NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH, APPLIED SCIENCES AND NATURAL RESOURCES

SCHOOL OF HEALTH SCIENCES

DEPARTMENT OF CLINICAL HEALTH SCIENCES

QUALIFICATION: BACHELOR OF MEDICAL LABORATORY SCIENCES	
QUALIFICATION CODE: 08BMLS	**LEVEL:** 7
COURSE CODE: MMB711S	**COURSE NAME:** MEDICAL MICROBIOLOGY 3
SESSION: JULY 2023	**PAPER:** THEORY
DURATION: 3 HOURS	**MARKS:** 101

SECOND OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER(S)	Ms. V Tjijenda and Dr Markus Schuppler
MODERATOR:	Prof R.T. Mavenyengwa

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

THIS QUESTION PAPER CONSISTS OF 9 PAGES (Including this front page)

Permissible material

Calculator

SECTION A (25)

QUESTION 1 **[20]**

Evaluate the statements below and determine whether each statement is true or false. If you state false, provide the correct statement.

1.1 Xpert MTB/RIF is a nucleic acid amplification test.

1.2 Acid fastness is a property associated with all mycobacterium species.

1.3 *Mycobacterium canetti* forms part of the non-tuberculosis mycobacterium

1.4 Tuberculin skin test is negative in latent TB infection

1.5 A negative Xpert MTB/RIF in a 3-year-old suggest no TB infection.

1.6 lateral-flow lipo-arabinomanan Antigen (LAM) Ag is a TB urine test signifying active TB disease.

1.7 Extensively drug resistant TB is defined as resistance to any fluoroquinolone, and at least one of three injectable second-line medicines (capreomycin, kanamycin and amikacin), in addition to resistance to rifampicin.

1.8 Mono resistance is defined as resistance to at least one anti-TB medicine.

1.9 Tuberculoid leprosy is non-infectious with a spontaneous recovery.

1.10 18 acid fast bacilli in 10 fields are scored a 1+ during Auramine O staining.

1.11 gyrA mutation is suggestive of resistance to one of the aminoglycosides.

1.12 Inh mutation is suggestive of a drug resistant mutation and can therefore not be treated with isoniazid.

QUESTION 2 **[5]**

2.1 Choose the correct answer and report only the suitable letter next to the relevant question number. (5)

2.1.1 With increased levels of oxidizable organic materials in wastewater, the biochemical oxygen demand (BOD) will: (1)

A. increase

B. decrease

C. remain the same

D. increase or decrease depending on the nature of the materials involved

2.1.2 Microbes are involved in which step(s) of wastewater treatment? (1)

A. primary and secondary

B. primary and tertiary

C. secondary and tertiary

D. secondary only

2.1.3 Which microorganisms produce CH4 during anoxic sewage treatment? (1)

A. Archea

B. Bacteria

C. Mould

D. Protozoa

2.1.4 Which bacterium is used as an "indicator organism" in drinking water analysis? (1)

A. *Staphylococcus aureus*

B. *Legionella pneumophila*

C. *Enterococcus faecalis*

D. *Rhanella aquatilis*

2.1.5 Which bacterium is not a waterborne pathogen? (1)

A. *Campylobacter jejuni*

B. *Vibrio cholerae*

C. *Shigella flexneri*

D. *Staphylococcus aureus*

SECTION B (60)

QUESTION 3 **[20]**

3.1 **Use the below images to answer the questions that follow:**

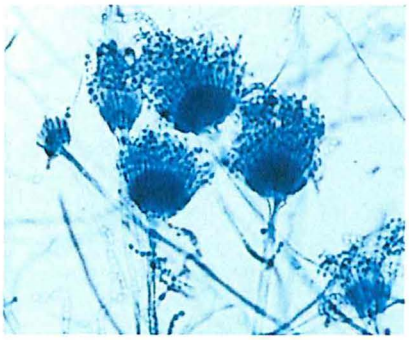


Figure A

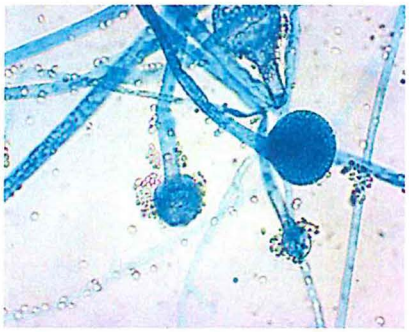


Figure B

3.1.1 Complete the following table for the fungi above (10)

.	Figure A	Figure B
Identify the fungi	(a)	(b)
Type of spore	(c)	(d)
Type of Hyphae	(e)	(f)
Reproduction	(g)	(h)
Colony colour	(i)	(j)

3.2 Rachel went to visit her local doctor and explained that she had a problem `down below'. She was feeling very sore, and had noticed some sticky white discharge on her pants. She had also noticed that there was some stinging when she urinates. She further indicated that she only had one regular boyfriend and had never had sex with anyone else. Upon investigation the vulva was swollen and red, and there was a thick white discharge coming from the vagina. A high vaginal swab was collected, labelled, and sent to the laboratory for culture.

3.2.1 What is the suspected infection and the causative agent? (2)

3.2.2 Discuss the expected results on culture and gram stain. (2)

3.2.2 Explain the diagnostic test will you perform to confirm the infection in 2.2.1 (5)

3.2.3 What is the expected results of on chromogenic agar. (1)

QUESTION 4 [21]

4.1 Identify the parasite (Genus and species were relevant) from information given below.

4.1.1 A 63-year-old male from rural village with a village with a hydatid cyst (2)

4.1.2 A parasite with freshwater snails as intermediate host and which may be detected in a properly collected urine specimen of infected patients. (2)

4.1.3 A stool specimen containing adult worms resembling whips and ova with prominent bipolar plugs. (2)

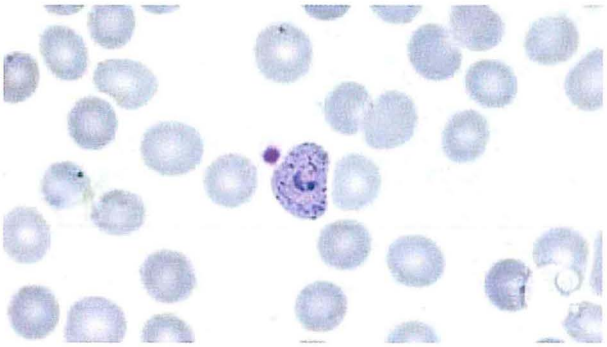
4.1.4 Acid fast parasite routinely stained for in stool specimen of children with diarrhoea. (2)

4.1.5 A tissue amebae responsible for causing PAM. (2)

4.1.6 Obligate intracellular parasite that can be transmitted congenitally when the tachyzoites cross the placenta. (2)

4.2

The sample below was collected from a patient who has a history of travelling to South Asia to visit his family. The patient recalls being bitten by mosquitos.



4.2.1 Identify the organism to specie level. (1)

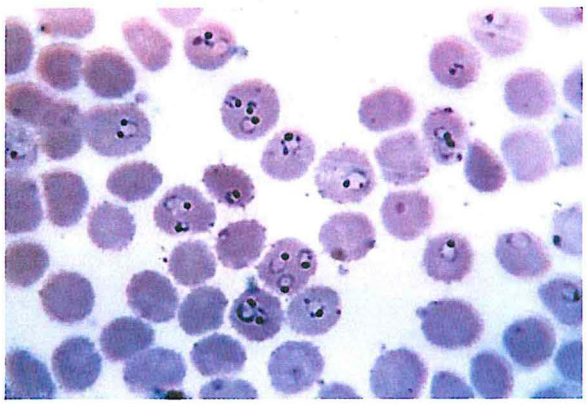
4.2.2 What stage of the parasite is this? (1)

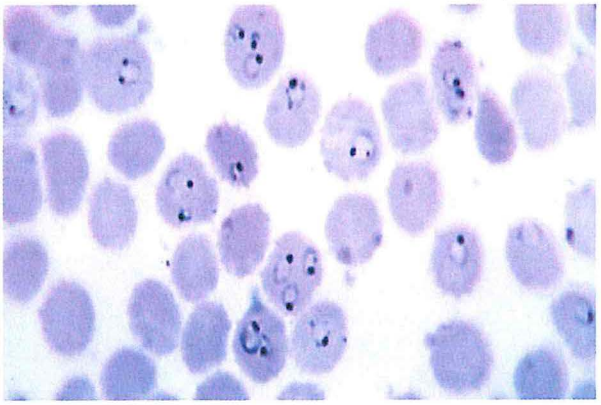
4.2.3 Mention the disease associated with this pathogen. (1)

4.2.4 Discuss the organism under the following: (3)
(a) red blood cell size
(b) inclusion bodies
(c) number of merozoites in schizont

	P. vivax,
red blood cell size	
inclusion bodies	
number of merozoites in schizont	

4.2.5 Perform a parasitaemia count on the two fields below. (3)





QUESTION 5 [19]

5.1 A patient visited his doctor and presented with yellowing of the skin and eyes (jaundice), dark urine, extreme fatigue, nausea, vomiting and abdominal pain. A sample was taken and sent to the laboratory for analysis. The following tests were performed and results are shown:

Viral Serology for Hepatitis B.

Marker	Result
HBsAG	Positive
HBeAG	Positive
IgM Anti-HBc	Positive
IgG Anti-HBe	Negative
IgG Anti-HBs	Negative
HBV -DNA	Positive

5.1.1 Discuss the laboratory findings and the significance of each marker. (12)

5.2 Compare and contrast between Influenza A, Corona Virus and Respiratory Syncytial Virus using criteria: (7)

5.2.1 Type of infection they cause

5.2.2 Patient group mostly affected

5.2.3 Surface proteins

SECTION C (16)

QUESTION 6 **[16]**

6.2 Assess the following statements and decide whether they are true or false. Write only the number of the question and next to it TRUE for a true statement and FALSE for a false statement (10)

6.2.1 Cereulide is the heat stable emetic-type toxin produced by *Bacillus cereus* during growth of the bacteria in the small intestine.

6.2.2 Cereulide is the heat stable emetic-type toxin of *Bacillus cereus*, which is synthesized independent from ribosomes.

6.2.3 Members of the *Bacillus cereus* group (ACT group) have rather similar metabolic and biochemical characteristics and can only be distinguished due to their specific virulence factors.

6.2.4 The light chain of the BoNT protein is responsible for the translocation of the heavy chain into the target cells.

6.2.5 Different *Clostridium botulinum* neurotoxin (BoNT) types cleave different proteins of the SNARE complex.

6.2.6 Molecular mimicry in *Campylobacter jejuni* means the bacteria produce a lipo-oligosaccharide that contains components that are similar to the ganglioside in nerve cell membranes.

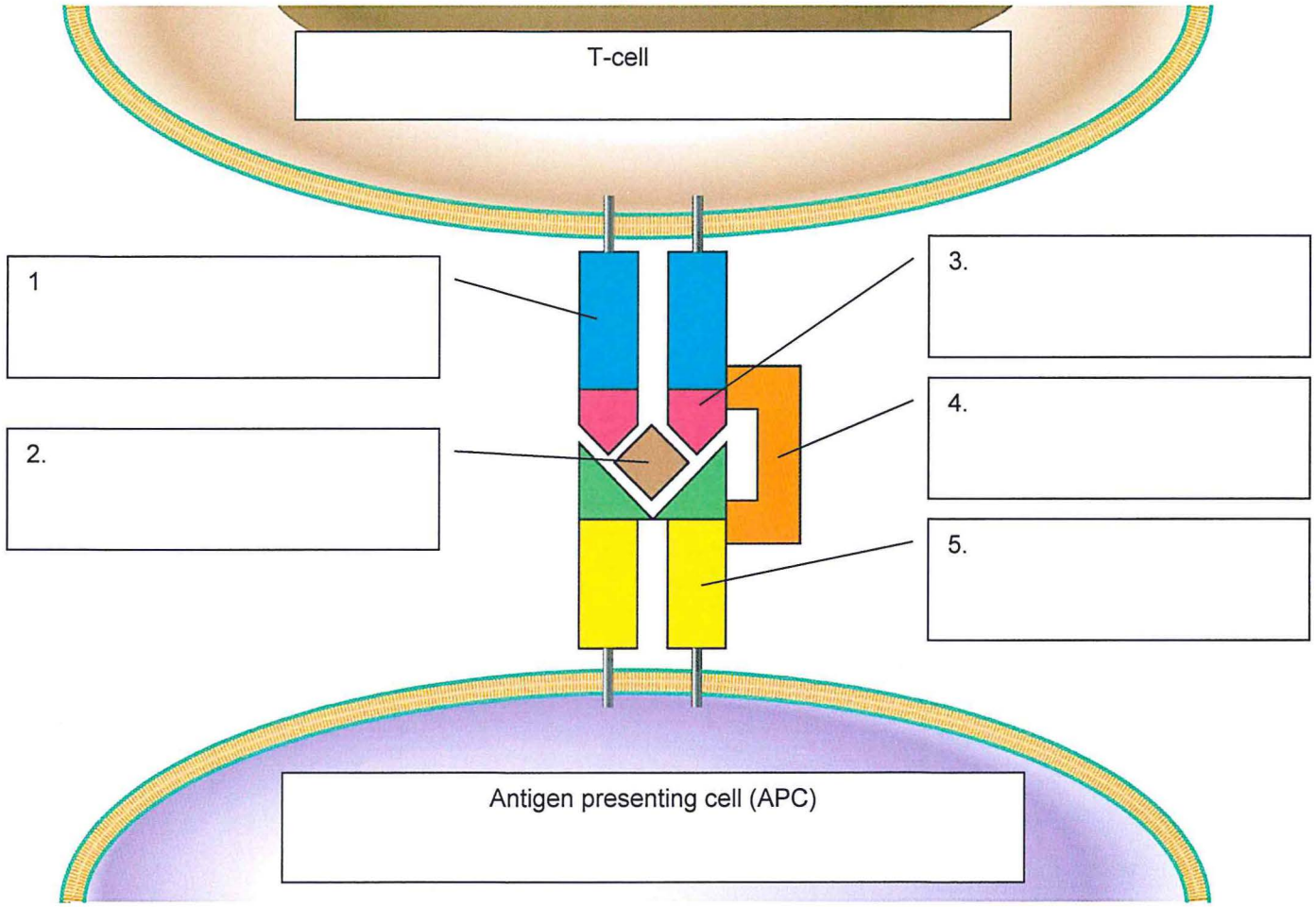
6.2.7 *Campylobacter jejuni* produce a cytolethal distending toxin (Cdt) that leads to damage in mitochondria.

6.2.8 Besides the stx genes most EHEC strains also contain a pathogenicity island that encodes a "type III secretion system".

6.2.9 *Listeria monocytogenes* feature temperature dependent regulation of virulence gene expression to make sure that virulence factors are only produced in warm blooded animals.

6.2.10 Listeriosis is in particular dangerous for humans belonging to the YOPI risk group, meaning: Young, Old, Pregnant, Incontinent.

6.3.1 Label the components of the image below accordingly. (5)



6.3.2 What important characteristic of Staphylococcal Enterotoxins is responsible for the frequent occurrence of food poisoning by this toxin? (1)

END OF EXAMINATION