



UNIVERSITI KUALA LUMPUR  
INSTITUTE OF MEDICAL SCIENCE TECHNOLOGY

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FINAL EXAMINATION  
MARCH 2025 SEMESTER

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COURSE CODE : HDD20703  
COURSE TITLE : DIAGNOSTIC IMMUNOLOGY  
PROGRAMME NAME : DIPLOMA OF MEDICAL LABORATORY TECHNOLOGY  
DATE : 30 JUNE 2025  
TIME : 9:00AM - 12:00PM  
DURATION : 3 HOURS



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INSTRUCTIONS TO CANDIDATES

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1. Please read the instructions given in the question paper CAREFULLY.
2. This question paper is printed on both sides of the paper.
3. This question paper consist of TWO sections.
4. Section A consist 25 MCQ or EMQ questions. Answer ALL questions.
5. Section B consist of four questions. Answer THREE (3) questions only.
6. Please write your answer on the answer booklet provided.
7. Please answer all questions in English only.
8. Please answer MCQ/EMQ questions using OMR sheet.  *Tick if applicable*
9. Refer to the attached Formula/ Appendies.  *Tick if applicable*

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THERE ARE 11 PAGES OF QUESTIONS INCLUDING THIS PAGE

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SECTION A (Total: 25 marks)

Answer ALL questions.

Please use the objective answer sheet provided.

1. Factors that affect antigen/antibody reactions include \_\_\_\_\_ .
  - I. Temperature
  - II. Length of incubation
  - III. Concentration of the reactants
  - IV. Quality of the kit
  - A. I
  - B. I, II & III
  - C. II & III
  - D. I,II,III & IV
  
2. Reactive oxygen species (ROS) function as cell \_\_\_\_\_ in bacterial killing.
  - A. stimulator
  - B. effector
  - C. protector
  - D. accessories
  
3. Why are monoclonal antibodies useful in diagnostics?
  - A. They are antibody preparations obtained from a single animal.
  - B. They work quicker than regular antibody preparations
  - C. They are pure preparations of a single antibody molecule.
  - D. They are longer lasting than regular antibody preparations.

4. Labels which may be used in labeled immunoassay include \_\_\_\_\_.

- I. enzymes
- II. fluorescent
- III. radioactive
- IV. chemiluminescent

- A. I, II & III
- B. I
- C. I, II, III, IV
- D. II & III

5. Which of the following is evidence of viral neutralization?

- A. presence of viral fragments in the patient's serum
- B. absence of cytopathic effect
- C. absence of antigen-antibody precipitation
- D. presence of viral hemagglutination

6. Which of the following is immobilized on the microtiter well in sandwich ELISA?

- A. detection antibody
- B. capture antibody
- C. sample
- D. secondary antibody conjugated to an enzyme

7. Which of the following is not an example of labeled antibody tests?

- A. ELISA
- B. fluorescent antibody tests
- C. the immunodiffusion test
- D. western blots

8. Which of the followings is used to confirm the presence of HIV infection in individuals who are antibody-positive by ELISA?
- A. complement fixation
  - B. Ouchterlony test
  - C. western blot
  - D. hemagglutination
9. Precipitation involves combination of \_\_\_\_\_ antibody with \_\_\_\_\_ antigen to produce insoluble complexes.
- A. Insoluble, insoluble
  - B. Soluble, insoluble
  - C. Soluble, soluble
  - D. Insoluble, soluble
10. In Rocket Immuno-electrophoresis: \_\_\_\_\_.
- I. Wells cut in a row in the agar mixed with antibody
  - II. An electrical current is applied
  - III. The end result is a precipitin line with a conical shape.
  - IV. The height is measured and is directly proportional to the concentration of antigen.
- A. II & III
  - B. I, II & III
  - C. I
  - D. I, II, III & IV
11. A protein ladder in gel electrophoresis \_\_\_\_\_.
- A. has a define commercial mixture of protein with defined molecular weights
  - B. is not required every time the test is run.
  - C. has both antigen and antibody for the test
  - D. is added after the assay is finished and before reading the result.

12. HLA typing is applied in \_\_\_\_\_.
- I. Forensic
  - II. Vaccine development
  - III. Organ transplant
  - IV. Blood donation
- A. I
  - B. I, II, III & IV
  - C. I, II & III
  - D. II & III
13. In the precipitation agar method, \_\_\_\_\_.
- A. zone of antigen excess is also known as prozone
  - B. zone of antibody excess will not inhibit agglutination reaction
  - C. only indirect agglutination technique can be applied
  - D. the equivalence zone is where maximal lattice formation takes place
14. Immunohistochemistry uses antibodies to detect and visualise antigens in \_\_\_\_\_.
- A. tubes
  - B. tissues
  - C. slides
  - D. In vitro
15. Which of the following does not describe advantages of ELISA tests?
- A. They can demonstrate the presence of multiple antigens.
  - B. They can quantify the amounts of antigen or antibody in a sample.
  - C. They can detect either antigens or antibodies.
  - D. They can be easily automated.

16. Commercially available ELISA kits are used for the detection of \_\_\_\_\_.
- I. rotavirus
  - II. anti-HIV antibodies
  - III. hepatitis B surface antigen
  - III. *Neisseria gonorrhoeae*
- A. I
  - B. II & III
  - C. I, II, III & IV
  - D. I, II & III
17. Haemagglutination involve reaction using \_\_\_\_\_.
- A. serum only
  - B. red blood cells
  - C. white blood cells
  - D. platelet only
18. In Western blotting technique \_\_\_\_\_ molecules are separated using electric current.
- A. protein
  - B. antibodies
  - C. DNA
  - D. enzyme
19. A preferred test for Syphilis is \_\_\_\_\_.
- A. precipitation test
  - B. complement fixation test
  - C. agglutination test
  - D. flocculation test

20. Which of the following is false regarding immunohistochemistry staining procedure?
- A. Preparation of antibody
  - B. Removes polymorphonuclear cells
  - C. Antibody application
  - D. Preparation of tissue
21. Radioimmunoassay (RIA) techniques \_\_\_\_\_.
- A. have a good sound
  - B. use radioactive substance as a label
  - C. are example of immunoprecipitation
  - D. require no standard curve
22. Name the material that is being blocked in immunohistochemistry's blocking procedure.
- A. Labelled enzyme
  - B. Endogenous peroxidase
  - C. Antigenic sites
  - D. Secondary antibody
23. Turbidimetry is very \_\_\_\_\_ but not very \_\_\_\_\_.
- A. simple, sensitive
  - B. specific, reliable
  - C. simple, specific
  - D. sensitive, reliable

24. A sample of blood agglutinates in the presence of anti-B antibodies but not in the presence of anti-A antibodies. What is the blood type of this sample?
- A. Type B
  - B. Type A
  - C. Type AB
  - D. Type O
25. Reactive oxygen species (ROS) function as cell \_\_\_\_\_ in bacterial killing
- A. protector
  - B. effector
  - C. accessories
  - D. promoter

SECTION B (Total: 75 marks)

Answer THREE (3) questions only.

Please use the answer booklet provided.

Question 1

The Nitro Blue Tetrazolium (NBT) test is a diagnostic assay used to evaluate the functional activity of neutrophils by measuring their ability to produce reactive oxygen species (ROS) during the oxidative burst which plays a critical role in the body's defense against infections.

- (a) Explain the principle and result interpretation of the Nitro Blue Tetrazolium (NBT) test, and name two diseases in which this test is commonly use.

(10 marks)

- (b) Explain the steps involved in preparing a blood sample for the Nitroblue Tetrazolium (NBT) test.

(10 marks)

- (c) Describe the functions of five main types of white blood cells.

(5 marks)

**Question 2**

Radioimmunoassay (RIA) is a highly sensitive laboratory technique that quantifies small concentrations of substances by utilizing radioactive-labeled antigens or antibodies and their specific binding reactions in both clinical and research settings.

- (a) Explain the key requirements for performing a Radioimmunoassay (RIA) test.  
(20 marks)

- (b) List five advantages of using Radioimmunoassay (RIA) in clinical testing.  
(5 marks)

**Question 3**

Immunodiffusion techniques play a crucial role in immunology by enabling the detection and analysis of antigen-antibody interactions. These methods help assess the specificity and sensitivity of immune responses, making them valuable tools in both research and diagnostic applications.

- (a) Explain the principle of the double immunodiffusion Ouchterlony test using a labeled diagram illustrating the typical result patterns in the detection of antigen-antibody reactions.  
(20 marks)

- (b) Explain briefly the five factors that may alter the outcome of the Ouchterlony double immunodiffusion test.  
(5 marks)

**Question 4**

Enzyme-Linked Immunosorbent Assay (ELISA) is a precise immunological method used to detect and measure specific antigens or antibodies by producing a detectable enzyme-mediated signal.

- (a) Explain the principle and advantages of Direct and Indirect ELISA.  
(20 marks)
  
- (b) Explain the purpose of the blocking step in an ELISA procedure.  
(5 marks)

END OF EXAMINATION PAPER



