



**MASINDEMULIROUNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)**

MAIN CAMPUS

**UNIVERSITY EXAMINATIONS
2019/2020 ACADEMIC YEAR**

SUPPLEMENTARY EXAMINATION

**FOR THE DEGREE
OF
BACHELOR OF SCIENCE IN CLINICAL MEDICINE**

COURSE CODE: HCM 201

COURSE TITLE: IMMUNOLOGY

DATE: WEDNESDAY 22ND SEPTEMBER 2021

TIME: 3 HOURS

INSTRUCTIONS TO CANDIDATES

All questions are compulsory

Section A: Multiple Choice questions (MCQ'S) (20 Marks).

Section B: Short answer questions (SAQ's). (40 Marks).

Section C: Long answer questions. (LAQ'S) (40 Marks).

TIME: 3 Hours

MMUST observes ZERO tolerance to examination cheating
SECTION A (MULTIPLE CHOICE QUESTIONS/1 MARK EACH)

Attempt all questions
This Paper Consists of 3 Printed Pages. Please Turn Over.

1. Which of the following polypeptide is important for the expression of MHC I on the cell membrane:
- A. Interferons
 - B. β_2 -microglobulin
 - C. Lymphokine

T-cells

- D. Interleukins
2. Which of these are non-professional antigen presenting cells:
 - A. Macrophages ✓
 - B. Dendritic cells ✓
 - C. Fibroblasts
 - D. B lymphocytes
 3. Name the cell which receives antigen presented by MHC molecule:
 - A. NK cells
 - B. B-cells
 - C. T-cells
 - D. Macrophages
 4. Name the class of MHC which is recognized by CD4 TH cell:
 - A. MHC cannot recognize T cells
 - B. MHC III
 - C. MHC I
 - D. MHC II
 5. Which MHC molecule recognizes CD8 TC cells:
 - A. MHC I
 - B. MHC II
 - C. MHC III
 - D. HLA-C
 6. Name the part of processed antigen that binds to the MHC molecule and recognized by T-cells:
 - A. Immunoglobulin ✓
 - B. Agrelope
 - C. Epitope
 - D. Chaperone ✓
 7. Which of the following statements is INCORRECT about superantigens?
 - A. Viral or bacterial proteins ✓
 - B. Endogenous by nature *
 - C. Unique binding ability ✓
 - D. Activate a large number of T-cells ✓
 8. Which one of the following is a component of the first line of defense:
 - A. Immune response
 - B. Skin and mucous membranes * Innate
 - C. Inflammatory response
 - D. Inflammation, skin and mucous membranes

9. Which cells stimulate the proliferation of other lymphocytes:
- A. Regulatory T cells
 - B. Helper T Cells
 - C. Complement
 - D. Interferon
10. Which immunoglobulin provides mucosal immunity:
- A. IgG
 - B. IgA
 - C. IgD
 - D. IgE
11. The principal difference between cytotoxic (type II) and immune complex (type III) hypersensitivity is:
- A. The class (isotype) of antibody
 - B. The site where antigen-antibody complexes are formed
 - C. The participation of complement
 - D. The participation of T cells
12. A patient with severe asthma gets no relief from antihistamines. The symptoms are MOST likely to be caused by:
- A. Interleukin-2
 - B. Slow-reacting substance A (leukotriene)
 - C. Serotonin
 - D. Bradykinin
13. What is the role of class II MHC proteins on donor cells in graft rejection?
- A. They are the receptors for interleukin-2, which is produced by macrophages when they attack the donor cells
 - B. They are recognized by helper T cells, which then activate cytotoxic T cells to kill the donor cells
 - C. They induce the production of blocking antibodies that protect the graft
 - D. They induce IgE which mediates graft rejection.
- A. Protein C3 is cleaved to form C3a and C3b by C3 convertase. C3b is involved in all of the following EXCEPT:
- A. Altering vascular permeability
 - B. Promoting phagocytosis
 - C. Forming alternative-pathway C3 convertase
 - D. Forming C5 convertase

14. After binding to its specific antigen, a B lymphocyte may switch its:
- A. Immunoglobulin light-chain isotype
 - B. Immunoglobulin heavy-chain class
 - C. Variable region of the immunoglobulin heavy and light chains
 - D. Constant region of the immunoglobulin light chain
15. Proteins C3a and C5a can cause:
- A. Bacterial lysis
 - B. Vascular permeability
 - C. Phagocytosis of IgE-coated bacteria
 - D. Aggregation of C4 and C2
16. The classic complement pathway is initiated by interaction of C1 with:
- A. Antigen
 - B. Factor B
 - C. Antigen-antibody complexes
 - D. Bacterial lipopolysaccharides
17. Natural killer cells are:
- A. B cells that can kill without complement
 - B. Cytotoxic T cells
 - C. Increased by immunization
 - D. Able to kill virus-infected cells without prior sensitization
18. The antibody-binding site is formed primarily by:
- A. The constant regions of H and L chains
 - B. The hyper variable regions of H and L chains
 - C. The hyper variable regions of H chains*
 - D. The variable regions of H chains
19. Cytotoxic T cells induced by infection with virus A will kill target cells:
- A. From the same host infected with any virus
 - B. Infected by virus A and identical at class I MHC loci of the cytotoxic T cells
 - C. Infected by virus A and identical at class II MHC loci of the cytotoxic T cells
 - D. Infected with a different virus and identical at class I MHC loci of the cytotoxic cells
20. A patient's skin-tested with purified protein derivative (PPD) to determine previous exposure to Mycobacterium tuberculosis develops induration at the skin test site 48 hours later. Histologically, the reaction site would MOST probably show:
- A. Eosinophils

- B. Neutrophils
 - C. Helper T cells and macrophages
 - D. B cells
21. The role of the macrophages during an antibody response is to:
- A. Make antibody
 - B. Lyse virus-infected target cells
 - C. Activate cytotoxic T cells
 - D. Process antigen and present it
22. Each of the following statements concerning class I MHC protein is correct EXCEPT:
- A. They are cell surface proteins on virtually all cells
 - B. They are recognition elements for cytotoxic T cells
 - C. They are codominantly expressed
 - D. They are important in the skin test response to *Mycobacterium tuberculosis*
23. Each of the following statements concerning immunological tolerance is correct EXCEPT:
- A. Tolerance is not antigen-specific; i.e., paralysis of the immune cells results in a failure to produce a response against many antigens
 - B. Tolerance is more easily induced in T cells than in B cells
 - C. Tolerance is more easily induced in neonates than in adults
 - D. Tolerance is more easily induced by simple molecules than by complex ones
24. A child stung by a bee experiences respiratory distress within minutes and lapses into unconsciousness. This reaction is probably mediated by:
- A. IgE antibody
 - B. IgG antibody
 - C. Sensitized T cells
 - D. Complement
25. The main purposes of the lymph system in immunity is to:
- A. Filter lymph fluid; with localized immune cells on alert for foreign organisms
 - B. Filter blood; with localized immune cells on alert for foreign organisms
 - C. Pump fluid around the body
 - D. Re-oxygenate blood
26. A 'foreign' molecule which can invoke an adaptive immune response is called a(n):
- A. Immunoglobulin
 - B. Antibody
 - C. Antigen
 - D. Cytokine
27. The basic structure of antibodies are:
- A. Y-shaped
 - B. X-shaped

- C. Linear
- D. Hyperbolic

28. Which immunoglobulin can pass through placenta:

- A. IgD
- B. IgE
- C. IgM
- D. IgG

29. Select the statement that correctly represents the role of cytotoxic T-cells:

- A. Help in B-cell activation
- B. Produce cytotoxic
- C. Proliferate T-cell
- D. Kill the target cell by poison effect

30. Which of the following constitutes the substances produced by CTLs:

- A. Lysozyme
- B. Lymph
- C. Protein
- D. Perforin and granzym

SECTION B: SHORT ANSWER QUESTIONS (40 MARKS)

Answer all questions

1. Match the cells and with their functions in the table below (5 Marks)

	Cells		Functions
1.	Cytotoxic T cells	A	Recognize foreign antigens combined with MHC-1 molecules on the surface of body cells infected by viruses, some tumour cells, and cells of a tissue transplant.
2.	B cells	B	Differentiate into plasma cells that secrete specific antibodies
3.	Phagocytes	C	Process and present exogenous antigens; include macrophages, B cells and dendritic cells
4.	Antigen presenting cells	D	Ingest microbes or any foreign particulate matter; include neutrophils and macrophages
5.	Hapten	F	A substance that has reactivity but lacks immunogenicity

2. Describe the procedure involved in sandwich ELISA (5 Marks)
3. Define:
- i. Autoimmunity (1 Mark)
 - ii. Immunological tolerance (1 Mark)
 - iii. Describe the pathogenesis of diabetes type I (3 Marks)
4. Elucidate the milestones that constitute the history of immunology (10 Marks)
5. Explain the **THREE** mechanisms via which Abs work (6 Marks)
6. Describe the **THREE** mechanisms by which the complement system works (9 Marks)

SECTION C: LONG ANSWER QUESTIONS (30 MARKS)

1. Discuss the steps involved in the process of preparation of PBMCs (15 Marks)
2. Discuss the pathogenesis of any **THREE** hypersensitivity reactions (15 Marks)

~~T_C = MHC-I - CD8~~
~~T_{Helper} = MHC-II - CD4~~