

KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2011/2012

FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF
SCIENCE (WATER AND ENVIRONMENTAL ENGINEERING)

SET 421: SANITARY MICROBIOLOGY I

DATE: Friday, 2nd December, 2011

TIME: 11.00 a.m. – 1.00 p.m.

INSTRUCTIONS:

- (i) Answer question one and any other two questions
- (ii) Questions one carries 30 marks and all the other questions carry 20 marks each

QUESTION 1

- a) Bacteria belong to a group of living organisms that are neither plants nor animals.
 - i. What is the name given to this group of living things? {1Mark}
 - ii. Other organisms classified into this group together with bacteria include Algae, Fungi, and Protozoa. Bacteria are further classified as Prokaryotes while Algae, Fungi, and Protozoa are classified as Eukaryotes. In as much as possible describe the features distinguishing prokaryotes from eukaryotes
{9 Marks}
- b) Figure Q1-b shows generalized diagrams of typical cell structures for Prokaryotes and Eukaryotes.
 - i. List all the key features indicated for a eukaryotic cell
{5 marks}
 - ii. Similarly, list all the key features of a prokaryotic cell
{3 Marks}

Figure Q1 b-i

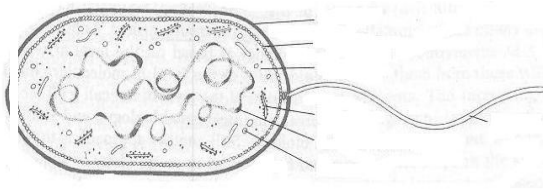
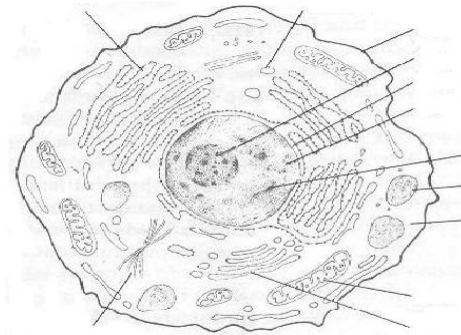


Figure Q1 b-ii



- c) List eight impacts that can result from disposing untreated waste water into natural water bodies

{6 Marks}

- d) List the various water borne diseases and the causative micro-organisms

{6 Marks}

QUESTION 2

- a) Bacteria are ubiquitous in their occurrence. They occur in air, on the land in lakes in oceans, and, in intestinal tracts of human and other animals. Briefly describe the morphology with regard to:-

i. Size {2 Marks}

ii. Shape {5Marks}

iii. Movement {3 Marks}

- b) Nutritional requirements of bacteria vary greatly. Bacteria also exhibit differences with respect to the physical conditions favoring their growth.

- i. List the different types of bacteria based on their energy source and hydrogen donors.

{4 Marks}

- ii. List the different types of bacteria based on their need for oxygen

{3 Marks}

- iii. List the different types of bacteria based on the temperature favoring their growth.

{3 Marks}

QUESTION 3

- (a) In any particular environment, bacteria exist as mixed cultures. Many different bacteria inhabit a particular habitat. One gram of faecal matter may contain up to 1×10^{11} bacteria. A study of bacteria in such a habitat require

knowledge of the specific microbe present. This in turn requires unraveling of mixed population into pure cultures of separate, different species. Three kinds of separate methods are used to isolate pure cultures. These are:-

- (i) Chemical methods
- (ii) Physical methods
- (iii) Biological methods

Describe each of the methods and provide examples of each method.

{12 Marks}

Distinguish between streak plate and pour plate technique of transferring bacteria culture into a growth medium

{8 Marks}

QUESTION 4

(a) What is staining?

{2 Marks}

(b) List three advantages of staining

{3 Marks}

(c) Name three different types of stains and give three examples of each types

{6 Marks}

(d) Bacteria morphology can be studied using staining. List the two ways bacteria morphology can be studied using staining

{4 Marks}

(e) Describe the principle of gram staining and explain the difference between gram positive and gram negative bacteria

{5 Marks}

QUESTION 5

(a) Some bacterial cells are surrounded by a viscous substance forming a covering layer or envelope around the cell wall. This layer is called a capsule. Give five functions of such a capsule.

{10 Marks}

(b) Briefly explain what bacteria pili are and the functions they serve

{10 Marks}