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QUALIFICATION : **BACHELOR OF SCIENCE**	
QUALIFICATION CODE: **07BOSC**	LEVEL: **7**
COURSE: **BIOTECHNOLOGY**	COURSE CODE: **BIO702S**
DATE: **NOVEMBER 2023**	SESSION: **1**
DURATION: **3 HOURS**	MARKS: **120**

FIRST OPPORTUNITY: QUESTION PAPER

EXAMINER: *Prof Percy Chimwamurombe*

MODERATOR: *Dr Ronnie Bock*

INSTRUCTIONS

1. Answer all questions on the separate answer sheet.
2. Please write neatly and legibly.
3. Do not use the left side margin of the exam paper. This must be allowed for the examiner.
4. No books, notes and other additional aids are allowed.
5. Mark all answers clearly with their respective question numbers.

PERMISSIBLE MATERIALS:

1. Non-Programmable Calculator

ATTACHEMENTS

1. NONE

This paper consists of 6 pages including this front pages.

SECTION A: Multiple Choice Section [20 MARKS]

A1. In Biotechnology, reporter genes are incorporated into vectors because they encode proteins that are readily detected.

(a) true
(b) false
(c) all cell needs them
(d) not all cell need them

A2. What is a shuttle vector?

(a) is a cloning vector that can stably replicate in two different organisms
(b) vehicle
(c) a shuttling device
(d) none of the above

A3. In gene therapy, functional copies of a gene can be supplied to an individual to treat human genetic diseases.

(a) false
(b) true
(c) only for some diseases
(d) only for microbial diseases

A4. The following are examples of transgenic plants

(a) Bt – cotton
(b) Bt-maize
(c) Tomato flvr savr
(d) All of the above

A5. Which of the following cut DNA at a specific site

(a) DNA ligase
(b) exonuclease
(c) *E. coli* restriction endonuclease II
(d) DNA gyrase

A6. The bacterium generally used in genetic engineering is

(a) Bacillus
(b) Agrobacterium
(c) Pseudomonas
(d) none of the above

A7. Which of the following is related to genetic engineering

(a) plasmid
(b) heterosis
(c) mutation
(d) plastid

A8. Genetic engineering is possible because

(a) restriction endonucleases purified from bacteria can be used i*n vitro*
(b) we can see DNA with an electron microscope
(c) we can cut DNA with endonucleases like DNAase I
(d) none of the above

A9. First step of genetic engineering is

(a) isolation of gene interest
(b) insertion of gene into vector
(c) growth of GMO
(d) expression of gene

A10. Application of biotechnology procedures in medical processes is classified as

(a) white biotechnology
(b) red biotechnology
(c) blue biotechnology
(d) green biotechnology

A11. Field of biotechnology which is applied to industrial processes is known as

(a) blue biotechnology
(b) green biotechnology
(c) white biotechnology
(d) red biotechnology

A12. Genetic testing identifies changes in

(a) genes
(b) proteins
(c) chromosomes
(d) all of above

A13. Totipotency is

(a) flowering in culture medium
(b) development of roots
(c) development of leaves and roots
(d) development of an organ from a cell in culture medium

A14. In plant tissue culture, the callus tissues can be regenerated into complete plantlets by primarily altering the concentrations of

(a) sugars
(b) amino acids
(c) fatty acids
(d) hormones

A15. What is a genome?

(a) a complete sets of genes of an organism
(b) a complete sets of genetics of an organism
(c) a complete sets of proteins of an organism
(d) a complete sets of DNA of an organism

A16. Process of manipulating genes usually outside normal reproductive process is known as

(a) genetic modification
(b) gene targeting
(c) genome recombination
(d) gene linking

A17. Enzyme which is used to remove or knockout genes is known as

(a) nucleolus
(b) nuclease
(c) nucleotide
(d) clones

A18. Reverse transcriptase is also called

(a) RNA dependent DNA polymerase
(b) DNA dependent RNA polymerase
(c) DNA dependent DNA polymerase
(d) RNA dependent RNA polymerase

A19. The natural genetic engineer is

(a) dipteran species
(b) rhizobium species
(c) bacillus species
(d) none of the above

A20. Which of following scientist developed the process of DNA fingerprinting together with co-workers?

(a) Kary B. Mullis
(b) Alec Jeffreys
(c) T.H. Morgan
(d) H.O. Smith

SECTION B [80 MARKS]

1. Give any five applications of the PCR technology (5)
2. Describe any one molecular marker technique that you know. (5)
3. Describe the technique of western blotting (5)
4. Describe the technique of Northern Blotting. (5)
5. Describe the technique of plant regeneration that you know and explain its importance in producing genetically modified plants. (5)
6. Explain the technique of sited-directed mutagenesis (5)
7. Describe the process of biopharming? (5)
8. Describe any five applications of the technique of biopharming (5)
9. What is difference between biotechnology and biosafety? (5)
10. What is the importance of public awareness on biotechnology and biosafety (5)
11. Briefly describe the steps of DNA isolation from a plant tissue. (5)
12. Compare Restriction Fragment Length Polymorphisms (RFLPs) and Randomly Amplified Polymorphic DNAs (RAPDs). (5)
13. *Aridibacter famidurans* can be a valuable resource for which trait? How you could use this trait in genetic engineering a product of your choice (5)
14. Describe the use of gene mining in prospecting and using the found genes to produce a GMO of your choice. (5)
15. Describe how to make golden rice? (10)

SECTION C **[20 MARKS]**

1. Write a concise essay describing the application of biotechnology in forensics in contemporary society issues. (20)

--------END OF EXAMINATION QUESTION PAPER------