



**KENYATTA UNIVERSITY**  
**UNIVERSITY EXAMINATIONS 2011/2012**  
**SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE**  
**IN MOLECULAR AND CELL BIOLOGY**  
**SBC 317: FUNDAMENTALS OF MICROBIOLOGY**

**DATE:** Tuesday 27<sup>th</sup> March, 2012

**TIME:** 11.00 a.m. – 1.00 p.m.

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**SECTION A: Instruction: Answer All questions: 1 mark each**

1. Which one of the following group of organisms is not prokaryotic?
  - a) *Saccharomyces*
  - b) *Rickettsia*
  - c) *Bdellovibrio*
  - d) *Borrelia*
  
2. The following are components that make up a bacterial cell except
  - a) Cell membrane
  - b) Ribosomes
  - c) Periplasm
  - d) Nuclear membrane
  
3. How many chromosomes does a prokaryotic cell have?
  - a) 1
  - b) 2
  - c) 3
  - d) 0

4. There are approximately \_\_\_\_\_ as many bacterial cells in the human flora of bacteria as there are human cells in the body.
- a) Two times
  - b) Five times
  - c) Ten times
  - d) Twenty times
5. Bacteria can be found with large numbers of bacteria on the skin and gut flora. Which of the following species can you rarely find in the skin?
- a) *Streptococcus pyogenes*
  - b) *Staphylococcus aureus*
  - c) *Mycobacterium leprae*
  - d) *Escherichia coli*
6. Lipopolysaccharide (LPS) consists of all the following molecules except:
- a) Lipid A
  - b) Teichoic acid
  - c) Core polysaccharide
  - d) O antigen
7. What are the smallest microorganisms that can independently grow on a cell-free medium?
- a) Mycoplasma
  - b) Rickettsia
  - c) Spirochaetaceae
  - d) Chlamydias

8. Archaea have unique cell walls. Which one of the following components is absent in their cell wall?
- a) Polysaccharides
  - b) N-acetyl-muramic acid
  - c) N-acetyl-glucosamine
  - d) proteins
9. The following bacteria groups are plant pathogens except:
- a) Pseudomonas
  - b) Xanthomonas
  - c) Agrobacterium
  - d) Bordetella
10. Which type of prokaryotes group lack the peptidoglycan in their cell wall?
- a) Mycoplasma
  - b) Archaea
  - c) Spirochaetaceae
  - d) Chlamydias
11. Lachrymal secretions are responsible for the cleavage of what kind of bond in the peptidoglycan layer?
- a)  $\beta$ -1, 4 bond between N-acetylmuramic acid and N-acetylglucosamine
  - b)  $\alpha$ -1,4 bond between N-acetylmuramic acid and N-acetylglucosamine
  - c) Interpeptide bond between a free amino group on one amino acid and a free carboxy group on a nearby amino acid
  - d) None of the above.
12. What type of bacteria is used in industrial fermentation?
- a) *Saccharomyces cerevisiae*
  - b) Lactic acid bacteria

**SECTION B: Answer all questions: marks are indicated at the end of every question**

1. Illustrate using a well labelled diagram the structure of typical bacteria. (5 marks)
2. Explain the gram stain protocol, how and why bacteria stain differently. (5 marks)
3. Giving examples of the causative agents, describe 5 diseases that are caused by gram positive bacteria. (5 marks)
4. How does the body react against gram-negative bacterial infection? (5 marks)
5. Define the following terms (2 marks each)
  - a. Opsonisation
  - b. Lipoteichoic acid (LTA)
  - c. Ribotyping
  - d. Periplasm
  - e. Pili

**SECTION C: Answer any two questions: 10 marks each.**

1. Explain the sources of errors that may arise when polymerase chain reaction (PCR) can is used to diagnose bacterial infection. (10 marks)
2. With the aid of diagrams, describe the differences in the peptidoglycan layer of gram positive and gram negative bacteria. (10 marks)
3. Discuss the ideal characteristics of an industrial microorganism? (10 marks)