

1412/311  
IMMUNOLOGY AND MEDICAL MICROBIOLOGY  
June / July 2008  
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL  
CRAFT CERTIFICATE IN MEDICAL LABORATORY TECHNOLOGY

IMMUNOLOGY AND MEDICAL MICROBIOLOGY

3 hours

**INSTRUCTIONS TO CANDIDATES**

*You should have the following for this examination:*

*Answer booklet  
Scientific calculator (battery operation)*

*This paper consists of TWO sections; A and B.  
Answer ALL questions in section A and any TWO questions from section B.  
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 as indicated.*

**This paper consists of 4 printed pages.**

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

## SECTION A

Answer **ALL** questions in this section.

1. State the steps involved in obtaining a pure culture. (4 marks)
2. (a) Name the selective agents commonly used in media. (2 marks)  
(b) Differentiate between selective and differential media. (2 marks)
3. Explain the strip spore method for quality control measure in autoclaving. (4 marks)
4. Outline the viable plate count technique. (4 marks)
5. Explain why eutrophication causes fish death in rivers. (4 marks)
6. (a) Define the term bioleaching. (2 marks)  
(b) Name the microorganism used in industrial manufacturing of:
  - (i) Bread
  - (ii) Beer
  - (iii) Rennin
  - (iv) Acetone. (2 marks)
7. For each of the following diseases, state their causal agent and the mode of transmission.
  - (a) Diphtheria (1 mark)
  - (b) Salmonellosis (1 mark)
  - (c) Yersiniosis (1 mark)
  - (d) Cholera. (1 mark)
8. Ten hours after eating a meal of mushroom, a patient started vomiting and diarrhoea and then went into a coma.
  - (a) Identify the most likely disease the patient suffered from. (1 mark)
  - (b) Explain how the mushroom caused the disease. (3 marks)

9. Columns A and B below show the names of scientists and their contributions respectively. Match the items in column A with those in column B.

Column A		Column B
(i) Metchnikoff	W	Bone Marrow Chimera
(ii) Edward Jenner	X	ABO Blood group system
(iii) Karl Landesteiner	Y	Phagocytosis
(iv) Medawar	Z	Smallpox Vaccination

(4 marks)

10. (a) Name **two** types of phagocytic cells. (2 marks)
- (b) Describe **two** ways in which naturally acquired immunity is achieved. (2 marks)
11. Draw a graph to illustrate the influence of antibody and antigen proportion on the amount of precipitate formed in a precipitin test. (4 marks)
12. Describe, giving examples, the primary lymphoid organs. (4 marks)
13. (a) Distinguish between inactivated and attenuated vaccines. (2 marks)
- (b) State **two** ways that attenuation can be achieved in preparation of a vaccine. (2 marks)
14. (a) Explain how the dose of an immunogen would influence immunogenicity. (2 marks)
- (b) Distinguish between affinity and avidity in relation to antigen-antibody reaction. (2 marks)
15. (a) Indicate which type of hypersensitivity state applies to the following conditions:
- (i) Transfusion reaction;
  - (ii) Haemolytic disease of the new born;
  - (iii) Granuloma;
  - (iv) Atopy. (2 marks)
- (b) List any **four** antibody classes. (2 marks)

## SECTION B

Answer any **TWO** questions from this section.

16. (a) Distinguish between the neurotoxins of *Clostridium botulinum* and *Clostridium tetani*. (4 marks)
- (b) Describe how each of the above organisms infect a human being, their prevention and cure. (16 marks)
17. Discuss upper respiratory tract cultures, citing the likely pathogens that would be encountered. (20 marks)
18. (a) Describe the two arms of adaptive immunity. (10 marks)
- (b) Give a diagrammatic illustration of an adaptive immune response. (10 marks)
19. Describe:
- (a) role of the skin and mucus membrane as anatomical barriers to infection; (10 marks)
- (b) classical complement pathway. (10 marks)