



WI-2-60-1-6

JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY
University Examinations 2023/2024

**YEAR I SEMESTER II EXAMINATION FOR THE DEGREE OF MASTER OF
SCIENCE IN MEDICAL MICROBIOLOGY**

TIM 3104: CELL AND MOLECULAR IMMUNOLOGY

DATE: DECEMBER, 2023

TIME: 3 HOURS

INSTRUCTIONS: Answer Any FOUR Questions (25 Marks each)

QUESTION ONE

- Compare the structures and function of IgG antibody and $\alpha\beta$ T-cell receptor with respect to human body immunity. (10 marks)
- Describe briefly gene expression leading to synthesis of B-cell receptors. (9 marks)
- How do vaccine antigens contribute to B-cell related immunological memory? (6 marks)

QUESTION TWO

- Describe the character and structures of Major Histocompatibility Complex (MHC) class I and II genes in humans. (10 marks)
- Differentiate the structure of proteins expressed by the two classes of MHC genes mentioned in 2a. (8 marks)
- Discuss briefly the role MHC I and II proteins play in presentation of peptide to immune cells. (7 marks)

QUESTION THREE

- Discuss the immunologic response induced by Plasmodium falciparum parasite in the human host. (12 marks)
- Which factors determine susceptibility and severity of malaria infection? (7 marks)
- Does an episode of malaria infection lead to acquired immunity against the parasite? Explain your answer. (6 marks)

QUESTION FOUR

COVID-19 infection is often associated with Acute Respiratory Distress Syndrome (ARDS);

- Discuss the underlying host immunologic factors which lead to ARDS. (13 marks)
- Outline an immunoassay protocol which confirms presence of active covid-19 virus in a patient sample. (7 marks)
- Explain why children present with mild covid-19 infection. (5 marks)

QUESTION FIVE

- a) Compare the process of conjugating antibody with fluorescing agent and enzyme using isothiocyanate and periodate methods respectively. (13 marks)
- b) Explain how the conjugated antibody can be used to confirm active parasite in a patient sample using rapid diagnostic test. (12 marks)

QUESTION SIX

- a) Differentiate between whole antibody molecule and functional antibody fragments. (12 marks)
- b) What are the advantages of using antibody fragments in research and clinical medicine? (5 marks)
- c) Describe the process of generating antibody fragments from whole antibody molecule. (8 marks)

END