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:** 6
COURSE CODE: MMB621S	**COURSE NAME:** MEDICAL MICROBIOLOGY 2B
SESSION: November 2022	**PAPER:** THEORY
DURATION: 3 HOURS	**MARKS:** 100

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER(S)	**Mrs Fredrika Engelbrecht**
MODERATOR:	**Ms Vanessa Tjijenda**

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

THIS QUESTION PAPER CONSISTS OF 5 PAGES (Excluding this front page)

SECTION A (25)

QUESTION 1 [10]

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 and **give a reason for calling a statement FALSE. (2 marks allocated to false with a reason, 1 mark allocated to true)**

1.1 The K antigens of enterobacteriaciae is associated with:
- A) The flagellar proteins.
- B) Components of the polysaccharide capsule.
- C) The lipopolysaccharides in the outer membrane.
- D) The types of linkages between sugar components.

1.2 Quinolone antibiotics act on organisms through:
- A) Inhibiting DNA synthesis.
- B) Inhibiting folic acid synthesis.
- C) Inhibiting cell wall synthesis.
- D) Inactivating enzymes.

1.3 Virulence factors found in *S. pneumoniae* that damages host cells are:
- A) the pneumolysins.
- B) the polysaccharide capsules.
- C) neuramidases.
- D) autolysins.

1.4 Abacterial pyuria can be defined as:
- A) urine containing excess pus cells and a sterile culture.
- B) urine containing excess pus cells and numerous bacteria.
- C) urine containing numerous bacteria with no pus cells.
- D) urine containing no bacterial and no pus cells in the.

1.5 A short course (48hrs) of Glycopeptide antibiotic would be used to treat a:
- A) *S. aureus* infection acquired from an intravenous catheter.
- B) Coagulase-negative staphylococcal infection acquired from an intravenous catheter.
- C) Corynebacterial infection acquired from an intravenous catheter.
- D) Both A and C.

1.6 Leptospira can be classified as:
- A) A strict anaerobe.
- B) A commensal of the human intestine.
- C) A strict aerobe.
- D) As a fastidious organism.

1.7 The lag between the onset of infection and production of antibodies can be define as:

A) the time when a person is already infected but antibodies are not yet produced.
B) the time when a person is not yet infected with and organism.
C) the time when a person's immune system is not able to cope with an infection.
D) the time when a person's body do not recognise the infection as foreign.

1.8 Identify the organism that is motile at 22°C and not motile at 37°C.

A) *Clostridium perfringens.*
B) *Salmonella paratyphi.*
C) *Yersinia enterocolitica.*
D) *Stenotrophomonas maltophilia.*

1.9 Bacitracin sensitivity assists in the positive identification of:

A) *S. pyogenes.*
B) *S. pneumoniae.*
C) *S. agalactiae.*
D) *S. bovis.*

1.10 Brucella is an organism known to be:

A) often transferred from person to person.
B) a zoonotic infection.
C) only causing infections amongst animals.
D) not a pathogenic organism.

QUESTION 2 [15]

Choose the correct answer and report only the suitable letter next to the relevant question number.

2.1 *Staphylococcus aureus* belongs to the coagulase positive group of organisms.

2.2 Boric acid is a bacteriostatic agent that inhibits the growth of organisms when it is added to urine to give a final concentration of 1.8%.

2.3 Gram negative cocci usually in pairs (diplococci) with flattened adjacent sides "Kidney bean"/"Coffee bean" shape are associated with Acinetobacter species.

2.4 Fermentation is an anaerobic metabolic process.

2.5 Indole differentiates between *Proteus vulgaris* and *Proteus mirabilis.*

2.6 Beta-lactamases is antibiotic that inactivates the β-lactam ring.

2.7 IgM antibodies will indicate that the patient is in the convalescent stage of the disease and that he has previously been exposed to the micro-organism.

2.8 *R. prowazekii* directly causes human infection.

2.9 Pseudomembrane colitis is associated with the organism *Corynebacterium perfringens*.

2.10 Coxiella burnetii is associated with Q fever

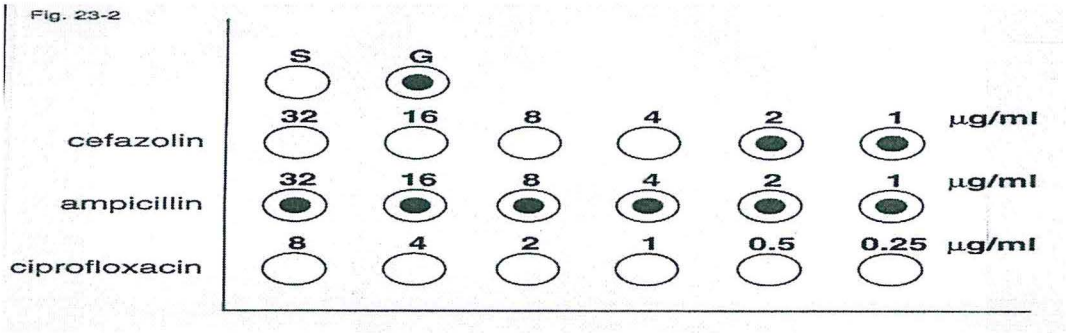
SECTION B (35)

QUESTION 3 [9]

3.1 Categorize the following antibiotics according to its bacterial targets:

A) Vancomycin [1]
B) Aminoglycosides [1]
C) Tetracyclines [1]
D) Quinolones [1]

3.2 Evaluate the picture of the microtitre plate below and answer the questions that follows:



A) Can the results from the microtitre plate be considered to be accurate, justify your answer. [3]

B) Which antibiotic **and** at what concentration would effectively treat the patient when you interpret the results of the microtitre plate. [2]

QUESTION 4 [9]

4.1 Compare the significance of Compliment fixation and the Weil-Felix test in the diagnosis of Rickettsial diseases. [9]

QUESTION 5 [17]

5.1 Summarise the pathogenesis and clinical manifestations of primary and secondary syphilis. [10]

5.2 Suggest how a scientist can differentiate between *E.coli* 0157:H7 from the other *E.coli* species in the diagnostic laboratory. [7]

SECTION C (40)

QUESTION 6 [20]

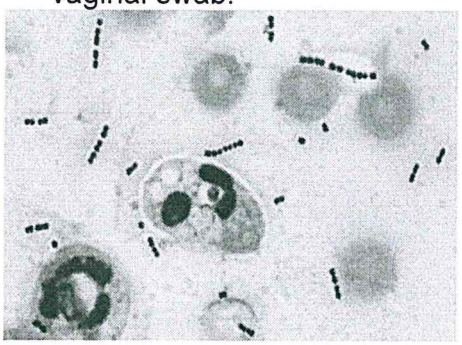
6.1 A 4-year-old Caucasian boy presented with a one-week history of general malaise, mild fever, indolence, and anorexia. He subsequently developed dysphagia, sialorrhoea, difficulties opening the mouth and eventually dehydration. Due to parental concerns about the boy's refusal of fluids, a paediatrician was consulted. At that time of presentation, he showed signs of trismus and muscle rigidity. Together with the lack of immunization and a toenail infection, the doctor suspected generalised tetanus.

A) Identify the causative pathogen of generalised tetanus. [2]

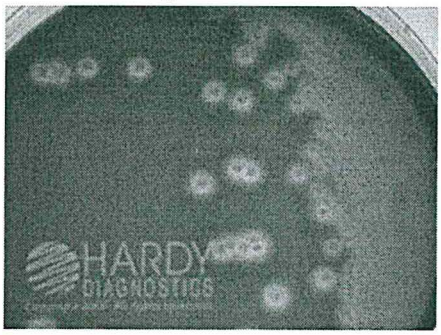
B) Illustrate by means of a drawing the gram stain morphology and gram reaction you expect for this organism. [2 x ½ = 1]

6.2 A pregnant woman presented with a vaginal discharge but with no further symptoms of infection. Her doctor collected a vaginal swab and submitted it to the diagnostic medical microbiology laboratory for analysis.
Study the slides below presenting the laboratory findings from the pregnant patient and then answer the questions.

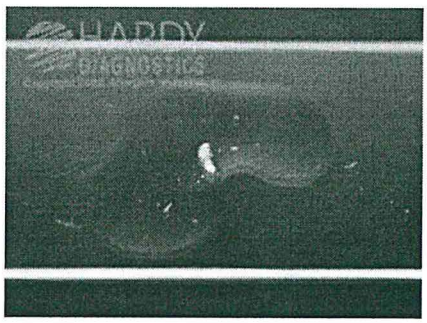
1) Gram stain result from the vaginal swab:



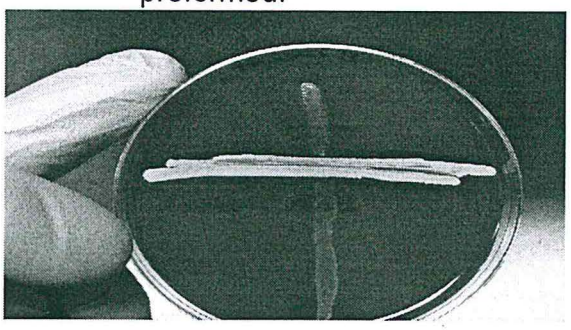
2) The culture from the vaginal swab on a blood agar after incubation.



2) Catalase test result:



4) Additional test that were preformed:



A) Report your findings on the gram-stained slide, presented in slide 1. [3]
B) Report your findings of the growth seen on slide 2. [2]
C) Report the catalase results from the test presented in slide 3. [1]
D) Identify the reagent used for the catalase test. [2]

E) Discuss the principle of the catalase test. [3]

F) Name the test that were done in slide 4, and by using a labelled illustration of the test, explain the principle of the test. [6]

QUESTION 7 [20]

7.1 Design a flow chart for the identification of gram-positive cocci. [20]

TOTAL: 100 MARKS