



KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2020/2021

FIRST SEMESTER EXAMINATION FOR THE DEGREE OF
BACHELOR OF SCIENCE (MEDICAL LABORATORY SCIENCE)

HML 214: BASIC VIROLOGY

DATE: Thursday, 22nd July 2021

TIME: 8.00 a.m. - 10.00 a.m.

INSTRUCTIONS:

Section A (Answer ALL questions: 4 marks each)

1. Viruses are a part of the biosphere. However, there is active debate concerning whether they should be treated as living or nonliving. Briefly describe a feature of viruses that;
 - (a) is also found in cell based life forms. (2 marks)
 - (b) distinguishes them from cell-based life forms. (2 marks)
2. Describe virus genomes. (4 marks)
3. For the following virus families, mention one virus species and three characteristics
 - (a) *Paramyxoviridae* (2 marks)
 - (b) *Papovaviridae* (2 marks)
4. 'RNA viruses often bring their own enzymes into the host cell to replicate their genomes'. Using HIV as an example, explain this statement. (4 marks)
5. Describe COVID-19 mRNA vaccines. (4 marks)

Section B (Answer any ONE question, 20 marks)

6.
 - (a) Describe giving examples the main portals of virus entry. (8 marks)
 - (b) Discuss the factors associated with the emergency and reemergence of viruses. (12 marks)
7.
 - (a) Describe the phases of the one step growth curve of viruses. (8 marks)
 - (b) Outline the replication cycle of Severe acute respiratory syndrome coronavirus-2 (SARS-CoV2) (12 marks)

Section C (Answer ALL questions by circling the correct answer: 10 marks)

1. Who conducted the first studies that led to the discovery of the first virus?
 - A. The microscopist Anton van Leeuwenhoeck
 - B. The bacteriologist Charles Chamberland
 - C. The botanist Dmitri Iwanowsky
 - D. The virologist Jonas Salk
2. Which one of the following is TRUE concerning viral capsids?
 - A. Viruses acquire host proteins as their capsids
 - B. Capsids are virus specific proteins, which protect their genome and provide shape to viruses
 - C. Capsid protein subunits form a helix with the core proteins to mainly provide helical symmetry
 - D. Capsids are lipid bilayer membranes containing proteins and/or glycoproteins
3. Which of the following viruses is a Baltimore class III virus?
 - A. HIV
 - B. Polio
 - C. Rotavirus
 - D. Adenovirus
4. All the following RNA viruses replicate in the cytoplasm EXCEPT
 - A. Influenza
 - B. Ebola
 - C. Measles
 - D. Chikungunya
5. All the following RNA viruses replicate in the cytoplasm EXCEPT
 - A. Influenza
 - B. Ebola
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6. Which of the following explains why HIV is highly mutable?
 - A. the error-free process of reverse transcription in HIV
 - B. the error-prone process of DNA transcription in HIV
 - C. the error-prone process of proviral DNA integration in HIV
 - D. the error-prone process of reverse transcription in HIV

7. The feature of influenza A virus that contributes to antigenic variation and pandemics is:
- A. it's RNA dependent RNA polymerase enzyme.
 - B. It's segmented genome.
 - C. Has high glycogen content which enhances binding to nucleoproteins.
 - D. It's Haemagglutinin (HA) consists of HA1 and HA2
8. RNA viruses appear to have higher rates of mutation because
- A. RNA nucleotides are more unstable than DNA nucleotides.
 - B. RNA viruses can incorporate a variety of nonstandard bases.
 - C. RNA viruses respond more to mutagens.
 - D. replication of their nucleic acid does not involve the proofreading steps of DNA replication.
9. Which of the following steps of the HIV infectious cycle do NOT require a viral enzyme?
- A. Viral maturation
 - B. Integration
 - C. Viral dsDNA synthesis
 - D. Viral protein synthesis.
10. Which of the following would be the first step in replication of a Baltimore class VI virus?
- A. Synthesis of DNA from an RNA template
 - B. Synthesis of + single-stranded RNA from an RNA template
 - C. Synthesis of + double-stranded RNA from a DNA template
 - D. Translation of the RNA genome into viral proteins
11. The following are steps in the viral replication cycle of ALL viruses EXCEPT
- A. Translation of viral proteins
 - B. Acquisition of an envelope
 - C. Production of mRNA for protein production
 - D. Copying of viral genome
12. Which of the following virus does not belong to the *Herpesviridae* family?
- A. Varicella Zoster
 - B. Cytomegalovirus
 - C. Epstein Barr
 - D. Hepatitis B

13. Which of the following are examples of virus delivery of its genome to the cell nucleus?
- A. Herpesvirus diffusion through the lipid bilayer of the nuclear membrane
 - B. Adenovirus diffusion through the nuclear pore complex
 - C. Adenovirus busting through the cell nuclear membrane
 - D. Parvovirus entry through the nuclear pore
14. Which of the following viruses would contain an RNA dependent RNA polymerase (RdRp) as part of the virion?
- A. HIV
 - B. Ebola
 - C. Small pox virus
 - D. Human papilloma virus
15. Enfuvirtide is an approved anti retroviral drug that binds to HIV gp41. Given the function of gp41 in the replication cycle of human immunodeficiency (HIV), which event is affected by this drug?
- A. HIV attachment to the cell
 - B. HIV entry into the cell
 - C. HIV uncoating
 - D. HIV release from the cell
16. Viruses that infect the respiratory tract must overcome all the following EXCEPT
- A. Clearance by mucus
 - B. Inactivation by antibodies
 - C. Destruction by macrophages
 - D. Destruction by acidity
17. Positive stranded RNA viruses have which of the following characteristics?
- A. Their genome RNA can be translated directly as mRNA
 - B. They have to transcribe their genome RNA to mirror image copy as a mRNA
 - C. This genome is circular
 - D. This genome is segmented
18. Which of the following terms are **correctly** matched?
- A. Disseminated infection - virus spread to many organs
 - B. Systemic infection - virus spread to other tissues
 - C. Shedding - release of virus from infected cells/tissues
 - D. Tropism - spectrum of hosts affected by a virus

19. Regarding polioviruses the following statement is most correct

- A. The mouth is the portal of entry of the virus
- B. Are transmitted by mosquito bites
- C. Are still a problem in Kenya since vaccine is not effective
- D. Do not infect the gastrointestinal tract of man

20. How do most antiretroviral (ARV) drugs work?

- A. They kill the HIV.
- B. They cause the body to increase population of all types of T cells.
- C. They fight opportunistic infections.
- D. They interfere with replication of HIV.