGCGUUAAGCUAGUGCUACGUAUCG-3’
    c) 5’-ACGCAAUUCGAUCACGAUGCAUAGC-3’
    d) 5’-CGAUACGUAGCACUAGCUUAACGCA-3

13. Which of the following is true of both eukaryotic and prokaryotic gene expression?
    a) After transcription, a 3′ poly A tail and a 5′ cap are added to mRNA.
    b) Translation of mRNA can begin before transcription is complete.
    c) mRNA is synthesized in the 3’ to 5’ direction.
    d) RNA polymerase binds at a promoter region upstream of the gene.

14. A defect in adenosine deaminase (ADA) gene causes severe combined immunodeficiency syndrome (SCID), a condition that can be treated using gene therapy, which statement accurately describes features of the condition.

    a) The condition is associated with a high incidence of heart attacks since the low-density lipoprotein receptor is deficient.
    b) Cells of the immune system cannot proliferate at normal rate hence the survival rate is low.
    c) The condition is a genetically determined autosomal recessive disease that can be caused by a variety of mutations.
    d) The condition is more common in Caucasians.

15. Electrophoresis resolves double – stranded DNA fragments based on which of the following?
    a) Sequence.
    b) Molecular weight.
    c) Isoelectric point.
    d) Frequency of CTG repeats.

16. Which of the following is vector.
    a) plasmid

b) lac operon
c) yeast
d) BAC

17. Which is not a genetic technique.
    a) Southern blot
    b) PCR
    c) Staining
    d) Flow-cytometry

18. The non-coding regions in an RNA transcript are referred to as:

    a) Introns.
    b) Exons.
    c) Splice joints.
    d) Silencers.

19. Which disease was first described as a "molecular disease" due to mutation in 1949.

    a) Cystic Fibrosis.
    b) Sickle Cell Anemia.
    c) Severe Combined Immunodeficiency Syndrome.
    d) Familial Hypercholesterolemia.

20. Mutation in p53 genes results in……..?
    a) Cancer
    b) Cystic fibrosis
    c) Severe combined immune-defiency
    d) klinefelter

SECTION B
Answer All Questions (40 Marks).

1. Define the following terms as applied in genetic technology. a) Vector b) promoter, c) genetic technology, d) gene therapy (8 Marks).
2. State the importance of DNA fingerprinting (8 Marks).
3. Discuss properties of a good cloning host (8 Marks).
4. Briefly differentiate types of gene therapy (8 Marks)
5. With examples list any four product of recombinant DNA technology (8 Marks).

SECTION C
Answer All Questions (60 Marks).

1. List any twenty restriction endonucleases enzymes used in genetic technology (20 Marks).
2. Describe in detail hybridoma technology and its potential applications (20 Marks).
3. Discuss PCR as technique in genetic technology (20 marks)