



**ΠΑΜΙΒΙΑ UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

FACULTY OF HEALTH, APPLIED SCIENCES & NATURAL RESOURCES

DEPARTMENT OF HEALTH SCIENCES

QUALIFICATION : BACHELOR OF ENVIRONMENTAL HEALTH SCIENCES	
QUALIFICATION CODE: 08BOHS	LEVEL: 5
COURSE CODE: MAP512S	COURSE NAME: MICROBIOLOGY AND PARASITOLOGY
SESSION: JANUARY 2023	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 120

SUPPLEMENTARY/SECOND OPPORTUNITY EXAMINATION PAPER	
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INSTRUCTIONS
<ol style="list-style-type: none">1. Answer ALL the questions in the answer book provided.2. Write clearly and neatly.3. Number the answers clearly.4. All written work MUST be done in blue or black ink.

PERMISSIBLE MATERIALS

1. Scientific Calculator

THIS QUESTION PAPER CONSISTS OF 9 PAGES (including this cover page)

SECTION A: MULTIPLE CHOICE QUESTIONS [20]

Question 1 (20)

- There are 20 multiple choice questions in this section.
- Answer **ALL** questions by selecting the letter of the correct answer.
(Each question carries 1 mark).

- 1.1 The germ theory of disease states that:
- A. Bacteria are microscopic
 - B. Bacteria produce resistant spores
 - C. Only bacterial organisms may cause disease
 - D. Microorganisms are the cause of diseases
 - E. None of the above
- 1.2 Who was the first man to discover the cause of the disease anthrax and tuberculosis?
- A. Alexander Flemming
 - B. Robert Koch
 - C. Louis Pasteur
 - D. None of the above
 - E. All the above
- 1.3 Which of these bacterial components is least likely to contain useful antigens?
- A. Cell wall
 - B. Flagella
 - C. Ribosomes
 - D. Capsule
 - E. None of the above
- 1.4 Which of the following contains structures composed of N-acetylmuramic acid and N-acetylglucosamine?
- A. Mycoplasmas
 - B. *Amoeba*
 - C. *E. coli*
 - D. Spheroplast
 - E. None of the above

- 1.5 The association of endotoxin in gram-negative bacteria is due to the presence of:
- A. Steroids
 - B. Peptidoglycan
 - C. Lipopolysaccharides
 - D. Polypeptide
 - E. All of the above
- 1.6 Which of the statements regarding gram staining is wrong?
- A. *Mycobacterium tuberculosis* stains blue because of the thick lipid layer
 - B. *Streptococcus pyogenes* stains blue because of a thick peptidoglycan layer
 - C. *Escherichia coli* stains pink because of a thin peptidoglycan layer
 - D. *Mycoplasma pneumoniae* is not visible in the Gram's stain because it has no cell wall
 - E. None of the above
- 1.7 Which of the following is not a recognized cause of diarrhea?
- A. *Vibrio cholerae*
 - B. *Escherichia coli*
 - C. *Clostridium perfringens*
 - D. *Enterococcus faecalis*
 - E. All of the above
- 1.8 Which of the following is a gram-positive eubacterium?
- A. *Actinomyces*
 - B. *Clostridium*
 - C. *Rhizobium*
 - D. *Clostridium, Actinomyces*
 - E. None of the above
- 1.9 Diarrhea is not caused by:
- A. *Shigella dysenteriae*
 - B. *Streptococcus pyogenes*
 - C. *Clostridium difficile*
 - D. *Salmonella enteritidis*
 - E. All of the above

- 1.10 The coagulase test is done to differentiate:
- A. *Staphylococcus aureus* from *Staphylococcus epidermidis*
 - B. *Staphylococcus epidermidis* from *Neisseria meningitidis*
 - C. *Streptococcus pyogenes* from *Enterococcus faecalis*
 - D. *Streptococcus pyogenes* from *Staphylococcus aureus*
 - E. None of the above
- 1.11 Prokaryotic cells are more resistant to osmotic shock than eukaryotic cells because:
- A. Their cell wall is composed of peptidoglycan
 - B. They are selectively permeable
 - C. They contain osmoregulation porins
 - D. They block water molecules from entering the cell
 - E. None of the above
- 1.12 The domains in which thermophiles exist are:
- A. Eubacteria
 - B. Eukarya
 - C. Archaea
 - D. Protista
 - E. All of the above
- 1.13 The symbiotic relationship most observed in protists, for example, the species *Trypanosoma* protozoa that can cause sleeping sickness:
- A. Predation
 - B. Commensalism
 - C. Mutualism
 - D. Parasitism
 - E. None of the above
- 1.14 The process of sterilizing milk using heat and rapid cooling is called:
- A. Heating
 - B. Radappertization
 - C. Tyndallisation
 - D. Pasteurization
 - E. None of the above

- 1.15 A bactericide is a substance that:
- A. Slows down bacterial growth
 - B. Kills some bacteria while allowing some to grow
 - C. Have no effect on bacteria
 - D. Kills bacteria
 - E. None of the above
- 1.16 Which microorganism(s) among the following perform photosynthesis by utilizing light?
- A. Cyanobacteria, Fungi and Viruses
 - B. Viruses
 - C. Cyanobacteria
 - D. Fungi
 - E. None of the above
- 1.17 Which part of the compound microscope helps in gathering and focusing light rays on the specimen to be viewed?
- A. Condenser lens
 - B. Magnifying lens
 - C. Objective lens
 - D. Eyepiece lens
 - E. All of the above
- 1.18 Bacteria having a tuft of flagella one pole of a cell are known as?
- A. Amphitrichous
 - B. Monotrichous
 - C. Peritrichous
 - D. Lophotrichous
 - E. Bi-trichous
- 1.19 Growth of bacteria or microorganisms refer to:
- A. Changes in the total population
 - B. An increase in number of cells
 - C. An increase in the size of an individual organism
 - D. An increase in the mass of an individual organism
 - E. All of the above

1.20 Teichoic acids in cell walls is characteristic of:

- A. Algae
- B. Fungi
- C. Gram-negative bacteria
- D. Gram-positive bacteria
- E. Mycobacteria

SECTION B [100]

Question 2 (16)

Define the following terms (*Each correct answer earns 2 marks*):

- 2.1 Acid fastness
- 2.2 Colony
- 2.3 Commensalism
- 2.4 Decimal Reduction Time (D value)
- 2.5 Exotoxin
- 2.6 Aseptic Technique
- 2.7 Biofilm
- 2.8 Botulism

Question 3 (10)

Differentiate between the following terms (*Each answer earns 2 marks*):

- 3.1 Saprophytes and parasites
- 3.2 Bacterial spore and Fungal spore
- 3.3 Lipopolysaccharides and Teichoic acid
- 3.4 Differential media and Selective media
- 3.5 Nitrogen fixation and Nitrification

Question 4 (10)

With the aid of diagrams, briefly outline the process of antibiotic isolation and characterization using the Cross-Streak Method.

Question 5 (18)

5.1 Mention the components of a Gram Stain and what they are used for: (8)

<u>Purpose of component</u>	<u>Gram-stain component</u>

5.2 For each of the following mention the common name (CN) and disease (D) caused where applicable: (10)

5.2.1 *Taenia spp* (D + CN)

5.2.2 *Trichuris trichuria* (D + CN)

5.2.3 *Trypanosoma spp* (D + CN)

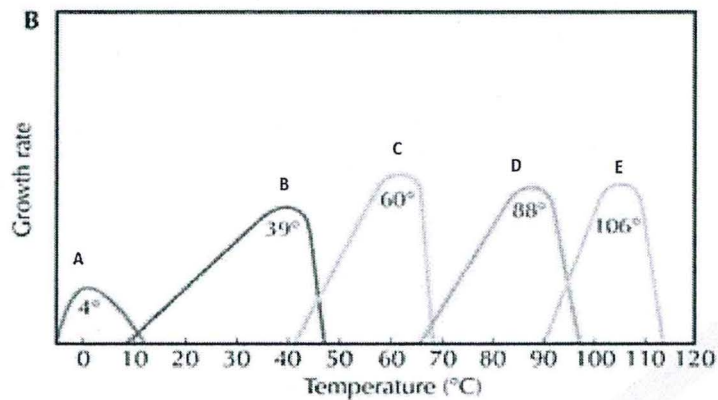
5.2.4 *Ascaris lumbricoides* (D + CN)

5.2.5 *Hymenolepis nana* (D+ CN)

Question 6 (10)

The figure below illustrates changes in population of different types of microorganisms with change in environmental temperature.

Optimal growth temperature (OGT) for Different Species



6.1 State the name given to each group of microorganisms A, B, C, D and E (5)

6.2 Give a typical organism growing in the temperature range of each (5)

Question 7 (12)

7.1 List seven (7) example of technologies related to bioremediation (7)

7.2 Mention an advantage of each of these microscopic techniques in relation to their use in microbiology: (5)

- 7.2.1 Bright field microscopy
- 7.2.2 Dark field microscopy
- 7.2.3 Phase contrast microscopy
- 7.2.4 Florescence microscopy
- 7.2.5 Electron microscopy

Question 8 (14)

Several biochemical tests are available to aid in the identification of microorganisms. For each of the following (A-N) fill in the missing information. (Each correct answer earns 1 mark).

Test	Positive	Negative	Target
Catalase	A	B	Peroxide
Slide coagulase	C	No clumps on slide	CRF
Tube coagulase	D	E	CRF
F	Purple pigment	No pigment	Cytochrome oxidase
Spot indole	Reddish-pink pigment	G	Tryptophanase
Bile solubility	Clear broth	H	Autolytic enzyme
PYR	I	Pink/red	Pyroglutamyl-aminopeptidase
Urease	Pink	J	K
DNase	Clear medium	L	M
Hippurate hydrolysis	Purple/violent	N	Hippuricase

Question 9 (10)

Outline the life cycle of the pinworm life cycle.

END