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 1 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. Virus replication involves the following distinct phases except:
    a. Initiation of infection
    b. Replication of the virus genome
    c. Expression of the virus genome
    d. Cleavage of the virus genome
    e. Release of mature virions from the infected cell
2. Which of the following is not a cytopathic effects of virus infection in cells
    a. Altered shape
    b. Detachment from the substrate
    c. Lysis
    d. Membrane fusion and altered permeability
    e. Apoptosis
3. Which of the following statements is NOT true
    a. The vast majority of virus infections do not result in disease
    b. Retroviruses have been used successfully as vectors for gene therapy
    c. The majority of successful virus vaccines are based on attenuated viruses
    d. Latent infections are not reactivated by alterations of the host's immune status
4. Which of the following terms refer to the exchange of homologous segments of RNA between two different influenza A viruses
    a. Complementation
    b. Genetic reassortment
    c. Phenotypic mixing
    d. Phenotypic masking
5. Which of the following virus families has a messenger (positive) polarity genome.
    a. Adenoviruses
    b. Papovaviruses
    c. Paramyxoviruses
    d. Polioviruses
6. Important practical use of mutation is/are production of
    a. Recombinant vaccines
    b. Inactivated vaccines
    c. Subunit vaccines
    d. Live attenuated vaccines
7. When two genetically distinct viruses infect the same cell the following phenomena can ensue <u>except</u>
    a. Conditional-lethal mutation
    b. Complementation
    c. Recombination
    d. Phenotypic mixing
8. which of the following statements concern viruses is false
    a. Viruses can reproduce only within cells
    b. The proteins on the surface of the virus mediate the entry of the virus into host cells
    c. Neutralizing antibody is directed against proteins on the surface of the virus
    d. Viruses replicate by binary vision

9. Viruses enter cells by adsorbing to specific sites on the outer membrane of cells. Which of the following statements concerning this interaction is false.

    a. The interaction determines the specific target organs for infection
    b. The interaction determines whether the purified genome of a virus is infectious
    c. The interaction can be prevented by neutralizing antibody
    d. If the sites are occupied, interference with virus infection occurs.

10. The eclipse period of a viral multiplicatipon curve is defined as the period of time between the

    a. Uncoating and assembly of the virus
    b. Start of the infection and the first appearance of extracellular virus
    c. Start of the infection and the first appearance of intracellular virus
    d. Start of the infection and uncoating of the virus

11. Which of the following statements about clinical viral disease is true?

    a. It is most frequently due to toxin production
    b. It usually follows viral infection
    c. It can result without infection of host cells
    d. It is associated with target organs in most disseminated viral infections.

12. Established the concept of one virus growth cycle
    a. Helmuth Ruska (1940)
    b. George Hirst (1941)
    c. Emory Ellis (1939)
    d. Salcador Luria (1945)

13. Walter Reed demonstrated that
    a. The TMV agent was a soluble living organism
    b. FMD was caused by a filterable agent
    c. Yellow fever is spread by mosquitoes
    d. Poliomyelitis was caused by a virus

14. First person to differentiate between viruses and other infectious agents in 1892
    a. Benjamin Jesty
    b. Martinus beijerinck
    c. Dmiti Ivanoivski
    d. Jorn Burst

15. Experimented with rabies vaccination in 1885
    a. John Buist
    b. Edward Jenner
    c. Louis Pasteur
    d. Benjamin Jesty

16. Which of the following virus groups possess lipid envelopes:
    a. Orthomyxoviruses.
    b. Paramyxoviruses.
    c. Picornaviruses.
    d. Rhabdoviruses.

17. Which of the following is not a factor of pathogenesis in viral infection?
    a. Viral size
    b. Viral surface receptors
    c. Cellular receptor sites
    d. Cell trophism

18. The following are viral enzymes except
    a. RNA polymerase
    b. Reverse transcriptase
    c. Neuraminidase
    d. Hyaluronidase
19. Viroids
    a. Are defective viruses that are missing the DNA coding for the matrix protein
    b. Consist of RNA without a protein or lipoprotein outer coat
    c. Cause tumors in animals
    d. Require an RNA polymerase in the particle for the replication to occur
20. All of the following viruses contain envelopes except
    a. Varicella-zooster virus
    b. Papillomavirus
    c. Influenzavirus
    d. Human immunodeficiency virus

21.During the maturation of a B lymphocyte, the first immunoglobulin heavy chain synthesized is the
    A. Mu chain.
    B. gamma chain.
    C. epsilon chain.
    D. alpha chain
22.If an individual was genetically unable to make J chains, which immunoglobulin(s) would be affected?
    A. IgG
    B. IgM
    C. IgA
    D IgM and IgA

23. Individuals of blood group type AB
    A. Are Rh(d)-negative.
    B. Are "universal recipients" of transfusions.
    C. Have circulating anti-A and anti-B antibodies.
    D. Have the same haplotype.

24. The role of the macrophage during an antibody response is to
    A. make antibody.
    B. lyse virus-infected target cells.
    C. activate cytotoxic T cells.
    D. process antigen and present it.

25. Neutrophils are attracted to an infected area by
    A. IgM.
    B. Vascular permeability.
    C. Phagocytosis of IgE-coated bacteria.
    D. aggregation of C4 and C2.

26. Natural killer cells are
    A. B cells that can kill without complement.
    B. Cytotoxic T cells.
    C. Increased by immunization.
    D. Able to kill virus-infected cells without prior sensitization.

27. Which of the following does not apply to "innate" immune mechanisms?
    A) Absence of specificity
    B) Activation by a stimulus
    C) Involvement of multiple cell types
    D) A memory component

28. Which of the following is the major function of the lymphoid system?

    A) Innate immunity
    B) Inflammation
    C) Phagocytosis
    D) Acquired immunity

29. An immunologic adjuvant is a substance that
    A) Reduces the toxicity of the immunogen.
    B) Eenhances the immunogenicity of haptens.
    C) Enhances hematopoiesis.
    D) Eenhances the immune response against the immunogen.
    E) Enchances immunologic cross-reactivity

30. The class-specific antigenic determinants (epitopes) of immunoglobulins are associated with
    A) L chains.
    B) J chains.
    C) Disulfide bonds.
    D) H chains.
    E) Variable regions.

31. The first immunoglobulin synthesized by the fetus is
    A) IgA.
    B) IgE.
    C) IgG.
    D) IgM.
    E) None; the fetus does not synthesize immunoglobulins.

32. Complement is required for
    A) lysis of erythrocytes by lecithinase.
    B) NK-mediated lysis of tumor cells.
    C) Phagocytosis.
    D) Bacteriolysis by specific antibodies.

33. Mast cells
    A) Are found circulating in the blood.
    B) Release their granules following lysis.
    C) Are basophilic after complete degranulation.
    D) Are very similar to basophils.

34. Which of the following does not protect body surfaces:
    A) Skin
    B) Mucus
    C) Gastric Acid
    D) Salivary Amylyse

35. The mononuclear phagocyte system does not include:
    a) Monocytes.
    b) Kupffer cells.
    c) Kidney mesangial cells.
    d) Endothelial cells.

36. The single best defining feature of a lymphocyte is that it is:
    A A type of leukocyte
    B A cell that is specialized to produce cytokines
    C Present in the circulation
    D Antigen-specific

37. All of the following are true with respect to IgE molecules, EXCEPT which one?
    a) They are the principal immunoglobulin class involved in allergic reactions.
    b) They are involved in mediating anti-parasitic immune responses.
    c) They will cross the placenta and fix complement.
    d) They can effect the release of histamine and other chemical mediators.

38. All of the following are true about antibodies, EXCEPT which one?
    a) They fix complement.
    b) They occur on the surface of B-lymphocyte
    c) They predominate the primary immune response to antigen.
    d) D.They are molecule with a single, defined amino acid sequence

39. Which immunoglobulin is the principal one found in secretions such as milk?
    a) IgG
    b) IgM
    c) IgA
    d) IgD

40. Which of the following statement is not true
    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

SECTION B (60 MARKS)

41.(a) Discuss the following portals of entry and transmission of viruses
    i) Respiratory tract (5marks)
    ii) Skin (5marks)

    b) Differentiate between specific and non specific immunity. (10 marks)

42.i). Discuss the following concepts of mammalian cell culture (10marks)
    a. Isolation of cells
    b. Maintaining cells in culture
    ii). Discuss viral pathogenesis (10marks)

43. a) State the purpose of primary lymphoid organs. (4Marks)

    b) Draw a labeled diagram of an antibody. (16 Marks)