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: MMB611S	**COURSE NAME:** MEDICAL MICROBIOLOGY 2A
SESSION: JUNE 2022	**PAPER:** THEORY
DURATION: 3 HOURS	**MARKS:** 120

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 (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 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 70% Ethanol is a more effect antimicrobial agent than 95% ethanol.

1.2 *Streptococcus pneumoniae* contains active autocatalytic enzymes.

1.3 The declining growth phase of bacteria is the phase in which the bacterial cells die.

1.4 A bacterial urinary tract infection is completely ruled out by a negative nitrite dipstix result.

1.5 During mixed acid fermentation of bacterial cells, pyruvate is metabolized to a number of different products.

1.6 DNA-DNA hybridization has been most useful for comparing organisms at or below specie level.

1.7 Micro-organisms are always causing infection and should be eradicated.

QUESTION 2 [15]

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

2.1 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]

2.2 What organism would you expect to grow in reduced medium?
- A) Obligate anaerobes.
- B) Organisms that have a requirement for CO2 to grow.
- C) Aerobic organisms
- D) Organisms with a specific nutrient requirement. [1]

2.3 Heat resistance of bacterial endospores is believed to be due to
- A) Its very resistant cortex.
- B) Reduced amounts of water in the core of the spore itself.
- C) The shape of the endospore.
- D) The structure of the endospore membrane. [1]

2.4 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) *Streptococcus* infection acquired from an intravenous catheter.
- D) *E. coli* infection acquired from an intravenous catheter. [1]

2.5 Ketonuria is commonly associated with:
- A) Cushing's syndrome.
- B) Liver disease.
- C) Pancreatic disease.
- D) Starvation. [1]

2.6 Bile solubility testing is done by the use of
- A) Tryptophanase to check for enzymatic activity.
- B) Sodium deoxycholate as check for bile tolerance by the organism.
- C) Sodium deoxycholate as bile salt to detect autolytic activity of the bacteria.
- D) Tryptophanase to detect autolytic activity of the bacteria. [1]

2.7 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]

2.8 Potassium tellurite blood agar is used to identify
- A) Enterococcus species.
- B) *Corynebacterium diphtheria*.
- C) *Haemophillus influenza*.
- D) *Staphylococcus epidermidis*. [1]

2.9 Lithotrophic bacteria can be classified as
- A) Bacteria that is unable to use CO_2 as their sole source of carbon.
- B) Requires an organic form of carbon.
- C) Use CO_2 as its sole source of carbon.
- D) Bacteria that only survive in aquatic environments. [1]

2.10 The stationary phase of bacterial growth is when
- A) The growth ceases because of exhaustion of essential nutrients.
- B) The number of viable cells has plateaued, and the number of new organisms produced is equal to the number of cells dying.
- C) The cells begin to lyse and die.
- D) The growth and cell division occur at its maximum rates. [1]

2.11 The S layer of a bacterial cell
- A) Inhibit phagocytosis.
- B) Are associated with cell wall stability.
- C) Chelate small ions needed for cell function.
- D) Determine the bacterial cells competence. [1]

2.12 The cord factor of mycobacteria is
- A) Lipoaabinomannan.
- B) A soluble lipid.
- C) The muein layer of the cells.
- D) A unique mycolic acid. [1]

2.13 Enriched media can be defined as:
- A) Media that suppress the growth of specific bacteria.
- B) Media supporting the growth of obligate anaerobes.
- C) Media to which additional growth factors have been added.
- D) Media supporting the growth of different organisms with morphologically distinct colonies. [1]

2.14 Sanitization can be described as:
- A) Reduction of the microbial population to levels set by public health authorities.
- B) The prevention of sepsis.
- C) The process by which micro-organisms are killed.
- D) The process by which microbial spores are destroyed. [1]

2.15 The mode of action employed by quaternary ammonium compounds is:
- A) Inactivation of essential metabolic compounds.
- B) Modifying of bacterial DNA.
- C) Disrupting of bacterial cell membranes.
- D) Denaturing of bacterial proteins. [1]

SECTION B (39)

QUESTION 3 [11]

3.1 Match the following: **(1 mark each)**

3.1.1 Urinoid odour	A) Alkaline fermentation
3.1.2 Ammoniac odour	B) UTI infection
3.1.3 Urine with faecal smell	C) Normal urine
3.1.4 Pungent odour	D) Gastointestinal-bladder fistulas [4]

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

3.3 Show, with a drawing, what you would expect to see under the microscope for the following:

3.3.1 Gram negative diplococci. [1/2 x 2 = 1]

3.3.2 Gram positive bacilli. [1/2 x 2 = 1]

3.3.3 Gram variable coccobacilli. [1/2 x 2 = 1]

QUESTION 4 [10]

4.1 You need to culture a gastro-intestinal specimen for the most commonly isolated potential pathogens from this site.

4.1.1 Propose a medium that should be used. [1]

4.1.2 Classify the type of medium you proposed. [2]

4.1.3 Defend why the medium have these properties. [7]

QUESTION 5 [18]

5.1 Discuss bacterial nitrate reactions. [8]

5.2 Explain the principle and the significance of the bile aesculin agar. [10]

SECTION C (56)

QUESTION 6 [20]

6.1 Categorise the following media under indicator, selective and/or differential media.

6.1.1 Cystine Lactose Electrolyte Deficient media.

6.1.2 Mannitol Salt agar.

6.1.3 Nagler medium.

6.1.4 Potassium tellurite blood agar. [7]

6.2 Propose universal safety precautions that need to be considered when working in a diagnostic medical laboratory. [8]

6.3 Evaluate the necessity of transmembrane proteins in bacterial cells. [5]

QUESTION 7 [36]

7.1 Predict how a pathogenic organism can evade the defence systems of the host. [6]

7.2 Defend why Thiosulphate Citrate Bile Sucrose agar is a selective and differential culture media. [7]

7.3 Compose a diagram with labels to illustrate the sporulation process. [12]

7.4 Formulate a standard operating procedure for the preparation of sterile blood agar plates. [11]

TOTAL: 120 MARKS