



(University of Choice)

**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)**

MAIN CAMPUS

**UNIVERSITY EXAMINATIONS
2019/2020 ACADEMIC YEAR**

**SECOND YEAR, FIRST SEMESTER EXAMINATIONS
FOR THE DEGREE
OF
BACHELOR OF MEDICAL LABORATORY SCIENCE
(DIRECT & WEEKEND PROGRAMME)**

COURSE CODE: BML 212

COURSE TITLE: INTRODUCTION TO MEDICAL MICROBIOLOGY

DATE:

TIME:

INSTRUCTIONS TO CANDIDATES

Instructions to Candidates
Answer All Questions

Section A: Multiple Choice Questions (MCQ)	20 Marks.
Section B: Short Answer Questions (SAQ)	40 Marks.
Section C: Long Answer Question (LAQ)	60 Marks

TIME: 2Hours

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 4 Printed Pages. Please Turn Over.

BML 212: INTRODUCTION TO MEDICAL MICROBIOLOGY

Section A: Multiple Choice Questions (MCQ)

20 Marks

1. Which of the following structures is not part of the bacterial cell envelope?
 - (A) Peptidoglycan
 - (B) Lipopolysaccharide
 - (C) Capsule
 - (D) Gas vacuole
2. Which of the following components is present in gram-negative bacteria but not in gram-positive bacteria?
 - (A) Peptidoglycan
 - (B) Lipid A
 - (C) Capsule
 - (D) Flagella
3. Which of the following components is present in gram-positive bacteria but not in gram-negative bacteria?
 - (A) Peptidoglycan
 - (B) Capsule
 - (C) Flagella
 - (D) Teichoic acid
4. The DNA polymerase from *Thermus aquaticus* is an important component of DNA amplification methods such as the polymerase chain reaction. This organism is capable of growing at temperatures above 100°C. Organisms that are capable of growth at these temperatures are referred to as
 - (A) Mesophiles
 - (B) Psychrophiles
 - (C) Halophiles
 - (D) Thermophiles
5. The action of which of the following agents or processes on bacteria can be reversed?
 - (A) A disinfectant
 - (B) A bactericidal agent
 - (C) A bacteriostatic agent
 - (D) Autoclaving at 121°C for 15 minutes
6. The growth rate of bacteria during the exponential phase of growth is
 - (A) Zero
 - (B) Increasing
 - (C) Constant
 - (D) Decreasing
7. Most microorganisms pathogenic for humans grow best in the laboratory when cultures are incubated at
 - (A) 15–20°C
 - (B) 20–30°C
 - (C) 30–37°C
 - (D) 38–50°C
8. Which of the following terms best describes a microorganism that grows at 4-20°C?
 - (A) Neutrophile
 - (B) Psychrophile

- (C) Mesophile
(D) Osmophile
9. The first microorganism to satisfy Koch's postulates (in the late 19th century) was
(A) *Treponema pallidum*
(B) *Stenotrophomonas maltophilia*
(C) *Mycobacterium leprae*
(D) *Bacillus anthracis*
10. Which statement regarding fungi is correct?
(A) All fungi are able to grow as yeasts and molds.
(B) Although fungi are eukaryotes, they lack mitochondria.
(C) Fungi are photosynthetic.
(D) Fungi have one or more nuclei and chromosomes.
11. An 8-year-old boy develops a circular dry, scaly, and pruritic lesion on his leg. What is the diagnostic significance of observing branching, septate, nonpigmented hyphae in a potassium hydroxide/calcofluor white preparation of a scraping from this skin lesion?
(A) Chromomycosis
(B) Dermatophytosis
(C) Phaeoerythromycosis
(D) Sporotrichosis
12. Which statement regarding the epidemiology of candidiasis is correct?
(A) Patients receiving bone marrow transplants are not at risk for systemic candidiasis.
(B) Patients with impaired or low numbers of neutrophils and monocytes are not at risk for systemic candidiasis.
(C) Patients with any form of diabetes have enhanced resistance to candidiasis.
(D) Patients with AIDS frequently develop mucocutaneous candidiasis, such as thrush.
13. Which statement regarding the laboratory identification of fungi is correct?
(A) *Histoplasma capsulatum* typically requires less than 48 hours of incubation to yield positive cultures from clinical specimens.
(B) Since many saprobic (nonpathogenic) molds resemble dimorphic mycotic agents in culture at 30°C, the identification of putative dimorphic pathogenic fungi must be confirmed by conversion to the tissue form in vitro or by the detection of species-specific antigens or DNA sequence analysis.
(C) Molds are routinely speciated by a battery of physiologic tests, such as the ability to assimilate various sugars.
(D) A positive germ tube test provides a rapid presumptive identification of *Candida glabrata*.
14. A 28-year-old female sex worker from western Kenya complained of headaches, dizziness, and occasional episodes of "spacing out" during the past 2 weeks. A lumbar puncture revealed reduced sugar, elevated protein, and 450 mononuclear leukocytes per milliliter. She was seropositive for HIV. Her history is compatible with fungal meningitis due to *Cryptococcus neoformans*, *Coccidioides posadasii*, or a species of *Candida*. Which one of the following tests is confirmatory?
(A) Meningitis due to *Coccidioides posadasii* would be confirmed by a positive test of the CSF for cryptococcal capsular antigen.

- (B) Meningitis due to *Cryptococcus neoformans* would be confirmed by a positive test of the CSF for complement fixation antibodies to coccidioidin.
- (C) Meningitis due to a species of *Candida* would be confirmed by the microscopic observation of oval yeast cells and pseudohyphae in the CSF.
- (D) Meningitis due to *Coccidioides posadasii* would be confirmed by a positive skin test to coccidioidin.
15. Which statement regarding sporotrichosis is correct?
- (A) The most common etiologic agent is *Pseudallescheria boydii* (*Scedosporium apiospermum*).
- (B) The etiologic agent is a dimorphic fungus.
- (C) The ecology of the etiologic agent is unknown.
- (D) Most cases are subcutaneous and nonlymphangitic.
16. Which statement regarding dermatophytosis is correct?
- (A) Chronic infections are associated with zoophilic dermatophytes, such as *Trichophyton rubrum*.
- (B) Acute infections are associated with zoophilic dermatophytes, such as *T rubrum*.
- (C) Chronic infections are associated with anthropophilic dermatophytes, such as *T rubrum*.
- (D) Acute infections are associated with anthropophilic dermatophytes, such as *T rubrum*.
17. Which statement regarding paracoccidiomycosis is not correct?
- (A) The etiologic agent is a dimorphic fungus.
- (B) Most patients acquired their infections in South America.
- (C) The vast majority of patients with active disease are males.
- (D) The etiologic agent is inherently resistant to amphotericin B.
18. Which one of the following antifungal drugs does not target the biosynthesis of ergosterol in the fungal membrane?
- (A) Itraconazole
- (B) Terbinafine
- (C) Fluconazole
- (D) Micafungin
19. Which one of the following pathogenic yeasts is not a common member of the normal human flora or microbiota?
- (A) *Candida tropicalis*
- (B) *Malassezia globosa*
- (C) *Cryptococcus neoformans*
- (D) *Candida glabrata*
20. Which of the following statements regarding virus morphology is true?
- (A) All RNA viruses are spherical in shape.
- (B) Some viruses contain flagella.
- (C) Some viruses with DNA genomes contain a primitive nucleus.
- (D) Viral surface proteins protect the viral genome from nucleases.

Section B: Short Answer Questions (SAQ)**40 Marks.**

1. Highlight on the contributions made by the following scientist in the history of microbiology (4 marks)
 - A) Anton Van Leeuwenhoek (1632-1723)
 - B) Edward Jenner (1749 - 1823).
 - C) Lina Hesse (1881)
 - D) Louis Pasteur (1822-1895)
2. Highlight on 4 conditions that must be satisfied for a micro-organism to be accepted as a causative agent of an infectious disease according to Robert Koch's postulates (4 marks)
3. Give four differences between prokaryotes and eukaryotes (4 marks)
4. State four functions of a bacterial cytoplasmic membrane (4 marks)
5. Spores or endospores are inactive bacterial cells formed in response to certain adverse nutritional conditions. Give four more features of spores (4marks)
6. Give the gram reaction / appearance of the following bacterial species (4marks)
 - A) *Neisseria. gonorrhoeae*
 - B) *Streptococcus. pyogenes*
 - C) *Bacillus. anthracis*
 - D) *Vibrio. Cholera*
7. A large number of biochemical tests are available which help in identifying the bacteria. Highlight on 4 groups in which these tests can be classified and give an example of a test under each group (4marks)
8. Define a culture medium and explain 3 plating techniques used in isolation of a single cell progeny/ pure culture (4marks)
9. Microbiological Media is classified into five classes depending entirely on the ingredients the media contains and what types of micro-organisms are capable of growing in it. Give 4 classes of media(4marks)
10. Explain characteristics of the following media used to cultivate bacteria (4marks)
 - i. Blood agar
 - ii. Chocolate agar
 - iii. MacConkey agar
 - iv. Nutrient agar

Section C: Long Answer Question (LAQ)**60 Marks**

1. Give an account of gram staining method, in terms of the principle, required reagents, test procedure and give the results interpretation (20 marks).
2. Discuss the five classes of microbiological media by way of defining the class, use, examples in each class and bacteria that can grow in it (20 marks)
3. Discuss sterilization by autoclaving procedure. Explain the Mechanisms of microbial inactivation, drawbacks and cautions to be observed (20marks)