

2407/304
IMMUNOLOGY
Oct./Nov 2022
Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL
DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY

IMMUNOLOGY

3 hours

INSTRUCTIONS TO CANDIDATES

*This paper consists of TWO sections; A and B.
Answer ALL the questions in section A and any THREE questions from section B in the answer booklet provided.*

*Each question in section A carries 4 marks, while each question in section B carries 20 marks.
Maximum marks for each part of a question are indicated.*

Candidates should answer the questions in English.

This paper consists of 4 printed pages.

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

SECTION A (40 marks)

Answer ALL the questions in this section.

1. Define the following:
 - (a) Innate immunity; (1 mark)
 - (b) Active immunization; (1 mark)
 - (c) Passive immunization; (1 mark)
 - (d) Adoptive immunization. (1 mark)
2. Compare and contrast a hapten and an antigen. (4 marks)
3. Table 1 below shows properties of immunoglobulins. Indicate whether its **True** or **False** concerning the stated properties for each immunoglobulin. (4 marks)

Table 1

Property	IgG	IgA	IgM
Placental passage			
Presence in secretions			
Activation of complement			

4. (a) Name:
 - (i) a primary lymphoid organ. (1 mark)
 - (ii) a secondary lymphoid organ. (1 mark)
- (b) Explain the effects of removal of the lymphoid organ named in (a)(i) above from a neonate. (2 marks)
5. Explain Rheumatoid Arthritis as a Type III hypersensitivity. (4 marks)
6. List any **four** methods of treatment of autoimmune diseases. (4 marks)
7. Distinguish between:
 - (a) An Isograft from an allograft. (2 marks)
 - (b) Hyperacute and chronic rejection. (2 marks)

8. State four cellular immune effector mechanisms capable of destroying tumours in vitro. (4 marks)

9. Match the type of immunity in Column A with its mode of acquisition in Column B. (4 marks)

	Column A		Column B
	Type of immunity		Mode of acquisition
(a)	Active natural	(i)	Administration of immune human globulin (1 mark)
(b)	Active artificial	(ii)	Infection (1 mark)
(c)	Passive natural	(iii)	Vaccination (1 mark)
(d)	Passive artificial	(iv)	Transplacental or colostral transfer of antibody, mother to infant. (1 mark)

10. Explain "single radial immunodiffusion" technique. (4 marks)

SECTION B (60 marks)

Answer any THREE questions from this section.

11. (a) Define "complement" as used in immunology. (2 marks)

(b) Describe the following phases of the classical pathway of complement activation:

- (i) Amplification phase. (5 marks)
- (ii) Membrane Attack Complex phase. (13 marks)

12. (a) Explain any five factors that may limit the effectiveness of the immune response to tumours. (15 marks)

(b) State five substances detected immunologically in diagnosis of tumour. (5 marks)

13. (a) Explain five mechanisms of action of adjuvants. (10 marks)

(b) (i) Name four types of non-covalent bonds that hold antigenic determinants within the antibody combining site. (4 marks)

- (ii) Distinguish between antibody affinity and antibody avidity. (2 marks)
- (iii) List any **two** differences between "a good fit" and a "poor fit" regarding antibody affinity. (4 marks)
14. (a) Describe the activities in various regions of the lymph node. (14 marks)
- (b) Explain the following roles of IgG in immunity:
- (i) Immobilization of bacteria; (2 marks)
- (ii) Passive immunization; (2 marks)
- (iii) Neutralization of viruses (2 marks)
15. (a) A technician in a snake venom producing farm got careless one day and was bitten by a rare lethal Egyptian Cobra. He was rushed to the emergency ward and horse anti-serum was intravenously administered within 5 hours. The following day he was given another dose of the anti-venom. A week later he left hospital. Ten (10) days later he complained of Joint pain, fever and itchy, edematous rashes over parts of his body. Occasionally his urine was found to contain red blood cells and albumin. Explain these observations (8 marks)
- (b) A young man celebrating the rites of passage of young males was covered with elaborate patterns of stripes and circles using a variety of colours extracted from local plants on his back and arms. Three (3) weeks later, the young man developed alarmingly itchy and weepy red areas of skin that run in sharply demarcated stripes across his back on one arm. Explain this observation. (7 marks)
- (c) Explain the role of IgE in type I hypersensitivity. (5 marks)

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