

CANDIDATE NUMBER.....



"Investing in Africa's Future"

**COLLEGE OF HEALTH, AGRICULTURE & NATURAL
SCIENCES**

**DEPARTMENT OF BIOMEDICAL AND LABORATORY SCIENCES
BACHELOR OF MEDICAL LABORATORY SCIENCES HONOURS**

NSLS 204 BACTERIOLOGY THEORY EXAMINATION

END OF SEMESTER EXAMINATIONS

NOVEMBER 2023

LECTURER: MR G.B HLEREMA

DURATION: 3 HOURS

INSTRUCTIONS

The paper comprises of three sections (A, B and C).

Section A (20 marks)

Answer all questions in this section.

Circle the correct answer

Section B (20 marks)

Answer all questions in this section.

Section C (60 marks)

Choose **three** questions. Credit will be given for logical, systematic and neat presentations.

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SECTION A: CIRCLE THE CORRECT ANSWER [20 MARKS]

1. Who is known as the father of Microbiology

- A. Edwin John
- B. Robert Koch
- C. Ferdinand Cohn
- D. Anton Van Leeuwenhoek

2. Peptidoglycan accounts for _____ of the dry weight of cell wall in many gram positive bacteria.

- A. About 10%
- B. 11%+ 0.22%
- C. 50% or more
- D. About 20%

3. Each of the following statements concerning the Gram stain is correct except:

- A. *Escherichia coli* stains pink because it has a thin peptidoglycan layer
- B. *Streptococcus pyogenes* stains blue because it has a thick peptidoglycan layer
- C. *Mycoplasma pneumoniae* is not visible in the Gram's stain because it does not have a cell
- D. *Mycobacterium tuberculosis* stain blue because it has a thick lipid layer

4. Which of the following is true about cell wall of gram-positive bacteria?

- A. It consists of multiple layers
- B. It is thicker than that associated with gram-negative bacteria
- C. It contains teichoic acids
- D. All of these

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5. The identification of bacteria by serologic tests is based on the presence of specific antigens.

Which of the following bacterial components is least likely to contain useful antigens?

- A. Capsule
- B. Cell wall
- C. Flagella
- D. Ribosomes

6. The organism which grows best above 45°C are called

- A. Psychrophilic
- B. Mesophilic
- C. Thermophilic
- D. Any of these

7. Which of the following is/are not gram-positive bacteria?

- A. Streptococci
- B. Pseudomonas
- C. Mycobacteria
- D. None of these

8. Which of the following is used for the proper maintenance and preservation of pure cultures?

- A. Periodic transfer to fresh media
- B. Preservation by overlaying cultures with mineral oil
- C. Preservation by lyophilization
- D. All of the above

9. Catalase production is negative in which of the following?

- A. Streptococcus
- B. Salmonella
- C. Proteus
- D. Staphylococcus

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10. The production of sufficient acid by fermentation of glucose leads to decrease in pH such that pH of the medium falls below 4.5. Which of the following test can detect it?

- A. Indole test
- B. Methyl red test
- C. Citrate utilization test
- D. Voges-Proskauer test

TRUE (T) OR FALSE (F) QUESTIONS CIRCLE THE CORRECT ANSWER [10 MARKS]

11. The coagulase test is used to differentiate

- T F A. Staphylococcus epidermidis from Neisseria meningitidis
- T F B. Staphylococcus aureus from Staphylococcus epidermidis
- T F C. Streptococcus pyogens from Staphylococcus aureus
- T F D. Streptococcus pyogens from Enterococcus faecalis

12. The role of bacterial capsules as virulence factors is usually related to their ability to interfere with

- T F A. Antibody binding
- T F B. Antibacterial penetration of bacterial cells
- T F C. Phagocytosis
- T F D. The release of interferon gamma and other macrophage activating cytokines

13. The molecular basis for the effect of cholera toxin on duodenal mucosal cells is

- T F A. Activation of adenylate Cyclase
- T F B. increased generation of cyclic adenosine monophosphate (cAMP)
- T F C. Ribosylation of a guanosine triphosphate (GTP) binding protein.

14. A patient develops explosive, watery diarrhea 24 hours after eating seafood. What bacterium is most likely involved?

- T F A. Campylobacter fetus

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- T F B. *Salmonella typhimurium*
- T F C. *Shigella flexneri*
- T F D. *Vibrio cholera*

15. Which of the following bacteria is rarely associated with urinary tract infections?

- T F A. *Escherichia coli*
- T F B. *Enterobacter spp*
- T F C. *Proteus spp*
- T F D. *Shigella spp*

16. Which of the following bacteria is the most important cause of acute bacterial meningitis?

- T F A. *Neisseria meningitidis*
- T F B. *Streptococcus pneumoniae*
- T F C. *Haemophilus influenzae*
- T F D. *Streptococcus pyogenes*

SECTION B: SHORT ANSWERS [20 MARKS]

Answer all questions in this section

B1. (i) Name the space found between inner membrane and outer membrane in gram negative bacterial cell wall and state its function. (3)

B2. Describe the four stages in bacterial growth curve giving reasons for each stage (7)

B3 Tuberculosis (TB) is an important infectious disease in sub Saharan Africa.

Which organism causes TB? (1)

What virulence factors are associated with the pathogenicity of the causative organism (3)

Explain the structure of the cell wall for the causative organism (6)

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SECTION C: SHORT ANSWERS [60 MARKS]

Choose three questions in this section

C1. a) What contribution was made by Louis Pasteur and Robert Koch to the world of bacteriology? (5)

b) Describe the following terms used in bacteriology

(i) Gram stain (3)

(ii) Endospore (3)

(iii) Transformation (3)

(iv) Transduction (3)

(v) Conjugation (3)

C2. Write an essay on culture media, explaining the uses of different types of culture media in bacteriology (20).

C3. What do you understand by bacterial toxins? (20).

C4. Describe the steps you would take to investigate the etiology of wound infection from a wound swab (20).

C5. Describe the steps you would take to investigate the etiology of bacterial pneumonia from a throat swab (20)