

UNIVERSITY OF FORT HARE

MICROBIOLOGY
MCB212E

MAIN /SEMESTER EXAMINATION MAY/JUNE

2025

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Time: 3 HOURS

Subject: MCB212E

Marks: 100

This paper consists of 10 pages including the cover page

Internal Examiners

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INSTRUCTIONS

This question paper consists of three sections (A, B, C) and all questions are compulsory. Answer on answer book for each question on the Exam paper. Submit answer book at the end of the examination. Please write clearly and legibly

SECTION A: MULTIPLE CHOICE QUESTIONS – 40 MARKS

1. Which of the following is a prokaryotic microorganism?
 - a) Virus
 - b) Bacterium
 - c) Fungus
 - d) Protozoan
2. Which scientist is known as the Father of Microbiology?
 - a) Robert Koch
 - b) Louis Pasteur
 - c) Alexander Fleming
 - d) Joseph Lister
3. The study of fungi is known as:
 - a) Virology
 - b) Mycology
 - c) Bacteriology
 - d) Parasitology
4. Viruses are considered non-living because:
 - a) They have no DNA
 - b) They cannot reproduce outside a host cell
 - c) They do not contain proteins
 - d) They have a nucleus
5. Which of the following structures is present in bacteria but not in human cells?
 - a) Mitochondria
 - b) Nucleus
 - c) Peptidoglycan cell wall
 - d) Endoplasmic reticulum
6. A disease that spreads from one person to another is called:
 - a) Chronic
 - b) Non-communicable
 - c) Infectious
 - d) Genetic
7. Which of the following is a vector-borne disease?
 - a) Tuberculosis
 - b) Malaria
 - c) Influenza
 - d) Tetanus

8. The first line of defence in the immune system includes:
- a) White blood cells
 - b) Antibodies
 - c) Skin and mucous membranes
 - d) T-cells

9. The main role of macrophages in immunity is:
- a) To destroy red blood cells
 - b) To secrete antibodies
 - c) To engulf and digest pathogens
 - d) To produce toxins

10. Which of the following is an example of active immunity?
- a) A baby receiving antibodies through breast milk
 - b) A person receiving a tetanus shot after injury
 - c) A person recovering from chickenpox
 - d) A patient receiving an antibody injection

11. Autoimmune diseases occur when the immune system:
- a) Fails to recognize self and attacks the body's own cells
 - b) Becomes too weak to fight infections
 - c) Reacts only to bacterial infections
 - d) Develops antibodies against viruses

12. The function of B-cells in the immune system is to:
- a) Attack infected cells directly
 - b) Produce antibodies
 - c) Secrete histamines
 - d) Release cytokines

13. The four cardinal signs of inflammation include:
- a) Fever, chills, pain, swelling
 - b) Redness, heat, swelling, pain
 - c) Nausea, vomiting, headache, fever
 - d) Cough, pain, fatigue, rash

14. Inflammation is triggered by:
- a) Bacterial infections only
 - b) Tissue injury or infection
 - c) Low blood sugar
 - d) Excess antibody production

15. The chemical mediator responsible for allergic reactions is:
- Histamine
 - Insulin
 - Haemoglobin
 - Adrenaline
16. Anaphylaxis is a severe form of:
- Bacterial infection
 - Inflammatory response
 - Hypersensitivity reaction
 - Autoimmune disorder
17. Which of the following is an example of a Type IV hypersensitivity reaction?
- Asthma
 - Tuberculosis skin test (Mantoux test)
 - Anaphylactic shock
 - Blood transfusion reaction
18. Which of the following is an example of a Type I hypersensitivity reaction?
- Contact dermatitis
 - Rheumatoid arthritis
 - Food allergy
 - Poison ivy rash
19. The main purpose of sterilization in healthcare is to:
- Remove visible dirt
 - Kill all microorganisms, including spores
 - Reduce bacterial count
 - Inactivate viruses only
20. Autoclaving uses which method of sterilization?
- Chemical disinfection
 - Dry heat
 - Moist heat under pressure
 - Filtration
21. Which of the following is a high-level disinfectant?
- Alcohol
 - Hydrogen peroxide
 - Phenol
 - Soap

22. Which type of radiation is commonly used for sterilization?
- Ultraviolet (UV) radiation
 - Infrared radiation
 - Gamma radiation
 - Microwave radiation
23. Which of the following best describes aseptic technique?
- A method to kill all bacteria
 - A method to prevent contamination
 - A method for treating bacterial infections
 - A method for culturing viruses
24. Tuberculosis is caused by:
- Streptococcus pneumoniae*
 - Mycobacterium tuberculosis*
 - Escherichia coli*
 - Salmonella typhi*
25. Which bacterial infection is commonly acquired in hospitals (HAI)?
- Common cold
 - MRSA (Methicillin-resistant *Staphylococcus aureus*)
 - Measles
 - Influenza
26. The common cold is caused by:
- Bacteria
 - Fungi
 - Rhinoviruses
 - Protozoa
27. Which viral infection is preventable with a vaccine?
- HIV/AIDS
 - Hepatitis B
 - Common cold
 - Dengue fever
28. The vector responsible for transmitting malaria is:
- Housefly
 - Tick
 - Anopheles mosquito
 - Lice

29. A patient with watery diarrhoea after drinking contaminated water may have:

- a) Influenza
- b) *Vibrio cholerae* infection
- c) Chickenpox
- d) *Aspergillus* infection

30. The most common parasitic infection worldwide is:

- a) Malaria
- b) Tuberculosis
- c) Pneumonia
- d) Influenza

31. A fungal infection of the skin is known as:

- a) Tinea (ringworm)
- b) Tuberculosis
- c) Syphilis
- d) Hepatitis

32. Thrush (oral candidiasis) is caused by:

- a) *Aspergillus*
- b) *Candida albicans*
- c) *Cryptococcus neoformans*
- d) *Trichomonas vaginalis*

33. A major risk factor for developing a fungal infection is:

- a) High blood pressure
- b) Immunosuppression
- c) Dehydration
- d) High sugar intake

34. Which of the following is an opportunistic fungal infection?

- a) Measles
- b) HIV/AIDS
- c) Candidiasis
- d) Influenza

35. Which of the following is an example of a viral infection?

- a) Tuberculosis
- b) Measles
- c) Malaria
- d) Ringworm

36. What is the primary function of antibiotics?

- a) To kill viruses
- b) To kill fungi
- c) To kill bacteria
- d) To increase the immune response

37. Which of the following is NOT a characteristic of Gram-negative bacteria?

- a) Thin peptidoglycan layer
- b) Stains pink with Gram stain
- c) Outer lipid membrane
- d) No cell wall

38. The term "pandemic" refers to a disease that:

- a) Affects only animals
- b) Affects many people in a specific geographic area
- c) Occurs in a population regularly
- d) Affects large populations across multiple countries or continents

39. Which type of infection is caused by a helminth?

- a) Tuberculosis
- b) Malaria
- c) Ascariasis
- d) Chickenpox

40. Which of the following is a fungal infection that commonly affects immunocompromised individuals?

- a) Candidiasis
- b) Hepatitis
- c) Streptococcal pharyngitis
- d) Influenza

SECTION B: SHORT QUESTIONS – 40 MARKS

1. Define the term microorganism and give two examples of beneficial microorganisms. (2)
2. What is the difference between aerobic and anaerobic bacteria? Provide an example of each. (2)
3. Explain the role of normal flora in the human body and how it helps in preventing infections. (2)
4. Describe the significance of Koch's postulates in understanding infectious diseases. (2)
5. What are vectors and give two examples of diseases transmitted by vectors. (2)
6. Briefly describe the phagocytosis process in the immune response. (2)
7. Explain the difference between natural immunity and artificial immunity. Provide an example of each. (4)
8. Give the temperature and morphology types of a dimorphic fungi. (2)
9. What is the role of antibodies in the immune response? (2)
10. Define inflammation and describe its purpose in the body. (2)
11. What is the difference between acute inflammation and chronic inflammation? (2)
12. Name and briefly describe the four types of hypersensitivity reactions. (4)
13. Define sterilization and explain why it is important in a healthcare setting. (2)
14. List two methods of disinfection and give an example of when each method is used. (2)
15. What is the difference between disinfection and antiseptics? (2)
16. Give the reproduction cycle of HIV in a CD4 cell. (6)

SECTION C: CASE STUDY – 20 MARKS

Case Study: Infection Management in a Diabetic Patient

Background:

Mrs. Mayo, a 52-year-old diabetic woman, presents to the hospital with complaints of a painful swelling on her left foot. She mentions that the swelling started a week ago and has progressively worsened. The area is warm, red, and tender, and she reports feeling feverish. She is also concerned about a recent increase in her blood glucose levels, despite maintaining her usual insulin regimen.

Medical History:

- Type 2 diabetes mellitus (diagnosed 6 years ago)
- Hypertension (controlled)
- No history of recent surgery or trauma to the foot
- Regularly takes insulin and oral antihypertensive medication

Physical Examination:

- Temperature: 38.5 °C
- Blood pressure: 145/85 mmHg
- Heart rate: 98 bpm
- Red, swollen area on the left foot with visible pus draining from the site.
- Limited range of motion in the left ankle due to pain
- Laboratory tests show elevated white blood cell count (WBC: 12,000/ μ L) and an increased blood glucose level (12 mmol/L).

Diagnostic Findings:

- A culture of the pus from the foot reveals *Staphylococcus aureus* as the causative pathogen.
- An X-ray of the foot shows no signs of osteomyelitis but indicates soft tissue infection.

1. What factors contribute to Mrs. Moyo's increased risk of developing an infection in her foot?
(4)
2. Describe the role of diabetes in the development and progression of infections, especially in the context of impaired wound healing.
(4)
3. Explain how the body's immune system responds to the infection caused by *Staphylococcus aureus*.
(4)
4. What is the significance of elevated white blood cell count (WBC) and blood glucose levels in this case?
(4)
5. What infection control measures should be taken to prevent the spread of *Staphylococcus aureus* in the hospital setting?
(4)

THE END