



**THE KENYA POLYTECHNIC UNIVERSITY
COLLEGE**

SCHOOL OF HEALTH SCIENCES AND TECHNOLOGY

**DEPARTMENT OF BIOMEDICAL LABORATORY SCIENCES AND
TECHNOLOGY**

DIPLOMA IN MEDICAL LABORATORY SCIENCES

END OF YEAR II EXAMINATION

IMMUNOLOGY/VIROLOGY

TIME: 3 HOURS

INSTRUCTIONS

This paper consists of TWO SECTIONS: A and B.

Answer ALL questions in SECTION A and B.

Circle the letters of ALL correct answers in each multiple choices questions

Any wrong answer for multiple choices will be penalized (0.5 marks)

SECTION A (40 MARKS)

1. Each of the following statements concerning adenovirus is correct except
 - a) Adenoviruses are composed of a double stranded DNA genome and a capsid without an envelope
 - b) Adenoviruses cause both sore throat and pneumonia
 - c) Adenoviruses have only one serologic type
 - d) Adenoviruses are implicated as a cause of tumors in animals but not humans
2. The eradication of smallpox was facilitated by several features of the virus
 - a) It has one antigenic type
 - b) Inapparent infection is rare
 - c) Administration of live vaccine reliably induces immunity
 - d) It multiplies in the cytoplasm of infected cells
3. The following are statements about infectious mononucleosis. Which one is NOT true
 - a) Multinucleated giant cells are found in the skin lesions
 - b) Infected T lymphocytes are abundant in peripheral blood
 - c) Isolation of the virus is necessary to confirm the diagnosis
 - d) Infectious mononucleosis is transmitted by virus in saliva
4. The following are recognized routes of transmission of HIV infection EXCEPT.
 - a) Blood transfusion.
 - b) Heterosexual intercourse.
 - c) Breast feeding.
 - d) Nosocomial infection.
5. Which one of the following viruses are associated with respiratory infections
 - a) Rotaviruses
 - b) Adenoviruses
 - c) Echovirus
 - d) Coxsackie viruses
6. Which of the following statements is false
 - a) Major epidemics of influenza are caused by influenza A virus
 - b) Swine flu virus H1N1 is a human influenza A virus with new antigens from swine influenza A virus
 - c) Major antigenic changes (shift) of influenza viruses are primarily in A rather than B
 - d) The antigenic changes that occur in antigenic drift are due to reassortment of the multiple pieces of the influenza virus genome
7. Herpes simplex virus and cytomegalovirus share the following characteristics except
 - a) Important cause of morbidity and mortality in the newborn
 - b) Congenital abnormalities due to transplacental passage
 - c) Important cause of serious disease in immunosuppressed individuals
 - d) Mild or inapparent infection
8. Koplik's spots are characteristic of which of the following infections?
 - a) Mumps
 - b) Measles
 - c) Herpes

- d) Rubella
9. All of the following statements are true except
- RSV induces the formation of multinucleated giant cells
 - RSV causes pneumonia primarily in children
 - The principal reservoir for antigenic shift variants of influenza virus appears to be people in isolated communities
 - Following a primary herpes infection the most common outcome is latency in sensory ganglia
10. Live attenuated vaccines are available against all of the following viruses EXCEPT
- Influenza A Virus
 - Rubella Virus
 - Yellow Fever Virus
 - Hepatitis B Virus
11. Which of the following statements is true of Varicella-Zoster Virus
- Causes a maculopapular rash
 - Recurrent episodes of Shingles do occur
 - Patients with shingles are not infectious
 - Remains latent in sensory ganglia following primary infection
12. Which of the following statements is true of Cytomegalovirus (CMV)
- Is teratogenic
 - An infectious mononucleosis-like syndrome does NOT occur during primary infection.
 - Is not associated with severe infection in immunocompromised individuals
 - Causes Kawasaki's Disease
13. Epstein-Barr Virus (EBV) is associated with the following EXCEPT
- Infectious Mononucleosis
 - Burkitt's lymphoma
 - Vesicular rash
 - Nasopharyngeal carcinoma
14. Which of the following is not a direct detection method
- Detection of rotavirus antigen in faecal specimens
 - CMV DEAFF test
 - Electron microscopy
 - Polymerase chain reaction
15. Which of the following methods may not be used for serological diagnosis
- Complement-fixation tests
 - Single Radial Haemolysis
 - CMV DEAFF test
 - Western blot
16. A serological diagnosis of a primary viral infection may be made by Detection of
- viral-specific IgA

- b) viral-specific IgD
- c) viral-specific IgE
- d) Seroconversion

17. The following are examples of viral genome detection (molecular methods) except

- a) Southern blot
- b) Western blot
- c) Branched DNA
- d) Polymerase chain reaction

18. The following statements are true for the haemagglutination-inhibition (HAI) test except

- a) Not a quantitative test
- b) Treatment of patient serum is necessary to remove non-specific inhibitors
- c) Animal blood is necessary
- d) Usually more specific than complement fixation tests (CFT)

19. A standard Polymerase Chain Reaction (PCR) consists of

- a) Denaturation, annealing, and ligation steps
- b) Denaturation, annealing, and extension steps
- c) dNTPs
- d) Mg⁺⁺ ions

20. A chronic carrier state may occur in which of the following viral infections:

- a) Rubella virus
- b) Hepatitis B
- c) Measles virus
- d) Mumps virus

21. Which among the following is NOT an immunosuppressive agent in graft rejection?

- A. corticosteroids
- B. Antihistamines
- D. Methotroxate

22. Which one of the following is an anatomical defense barrier in non-specific immunity

- A. Normal flora
- B. Phagocytic bacteria
- C. Inflammation
- D. Soluble factors

23. HLA complex is a collection of genes on chromosome

- A. 5
- B. 8
- C. 6
- D. 3

24. The main immunoglobulin in mucous membranes is

- A. Ig E

- B. Ig M
- C. Ig A
- D. Ig G

25. Which immunoglobulin is most active in a parasite infection

- A. Ig E
- B. Ig G
- C. Ig M
- D. Ig A

26. Which among the following is NOT a complement protein

- A. Properdin
- B. Protein S
- C. Protein A
- D. Serpin

27. Type II hypersensitivity is mediated by

- A. Ig A and Ig E
- B. Ig M and Ig G
- C. Ig E and Ig G
- D. Ig A and Ig M

28. Which one of the following is NOT an immunologically privileged site

- A. The uterus
- B. The anterior chamber of the eye
- C. Testes
- D. Spleen

29. A universal donor has blood type has _____ serum antibodies

- A. anti-A and anti-B
- B. none
- C. anti-B
- D. anti-A

30. In rheumatoid arthritis, auto-antibodies are formed against

- A. Ig G
- B. Ig A
- C. Ig E
- D. Ig M

31. All of the following are true with respect to IgM antibodies EXCEPT which one

- A. they fix complement
- B. they mediate allergic reaction

- C. they occur on the surface of lymphocytes
 - D. they are glycoproteins
32. One principal function of complement is to
- A. inactivate perforins
 - B. mediate the release of histamine
 - C. Bind antibodies attached to cell surfaces and to lyse these cells
 - D. phagocytize antigens
33. T-cell antigen receptors are distinguished from antibodies by which of the following
- A. T-Cell receptors are glycosylated
 - B. T-cell receptors must interact with antigen uniquely presented by other cells but not with free antigen
 - C. T-Cell receptors bind various cytokines
 - D. T-Cell receptors bind complement to lyse cells
34. The class of an immunoglobulin
- A. is determined by Class I and Class II major histocompatibility complex proteins
 - B. is determined by the carbohydrate attached to the light chain is
 - C. determined by the antigen
 - D. is determined by the heavy chain type
35. All of the following are true about antibodies, EXCEPT which one?
- A. They are molecule with a single, defined amino acid sequence.
 - B. They occur on the surface of B-lymphocyte
 - C. They predominate the primary immune response to antigen.
 - D. They fix complement
36. Which of the following is NOT a true statement?
- A. IgM and IgG can fix complement
 - B. IgA is a secretory immunoglobulin
 - C. IgE mediates immediate hypersensitivity
 - D. IgD provides most passively acquired maternal immunity
37. Class I MHC proteins are
- A. able to carry an antigen fragment
 - B. recognized by the CD8 protein
 - C. used in combination with an antigen fragment to mark a cell for killing by cytotoxic T-cells
 - D. used to participate in helper function
38. Which properties do the T-cell receptor and the antibody share in common?
- A. Both recognize antigen or antigen fragments
 - B. Both are able to fix complement
 - C. Both are composed of four polypeptide chains
 - D. Both are multivalent
39. Which one of the following does NOT produce immunoglobulins?
- A. Plasma cells
 - B. T-cells

- C. Macrophages
- D. B-cells

40. Killer T-cells effect their killing

- A. by antibodies with specific recognition capabilities
- B. by Inserting the complement components, C5 and C9, into the target cell membrane
- C. by the T- cell antigen receptor and Class MHC proteins
- D. By inserting a pore forming protein called perforin into the target cell membrane

SECTION B (60 Marks)

41. (a) Complete the following table of herpesvirus epidemiology (10 Marks)

| VIRUS | PRIMARY INFECTION | USUAL SITE OF LATENCY | RECURRENT INFECTION | ROUTE OF TRANSMISSION |
|-------|-------------------|-----------------------|---------------------|-----------------------|
| HSV 1 | | | | |
| HSV 2 | | | | |
| VZV | | | | |
| EBV | | | | |

(b) Discuss the following autoimmune disorders:

- (i) Hashimoto’s disease (5 marks)
- (ii) Grave’s disease (5 Marks)

42. Discuss the following methods used in direct examination of virological specimen

- a. Immunofluorescence (5 marks)
- b. Electron microscopy (5 marks)
- c. light microscopy (5 marks)
- d. genome detection (hybridization) (5 marks)

43. Describe the classical activation pathway of the complement system. (20 marks)