



**PAMIBIA UNIVERSITY**  
OF SCIENCE AND TECHNOLOGY

**FACULTY OF HEALTH, APPLIED SCIENCES AND NATURAL RESOURCES**  
**SCHOOL OF HEALTH SCIENCES**  
**DEPARTMENT OF CLINICAL HEALTH SCIENCES**

<b>QUALIFICATION : BACHELOR OF MEDICAL LABORATORY SCIENCES</b>	
<b>QUALIFICATION CODE: 08BMLS</b>	<b>LEVEL: 8</b>
<b>COURSE CODE: MMB611S</b>	<b>COURSE NAME: MEDICAL MICROBIOLOGY 2A</b>
<b>SESSION: JUNE 2023</b>	<b>PAPER: THEORY</b>
<b>DURATION: 3 HOURS</b>	<b>MARKS: 120</b>

<b>FIRST OPPORTUNITY EXAMINATION QUESTION PAPER</b>	
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<b>INSTRUCTIONS</b>
<ol style="list-style-type: none"><li>1. Answer ALL the questions.</li><li>2. Write clearly and neatly.</li><li>3. Number the answers clearly.</li></ol>

**PERMISSIBLE MATERIALS**

1. Calculator

**THIS QUESTION PAPER CONSISTS OF 9 PAGES (Including 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. For all **FALSE statement**, indicate that it is false **and provide a rationale**.

- 1.1 The outer rings of the basal body of bacterial flagella function as bearings, minimizing friction and leakage of materials from the cell at the points of flagellar insertion.
- 1.2 Clumping factor is a cell-associated substance that binds plasma fibrinogen, causing agglutination of the organisms by binding them together with aggregated fibrinogen.
- 1.3 A convalescent carrier is an individual who is incubating the pathogen in large numbers but is not yet ill.
- 1.4 The enzyme tryptophanase can be detected by oxidase test.
- 1.5 Malachite green in the Lowenstein Jensen medium enhances the growth of *Mycobacterium tuberculosis* and serves as a carbon source.
- 1.6 Classification of organisms is the process of systematically dividing them into groups, with species being the smallest and most definite level of division.
- 1.7 Phenols act by denaturing bacterial proteins and disrupting of bacterial cell membranes.

**QUESTION 2** [15]

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

- 2.1 Povidone-iodine is considered to be a
  - A) Iodophore.
  - B) Aldehyde.
  - C) Phenol.
  - D) Halogen.

(1)

- 2.2 Tyndallisation can be defined as:
- A) A method used to destroy certain micro-organisms in milk, other dairy products and alcoholic beverages
  - B) The material is heated to 62 °C for 30 minutes followed by rapid cooling.
  - C) Heating of the material at 90 to 100 °C for 30 minutes on each of 3 consecutive days and incubating the material at 37 °C in between.
  - D) Materials to be autoclaved are placed in an oven at a temperature of 160 - 170 °C for 2 – 3 hours. (1)
- 2.3 Potassium tellurite blood agar is:
- A) A selective media due the presence of the tellurite.
  - B) A differential media for *Corynebacterium diphtheriae*.
  - C) A differential media because of the presence of the tellurite
  - D) All of the above. (1)
- 2.4 The hook of bacterial flagella
- A) Is a ring structure attached to the cell membrane.
  - B) Permits the transmission of a rotary motion.
  - C) Minimize friction and leakage of material.
  - D) Able to alter the expressed antigenic type. (1)
- 2.5 The potassium hydroxide test yields
- A) A string formation for gram negative bacteria.
  - B) A string formation for gram positive bacteria.
  - C) Bubble production for gram positive bacteria.
  - D) Bubble production for gram negative bacteria. (1)

- 2.6 Extracellular coagulase is tested for by means of
- A) Tube coagulase test.
  - B) Slide coagulase test.
  - C) Both tube and slide coagulase.
  - D) Rapid thermonuclease test. (1)
- 2.7 The mode of action employed by quaternary ammonium compounds is:
- A) Disrupting of bacterial cell membranes.
  - B) Modifying of bacterial DNA.
  - C) Denaturing of bacterial proteins.
  - D) Inactivation of essential metabolic compounds. (1)
- 2.8 End stage kidney disease is associated with the presence of
- A) White cell casts.
  - B) Broad granular casts.
  - C) Red cell casts.
  - D) Waxy casts. (1)
- 2.9 Porin proteins can:
- A) Activate complement.
  - B) Stabilizes the cell wall.
  - C) Attach to the core polysaccharide.
  - D) Limit passage of many antimicrobial agents. (1)
- 2.10 Fluorophores lose their ability to fluoresce through:
- A) Exposure to strong acids.
  - B) Exposure to direct sunlight.
  - C) Exposure to strong alkalis.
  - D) When stored in a dark room. (1)

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- 2.11 Normal flora inhibit other bacteria through:
- A) the production of bacteriocins.
  - B) competing with potential pathogens for food and lodging site.
  - C) influencing clearing mechanisms to get rid of the pathogen.
  - D) All of the above. (1)
- 2.12 Iatrogenic infection can be defined as:
- A) An illness that can be transmitted from an external source to a patient.
  - B) An infection produced by medical interventions.
  - C) An illness that can be transmitted from patient to patient.
  - D) An illness caused by a replicating or multiplying of an external agent. (1)
- 2.13 The mode of action employed by quaternary ammonium compounds is:
- A) Denaturing of bacterial proteins.
  - B) Inactivation of essential metabolic compounds.
  - C) Disrupting of bacterial cell membranes.
  - D) Modifying of bacterial DNA. (1)
- 2.14 A bacterial colony can be explained as:
- A) a Pile or mass of a sufficiently large number of cells.
  - B) a Mass of cells growing on solid media.
  - C) Bacterial pile on solid media, visible to the naked eye.
  - D) All of the above. (1)
- 2.15 Organisms with flagella over the entire cell surface are termed
- A) Amphitrichous
  - B) Amphi-lophotrichous
  - C) Peritrichous
  - D) Lophotrichous (1)

**SECTION B**

**(55)**

**QUESTION 3**

**[17]**

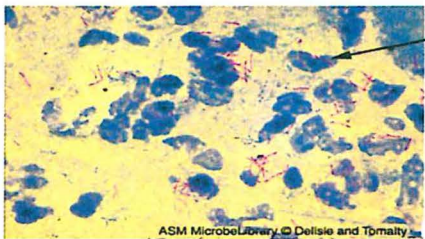
3.1 Illustrate by means of a drawing how the following crystals would look in a urine wet preparation.

- A) Calcium oxalate crystals. (1)
- B) Uric acid crystals. (1)
- C) Triple phosphate crystals. (1)
- D) Cystine crystals. (1)

3.2 Compare in a table form, the functions of selective, differential and enriched media. (4)

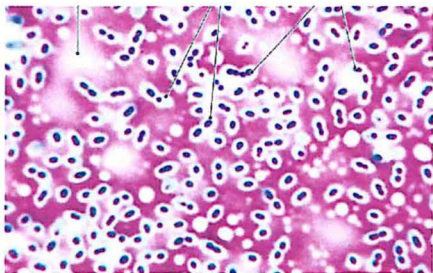
3.3 Match the following slides with the relevant stain used in the on it:

3.3.1



- A) Negative staining (1)
- B) Ziehl-Neelson stain (1)
- C) Shaeffer-Fulton (1)
- D) Capsule stain (1)

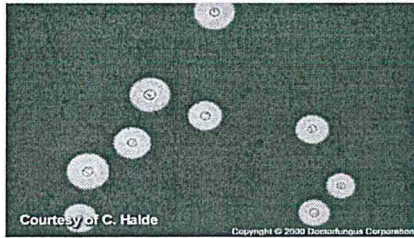
3.3.2



3.3.3



3.3.4



- 3.4 Judge the following statement by stating if it is true or false and defend your opinion. The epidermis is not a good environment for colonization. (5)

**QUESTION 4** [20]

- 4.1 A first year Medical Laboratory Sciences student was instructed to prepare culture media that will support the growth of *Haemophilus influenzae*.  
The student comes to you for advice, what would you tell him/her concerning the following.
- A) What culture media will support the growth of *Haemophilus influenzae*? (1)
  - B) Why will this medium support the growth of *Haemophilus influenzae*? (2)
  - C) What important steps are required to prepare this medium? (6)
- 4.2 Discuss the factors during specimen collection that could influence the quality of the final microbiology laboratory report that will be send to the doctor. (5)
- 4.3 Illustrate the different growth phases of bacteria by means of a graph. (6)

**QUESTION 5** [18]

- 5.1 Differentiate between the different phases during the bacterial growth curve. (8)
- 5.2 Explain the principle and the significance of the bile aesculin agar. (10)

**SECTION C** (40)**QUESTION 6** [23]

- 6.1 Compare (in a table form) and justify the gram reaction for gram positive and Gram negative bacteria. (11)
- 6.2 Compose a diagram with labels to illustrate the sporulation process. (12)

One mark allocated to each illustration and one mark allocated to each description.

**QUESTION 7** [17]

- 7.1 Illustrate the expected positive reactions on a DNase agar and explain the principle of a positive reaction that could be seen on a DNase agar plate. (12)



- 7.2 Evaluate the effectiveness of antimicrobial agent T by using the information provided below. (5)

Phenol Concentration	Growth after 5 minutes	Growth after 10 minutes	Growth after 15 minutes
1:25	+	-	-
1:50	+	-	-
1:75	+	-	-
1:100	+	+	-
1:150	+	+	+

Disinfectant T Concentration	Growth after 5 minutes	Growth after 10 minutes	Growth after 15 minutes
1: 200	+	-	-
1: 225	+	+	-
1:250	+	+	-
1:275	+	+	+
1:300	+	+	+

**TOTAL: 120 MARKS**