KENYATTA UNIVERSITY

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

HML 309: DIAGNOSTIC VIROLOGY

2ND SEMESTER 2022/2023 TIME: 2 HOURS

Section A: Answer ALL questions (4 marks each)

1. Outline the packaging of an oropharyngeal swab collected from a suspected Ebola fatality.

(4 marks)

2. Sate the advantages and disadvantages of virus isolation in laboratory animals

(4 marks)

3. Describe the principle of the indirect immunofluorescent assay. (4 marks)
4. In performing a rapid diagnosis of SARS-CoV-2 antigen,describe what would be the possible causes of a false negative test result. (4 marks)
5. The following results were obtained from a multiplex real time PCR testing for influenza A, A/H1, A/H5 and influenza B. Interpret the results. (4 marks)

	A	H1	H3	H5	B	RNP
Sample 1	+	-	-	+	-	+
Sample 2	-	-	-	-	+	+
Sample 3	-	-	-	-	-	+
Sample 4	-	-	-	-	-	-

Section B: Answer only ONE question (20 marks)

6. a) Describe the modern methods used in cell culture. (6 marks)
   b) Discuss real time polymerase chain reaction and its application in diagnostic virology.

(14 marks)

7. a) Outline the plaque assay and its role in the quantification of viruses.

(8 mar

b) A test is used to screen people for hepatitis B virus. The sensitivity of the test is 95% a the specificity is 90%. Assuming that the total number of persons being tested is 50,00 and that the true prevalence of hepatitis B in the population is 0.2%, calculate the numbe of true positives, false positives, positive predictive value and negative predictive value.

(12 marks)

Section C: Answer ALL questions in the answer booklet (½ mark each)

1. The earliest method used in diagnostic virology is
   A. Electron microscopy
   B. ELISA
   C. RIA
   D. Pathology

2. If you are working in a virology laboratory and samples are to be stored for more than a month, which of the following freezer temperature is recommended?
   A. 2-8 °C
   B. -80 °C
   C. -20 °C
   D. All of the above

3. The most common laboratory animal used in virus isolation is
   A. Guinea pig
   B. Mice
   C. Hamster
   D. Rat

4. In the diagnosis of HIV, which viral marker is detectable earliest post infection?
   A. RNA
   B. p24 antigen
   C. Ig M antibody
   D. Ig G antibody

5. In an indirect ELISA, why is it necessary to wash the plates repeatedly?
   A. To keep the plate wells clean
   B. To wash away unbound antibodies from the wells
   C. To wash away all bound and unbound antibodies in the wells
   D. Because it is a good laboratory practice

nd more variable than the intended oligonucleotide sequences?

A. The PCR reaction would not commence
B. The PCR reaction would end after one cycle
C. The reaction would generate a single short PCR product
D. The reaction would yield a mixture of non-specific products

7. When performing a western blot, what is the purpose of adding anti human globin?
   A. Block any interfering noise coming from the membrane
   B. Ensure that the primary antibody binds properly to the sample
   C. Separate the sample from other proteins
   D. Allow for detection of the protein sample

8. To diagnose viral infection in a neonate using serology, which of the following antibodies is the BEST for detection?
   A. Ig M
   B. Ig G
   C. Ig D
   D. Ig E

9. Laboratory diagnosis of viral respiratory tract infections can be established by all of the following tests except :
   A. Detection of virus specific IgM antibodies in single serum specimen
   B. Demonstration of viral antigens by indirect immunofluorescence assay in nasopharyngeal swabs
   C. Isolation of viruses using cell culture
   D. Detection of viral heamagglutination inhibiting (HAI) antibodies in a serum specimen

10. Which of the following statements correctly define TCID50?
   A. the dilution of virus required to cause CPE in 50% of inoculated cell cultures
   B. the dilution of virus required to cause death in 50% of inoculated animals
   C. the dilution of cells required to cause CPE in 50% of inoculated cell cultures
   D. the dilution of cells required to cause death in 50% of inoculated animals

11. Identify the most commonly used diagnostic technique in the virus laboratory during a pandemic
   A. Virus isolation
   B. Immunodiagnosis
   C. Next generation sequencing
   D. Real time PCR

12. Which clinical sample is used to diagnose hepatitis B?
   A. Blood
   B. Liver biopsy
   C. Throat swab
   D. Stool

A. Antigen
B. Antibody
C. Substrate
D. Complement

14. To prepare inhouse Virus Transport Media (VTM), you would need all the following EXCEPT
    A. Fetal calf serum
    B. pH indicator
    C. antibiotic
    D. Buffer

15. All the following are detection labels used in a rapid diagnostic test EXCEPT
    A. Colloidal gold
    B. Streptavidin
    C. Nitrocellulose
    D. Latex beads

16. Immune electron microscopy of the stool can be used to diagnose:
    A. Rota virus
    B. Calici virus
    C. Adeno virus
    D. All the above

17. The viral hemagglutination inhibition test
    A. involves antibodies against erythrocytes blocking viral binding site
    B. involves antiviral antibodies enhancing binding of viral particles to erythrocytes
    C. can be used to detect the presence of the measles virus in patient serum
    D. can be used to detect the presence of antibody to the measles virus in patient serum

18. A patient who became ill with a viral disease 10 days ago presents in the laboratory. Serological results show that the patients' antibodies against this virus have a high ratio of IgM to IgG. What would be your conclusion?
    A. It is unlikely the patient has encountered this virus previously
    B. This is likely a reactivation of the disease
    C. The patient is predisposed to IgE mediated hypersensitivity reactions
    D. The information given is irrelevant to previous antigen exposure

19. HeLa cells are derived from
    A. Human lung
    B. Human cervix
    C. Human kidney
    D. Human liver

20. The microscope used for the examination of cell cultures is called
    A. Fluorescent microscope
    B. Inverted microscope
    C. Electron microscope
    D. Dissecting microscope