



*(University of Choice)*

# **MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)**

**(MAIN CAMPUS)**

**UNIVERSITY EXAMINATIONS  
2018/2019 ACADEMIC YEAR**

**FOURTH YEAR SECOND SEMESTER  
SPECIAL/SUPPLEMENTARY EXAMINATIONS**

**1. THE BACHELOR OF SCIENCE  
IN MEDICAL LABORATORY SCIENCES**

**2. THE BACHELOR OF SCIENCE  
IN MEDICAL BIOTECHNOLOGY**

**COURSE CODE: BML 226**

**COURSE TITLE: IMMUNOLOGY**

**DATE:**

**TIME:**

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**INSTRUCTIONS:**

**ANSWER ALL QUESTIONS IN ALL SECTION**

TIME: 2 Hours

MMUST observes ZERO tolerance to examination  
cheating

This Paper Consists of 6 Printed Pages. Please Turn Over

## SECTION A: MULTIPLE CHOICE QUESTIONS (20 MARKS)

1. Which one of the following statements is UNTRUE about the field of immunology
  - (a) Its origin is usually attributed to Sir Edward Jenner
  - (b) The earliest written mention and discovery of immunity can be traced back to Robert Koch
  - (c) When health conditions warrant, the immune system organs can be surgically excised from the body while the patient is still alive
  - (d) The vaccine for rabies invented by Louis Pasteur, was a spectacular success upon its first trial
2. The study of the immune system regulation and response to pathogens by use of genome-wide studies is specially known as
  - (a) Immunophysiology
  - (b) Immunoproteomics
  - (c) Immunomics
  - (d) Diagnostic immunology
3. Any substance that enhances the immune response to an antigen with which it is mixed is called
  - (a) A hapten
  - (b) An allergen
  - (c) An adjuvant
  - (d) A vaccine
4. The first antibody to appear during immune responses that is pentameric and with very high avidity is
  - (a) Immunoglobulin G
  - (b) Immunoglobulin M
  - (c) Immunoglobulin D
  - (d) Immunoglobulin E
5. The adaptive immune system
  - (a) Mounts nonspecific responses
  - (b) Facilitate immediate and maximal responses to infections
  - (c) Confers immunological memory
  - (d) Involve only cell mediated immunity
6. Select an inflammatory mediator that is INCORRECTLY matched with an inflammatory function
  - (a) Endogenous pyrogen interleukin 1 – raises core temperature
  - (b) Histamines – promote vascular permeability
  - (c) Eicosanoids – stimulate suppuration
  - (d) Heparin – inhibits coagulation

7. All the following bone marrow microenvironment components support the multipotential haematopoietic stem cell (MPHSC) anchoring EXCEPT
- (a) Osteoprogenitor cells
  - (b) Stromal cells
  - (c) Endothelial cells
  - (d) Fibroblasts
8. The lymphoid organ in which T lymphocyte precursors undergo full processing to maturity is
- (a) The thymus gland
  - (b) The lymph node
  - (c) The spleen
  - (d) The bone marrow
9. Identify cellular products that DO NOT originate from the common myeloid progenitor
- (a) Natural killer cells
  - (b) Erythrocytes
  - (c) Dendritic cells
  - (d) Monocytes
10. Identify the CORRECT T lymphocyte developmental sequence
- (a) Stem cell, double negative T cells, single positive T cells, double positive T cells
  - (b) Stem cell, double positive T cells, single positive T cells, double negative T cells
  - (c) Stem cell, double positive T cells, double negative T cells, single positive T cells
  - (d) Stem cell, double negative T cells, double positive T cells, single positive T cells
11. The specialised receptor that transduces the signal for commitment to the T cell lineage is called
- (a) T cell receptor
  - (b) CD 4
  - (c) Notch 1 receptor
  - (d) mlg
12. Natural killer cells release the following microbicidal agents EXCEPT
- (a) Membrane attack complex
  - (b) Perforin
  - (c) Granzymes
  - (d) Alpha defensins
13. Which one of the following complexes forms the alternative pathway C3 convertase
- (a) C3bBb
  - (b) C4b2a3b

- (c) C3bBbC3bP
  - (d) C4b2a
14. Identify the MOST IMPORTANT complement effector molecule that is a strong anaphylatoxin mediator
- (a) C5a
  - (b) C3a
  - (c) C5b
  - (d) C3b
15. Which one of the following is responsible for killing virus infected cells by producing the granulysin protease
- (a) Suppressor / regulatory T cells
  - (b) Gamma delta T cells
  - (c) Cytotoxic T cells
  - (d) B cells
16. The immunoglobulin E antibody molecule
- (a) Is the most abundant antibody in circulation
  - (b) Is found in milk, colostrum, and respiratory secretions
  - (c) Is pentameric and protects against parasitic worms
  - (d) Is involved in allergy by binding to allergens and triggering histamine release
17. Identify a property that is NOT attributed to the CD (Cluster of Differentiation) markers
- (a) They contain beta microglobulin as in MHC class I structure
  - (b) Some of them can signal cascades that can alter cell behaviour
  - (c) Some of them play roles in cell adhesion
  - (d) They can be used in immunophenotyping and diagnostics
18. The cell surface molecule that is important in the presentation of cytosolic antigenic peptides to cytotoxic T lymphocytes is
- (a) MHC class I
  - (b) Kit ligand
  - (c) MHC class II
  - (d) Membrane-bound IgD
19. The following statements are TRUE of agglutination tests EXCEPT
- (a) In agglutination, antibodies cause the clumping of particulate antigens
  - (b) They can be used to assays the presence of antigen / antibody
  - (c) They are applied in the determination of blood group types
  - (d) They involve reactions with soluble antigens

20. Which one of the following statements is NOT TRUE concerning flow cytometry
- (a) Its functions can equally be performed by the X ray crystallographer
  - (b) Direct or indirect immunofluorescence is used in tagging cells in suspensions
  - (c) Fluorescent light emitted from cells is measured by photomultiplier detectors
  - (d) Cells exiting a flow cell are illuminated by a laser beam

**SECTION B: SHORT ANSWER QUESTIONS [40 MARKS]**

1. Identify and give the functions of any four T cell subtypes **(4 marks)**
2. Describe the needs supplied by the bone marrow microenvironment for haematopoiesis to occur **(4 marks)**
3. Describe four functions of the spleen as a lymphoid organ **(4 marks)**
4. Describe four forms of chemical surface barriers that aid in preventing entry of microbes into the body **(4 marks)**
5. Identify the two main mechanisms that trigger innate responses and outline what pathogen recognition receptors (PRRs) identify **(4 marks)**
6. Briefly describe the three ways by which C1q can bind to trigger agents leading to the activation of the classical complement cascade and explain how erythrocytes evade complement mediated lysis **(4 marks)**
7. With the aid of diagrams, describe the protein structures that make up MHC class I and class II molecules **(4 marks)**
8. Briefly outline the characteristics of killed, attenuated, toxoid and sub unit vaccines **(4 marks)**
9. Briefly describe the characteristics of the four types (types I, II, III and IV) of hypersensitivities **(4 marks)**
10. Discuss immunofluorescence as a technique for assaying antigens **(4 marks)**

**SECTION C: LONG ANSWER QUESTIONS [40 MARKS]**

1. With the aid of a diagram, describe the general structure of an antibody molecule **(10 marks)**
2. With the aid of a diagram, discuss the lymph node as a lymphoid structure **(10 marks)**
3. Discuss the antigenic stimulation and immunological mechanisms in helper T lymphocytes **(20 marks)**