CANDIDATE NUMBER……

"Investing in Africa's Future"

COLLEGE OF HEALTH, AGRICULTURE AND NATURAL SCIENCES

DEPARTMENT OF BIOMEDICAL AND LABORATORY SCIENCES

BACHELOR OF MEDICAL LABORATORY SCIENCES HONOURS DEGREE

NSLS404: MICROBIOLOGY II

END OF SEMESTER FINAL EXAMINATIONS

DECEMBER 2024

LECTURER: Mr Z CHIWODZA

DURATION: 3 HOURS

INSTRUCTIONS

1. Write your candidate number on the space provided on top of each page
2. Answer **all** questions in sections A on the question paper.
3. Answer **all** questions in section B on separate answer sheets provided.
4. Answer any **3** questions in section C on separate answer sheets provided
5. The mark allocation for each question is indicated at the end of the question
6. Credit will be given for logical, systematic and neat presentations in sections B and C

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SECTION A: MULTIPLE CHOICE [40 MARKS]

- **Answer all questions by encircling the correct response T for TRUE or F for FALSE for each statement in all the questions**
- **Each correct response is allocated half a mark**

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1. Regarding fungal infections

a) T F Cryptococcal IRIS can happen when an HIV patient is started on Antiretroviral therapy
b) T F *Pneumocystis jirovecii* can be treated with antibacterials like Clindamycin
c) T F *Histoplasma* can manifest as cutaneous infections
d) T F *Candida albicans* is the only yeast species that causes oral thrush

2. Which statement is true regarding antifungal drugs

a) T F Only target Ergosterol in the fungal cell wall
b) T F Nystatin is a polyene
c) T F Amphotericin B causes renal toxicity and cannot be administered for extended periods of time
d) T F Moulds, cannot develop resistance to Azole compounds.

3. Which one of the following parasites are correctly matched to typical signs and symptoms caused by that parasite?

a) T F *Toxoplasma gondii* – neuropsychiatric disorders
b) T F *Schistosoma mansoni* - Haematochezia
c) T F *Entamoeba histolitica* – Bloody diarrhoea
d) T F *Taenia saginata* - Cystersicosis

4. Match the disease to the sample that can be taken to the laboratory for diagnosis.

			DISEASE	SAMPLE
a)	T	F	Cryptococcal meningitis	Serum for *Cr*Ag Test
b)	T	F	Onychomycosis	Nail clippings
c)	T	F	Pneumocystis pneumonia	Blood for Beta-D Glucan analysis
d)	T	F	Histoplasmosis	Tissue biopsies transported in formalin

5. A patient 35-year-old patient visits the hospital complaining of symptoms similar to that of TB. Upon history taking it was noted that he was on anti-TB drugs and successfully finished his course. What would be your plan of action for this patient?

a) T F Test the sputum sample for drug resistant TB
b) T F Test the sputum sample for mycobacteria other than TB
c) T F Request for a lung biopsy specimen transported in formalin for fungal investigation
d) T F Request for a bronchoalveolar lavage for fungal cultures

6. Diarrhoea is described as

a) T F abnormal discharge accompanied by electrolyte loss
b) T F persistent when symptoms have been present for more than 4 weeks
c) T F chronic if it has lasted less than 14 days
d) T F acute if the durations of symptoms is less than 14 days

7. The major public health concerns regarding sepsis are that

a) T F It results in high morbidity
b) T F it highly infectious
c) T F it is under recognized
d) T F it is expensive to manage

8. The following are important Antimicrobial Stewardship interventions

a) T F Using health informatics systems to improve on Turn Around Time and communication
b) T F Educating healthcare staff
c) T F Monitoring the disposal of expired drugs
d) T F Increasing the Turn-around-time for microbiology results

9. In your weekly report you notice that 17 patients from the same ward are testing positive for *Acinetobacter baumanii* in their blood samples. What further steps can you take?

a) T F inform the superintendent, EHTs, Matron, the medical director, Africa CDC and WHO of a potential pandemic
b) T F take environmental swabs and swabs of high touch surfaces as well as the hands of the ward staff to establish the source of the bacteria
c) T F inform the ward staff to start treating all patients within the ward with Ceftriaxone
d) T F disinfect the laboratory by fogging since it could be a contamination in the laboratory.

10. The following are causes of Sexually Transmitted Infections (STIs)

a) T F Human papilloma Virus
b) T F Chlamydia trachomatis
c) T F Human Immunodeficiency Virus
d) T F Trichomonas vaginalis

11. Which of the following are risk factors for urinary tract infections (UTIs)

a) T F UTIs are more common in females because their urethras are shorter and closer to the rectum.

b) T F UTIs are more common in pregnant women than those females who are not.
c) T F UTIs are more common in the elderly.
d) T F UTIs are more common in patients who have structural problems in the urinary tract, such as an enlarged prostate

12. Regarding the Human papillomaviruses

a) T F They can cause Anal cancer and Genital Warts
b) T F Vaccination is available for both boys and girls
c) T F Chances of infections increase in sexually active individuals
d) T F it can be treated with Metronidazole

13. Some properties of viruses that are used in viral diagnosis include

a) T F they have a protein coat that be used as an antigens
b) T F They contain DNA or RNA which can be detected by real time PCR
c) T F They can cause a cytopathic effect in susceptible cells like L20B cell lines

d) T F Some viral proteins (antigens) can still elicit an immune response and immune cell response can be used as a diagnosis.

14. Approved Antiretroviral (ARV) drugs are classified based on how each drug interferes with the HIV life cycle. Which drug class matches with the specific mechanism of action?

	DRUG CLASS	MECHANISM OF ACTION
a) T F	Entry inhibitors	Bind to viral gp41 or gp120 or host cell CD4+ or chemokine (CCR5) receptors
b) T F	Non-nucleoside reverse transcriptase inhibitors	Nucleic acid analogues mimic the normal building blocks of DNA, preventing transcription of viral RNA to DNA
c) T F	Integrase inhibitors	Inhibits the enzyme necessary for integration of viral mRNA into host cells
d) T F	Protease inhibitors	Prevents the catalytic cleavage of proteins needed for viral replication

15. The following are common microbial causes of respiratory tract infections

a) T F *Klebsiella pneumonia*e
b) T F *Aspergillus fumigatus*

c) T F *Streptococcus pneumoniae*
d) T F Corona virus

16. Which of the following should be considered during blood sample collection?

a) T F 1 – 2 ml is the required amount from adults
b) T F Contamination must be avoided during collection.
c) T F Specimen should be collected after beginning antimicrobial therapy.
d) T F Specimen should be representative of infectious process.

17. With regards to immunity

a) T F Passive immunization involves the transfer of humoral immunity, in the form of "ready-made" antibodies, from one individual to another.
b) T F Passive immunity can occur naturally by transplacental transfer of maternal antibodies to the developing foetus
c) T F Artificially injecting a recipient with exogenous antibodies targeted to a specific pathogen or toxin is a form of passive immunisation
d) T F Herd immunity can prevent an individual from being infected.

18. Exposing humans to a pathogen can result in any of the following

a) T F Infection
b) T F immunity
c) T F carrier state
d) T F allergic reaction

19. A hemorrhagic fever that is showing symptoms similar to Ebola has been causing deaths in your province. Which precautions can you take from a laboratory's perspective?

a) T F Start using pneumatic tubes systems (automated or vacuum specimen delivery system) to transport specimens from suspected cases
b) T F Encourage staff to bring their own lab coats from home
c) T F Do a risk assessment to identify weak areas that need to be strengthened in terms of biosafety and biosecurity
d) T F Separate serum and plasma in the from suspected patients laboratory before sending it to the reference laboratory in cold chain for confirmation.

20. The different carriers of a disease include

a) T F chronic carriers who harbor an infection for a short time
b) T F convalescent carrier are those who have recovered from their illness but remain capable of transmitting to others
c) T F Genetic carrier, who is a person or organism that has inherited a genetic trait or mutation but displays no symptoms
d) T F Intermittent carriers who are individuals who have been exposed to and harbor a pathogen and who can spread the disease at different places or intervals

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SECTION B: [20 MARKS]

Answer all questions on separate answer sheets provided

1. State and describe any 5 drivers of antimicrobial resistance.**[5]**
2. State any 5 parasites that causes gastrointestinal infections. **[5]**
3. List 5 ways to reduce Cholera outbreaks**. [5]**
4. State 5 factors that may cause interferences in a PCR reaction of HIV viral load detection. **[5]**

SECTION C: [75 marks]

Answer any 3 questions from this section on separate answer sheets provided

1. Discuss what is involved in a Quality Management System and how it can help improve patient outcomes in terms of infectious diseases **[25]**
2. **Moleli** has been diagnosed with HIV. However, he is not responding to the antiretroviral treatment he is getting.
   a) With the aid of a diagram, describe a molecular test you can do in the laboratory to monitor antiretroviral treatment effectiveness. **[15]**
   b) Discuss causes of HIV drug resistance and what can be done to reduce them**. [10]**
3. Vaginal thrush is a disease that regularly affects women of child bearing ages
   a) Describe laboratory diagnosis of *Candida albicans* from a High Vaginal Swab sample, from sample collection to report. **[15]**
   b) Discuss the causes of vaginal thrush and how to control them. **[10]**
4. *Salmonella enterica* can cause typhoid fever
   a) Discuss in detail the conventional laboratory diagnosis of this organism from sample collection to report. **[15]**
   b) Discuss how the laboratory is involved in managing such an outbreak.**[10]**
5. Parasitic diseases have continued to be a global health threat.
   a) Draw and label the life cycle of the causative organism of urinary schistosomiasis, highlighting the diagnostic stages. **[15]**
   b) Discuss why it is difficult to eradicate parasitic diseases. **[10]**