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(University of Choice)

**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)
UNIVERSITY EXAMINATIONS (MAIN PAPER)
2023/2024 ACADEMIC YEAR**

FOURTH YEAR FIRST SEMESTER EXAMINATIONS

**FOR THE DEGREE
OF
BACHELOR OF SCIENCE IN MEDICAL BIOTECHNOLOGY**

COURSE CODE: BMB 415

**COURSE TITLE: CONTEMPORARY ISSUES IN MEDICAL
BIOTECHNOLOGY**

DATE: 8TH DECEMBER 2023

TIME: 2.00-4.00PM

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 statements about living organ donation is correct?
 - A. It can be directed to a specific recipient
 - B. It may be commercialised in necessary circumstances
 - C. It can be for non-directed altruistic donor chains
 - D. It can be altruistic non-directed donation
2. Excision and insertion of a gene is called.....
 - A. Biotechnology
 - B. Genetic engineering
 - C. Cytogenetics
 - D. Gene therapy
3. The expression of a transgene in the target tissue is identified by a.....
 - A. Transgene
 - B. Promoter
 - C. Enhancer
 - D. Reporter
4. _____ is used as a vector for cloning into higher organisms
 - A. Retrovirus
 - B. Baculovirus
 - C. *Salmonella typhimurium*
 - D. *Rhizopus nigricans*
5. Which bacterium is used in the production of insulin by genetic engineering?
 - A. *Saccharomyces*
 - B. *Rhizobium*
 - C. *Escherichia*
 - D. *Mycobacterium*
6. Using genetic technique in forensic science is also called
 - A. Genetic finger printing
 - B. In vitro culture
 - C. Hybridoma technology
 - D. Gene therapy
7. Transgenic organisms are.....
 - A. produced by gene transfer technology
 - B. extinct organisms
 - C. naturally occurring and endemic
 - D. produced by traditional plant breeding technique
8. Stem cells can be obtained from.....
 - A. embryo only
 - B. any part of the body
 - C. blood only
 - D. embryo, bone marrow, umbilical cord blood etc
9. Which one of the following statements about xenotransplantation is true?
 - A. Xenotransplantation is the transplantation of tissues and organs from one species into another
 - B. It is controlled by the Human Tissue Act 2004
 - C. Most research has been conducted in human

- D. Cross species infection is not a problem
10. Embryonic stem cells are derived from the _____ of the blastocyst.
 - A. inner cell mass
 - B. Ectoderm
 - C. Blastocoel
 - D. Mesoderm
 11. Which one of the following is an example of a transgenic Animal?
 - A. Sheep
 - B. All dairy cows
 - C. All Salmon fish
 - D. Ornamental GloFish
 12. Which one of the following is a basic creation method for transgenic forms?
 - A. DNA transformations
 - B. Retrovirus-Mediated Gene Transfer
 - C. Embryo transformation
 - D. Linked genes transformations
 13. What are the similarities between chimeric and transgenic organisms?
 - A. Both are body modifications.
 - B. Both processes have unintended medical consequences.
 - C. They do not bring out evolutionary changes in the organism.
 - D. These processes can be implemented in animals only.
 14. Which one of the following is a xenotransplantation ethical issue?
 - A. Introduction of zoonotic disease such as Mad Cow Disease by organs from animals to human.
 - B. Modified animals might 'escape' and breed with other animals
 - C. Risks are there for human health and environment
 - D. This scenario is changing the species concepts regarding Ecology
 15. Embryonic stem cells are _____.
 - A. Pluripotent
 - B. Small
 - C. Large
 - D. medium-sized
 16. _____ is the technique used to detect genetic disorders.
 - A. Preimplantation genetic diagnosis (PGD)
 - B. Gene therapy
 - C. Cell therapy
 - D. Proliferation
 17. The main purpose of reproductive cloning is to _____.
 - A. Extract somatic cells
 - B. Extract stem cells
 - C. Create a cloned individual from somatic cells
 - D. Create a cloned individual from stem cells
 18. Which one of the following describes the exact meaning of a chimera in genetics?
 - A. A combination of cells from different individuals
 - B. The combination of two DNA molecules from different individuals, or from different chromosomes of the same individual

- C. Refers to interspecies hybrids, such as the mule
 - D. Expression of human myeloid and lymphoid lineages
19. Which one of the following is an example of a chimera created by science?
- A. Human-monkey
 - B. Human-dog.
 - C. Human-cattle.
 - D. bacteria chimera.
20. Embryonic stem cells are preferred over adult stem cells because _____.
- A. They are limited to only certain types of specialized cells
 - B. They can be used for more types of specialized cells
 - C. They are available in limited supply
 - D. They allow the embryo to survive and develop

SECTION B: Short Answer Questions (40 Marks)

1. Describe types of human cloning (5 marks)
2. Explain the arguments of critics of transhumanism (5 marks)
3. Differentiate posthumanism from transhumanism (5 marks)
4. Contrast the types of eugenics (5 marks)
5. State the ethical issues arising from recombinant DNA technology (5 marks)
6. What is stem cell treatment for beauty (5 marks)
7. State the essential components of 3D bioprinting and give an example under each (5 marks)
8. Explain why the Human Genome Project has helped scientists come closer to developing genetic engineering as a form of treatment for inherited diseases like cystic fibrosis. (5 marks)

SECTION C: Long Answer Questions (40 Marks)

1. Discuss the use of the following in healthcare
 - i. Robotics (10 marks)
 - ii. Stem cells (10 marks)
2. Discuss controversies surrounding
 - i. Human genome project (10 marks)
 - ii. Animal-Human hybrids (Chimeras) (10 marks)
3. Discuss the concept and the contemporary issues arising from designer babies and eggsploitation (20 marks)