UNIVERSITI KUALA LUMPUR
INSTITUTE OF MEDICAL SCIENCE TECHNOLOGY

FINAL EXAMINATION

OCTOBER 2025 SEMESTER

COURSE CODE	:	HDB20703
COURSE TITLE	:	PRINCIPLES OF IMMUNOLOGY
PROGRAMME NAME	:	BACHELOR OF BIOMEDICAL SCIENCE (HONOURS)
DATE	:	27 JANUARY 2026
TIME	:	9:00AM - 12:00PM
DURATION	:	3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
2. This question paper is printed on both sides of the paper.
3. This question paper consist of TWO sections.
4. Answer ALL questions for Section A.
5. Section B consist of four questions. Answer THREE (3) questions only.
6. Please write your answer on the answer booklet provided.
7. Please answer all questions in English only.
8. Please answer MCQ/EMQ questions using OMR sheet. ☐ *Tick if applicable*
9. Refer to the attached Formula/ Appendies. ☐ *Tick if applicable*

THERE ARE 12 PAGES OF QUESTIONS INCLUDING THIS PAGE

SECTION A (Total: 40 marks)

Answer ALL questions.

Please use the answer booklet provided.

1. CD8 T cells recognize antigens with_____.

   A. MHC I

   B. either MHC

   C. without MHC

   D. MHC II

2. Antibodies are produced by_____.

   A. muscle cells

   B. red blood cells

   C. nerve cells

   D. B cells

3. CD4 T cells recognize antigens with which MHC?

   A. None

   B. MHC II

   C. Both

   D. MHC I

4. HLA stands for _____.

   A. Human Leukocyte Antigens

   B. High Level Antigens

   C. Human Liver Antibodies

   D. Hemoglobin Level Analysis

5. How do phagocytes differ from normal flora in the innate immune system?

   A. Bacteria recognize antigens; phagocytes secrete mucus.

   B. Phagocytes form physical barriers; bacteria digest pathogens.

   C. Both produce antibodies.

   D. Phagocytes engulf pathogens; nonpathogenic bacteria compete with harmful microbes.

6. After leaving primary lymphoid tissue, B cells_____.

   A. become inactive

   B. immediately produce antibodies

   C. mature and participate in defense

   D. are destroyed by T cells

7. Acquired immunity is best described as _____.

   A. found only in plants and fungi

   B. developed over life

   C. present at birth

   D. not involving cellular responses

8. Activated B cells can differentiate into_____.

   A. cytokine cells and host cells

   B. helper T cells and cytotoxic T cells

   C. memory B cells and plasma cells

   D. red blood cells and white blood cells

9. How does chemical complexity affect immunogenicity?

   A. Complexity causes toxicity, making them immunogenic.

   B. Complex substances are harder to recognize, lowering immunogenicity.

   C. Complex structures increase detectability by immune cells.

   D. Only proteins are complex, so they are immunogenic.

10. An immunogenic molecule that requires attachment to a protein is classified as_____.

   A. antigen

   B. antibody

   C. hapten

   D. carrier protein

11. The purpose of negative selection in thymic medulla is to _____.

   A. promote autoimmunity.

   B. eliminate self-reactive thymocytes.

   C. increase T cell numbers.

   D. allow all thymocytes to survive.

12. Main function of TCR-MHC interaction is to _____.

   A. activate and coordinate immune response.

   B. produce antibodies.

   C. transport oxygen.

   D. destroy red blood cells.

13. What is the role of humoral factors in adaptive immunity?

    A. Attacking only viruses.

    B. Producing red blood cells.

    C. Assisting digestion.

    D. Target or prepare foreign substances for destruction.

14. Why are polysaccharides generally weak antigens despite their large size?

    A. They are composed of many different building blocks.

    B. They have low molecular weight.

    C. They have repeating units.

    D. They are proteins.

15. Which immunity is nonspecific and which is specific?

    A. Acquired is nonspecific; innate is specific.

    B. Innate is nonspecific; acquired is specific.

    C. Both are specific.

    D. Both are nonspecific.

16. Where does hematopoiesis mainly occur?

    A. Spleen

    B. Liver

    C. Red bone marrow

    D. Lymph nodes

17. Primary lymphoid organs include_____.

A. heart and lungs

B. spleen and lymph nodes

C. thymus and bone marrow

D. liver and pancreas

18. What is the difference between $CD4^+$ and $CD8^+$ T cells?

A. CD4+ become plasma; CD8+ become memory

B. CD4+ assist other immune cells; CD8+ kill infected cells

C. CD4+ kill cells; CD8+ assist

D. CD4+ produce antibodies; CD8+ assist

19. Which best defines an antigen?

A. Metabolic hormone.

B. Y-shaped B cell molecule.

C. Antibody-producing cell.

D. Molecule recognized by immune system.

20. Which statement correctly describes the readiness of innate immunity?

A. It develops after pathogen exposure

B. Present only during active infection

C. It takes several days to respond

D. It is constantly present

21. Which pair represents the main types of lymphocytes?

A. Helper cells and killer cells

B. Platelets and plasma cells

C. B cells and T cells

D. Red blood cells and white blood cells

22. Which T cell primarily eliminates virally infected host cells?

A. Cytotoxic T cell

B. Plasma cell

C. Memory B cell

D. Helper T cell

23. What is the importance of antigenic determinants (epitopes)?

A. Specific regions targeted by immune cells

B. Exist only in self molecules

C. Irrelevant to immune specificity

D. Prevent recognition, causing non-specific response

24. Which is NOT an IgG function?

A. Promote phagocytosis

B. Activate complement.

C. Target virus-infected cells.

D. Produce insulin.

25. What is the function of IgD?

A. Receptor on B cell surface.

B. Complement activator.

C. Secreted antibody.

D. T cell receptor.

26. What does IgA mainly protect?

A. Mucosal surfaces.

B. Blood only.

C. Bone marrow.

D. Skin.

27. Which cells present antigens with MHC II?

A. Red blood cells

B. Antigen-presenting cells

C. Nerve cells

D. Muscle cells

28. The capacity of molecules to activate adaptive immune cells is called_____.

A. toxicity

B. permeability

C. sensitivity

D. imunogenicity

29. Why are proteins usually more immunogenic than polysaccharides?

A. They have diverse building blocks.

B. They are self molecules.

C. They have a lower molecular weight.

D. They have repeating units.

30. Which of these is NOT a myeloid-derived immune cell?

A. Dendritic cells.

B. Granulocytes.

C. Macrophages.

D. T cells.

31. Which is NOT a component of the lymphatic system?

A. Lymphatic vessels.

B. Lymphatic organs.

C. Red blood cells.

D. Lymphatic tissues.

32. What is a primary function of innate immunity when encountering foreign substances?

A. Produce memory cells for future defense.

B. Generate antibodies specific to each pathogen.

C. Block entry or initiate elimination of foreign particles.

D. Suppress the entire immune response.

33. Which examples illustrate anatomical barriers that help innate immunity?

A. Pepsin and lactoferrin

B. Skin and cilia

C. Toll-like receptors and phagocytes

D. B cells and T cells

34. What is the main functional difference between helper T cells and cytotoxic T cells?

A. Helper T cells make plasma cells; cytotoxic T cells make memory cells.

B. Helper T cells secrete cytokines; cytotoxic T cells kill infected host cells.

C. Helper T cells are innate; cytotoxic T cells are adaptive.

D. Helper T cells destroy viruses; cytotoxic T cells produce antibodies.

35. Where do B and T cells mature?

A. Both in spleen

B. B cells in bone marrow, T cells in thymus

C. Both in lymph nodes

D. B cells in thymus, T cells in bone marrow

36. Role of MHC Class II in B cell antigen processing is _____.

A. produces antibodies

B. prevents vacuole fusion

C. destroys antigen directly

D. presents degraded antigen on the surface

37. Which immunoglobulin receptor is present on immature B cells?

A. IgG

B. IgA

C. IgM

D. IgE

38. Which concept reflects the specificity of adaptive immunity?

A. Antigen suppression

B. Non-specific defense

C. Memory response

D. Immediate response

39. Which immunoglobulin is involved in allergy?

A. IgE

B. IgA

C. IgG

D. IgM

40. Which immunoglobulin can cross the placenta?

A. IgA

B. IgE

C. IgM

D. IgG

SECTION B (Total: 60 marks)

Answer THREE (3) questions only.

Please use the answer booklet provided.

Question 1

Explain the three lines of host defense, including their main components, examples, and roles in protecting the body against pathogens.

(20 marks)

Question 2

Describe the structure of an antibody and explain how its structure relates to its specificity and biological activity. Include the roles of variable and constant regions, Fab and Fc regions, and how these contribute to immune functions.

(20 marks)

Question 3

Describe and explain the key components of innate immunity. For each component, provide examples and their roles in the body's first line of defense against pathogens. Include cells, humoral factors, anatomical barriers, resident flora, and pattern recognition molecules.

(20 marks)

Question 4

Describe the stages of T cell development in the thymus, including key molecular events, selection checkpoints, and the significance of each stage in producing functional and self-tolerant T cells.

(20 marks)

END OF EXAMINATION PAPER