

**051106T4PB**

**APPLIED BIOLOGY LEVEL 6**

**APB/OS/AB/CR/10/6/A**

**PERFORM IMMUNOLOGICAL TECHNIQUES**

**July/August 2024**



**TVET CURRICULUM DEVELOPMENT, ASSESSMENT AND CERTIFICATION  
COUNCIL (TVET CDACC)**

**WRITTEN ASSESSMENT**

**TIME: 3 HOURS**

**INSTRUCTIONS TO CANDIDATE**

1. This paper consists of two sections; A and B
2. Answer ALL the question as guided in each section
3. Marks for each question are as indicated in the brackets
4. You are provided with a separate answer booklet to answer the questions
5. Do not write in this question paper

**This paper consists of FOUR (4) printed pages**

**Candidates should check the question paper to ascertain that all pages are printed as  
indicated and that no questions are missing**

**SECTION A (40 MARKS)**

*(Answer ALL the questions from this section)*

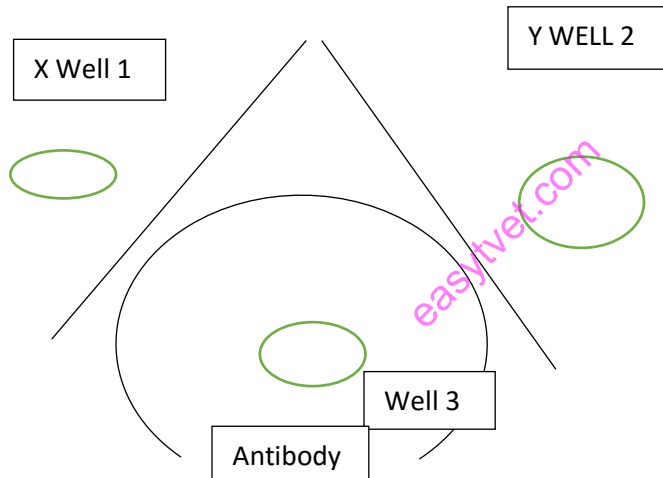
1. You are a doctor treating a patient with a suspected immunodeficiency disorder. Explain how you would differentiate between innate immunity and acquired immunity to help with the diagnosis. (4 Marks)
2. Imagine you are a researcher working in a laboratory. You want to perform an experiment to distinguish between single and double immune diffusion in agar gel. Describe the experimental setup and the expected outcomes. (4 Marks)
3. An Applied biology trainee studying immunology discovered an antigen that causes a certain immunodeficiency disease. Name four primary immunodeficiency diseases. (4 Marks)
4. HIV is key in study of immunodeficiency disease. Outline the replication process of the human immunodeficiency virus (HIV) (4 Marks)
5. Immunity of the body do fight and eliminate foreign substances, Outline the difference between humoral and cell-mediated immunity. (4 Marks)
6. Anatomy is crucial in the study of immunology. Differentiate between spleen and a lymph node. (4 Marks)
7. During an immunology practical on cells of the immune system, microscopy is carried out to study the cells. Draw a well labeled structure of a neutrophil (4 Marks)
8. Antibodies can be classified into three different structures, Draw a well labeled structure of the antibody dimer. (4 Marks)
9. The complement fixation test is one of the diagnostic techniques used in clinical laboratories. Describe the key steps involved in the test, as well as its clinical significance. (4 Marks)
10. Basing on the immunological knowledge, differentiate between immunodeficiency and immunosuppression. (4 Marks)

**SECTION B (60 MARKS)**

*(Answer any THREE questions from this section)*

11. Immune electrophoresis uses the differences in electrical charge and reactivity with antibodies in identification and separation of proteins.

- a) Describe the immune-electrophoresis techniques. (10 Marks)
- b) The figure below shows the relationship between antigen X and Y in an immune diffusion (ouchterloney) technique;



- i. Explain the pattern observed (4marks)
- ii. Supposing the reactants were replaced as follows:  
 Well1-antigen M  
 Well 2- antigen N  
 Well 3- antibody M, N  
 Draw a diagram to show this relationship. Explain (4marks)
- iii. State one advantage and one disadvantage of ouchterlony technique (2marks)

12. Imagine you are a microbiologist conducting a ring test to detect antigen-antibody precipitation in a liquid medium;

- a) Outline the procedure of ring test, highlighting the reagents used. And the expected results. (10 marks)
- b) In the context of the ring test, provide two real-world applications where this test is commonly used in laboratory or clinical settings. (4 marks)
- c) Explain three different types of antibody assays used for the detection of antigens in various laboratories. (6 marks)

13. Hypersensitivity is an immunological dysfunction of an exaggerated or inappropriate immune response.

- a) Describe the mechanisms underlying Type 1 and Type II hypersensitivity. (10 marks)
- b) Highlight the consequences of non-adherence prevention of vaccine-preventable diseases. (5 marks)
- c) Differentiate between inactivated and live attenuated vaccines. (5 marks)

14. Macrophage is the key monocytes cell of the immune system.

- a) Explain the diverse functions of macrophages in the immune system. (10 marks)
- b) Describe various lymphoid organs in the human body and elucidate their roles in immune function. (10 marks)

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