# UNIVERSITY OF NAMIBIA

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| **FACULTY** | HEALTH SCIENCES AND VETERINARY MEDICINE | | |
| **SCHOOL** | VETERINARY MEDICINE | | |
| **DEPARTMENT** | PARACLINICAL | | |
| **PROGRAMME** | VETERINARY MEDICINE | | |
| **MODULE** | VETERINARY MICROBIOLOGY II | | |
| **MODULE CODE** | V3611EM | | |
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| **DURATION** | **3 HOURS** | **MARKS** | **150** |

## SECOND OPPORTUNITY EXAMINATION

**Examiners:** Prof. C. Ntahonshikira, Prof. S. Khaiseb & Dr. L. Mwense
**Internal Moderator:** Dr. M.Y. Hemberger
**External Moderator:** Prof. B. Namangala

**This Paper consists of SEVEN (7) pages including the front page**

***Instructions***

1. **Read the questions carefully**
2. **Answer all questions**
3. **Write clearly and concisely**
4. **Hand in this question paper together with the answer booklet**
5. **Additional material to be supplied: None**

**SECTION A: MULTIPLE CHOICE QUESTIONS** **[20 marks]**

**Choose the correct answer.** **[20 marks, 1 mark for each correct answer]**

1. The viable bacterial count is:
    a. The total living bacteria in a sample.
    b. The total living and dead bacteria in a sample.
    c. The total bacteria in log phase of growth curve.
    d. The total dead, but intact bacteria in a sample.

2. The following statements are true except:
    a. nutrients are converted into cell substances like DNA, RNA, proteins, enzymes, etc. and the cell elongates.
    b. An inwards growth of cytoplasmic membrane at the middle of the cell
    c. An inward growth of cell wall to form a septum
    d. The new transverse membrane and cell wall grow outwardly
    e. The nuclei is doubled and distributed equally to two daughter cells and the process of binary fission is completed by formation of two new cells.

3. In carriers, staphylococci are found in the following cites except:
    a. Skin
    b. Nose
    c. Throat
    d. Tears

4. Examination of bacterial cultures by hanging drop preparation indicates:
    a. Shapes of bacteria
    b. Bacterial cell arrangement
    c. Motility
    d. Sizes of bacteria

5. Select one of the following staphylococcal enzymes that activates plasma plasminogen system:
    a. Coagulase
    b. Staphylokinase
    c. Lipase
    d. Hyaluronidase

6. The following conditions will be found in the stationary phase except:
    a. There is exhaustion of nutrients in the medium
    b. There is accumulation of toxic substances
    c. Fresh multiplication of bacteria stops completely
    d. There is high density of bacteria in a given space
    e. The number of bacteria per ml is higher than in the log phase

7. Which of the following method can be used to determine the number of bacteria quantitatively?
   a) Spread-plate
   b) Streak-plate
   c) Pour-plate and spread plate
   d) Pour plate

8. Fluorescence microscopy is especially useful in diagnosing:
   a. Tuberculosis
   b. Rabies
   c. Malaria
   d. Brucellosis

9. Brucella is best described as:
   a. Gram-positive rod
   b. Gram-negative coccobacillus
   c. Acid-fast bacillus
   d. Spirochete

10. Chinese letter arrangement and metachromatic granules are features of which organism?
   a. *S. aureus*.
   *b. Bacillus anthracis*
   *c. Corynebacterium* spp.
   d. *Streptococcus* spp.

11. Which of the following is an enrichment medium?
   a. Blood agar
   b. MacConkey agar
   c. Selenite F broth
   d. Nutrient agar

12. Bacteria are most susceptible to antibiotics during which phase of growth?
   a. Lag phase
   b. Log (exponential) phase
   c. Stationary phase
   d. Death phase

13. Which of the following statements about *Mannheimia haemolytica* is correct?
   a. It is a harmless environmental bacterium that does not cause disease in cattle
   b. It is the primary bacterial agent responsible for bovine pneumonic pasteurellosis (shipping fever)
   c. It mainly causes mastitis in cattle
   d. It is not associated with bovine respiratory disease

14. What is the primary mechanism by which non-enveloped viruses enter a host cell?
   a) Active transport across the cell membrane
   b) Direct fusion with the plasma membrane
   c) Receptor attachment and release of viral nucleic acids
   d) Endocytosis, forming a vesicle

15. Which process involves the breakdown of the viral capsid to release nucleic acids?
    a) Uncoating
    b) Budding
    c) Endocytosis
    d) Fusion

16. What is the key function of the viral proteins produced during the replication of double-stranded DNA viruses?
    a) They code for new viral mRNA.
    b) They form part of the new viral capsids.
    c) They modify the host's DNA.
    d) They inhibit the host's RNA polymerase

17. What is the major difference between positive-sense and negative-sense single-stranded RNA viruses?
    a) Only negative-sense viruses produce viral proteins.
    b) Positive-sense RNA can be directly translated, while negative-sense RNA needs to be transcribed first.
    c) Only positive-sense viruses can infect humans.
    d) Negative-sense viruses possess a double stranded RNA.

18. The presence of meso-diaminopimelic acid in the cell wall is important for:
    a. Capsule formation
    b. Cell wall structure
    c. Flagella formation
    d. Toxin production

19. Campylobacter spp. are:
    a. small, curved, motile, gram-positive bacilli
    b. small, curved, motile gram-negative bacilli
    c. small, curved, nonmotile, gram-negative bacilli
    d. small, curved, nonmotile, gram-negative bacilli

20. *Helicobacter pylori* may be identified presumptively by the following positive tests:
    a. NO3, hippurate, catalase
    b. Oxidase, indoxyl acetate, NO3
    c. Oxidase, catalase, rapid urea
    d. NO3, catalase, growth at 25° C

**SECTION B: TRUE/FALSE QUESTIONS AND FILL IN/COMPLETE SENTENCES** **[40 marks]**

I. State whether the following statements are TRUE or FALSE; where they are wrong, give the correct version. [20 marks, 1 mark for True or False + 1 mark for the correct answer in the case of a False answer]

1. Stained bacterial smears count only dead bacteria.
2. Most *Streptococcus* species are catalase positive.

3. *Bacillus* and *Clostridium* species are spore-forming and anaerobic bacteria.
4. Mycotic diseases are synonymous to fungal diseases
5. *Listeria monocytogenes* can cross the blood-brain barrier.
6. *Corynebacterium diphtheriae* is a spore-forming bacterium.
7. *Listeria monocytogenes* produces a wide zone of beta haemolysis similar to streptococci.
8. *Rhodococcus* equi causes pneumonia in foals.
9. Aeromonas is commonly associated with freshwater systems.
10. Some species of Nocardia produce aerial filaments when cultured.
11. *Helicobacter* pylori causes gastritis, peptic ulcer disease, and gastric cancer.
12. Chlamydiae possess cell wall, resembling Gram-negative bacteria but lacking muramic acid.
13. Clostridium and Bacillus species cause soil infections.
14. Fungal spores frequently contaminate bacterial cultures in the microbiology laboratory.
15. Mycoplasmas are the most important contaminants cell cultures destined for virus propagation.

**II. FILL IN/COMPLETE THE FOLLOWING SENTENCES. [20 marks, 1 mark for each correct answer]**

1. Streptococcus species are _____; they hence require the addition of _____ to the culture media for their optimal growth.
2. 
3. Leptospires are present in _____ and are excreted in _____, often for several months.
4. The time interval required for a bacterial cell to divide is known _____.
5. Cultures to be discarded should be discarded by _____.
6. The function of mitochondria in eucayotes is taken up by _____ in procaryotes.
7. _____- is the commonest method of testing antibiotic sensitivity of bacteria
8. Examination of bacterial cultures by hanging drop preparation is indicated to test for _____.
9. _____- is a good low-level disinfectant agent when used in concentrations of 3% or lower.
10. Sabouraud's medium is used for the selective culture of _____.
11. _____ fungal infections are the most serious infecions.
12. Swine erysipelas is caused by _____.
13. *Mannheimia is* associated with _____ Complex in cattle.
14. Exotoxins are mostly excreted by _____
15. _____ growth of *Dermatophilus congolensis* shows transverse septation.
16. _____ is the process by which a virus uses host machinery to produce new virions.
17. RNA viruses may use their RNA directly as _____.
18. The process of converting RNA into DNA is known as _____.
19. *Bordetella avium* and *B. bronchiseptica* are motile by _____.

**SECTION C: SHORT ANSWER QUESTIONS. [40 marks]**

**Question 1.** Name three important bacterial and fungal genera which produce most of antibiotics. [3]

**Question 2**. You are observing colonies of bacteria that grew on MacConkey agar, give three (3) basic information that you could report from your observations. [3]

**Question 3.**

Name two (2) methods that are used to estimate the total and viable counts of bacteria. [2]

**Question 4**. Name two veterinary important species of Chlamydia and the diseases they cause. [4]

**Question 5.** Clinically classify fungal diseases based on the localization of infection (relative to skin surface). [4]

**Question 6.**

a. Name the characteristic type of colony produced by *Rhodococcus equi* on blood agar. [1]

b. Campylobacter agar used for the isolation of *Campylobacter jejuni* from fecal or rectal swabs contains three important components. List these three components. [3]

**Question 7.** [7]

a. List three clinical symptoms caused by *Pasteurella* infections in animals and humans. [3]

b. List four morphological and growth characteristics of *Dermatophilus congolensis?* [4]

**Question 8**

**a.** Outline three (3) key points/features of members of the family Enterobacteriaceae. [3]

**b.** Name three (3) genera belonging to the family Enterobacteriaceae other than *Escherichia*, *Salmonella* and *Shigella*. [3]

**SECTION C: STRUCTURED QUESTIONS** **[50 MARKS]**

**Question 1.**

a. Other than required nutrients, name five (5) environmental factors that Influence microbial growth. [5]

b. Name two (2) routine and three (3) advanced methods that can be used to test for a bacterial isolate's sensitivity to different antibiotics. [5]

**Question 2.** **[5]**

Outline the inappropriate use (misuse) of antibiotics. [5]

**Question 3.**

Discuss the staining techniques used in the laboratory diagnosis of *Corynebacterium pseudotuberculosis* and their microscopic features. [6]

**Question 4.** Describe the growth characteristics of the genus *Bibersteinia*, focusing on the following aspects: [9]

**Question 5.** Describe the transmission of respiratory and enteric viruses. [5]

**Question 6**. Indicate seven diagnostic methods that can be used for the detection of viral diseases. [7]

**Question 7.** Virulence depends on various factors; indicate all of them. [7]

**END OF EXAM PAPER**