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(University of Choice)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

UNIVERSITY EXAMINATIONS (MAIN PAPER) 2023/2024 ACADEMIC YEAR

FIRST YEAR FIRST SEMESTER EXAMINATIONS

FOR THE DIPLOMA IN MEDICAL BIOTECHNOLOGY

COURSE CODE: DMB 111

COURSE TITLE: FOUNDATIONS OF MEDICAL BIOTECHNOLOGY

DATE: 5TH DECEMBER 2023 **TIME: 8.00-10.00AM**

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**). Answer all questions. **DO NOT WRITE ON THE QUESTION PAPER**

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 4 Printed Pages. Please Turn Over

SECTION A: Multiple Choice Questions (20 Marks)

1. Which one of the following is used in gene cloning?
   A. Plasmids.
   B. Mesosomes.
   C. Lomasomes.
   D. Nucleoids.
2. A recombinant DNA molecule is produced by_____
   A. Joining of two DNA fragment.
   B. Joining of two or more DNA fragments.
   C. Joining two or more DNA fragments originating from different organisms.
   D. Both A and B.
3. The first human hormone product of Recombinant DNA technology is_____
   A. Insulin.
   B. Thyroxine.
   C. Estrogen.
   D. Progesterone.
4. PCR and Restriction fragment length polymorphism are the methods for_____
   A. Genetic fingerprinting
   B. DNA sequencing
   C. Genetic transformation
   D. Study of enzymes
5. What is a plasmid?
   A. It is the genetic part in addition to DNA in microorganisms.
   B. It is a component of the cell wall of bacteria.
   C. Genes found inside the nucleus.
   D. Helps in respiration.
6. DNA or RNA segment tagged with a radioactive molecule is called_____
   A. Plasmid.
   B. Probe.
   C. Clone.
   D. Vector.
7. The DNA molecule to which the gene of interest is integrated for cloning is called_____
   A. Vector.
   B. Carrier.
   C. Template.
   D. Transformer.
8. The linking of antibiotic resistance gene with the plasmid vector became possible with_____
   A. Exonucleases.
   B. Endonucleases.
   C. DNA polymerase.
   D. DNA ligase.

9. In bacterial chromosomes, the nucleic acid polymers are_____
   A. Linear RNA molecule.
   B. Of two types– DNA and RNA.
   C. Circular DNA molecule.
   D. Linear DNA molecule.
10. Which one of the following is not used as a vector in recombinant DNA technology?
   A. Plasmid
   B. Phagemid.
   C. YAC.
   D. EcoR1.
11. The most effective treatment of genetic disorders in the present time is_____
   A. Gene mapping.
   B. Genetic counselling.
   C. Gene therapy.
   D. Cloning.
12. Genomic libraries can be prepared by_____
   A. PCR technique.
   B. Shotgun technique.
   C. Colony hybridization.
   D. Hybridoma technique.
13. The following are advantages of serum free media for hybridomas except_____
   A. Decreased viability of culture medium.
   B. Reduced risk of infectious agents.
   C. Increased control over bioreactor conditions.
   D. Higher dependency on animals.
14. The following are applications of medical biotechnology except_____
   A. Pharmacology.
   B. Gene therapy.
   C. Stem cells.
   D. Bioremedication.
15. Which one of the following doesn't take part in gene expression?
   A. Transcription
   B. RNA processing
   C. Replication
   D. Translation
16. Which one of the following methods is most useful for enzymatic amplification of specific gene segment of DNA?
   A. DNA hybridization.
   B. Nucleotide sequencing.
   C. Polymerase chain reaction.
   D. Reverse transcription.
17. Which one of the following is not required for DNA cloning?
   A. DNA ligase.
   B. A vector.
   C. Methylases.

D. Restriction endonucleases.

18. Nowadays it is possible to detect the mutated gene causing cancer by allowing a radioactive probe to hybridize its complimentary DNA in a clone of cells, followed by its detection using autoradiography because_____

A. Mutated gene does not appear on photographic film as the probe has complementarity to it.
B. Mutated gene partially appears on photographic film.
C. Mutated gene completely and clearly appears on photographic film.
D. Mutated gene does not appear on photographic film as the probe has no complementarity to it.

19. Technique for transferring foreign DNA into a host organisms DNA is known as_____

A. Blotting technique
B. Recombinant DNA technology
C. Gene cloning technique
D. PCR technique

20. What is the structure of Deoxyribonucleic Acid (DNA)?

A. Triple helix
B. Single helix
C. Circular helix
D. Double helix

SECTION B: Short Answer Questions (40 Marks)

1. Tabulate the differences between DNA and RNA (8marks).
2. Describe the major classes of proteins involved in DNA replication (8marks).
3. Describe clinical applications of Medical Biotechnology (8marks).
4. Using structures describe purines and pyrimidines (8marks).
5. A vector is an agent that can carry a DNA fragment into a host cell in which it is capable of replication.
   a) List two types of vectors (2marks).
   b) Describe properties of a good vector (6marks).

SECTION C: Long Answer Questions (60 Marks)

1. Discuss the process of transcription and RNA processing to acquire messenger RNA that will in turn serve as a template for making polypeptides (20 marks)
2. Discuss the procedure involved in Hybridoma technology to construct monoclonal antibodies (20 marks).
3. Discuss the key steps of recombinant DNA technology and its applications (20 marks).