



**NAMIBIA UNIVERSITY  
OF SCIENCE AND TECHNOLOGY**

**FACULTY OF HEALTH AND APPLIED SCIENCES**

**DEPARTMENT OF HEALTH SCIENCES**

<b>QUALIFICATION: BACHELOR OF MEDICAL LABORATORY SCIENCES</b>	
<b>QUALIFICATION CODE: 08BMLS</b>	<b>LEVEL: 6</b>
<b>COURSE CODE: IMY521S</b>	<b>COURSE NAME: IMMUNOLOGY</b>
<b>SESSION: JANUARY 2019</b>	<b>PAPER: THEORY</b>
<b>DURATION: 3 HOURS</b>	<b>MARKS: 105</b>

<b>SUPPLEMENTARY/SECOND OPPORTUNITY EXAMINATION QUESTION PAPER</b>	
<b>EXAMINER(S)</b>	DR MARTIN GONZO
<b>MODERATOR:</b>	DR MUNYARADZI MUKESI

<b>INSTRUCTIONS</b>
<ol style="list-style-type: none"><li>1. Answer ALL the questions.</li><li>2. Write clearly and neatly.</li><li>3. Number the answers clearly.</li></ol>

**PERMISSIBLE MATERIALS**

1. SCIENTIFIC CALCULATOR

**THIS QUESTION PAPER CONSISTS OF 5 PAGES (Including this front page)**

## SECTION A [15 Marks]

### QUESTION 1:

[15]

For each question and statement, select the correct answer from the given possibilities. You need only write down the letter of the correct answer:

- 1.1 After binding to its specific antigen, a B lymphocyte may switch its (1)
- (a) Immunoglobulin light chain isotype.
  - (b) Immunoglobulin heavy chain isotype.
  - (c) Variable region of the immunoglobulin heavy chain.
  - (d) Constant region of the immunoglobulin light chain.
  - (e) Immunoglobulin chain isotype
- 1.2 Antigen is removed from the blood in: (1)
- (a) The bone marrow
  - (b) The lymph nodes
  - (c) The spleen
  - (d) The thymus
  - (e) The liver
- 1.3 In the lymph node, antigen is presented to T cells in the (1)
- (a) cortex
  - (b) paracortex
  - (c) white pulp
  - (d) red pulp
  - (e) grey pulp
- 1.4 The antibody-binding site is formed primarily by (1)
- (a) The constant regions of H and L chains.
  - (b) The hypervariable regions of H and L chains.
  - (c) The hypervariable regions of H chains.
  - (d) The hypervariable regions of the H chains.
  - (e) The non-variable region of the H chain

- 1.5 Which one of the following properties of antibodies is NOT dependent on the structure of the heavy-chain constant region? (1)
- (a) Ability to cross the placenta.
  - (b) Isotype
  - (c) Affinity for antigen
  - (d) Ability to activate complement.
  - (e) Ability to opsonise an antigen
- 1.6 Which of the following statements best describes the structure of the TCR? (1)
- (a) The  $\kappa$  chain is made up of a variable and a constant domain.
  - (b) The  $\alpha$  chain is made up of the  $\alpha 1$  and  $\alpha 2$  domains.
  - (c) The heterodimer is made up of a  $\alpha$  and  $\delta$  chain.
  - (d) The  $\beta$  chain is made up of a variable and a constant domain.
  - (e) The heterodimer is made up of a  $\alpha 1$  and  $\delta$  chain.
- 1.7 Each of the following statements concerning a hybridoma cell is correct EXCEPT: (1)
- (a) The spleen cell component provides the ability to form antibody.
  - (b) The myeloma cell component provides the ability to grow indefinitely.
  - (c) The antibody produced by hybridoma cells is IgM because heavy chain switching does not occur.
  - (d) The antibody produced by a hybridoma cell is directed against a single
  - (e) Epitope.
- 1.8 Which of the following is NOT true of the gene segments that combine to make up a heavy chain gene? (1)
- (a) Many V region segments are available.
  - (b) Several J segments and several D segments are available.
  - (c) V, D & J segments combine to encode the antigen-binding site.
  - (d) The Fc portion of the antibody is made up of a V gene segment and a J gene segment.
  - (e) The FaB portion of an antibody does not have a variable region
- 1.9 In positive selection ... (1)
- (a) Thymocytes are presented with foreign MHC class I molecules.
  - (b) Thymocytes are presented with self MHC class II molecules.
  - (c) Thymocytes are presented with self antigens.
  - (d) Thymocytes are presented with foreign antigens.
  - (e) Thymocytes are presented to myelocytes

1.10 If an individual is genetically unable to make J chains, which immunoglobulins would be affected? (1)

- (a) IgA and IgM
- (b) IgE and IgM
- (c) IgA and IgG
- (d) IgE and IgG
- (e) IgD and IgE

1.11. By filling in the blank spaces, name the organism/diagnostic test with the specific diagnostic test/organism used for it: (5)

Organism	Diagnostic test
Neurosyphilis (cerebral spinal fluid)	VDRL
Syphilis (serum) – nontreponemal	-----
Syphilis - treponemal	-----
<i>Coxiella burnetii</i>	IFA
Group A <i>streptococcus</i>	-----
<i>Brucella</i>	Direct Agglutination
-----	Widal test
<i>Rickettsia</i>	-----

## SECTION B [50 Marks]

**QUESTION 2:** [15]

2.1. What is the difference between Type I and Type II hypersensitivity reactions and give an example of each: (8)

2.2. What are four things that affect the agglutination reactions? (4)

2.3. List 3 major differences between humoral and cell-mediated immunity (3)

**QUESTION 3:** [20]

A diagnostics company produces a monoclonal antibody against a specific antigen that is only found on ovarian cancer cells.

3.1. Explain the purpose of injecting a mouse with the ovarian cancer cells (the antigen) at least three times before removing the spleen from the mouse. (3)

3.2. Explain why the B cells and the myeloma cells die and only the hybridoma cells survive after the fusion process. (8)

3.3. Describe the role of cytokines in acute rejection (9)

**QUESTION 4: [15]**

4.1. Which **two** immunoglobulins fix complement? (2)

4.2. Of the two immunoglobulins above, which **one** is best at fixing complement? (1)

4.3. Name the component that is included in the recognition unit? (1)

4.4. List the **three** components are included in the activation unit? (3)

4.5. What are the **five** components included in the membrane attack complex? (5)

4.6. Which **three** serum proteins are involved in the alternative pathway? (3)

**SECTION C [40 Marks]**

**QUESTION 5: [20]**

Waldenstrom Macroglobulinemia (WM) is a lymphoproliferative disorder characterised by the proliferation of lymphoplasmacytic elements in the bone marrow and the presence of monoclonal immunoglobulin M (IgM) gammopathy.

5.1. What are the clinical manifestations of Waldenstrom Macroglobulinaemia? (10)

5.2. Describe the laboratory diagnosis for Waldenstrom Macroglobulinaemia. (10)

**QUESTION 6: [20]**

T cells are central to the adaptive immune response.

6.1. Describe the process of differentiation in T cells. (14)

6.2. Explain what happens after the TCR recognizes the antigen that is presented to it by the MHC molecule on the antigen presenting cells. (6)

**END OF EXAMINATION**