NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH, APPLIED SCIENCES AND NATURAL RESOURCES

DEPARTMENT OF HEALTH SCIENCES

QUALIFICATION: BACHELOR OF MEDICAL LABORATORY SCIENCES	
QUALIFICATION CODE: 08BMLS	**LEVEL:** 7
COURSE CODE: MMB711S	**COURSE NAME:** MEDICAL MICROBIOLOGY 3
SESSION: JUNE 2022	**PAPER:** THEORY
DURATION: 3 HOURS	**MARKS:** 115

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER(S)	Ms. V Tjijenda Dr Markus Schuppler
MODERATOR:	Prof RT Mavenyengwa

INSTRUCTIONS
1. Answer ALL the questions. 2. Write clearly and neatly. 3. Number the answers clearly.

PERMISSIBLE MATERIALS

None

THIS QUESTION PAPER CONSISTS OF 7 PAGES (Including this front page)

SECTION A (15)

QUESTION 1 [10]

State the mode of action for each of the following antimicrobials.

1.1	Zidovudine	(1)
1.2	Isoniazid	(1)
1.3	Amphotericin B	(1)
1.4	Caspofungin	(1)
1.5	Saquinavir	(1)
1.6	MMR vaccine	(1)
1.7	Amantadine	(1)
1.8	Flucytosine	(1)
1.9	Linezolid	(1)
1.10	Rifampicin	(1)

QUESTION 2 [5]

Choose the correct answer and report only the suitable letter next to the relevant question. One (1) mark for each correct answer.

2.1 With increased levels of oxidizable organic materials in wastewater, the biochemical oxygen demand (BOD) will:

A. increase
B. decrease
C. remain the same
D. increase or decrease depending on the nature of the materials involved

2.2 Microbes are involved in which step(s) of wastewater treatment?

A. primary and secondary
B. primary and tertiary
C. secondary and tertiary
D. secondary only

2.3 Which is an important product of anoxic sewage treatment that is used further in the wastewater treatment plant?

A. CO_2
B. H_2
C. H_2O
D. CH_4

2.4 Which bacterium is used as an "indicator organism" in drinking water analysis?

A. *Staphylococcus aureus*
B. *Legionella pneumophila*
C. *Enterococcus faecalis*
D. *Rhanella aquatilis*

2.5 Which enzyme is specific for *E. coli* and used for their identification as "Indicator organism" in drinking water analysis?

A. β-Galactosidase
B. β-Glucuronidase
C. β-Glucosidase
D. β-Amylase

SECTION B (85)

QUESTION 3 **[20]**

3.1 In 2019, Namibia had 22 cases of leprosy, which was an increase from the 17 reported in 2018 and 11 in 2017. Name the method used in the laboratory to diagnose leprosy, the principle and mention the expected result if positive. (7)

3.2 What is the function of malachite green in a TB medium (1)

3.3 Why is it important to identify and treat MOTT infection (3)

3.4 Explain what is meant by "extensively drug resistant TB". (3)

3.5 Give the principle of Mycobacterial Growth Indicator Tube automated System that is widely used for culturing *Mycobacterium tuberculosis*. (3)

3.6 Identify the laboratory level suitable for Mycobacteria analysis and provide any two (2) mechanical engineering requirements. (3)

QUESTION 4 [20]

4.1 Differentiate between thermally monomorphic and dimorphic fungi. (2)

4.2 The clinical infections caused by dermatophytes are generally referred to as Ringworm or Tinea. Name the body part affected by the following: (3)
One (1) mark for each correct answer.

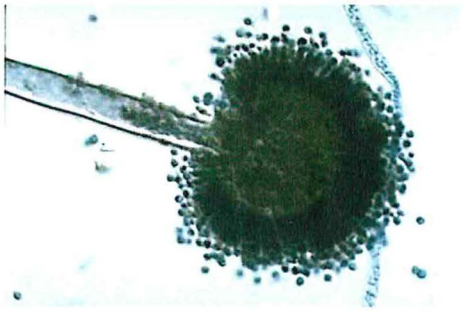
4.2.1 *Tinea pedis*

4.2.2 *Tinea unguium*

4.2.3 *Tinea barbae*

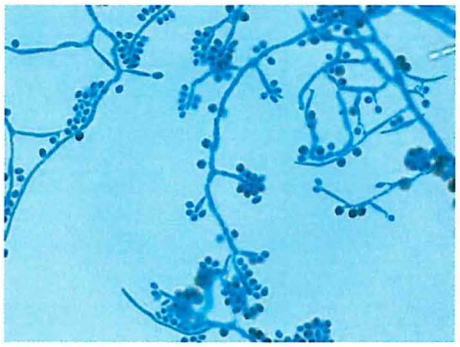
4.3 Mention the use of cornmeal agar and the expected results. (2)

4.4 Study the below images and answer the questions that follow:



(A)

(B)



(C)

(D)

4.4.1 Identify the fungi (4)

4.4.2 What type of infections are caused by the fungi? (4)

4.4.3 Describe the cultural morphology based on colony colour. (4)

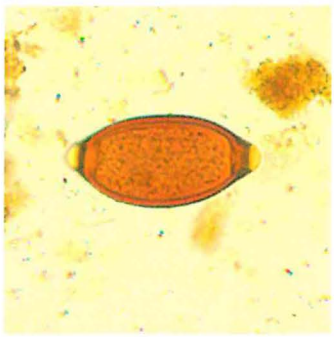
4.5 Mention the component that preserve the fungi in LPCB staining technique. (1)

QUESTION 5 [21]

5.1 Complete the table below. Where there is no intermediate write 'none'. Copy the table into your answer book. (16)

Parasite	Intermediate host	Definitive host	Infective stage	Diagnostic stage
Echinococuss granulosus	(1)	(1)	(1)	(1)
Toxoplasma gondii	(1)	(1)	(1)	(1)
Schistosoma spp.	(1)	(1)	(1)	(1)
Taenia saginata	(1)	(1)	(1)	(1)

5.2.1 Identify the organism to specie level. (1)



5.2.2 Summarize the life cycle of this pathogen. (4)

QUESTION 6 [24]

6.1 Differentiate between Marburg virus, Dengue fever and MERS-COV based on the following: (Three (3) marks for each correct answer.) (9)

6.1.1 Virus genome

6.1.2 Type of infection caused

6.1.3 Animal reservoir

6.2 An infant with a loud barking cough presents at the Emergency Room with laryngotracheobronchitis during a winter outbreak. A viral infection is suspected.

6.2.2 Provide the most probable clinical diagnosis for this patient. Justify your answer. (2)

6.2.3 Which other virus can be confused with the clinical presentation of the patient. (2)

6.2.4 Using the information provided in the case scenario, how did you differentiate this infection with the infection mentioned in 5.2.3. (1)

6.3 Describe the pathogenesis of HIV-1 virus. (8)

6.4 Explain the use of qPCR in HIV diagnosis other than HIV detection. (2)

SECTION C (15)

QUESTION 7 **[15]**

7.1 For the statement provided below, decide whether the statement is True or False. Write only the number and "True" for a true statement and "False" for a false statement. One (1) mark for each correct answer. (5)

7.1.1 The heat-stable emetic-type enterotoxin Cereulide is formed during growth of *Bacillus cereus* in food.

7.1.2 The diarrhea-type enterotoxins of *Bacillus cereus* are heat-stable and formed during growth of the bacteria in the small intestine of host.

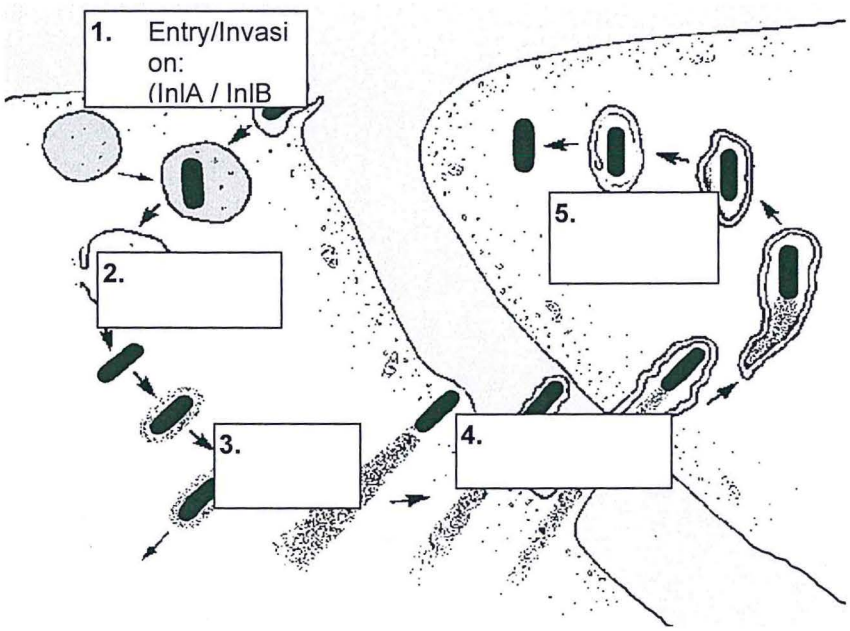
7.1.3 The food most likely to be contaminated with botulism neurotoxins are improperly processed home-canned foods?

7.1.4 Difficulty in swallowing, double vision and diarrhea are typical symptoms of foodborne botulism.

7.1.5 Botulinum neurotoxins (BoNTs) prevent the release of acetylcholine from the nerve end by the cleavage of SNARE proteins

7.2 *Listeria monocytogenes* is an intracellular pathogen.

7.2.1 Name the steps and the required pathogenicity factors (proteins or structures) produced by *Listeria monocytogenes* as displayed in 1. in the order they are required along the different steps of the infection. (5)
(See figure on next page)



7.3 *Campylobacter* is the leading cause of bacterial food-borne related diarrhoea throughout the world. One (1) mark for each correct answer. (5)

7.3.1 Identify animals that are the main reserviour for *Campylobacter*?

7.3.2 What toxin is made by Campylobacter as the major pathogenicity factor?

7.3.3 On what genetic element are the genes for this toxin localized?

7.3.4 What other (rare) disease might be caused by Campylobacter, which usually has its onset after a Campylobacter infection?

7.3.5 What other (rare) disease might be caused by *Campylobacter*, which usually has its onset after a *Campylobacter* infection?

END OF EXAMINATION