



**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: JULY 2022	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 109

SUPPLEMENTARY / SECOND 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 8 PAGES (Including this front page)

SECTION A (15)

QUESTION 1

[10]

Identify the disease/infection that is associated with the following:

- 1.1 Ring form trophozoites found on the blood smear of a patient who has a history of travelling to Ohangwena region for a holiday. (2)
- 1.2 Hallucination and paralysis seen in a patient who was bitten by a wild rabid dog while on an adventure. (2)
- 1.3 Microscopy results from a stool specimen. (2)



- 1.4 Microscopy results obtained from a hair sample. (2)



- 1.5 A patient presents with persistent cough, fever and weight loss. Results obtained from the sputum analysis shows 1+ acid fast bacilli, growth on culture within one week and negative for Xpert MTB/RIF. (2)

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 Water leaving an efficient wastewater treatment plant ideally has a biochemical oxygen demand (BOD) between _____ units.
- A. 100 and 1000
 - B. 50 and 100
 - C. 25 and 50
 - D. 1 and 25

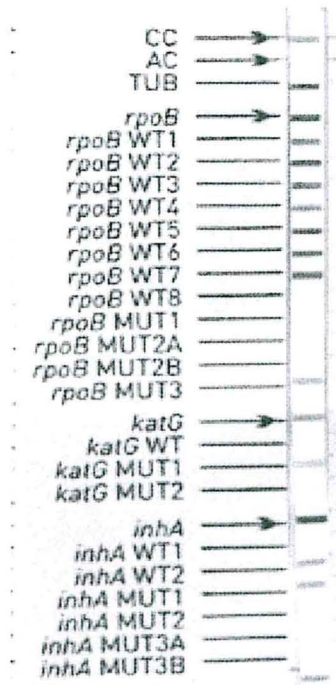
- 2.2 Microbes are used in secondary wastewater treatment to:
- A. remove heavy metals
 - B. remove organic matter
 - C. remove chemical pollutants
 - D. remove pathogenic organisms
- 2.3 Which bacteria are truly waterborne bacterial pathogens?
- A. *Vibrio cholera*
 - B. *Campylobacter jejuni*
 - C. *Staphylococcus aureus*
 - D. *Clostridium perfringens*
- 2.4 Why are “indicator organisms” used in drinking water analysis?
- A. It is impractical to screen drinking water for every pathogen
 - B. Not all waterborne bacterial pathogens grow on agar plates
 - C. “Indicator organisms” signal definite presence of pathogens
 - D. “Indicator organisms” are normal flora
- 2.5 Which enzyme is specific for fecal coliforms and used for their identification as “indicator organisms” in drinking water analysis?
- A. β -Glucosidase
 - B. β -Glucuronidase
 - C. β -Galactosidase
 - D. β -Amylase

SECTION B (79)

QUESTION 3

[20]

- 3.1 Differentiate between the two forms of Hansen disease. (5)
- 3.2 Give the definition for the acronym DOT in TB treatment. (1)
- 3.4 Explain the five (5) essential elements reinforced by the DOT strategy. (5)
- 3.3 Define poly-drug resistant TB. (2)
- 3.4 Interpret the following Line Probe Assay results with a specific mention of the antibiotics. (7)



QUESTION 4

[19]

- 4.1 A 40-year-old man living in the Karoo presented with influenza like Symptoms such as coughing, chills, low grade fever, minimal chest pains and weight loss. He was hospitalized and a CSF sample sent to the laboratory. His history indicated that he worked with pigeons and took part in pigeon racings.
- 4.1.1 Name the pathogen that the physicians suspected is the causative agent. (2)
- 4.1.2 Why is it important that the causative agent be identified and that the patient is treated immediately? (2)
- 4.1.3 Describe how you would process the sample in the laboratory to isolate the etiological agent involved and expected results. Using the following headings:
- 4.1.3.1 Microscopy (2)
- 4.1.3.2 Culture (2)
- 4.1.3.3 Serology (2)
- 4.2 Differentiate between *P. vivax*, *P. malaria* and *P. falciparum* under The following: (9)
- 4.2.1 Red blood cell size
- 4.2.2 Inclusion bodies
- 4.2.3 Number of merozoites in schizont

QUESTION 5

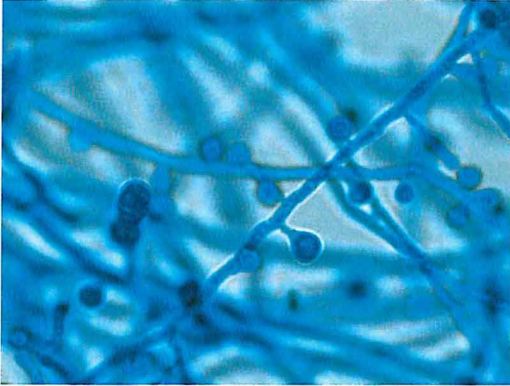
[20]

- 5.1 Differentiate between antigenic drift and antigenic shift. (2)
- 5.2 Mention four similarities between measles and rubella viruses. (4)
- 5.3 Enzyme linked Immuno Sorbent Assays (ELISA) have been used in diagnostic laboratories and provide the added advantage to improve turnaround time. You are recruited by the Executive Director of the Ministry of Health and Social Services to serve on a task force group on "COVID-19 Diagnostics" tasked with the responsibility to develop an ELISA rapid test for COVID-19. Identify the preferred assay and summarize the principle of the test assay your team will develop (4)
- 5.4 What is the mode of action of Oxford/AstraZeneca vaccine. (4)
- 5.5 Study the case study below.
In September 2004, a 15-year-old girl picked up a bat that she found in a church located in Wisconsin. She sustained a small bite on her left index finger, and having treated it with hydrogen peroxide, her mother decided not to seek medical attention. Thirty-seven days after the bite Giese developed neurological symptoms. She was admitted to the hospital with tremors and trouble walking. Her condition continued to deteriorate, and she was referred to a local hospital in Wisconsin.
- 5.5.1 Provide the disease. (1)
- 5.5.2 Discuss the pathogenesis of the disease in **5.5.1** (5)

QUESTION 6

[20]

- 6.1 A 40-year-old male from North America is presenting with a cough, weight loss, chest pain and fever. Examination of tissue from culture grown from the patient's tissues yield mold-like structures as shown below.



Answer the following questions regarding the pathogen:

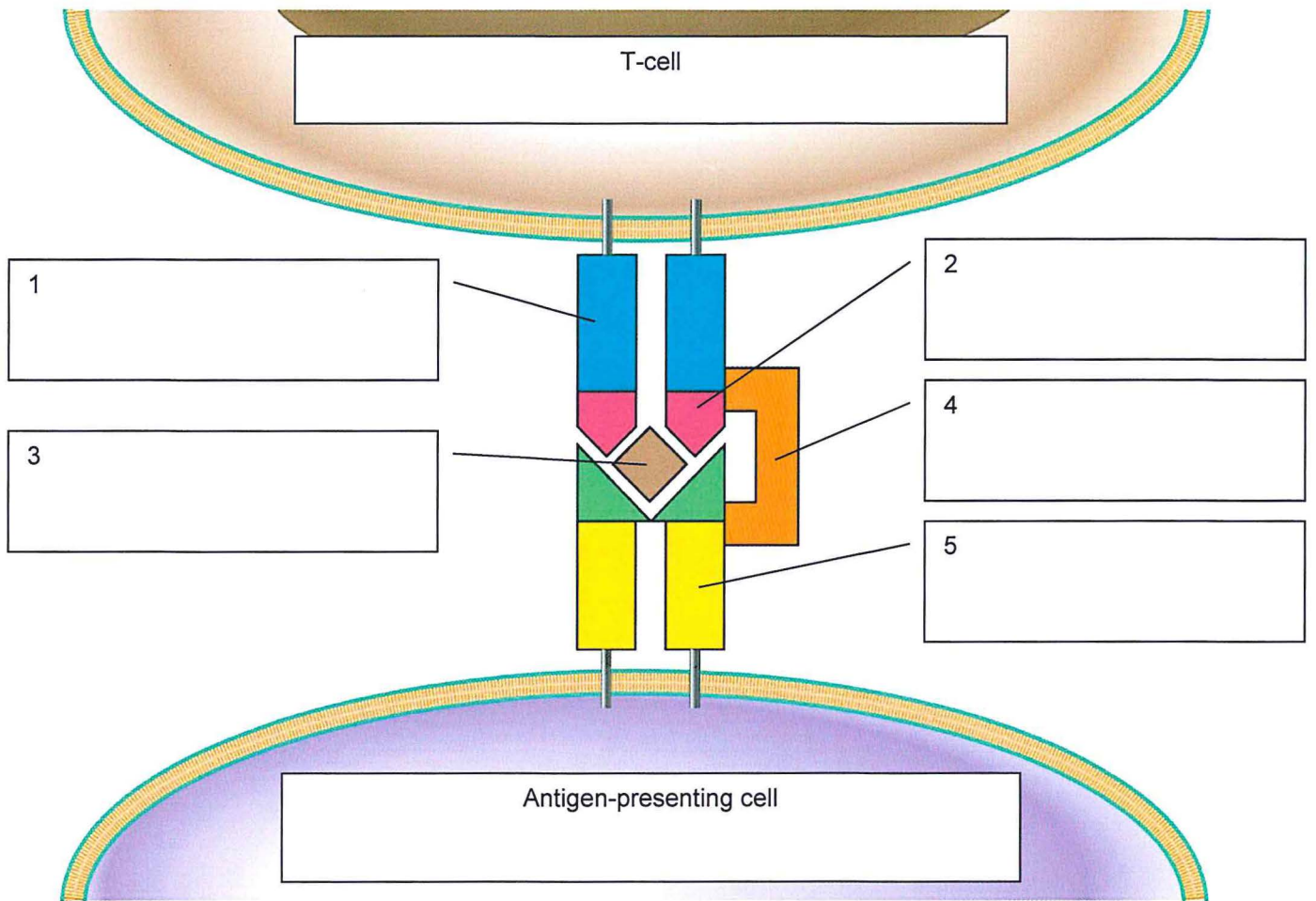
- 6.1.1 Identify the causative pathogen (2)
- 6.1.2 Explain how you would culture the pathogen. (3)
- 6.1.3 Discuss the pathogenesis of the disease caused by the organism. (4)
- 6.2 A yeast is isolated from the oral cavity of an HIV patient diagnosed with oral thrush.
- 6.2.1 Identify the presumptive causative agent. (2)
- 6.2.2 Describe the organisms' expected results for the following: (6)
- (a) Gram stain
 - (b) Cultural morphology
 - (c) Chromogenic agar
- 6.3 Discuss the principle of Chromogenic agar (3)

SECTION C (15)

QUESTION 7

[15]

- 7.1 For the below statement provided, 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 mark for each correct answer. (5)
- 7.1.1 The heat-labile diarrhea-type enterotoxins are pre-formed by *Bacillus cereus* during growth of the bacteria in food.
- 7.1.2 The heat-stable emetic-type enterotoxin Cereulide of *B. cereus* acts as an ionophore.
- 7.1.3 The majority of botulism cases are in infants.
- 7.1.4 Parents can help to prevent infant botulism in babies by avoiding to feed honey to the baby.
- 7.1.5 Botulinum neurotoxins (BoNTs) prevent the release of SNARE proteins from the nerve end by the degradation of acetylcholine.
- 7.2 Answer the following questions regarding pathogenic *E. coli*. (5)
One mark for each correct answer.
- 7.2.1 What is the difference between Enteropathogenic *E. coli* (EPEC) and Enterohemorrhagic *E. coli* (EHEC)?
- 7.2.2 What is the function of the toxin?
- 7.2.3 What life-threatening complication might be caused by the production of Shiga-like toxin (Stx) in the host?
- 7.2.4 What important pathogenicity factor or system is encoded by the "Locus of Enterocyte Effacement" (LEE) pathogenicity island that is also present in EHEC strains?
- 7.2.5 What type of food is most often responsible for EHEC infections?
- 7.3 Please label the below image showing the action of superantigens accordingly. (5)
(See image on next page)



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END OF EXAMINATION!
