



(University of Choice)

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

**THIRD YEAR FIRST SEMESTER EXAMINATIONS**

**FOR THE DIPLOMA  
IN  
MEDICAL BIOTECHNOLOGY**

**COURSE CODE: BBD 313**

**COURSE TITLE: CELL BIOLOGY AND IMMUNOTECHNOLOGY**

**DATE: 6<sup>TH</sup> DECEMBER 2023**

**TIME: 8.00-10.00AM**

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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). 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)

- Which one of the following cells is involved in humoral immunity?
  - T-cells
  - B-cells
  - Mast cells
  - Both T and B cells
- Cells Involved in Innate Immunity are \_\_\_\_\_.
  - Phagocytes
  - Macrophages
  - Natural Killer Cells
  - All of the above
- Which one of the following statements is true about Passive Immunity?
  - This immunity causes reactions
  - This immunity develops immediately
  - This immunity lasts only for a few weeks or months
  - All of the above.
- Which one of the following is an autoimmune disease?
  - Type 1 diabetes mellitus
  - Type 2 diabetes mellitus
  - Haemophilia A
  - Sickle cell anemia
- Which one of the following cells would be considered differentiated?
  - Blastomere
  - Spemann organizer
  - Myotome of somite
  - Muscle cell
  - Stem cell
- Differentiated cells express the genes and proteins characteristic of their final identity in the adult, and that identity can be altered only under special circumstances. How does the concept of differentiation, as described here, differ from the concept of determination?
  - Determined cells have begun to differentiate, but are not fully differentiated
  - Determined cells are embryonic cells that will give rise to all the cell types of the adult organism, but have not yet begun to express the genes and proteins characteristic of their final fates.
  - Determined cells will continue to follow their fate if grafted into a different place in a host embryo, even though they do not yet express the genes and proteins characteristic of their final fate.

- D. Determined cells are embryonic cells that will form certain cell types and structures if development is allowed to proceed normally, but will alter their development in response to their location if transplanted to a different place in a host embryo.
- E. Determination describes fully differentiated cells whose identity can no longer be altered.
7. Which one of the following are the basic categories of chemical signalling found in multicellular organisms?
- Paracrine signaling
  - Autocrine signaling
  - Endocrine signaling
  - All of the above
8. The type of culture which is prepared by inoculating directly from the tissue of an organism to culture media is called?
- Primary cell culture
  - Secondary cell culture
  - Cell lines
  - Transformed cell culture
9. The cell line of the human embryonic lung is \_\_\_\_\_
- HeLa
  - WISH
  - L
  - MRC-5
10. Which one of the following is known as the powerhouse of a cell?
- Mitochondria
  - Cytoplasm
  - Lysosome
  - Nuclei
11. The father of cell biology is \_\_\_\_\_
- George N. Papanicolaou
  - George Emil Palade
  - Robert Hooke
  - None of the above
12. Which one of the following cells are pluripotent?
- Embryonic stem cells
  - Nucleosomes
  - Hepatocytes
  - Neurons
13. The removal of cells from a multicellular organism and growing them in a favorable environment is referred to as-----
- Cell culture
  - Cell division
  - Cell proliferation
  - Cell isolation
14. Hybridoma cells have an application to produce \_\_\_\_\_
- Antigens
  - Antibodies
  - Cancer cells
  - Cell lines
15. In the secondary culture, cells are obtained from \_\_\_\_\_
- Primary culture

- B. The organism
  - C. Organ culture
  - D. Phenotypic culture
16. After the first subculture, the primary culture is called -----
- A. Clone
  - B. Daughter cells
  - C. Cell debris
  - D. Cell line
17. In order to avoid contamination in cell culture \_\_\_\_\_ is used
- A. Antibiotics
  - B. Anticoagulants
  - C. Antipyretics
  - D. Antiseptics
18. EDTA binds the \_\_\_\_\_ ions.
- A. Magnesium
  - B. Iron
  - C. Carbon
  - D. Calcium
19. EDTA is included in trypsin to function as \_\_\_\_\_
- A. Divalent cations chelator
  - B. Divalent anion chelator
  - C. Monovalent cation chelator
  - D. Monovalent anion chelator
20. Which of the following is the characteristics of a normal cell?
- A. Anchorage independent
  - B. Continuous cell lines
  - C. Dependent on external growth factor
  - D. No contact inhibition

**SECTION B: Short answer Questions (40 Marks)**

1. Define a **stem cell** and outline the 5 categories of stem cells based on their potential to differentiate (7marks)
- 2 a) Outline the phases of cell cycle and the cellular activities that occur in each of the phases ( 4 marks)
  - b) State the 4 groups of proteins that play a role in stimulating cell division (4 marks)
3. a) Describe the two basic methods of developing a primary cell culture (6 marks)
  - b) Distinguish between the characteristics of finite cell lines and indefinite/continuous cell lines (4 marks)
- 4 a) State 4 factors that should be considered for the replacement of a culture (8mks)
  - b) Enumerate cells involved in acquired immunity (2 marks)

5. State 5 types of dysfunctions of the immune system (5 marks)

**SECTION C: Long Answer Questions (60 Marks)**

1. Describe the present and future importance and applications of animal cell culture (20 marks)
2. a) Describe the antibody phage display as a technique of generating monoclonal antibodies (10 marks)  
b) Describe the functions of 5 cells involved in innate immunity (10 marks)
3. Discuss 5 disorders of the immune system (20 marks)

