



UNIVERSITY
OF
JOHANNESBURG

<u>FACULTY</u>	: Science
<u>DEPARTMENT</u>	: Biotechnology and Food Technology
<u>CAMPUS</u>	: DFC
<u>MODULE</u>	: MCB1AE1/MCB1XB1 Microbiology 1
<u>SEMESTER</u>	: Second
<u>EXAM</u>	: Final Exam 2019

<u>DATE</u>	14 November : 2019	<u>SESSION</u>	: 12:30pm
<u>ASSESSOR(S)</u>	DR MH Serepa- : Dlamini		
<u>MODERATOR</u>	: DR BC Dlamini		
<u>DURATION</u>	: 3 Hours	<u>MARKS</u>	: 120

NUMBER OF PAGES: 11 PAGES

INSTRUCTIONS:

1. Number your answers clearly.
 2. Answer SECTION A on the MCQ card and SECTION B in the booklet.
 3. It is in your best interest to write clearly and legibly.
 4. All the best.
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SECTION A

Question 1

- Answer the following questions on the allocated MCQ card.
- The mark allocation is ONE mark per question.



1. Acid-fast bacteria are unique because their cell wall contains.
 - a) peptidoglycan
 - b) LPS
 - c) mycolic acid
 - d) DNA
 - e) Granules
2. Which type of bacterial cell wall has the most peptidoglycan?
 - a) Gram-positive
 - b) Gram-negative
 - c) both G+ and G- have same amount
 - d) A and B
 - e) All of the above
3. Which type of bacteria would be an appropriate for negative Gram-staining?
 - a) *Staphylococcus aureus*
 - b) *Staphylococcus epidermidis*
 - c) *Streptococcus mutans*
 - d) *Escherichia coli*
 - e) *Bacillus subtilis*
4. The mordant used in Gram staining
 - a) kills the bacteria
 - b) helps bacteria stick to the slide

- c) traps the primary stain in the bacterial cell wall
 - d) traps the counterstain in the bacterial cell wall
 - e) removes the primary stain from the cell wall
5. The acid alcohol in the acid-fast staining procedure
- a) kills the bacteria
 - b) removes the secondary stain from the bacterial cell wall
 - c) traps the primary stain in the bacterial cell wall
 - d) traps the counterstain in the bacterial cell wall
 - e) removes the primary stain from the bacterial cell wall
6. Cells that retain the counterstain after undergoing acid-fast staining are considered to be:
- a) non-acid fast
 - b) Gram -
 - c) acid-fast
 - d) Gram +
 - e) B and D
7. Cells that retain the primary stain after undergoing Gram staining will be what colour?
- a) colourless
 - b) purple
 - c) pink
 - d) green
 - e) both pink and purple
8. What is the name of the membrane that is the boundary between the inside and outside of the prokaryotic cell?
- a) epidermis
 - b) nuclear membrane
 - c) plasma membrane
 - d) vesicle membrane
 - e) endodermis
9. What structure allows bacteria to survive in a hypotonic environment?
- a) plasma membrane
 - b) nucleoid
 - c) ribosomes

- d) cell wall
 - e) glycocalyx
10. The genome (genetic material) of a prokaryote is called a
- a) nucleus
 - b) nucleolus
 - c) nucleosome
 - d) nucleoid
 - e) Plasmid
11. Ribosomes contain
- a) DNA
 - b) rRNA
 - c) Peptidoglycan
 - d) Mitochondria
 - e) None of the above
12. The cell membrane:
- 1. is composed of phospholipid bilayer
 - 2. contains peptidoglycan
 - 3. is selectively permeable
 - 4. prevents cell from bursting in hypotonic environment
 - 5. contains nuclear material
- Which of the combinations below best describes the cell membrane?
- a) 1, 3, 5
 - b) 1, 2, 3, 4, 5
 - c) 1, 3
 - d) 2, 4, 5
 - e) 1, 5
13. If there were several bacteria that were shaped like the letter "o", arranged in a cluster, like a bunch of grapes, this arrangement of cells would be best described as:
- a) *bacillus*
 - b) *cocci*
 - c) *staphylobacillus*
 - d) *staphylococcus*
 - e) *streptobacillus*

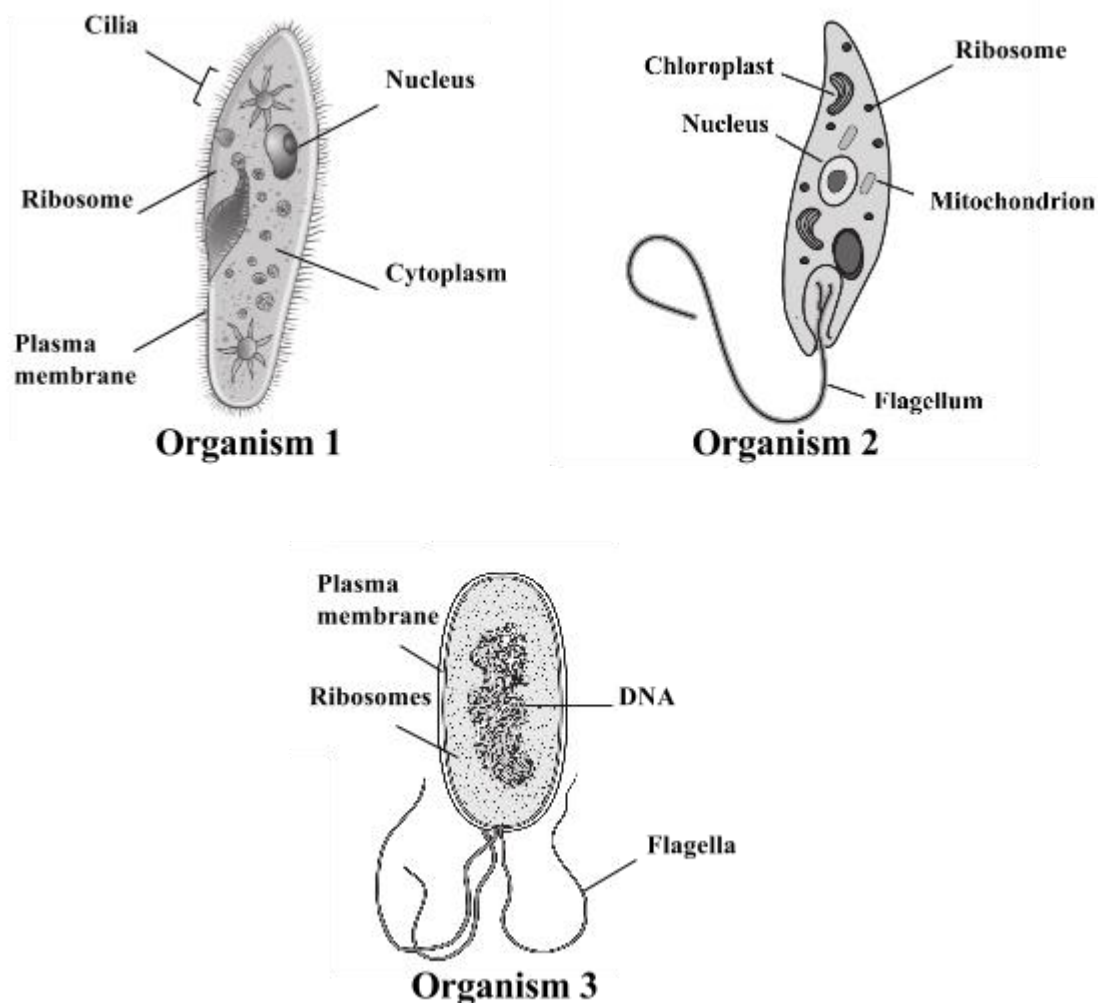
14. A plasmid is
- a) the genome of a bacterium
 - b) the cellular protein factory
 - c) an extra piece of prokaryotic DNA that provides an advantage
 - d) part of the cell wall structure of members of Eubacteria
 - e) None of the above
15. In prokaryotes, the term “lipid bilayer” is associated with
- a) the cellular endomembrane system
 - b) Gram positive cell walls
 - c) plasma membranes
 - d) ribosomes
 - e) DNA
16. If I boiled my dinner for a long time, and there were living bacteria in the food shortly after boiling, this would most likely be due to the fact that some of the bacteria in my food could produce
- a) a capsule
 - b) a cell wall
 - c) endospores
 - d) large populations of bacteria
 - e) a slime layer
17. If a cell has a plasma membrane, it is:
- a) Prokaryotic
 - b) Eukaryotic
 - c) can be either prokaryotic or eukaryotic
 - d) none of these have a plasma membrane
 - e) None of the above
18. The cellular components and organelles that both eukaryotic and prokaryotic cells have in common, include:
- 1. nucleus
 - 2. Golgi apparatus
 - 3. vesicles
 - 4. genetic material
 - 5. ribosomes
 - 6. cytoskeleton

Indicate which of the combinations below is the correct answer for question 18.

- a) 2 ,3, 4 and 7
 - b) 4, 5, and 6
 - c) 5 and 6 only
 - d) 1, 2 and 3
 - e) 3, 4, and 5
19. In prokaryotes, ribosomes are found throughout the cytoplasm and sometimes attached to the plasma membrane. In eukaryotic cells, which organelle is studded with ribosomes?
- a) Mitochondria
 - b) Lysosome
 - c) rough endoplasmic reticulum
 - d) smooth endoplasmic reticulum
 - e) cytoskeleton
20. You look into a light microscope and view an unknown cell. What might you see or not that would tell you whether the cell is either prokaryotic or eukaryotic?
- a) cytoplasm
 - b) a nucleus
 - c) plasma membrane
 - d) ribosomes
 - e) All of the above
21. Microtubules are a component of the cell's cytoskeleton. Which eukaryotic organelle consist of microtubules?
- a) flagella
 - b) cilia
 - c) plasma membrane
 - d) A and B
 - e) Plasmid
22. In microscopy, the negative stain is used to
- a) Visualize endospores.
 - b) Determine Gram reaction.
 - c) Determine flagella arrangement.
 - d) Visualize capsules.
 - e) Determine cell charge

23. Which of the following correctly traces the path of light through the compound microscope?
- a) Light source; condenser; specimen; objective lens; ocular lens
 - b) Condenser; light source; specimen; ocular lens; objective lens
 - c) Light source; specimen; condenser; objective lens; ocular lens
 - d) Condenser; light source; specimen; objective lens; ocular lens
 - e) Light source; condenser; objective lens; specimen; ocular lens
24. Which of the statements is TRUE?
- a) Endospores are for reproduction
 - b) Endospores allow cell to survive environmental changes
 - c) Endospores are easily stained in Gram stain
 - d) A cell produces one endospore and keeps growing
 - e) A cell can produce many endospores
25. Microorganisms can be classified according to
- a) pH
 - b) Temperature
 - c) Oxygen requirement
 - d) Nutrient requirements
 - e) All of the above

26. Based on the diagrams below, which organism(s) are eukaryotic and why?



- a) Organisms 2 and 3 only, because both use flagella.
 - b) Organisms 1, 2, and 3 because they are all single-celled.
 - c) Organisms 1 and 2 only, because both have a nucleus.
 - d) Organisms 1, 2, and 3, because they all have ribosomes.
 - e) None of the above
27. Bacteria and Archea are similar in which of the following?
- a) Peptidoglycan cell walls
 - b) Methionine as the start signal for protein synthesis
 - c) Sensitivity to antibiotics
 - d) Considered prokaryotic cells
 - e) Plasma membrane ester linkages
28. Which of the following media is best to observe bacterial colonies?
- a) Nutrient Broth
 - b) Nutrient agar

- c) A and B
- d) Piece of bread
- e) None of the above

29. Mesophiles grow best at

- a) 20-45 ° C
- b) -20-10 ° C
- c) 45-120 ° C
- d) A, B and C
- e) None of the above

30. Psychrophiles grow best at

- a) 20-45 ° C
- b) -20-10 ° C
- c) 45-120 ° C
- d) A, B and C
- e) None of the above

(30)

SECTION B

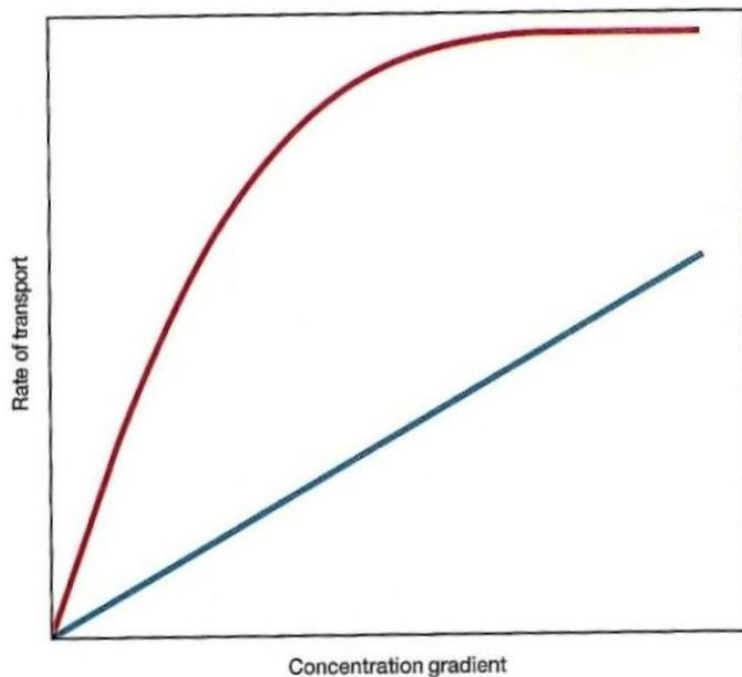
Question 1

1.1 Name and explain ONE ancient microbiology discovery/development and state how it has advanced the field of microbiology. (10)

1.2 Give 6 examples where microbiology is used as an applied science and briefly describe each example. (12)

Question 2

2.1 Study the graph below and answer the questions that follow.



- a) What does the graph above represent? (3)
 - b) Differentiate between two types of nutrient uptake mechanisms depicted in the graph. (10)
 - c) What determines whether a bacterial cell will use the transport proteins? (3)
 - d) Mention other FOUR types of nutrient uptake mechanisms in bacteria. (4)
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Question 3

- 3.1 Write a short essay about bacterial plasmids. (10)
- 3.2 Describe the process of vegetative cell formation from a bacterial endospore. (8)
- 3.3 State how DNA is packaged in bacteria and fungi. (10)
- 3.4 Using a table, compare and contrast the plasma membranes of bacteria and archaea. (10)
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Question 4

- 4.1 Define each of the following:
- a) Facultative anaerobe
 - b) Endospore
 - c) Genus
 - d) Thermophile
 - e) Optimum temperature (10)
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