



2nd SEM. 2005/2006

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UNIVERSITY OF SWAZILAND

FINAL EXAMINATION PAPER

PROGRAMME : BACHELOR OF SCIENCE IN HOME ECONOMICS [FOOD SCIENCE AND TECHNOLOGY OPTION] YEAR IV

COURSE CODE : FST 413

TITLE OF PAPER : FOOD MICROBIOLOGY

TIME ALLOWED : TWO (2) HOURS

INSTRUCTIONS : ANSWER QUESTION ONE (1) AND ANY OTHER (3) QUESTIONS

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Candidate Number:.....

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SECTION A

COMPULSORY (40 Marks)

Identification of Bacteria

Bacteria are the major microbes responsible for spoiling food in storage. It is therefore essential that we have an idea of how to identify them.

Question 1

What is the first thing we must have before starting an identification procedure?

..... (1 mark)

Question 2

Besides cell shape, cell aggregation, presence or absence of flagella, mention three other morphological characteristics one can use in identifying bacteria.

- (i)
- (ii)
- (iii) (3 marks)

Question 3

Besides oxygen requirements mention two other metabolic characteristics used in bacterial identification.

- (i)
- (ii) (2 Marks)

Question 4

Antigenic Characteristics of bacteria are used in:

- a) Precipitin Tests. Name the test in each description of test tube contents (from top to bottom of test tube).
 - (i) antigen (soln) – antibody (soln)
 -

- (ii) antigen (soln) – agar with antibody
.....
.....
 - (iii) antigen (soln) – agar – antibody (soln)
.....
.....
- (3 Marks)
- b) Agglutination Tests. Name an antigenic test in which blood is used.
.....
.....
- (1 Mark)
- c) Immunoassays
Write these in full.
 - (i) RIA
 - (ii) ELISA
- (2 Marks)

Question 5

Genetic Characteristics

- (a) What makes DNA hybridisation a very reliable tool to use in identification.
.....
.....
- (1 Mark)
- (b) Why are DNA probes synthetic and not naturally occurring DNA?
.....
.....
- (1 Mark)
- (c) When a probe is said to be “labelled” what is the atomic weight of
 - (i) C (carbon) =
 - (ii) P (phosphorus) =
 - (iii) H (hydrogen) =
- (3 Marks)

Question 6

a) Group bacteria by their preferred growth temperatures and state the temperature range in each case.

i)

ii)

iii) (6 Marks)

b) Considering oxygen requirements of bacteria during growth, name the group & briefly state their oxygen requirements.

(i)
.....

(ii)
.....

(iii)
.....

(iv)
.....

(iv)
.....

(10 Marks)

Question 7

A number of food preservation methods emanate from specific knowledge of microbial biology. Name the preservation method in each case.

(i) Most molds and yeasts encountered in food are aerobic

(ii) Certain foods have naturally occurring antimicrobial compound e.g. allicin in garlic, eugenol and thymol in sage.....

(iii) Most bacteria grow best in a narrow range of pH near neutrality pH 6.5 – 7.5.....

- (iv) Microbes require water for growth and they are 80 – 90% water themselves
.....
- (v) Most microorganisms are mesophilic. (2 methods)
-
-

(6 Marks)

Question 8

Common Foodborne Bacteria

From the brief descriptions provided, choose the organism that fits best from the list below.

- (i) Largest genus of bacteria existing in fresh food. Psychrotrophic.
.....
- (ii) Gram positive. Can grow at 0°C. Name suggests that it eats flesh.
.....
- (iii) G⁺ rod. Endospore forming. Important in thermal canning of food.
.....
- (iv) The other monad, found in and on sea foods. Aerobic. G⁻ motile rod.
.....
- (v) Common in dairy products. Acidogenic, aciduric, non-motile.
.....
- (vi) It produces alkaline in milk. It does not ferment sugar.
.....
- (vii) Can grow in high salt concentration. May be pigmented. G⁺.
.....
- (viii) The name suggests that it is curved, spirally curved. Microaerophilic to anaerobic. G⁻
.....
- (ix) Enteric, motile, pleomorphic.
.....
- (x) Enteric, non-motile, strictly human.....
.....

(xi) A coliform. Indicator of faecal contamination. Associated with cholera

.....

(11 Marks)

<i>Alcaligenes</i>	<i>Alteromonas</i>	<i>Campylobacter</i>	<i>Carnobacterium</i>
<i>Clostridium</i>	<i>Escherichia</i>	<i>Lactobacillus</i>	<i>Micrococcus</i>
<i>Proteus</i>	<i>Pseudomonas</i>	<i>Shigella</i>	

SECTION B

ANSWER THREE QUESTIONS FROM THIS SECTION.

Question 1

Discuss possible sources of microbial contamination in foods. For each source presented, cite at least three scientifically named microbes.

NB. Do not use the same example more than twice in this presentation. [20 Marks]

Question 2

The incidence and types of micro organisms present in food depend a lot on the steps involved in the production process. Use beef to illustrate your answer. [20 Marks]

Question 3

Discuss the intrinsic parameters of foods that affect microbial growth. Cite scientifically named microbes to enhance your answer. [20 Marks]

Question 4

Microbial contaminants in foods can often lead to disease. Illustrate this observation using gastroenteritis caused by Staphylococcus. [20 Marks]