



**UNIVERSITY
OF
JOHANNESBURG**

FACULTY OF SCIENCE

**DEPARTMENT OF BIOTECHNOLOGY AND FOOD TECHNOLOGY
NATIONAL DIPLOMA IN BIOTECHNOLOGY AND FOOD
TECHNOLOGY
CAMPUS: DFC
MODULE: MICROBIOLOGY 1 MCB1AE1
NOVEMBER 2016 EXAMINATION**

DATE: 29-NOVEMBER 2016

TIME: 8:30-11:30AM

ASSESSOR:

DR MH SEREPA-DLAMINI

INTERNAL MODERATOR

MR KEVIN MACLEAN

EXTERNAL MODERATOR

N/A

DURATION 3 HOURS

MARKS 120

PAGES 12

IT IS IN THE STUDENTS OWN INTEREST TO WRITE LEGIBLY

ANSWER SECTION A IN THE ANSWER BOOK PROVIDED

**ANSWER SECTION B ON THE MCQ CARD. DO NOT FOLD IT OR USE
A RED PEN**

SECTION A

QUESTION 1

1.1. Define each of the following. (2 mark each)

- a) Chemotaxis
- b) Microbial ecology
- c) Endocytosis
- d) Teichoic acids
- e) Refractive index
- f) Contrast
- g) Amphipathic
- h) Passive diffusion
- i) Bacterial vegetative cell
- j) Pinocytosis

[20]

QUESTION 2

2.1. Compare and contrast the structure of Gram-positive and Gram-negative peptidoglycan cell walls. (20)

[20]

QUESTION 3

3.1. Draw and name 10 bacterial shapes/arrangements. (10)

[10]

QUESTION 4

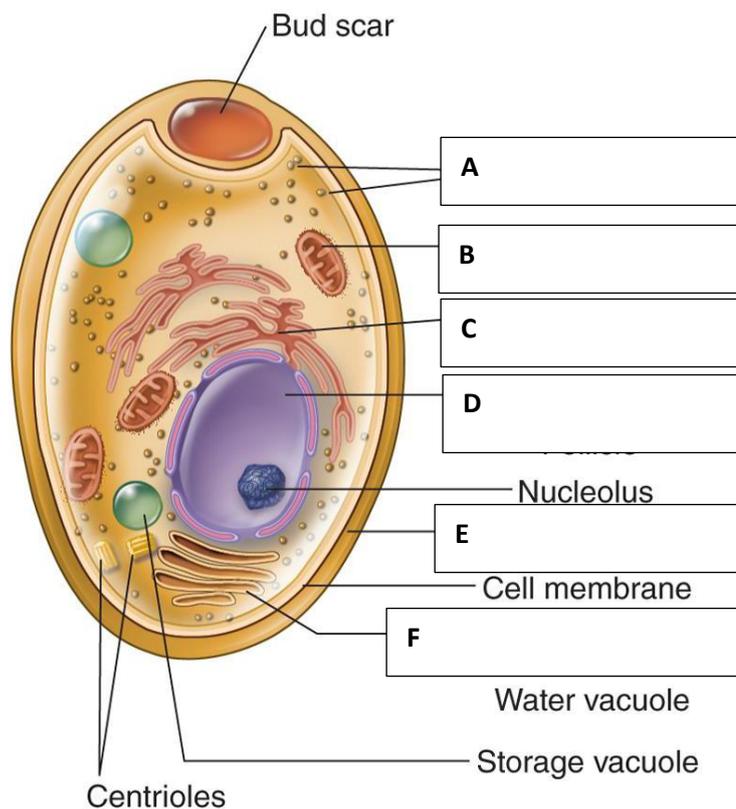
4.1. Write short notes on five of the following (5 marks each)

- a) Koch's postulate
- b) Medical Microbiology
- c) Bacterial plasmid
- d) Endospore structure
- e) Mosaic Fluid model
- f) Bacterial endospore
- g) Louis Pasteur
- h) Francesco Reddy

[25]

QUESTION 5

5.1. Label each of the following letters (A-F) and give ONE function for each organelle. (12)



(a) Fungal (Yeast) Cell

[12]

SECTION B

QUESTION 6

- 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. In figure 1. Line “c” to the microscope is?

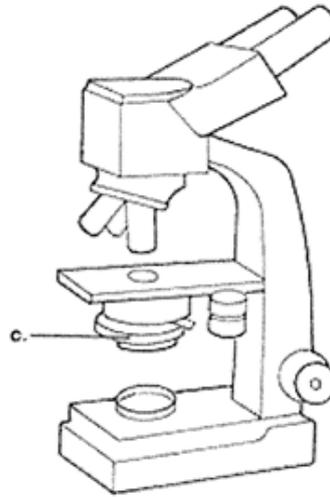


Figure 1

- a) Illuminator
 - b) Condenser
 - c) Ocular lens
 - d) Objective lens
 - e) Diopter ring
25. 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
26. Microorganisms can be classified according to
- a) pH
 - b) Temperature
 - c) Oxygen requirement
 - d) Nutrient requirements
 - e) All of the above

27. Bacterial plating methods include:
- a) Streak plate
 - b) Pour plate
 - c) Spread plate
 - d) A, B and C
 - e) None of the above
28. What will happen if a bacterial cell is placed in distilled water with lysozyme?
- a) The cell will plasmolyze
 - b) The cell will undergo osmotic lysis
 - c) Water will leave the cell
 - d) Lysozyme will diffuse into the cell
 - e) No change will result; the solution is isotonic
29. 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
30. Which of the following is the correct order of endospore layers?
- a) Core; inner membrane; germ cell wall; cortex; outer membrane; coat; exosporium
 - b) Coat; core; inner membrane; germ cell wall; cortex; outer membrane; exosporium
 - c) Exosporium; inner membrane; germ cell wall; cortex; outer membrane; coat; core
 - d) Exosporium; inner membrane; germ cell wall; cortex; outer membrane; coat; core
 - e) None of the above

31. Which of the following media is best to observe bacterial colonies?

- a) Nutrient Broth
- b) Nutrient agar
- c) A and B
- d) Pice of bread
- e) None of the above

32. 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

33. 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

[33]