



W1-2-60-1-6

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

YEAR I SPECIAL/SUPPLEMENTARY EXAMINATION FOR THE DEGREE OF
MASTER OF SCIENCE IN MEDICAL MICROBIOLOGY

TIM 3104: CELL AND MOLECULAR IMMUNOLOGY

DATE: APRIL, 2024

TIME: 3 HOURS

INSTRUCTIONS: Attempt any FOUR questions

Question One

- a) Describe the mechanism of gene rearrangement leading to synthesis of T-cell receptors in a developing T-lymphocyte. [10 marks]
- b) Explain the immunologic importance of gene rearrangement with respect to specificity and diversity of T-lymphocytes. [9 marks]
- c) Outline the role of T-lymphocytes in an immunologic response [6 marks]

Question Two

- a) With the aid of a diagram, describe the structure of pentameric IgM. [12 marks]
- b) Explain the importance of pentameric IgM during primary immune response. [5 marks]
- c) Design an immunoassay protocol that confirms presence of IgM in a patient's blood sample. [8 marks]

Question Three

- a) Differentiate between structures of the three (3) synthetic forms of antibody fragments. [7 marks]
- b) Describe the process of generating antibody fragments using Phage display protocol. [12 marks]
- c) Discuss briefly application of antibody fragments in research and medicine. [7 marks]

Question Four

- a) Discuss in detail the process of class-switching to generate different classes and sub-classes of antibody. [18 marks]
- b) Outline the role of each class of antibody in immunity. [7 marks]

Question Five

- a) Compare endogenous and exogenous peptide processing pathways. [15 marks]
- b) Explain the role each pathway in 5a above in body immunity. [10 marks]

Question Six

Discuss the following:

- a) Severe combined immunodeficiency (SCID) [8 marks]
- b) Antibody avidity
- c) Immunological impact of human immunodeficiency virus (HIV) infection in humans. [9 marks]