



KENYATTA UNIVERSITY

**EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN MEDICAL
LABORATORY SCIENCE**

HML 404: FOOD AND WATER MICROBIOLOGY

157
3RD

TRIMESTER 2021/2022

TIME: 2 HOURS

INSTRUCTIONS:

SECTION A: ANSWER ALL THE QUESTIONS (4 MARKS EACH)

1. Outline procedure for the enumeration of *Enterobacteriaceae* in foods using the plate count method [4 marks]
2. List the characteristics of faecal streptococci that make them good indicators for microbiological water quality [4 marks]
3. State the consideration for transport and storage until analysis of drinking water for compliance purposes [4 marks]
4. Outline the guidelines for transportation and storage of refrigerated foods for microbiological analysis [4 marks]
5. Explain the advantages of using spread plate over pour plate techniques in bacterial counts [4 marks]

SECTION B: Answer ONE Question (20 marks)

6. Describe the most probable number (MPN) procedure for the enumeration of total and thermotolerant coliforms and *E. coli* in foods [20 marks]
7. Describe the;
 - a) enumeration of *Pseudomonas* spp. in milk and milk products using the plate count method [10 marks]
 - b) detection of *Vibrio cholerae* in foods using the presence/absence methods [10 marks]

SECTION C: ANSWER ALL THE QUESTIONS IN THE ANSWER BOOKLET (0. MARK EACH)

1. The acceptable limit for presumptive coliform in drinking water is.
 - a) > 10/100 mL
 - b) 4–10/100 mL
 - c) 0/100 mL
 - d) 1–3/100 mL
2. The medium used in enumeration of aerobic mesophilic bacteria in food is:
 - a) DicloranGlicerol 18% Agar
 - b) Plate count agar
 - c) MacConkey agar broth
 - d) Potato Dextrose Agar
3. Detecting coliform bacteria in treated water supplies does not suggest:
 - a) inadequate treatment
 - b) post treatment contamination
 - c) excessive nutrients
 - d) pre-treatment microbial quantity
4. *Staphylococcus aureus* is isolated from faecal samples using:
 - a) Mannitol Salt Agar
 - b) Blood Agar
 - c) Chocolate Agar
 - d) Macconkey agar
5. Cooked rice is likely to be contaminated by:
 - a) *Salmonella spp*
 - b) *Bacillus cereus*
 - c) *Staphylococcus aureus*
 - d) *Campylobacter jejuni*
6. One of the following is not a coliform bacterium:
 - a) *Enterobacter*
 - b) *Citrobacter*
 - c) *Nitrobacter*
 - d) *Escherichia coli*
7. Coliform bacteria differ from *Enterococcus* spp., except that that *Enterococci*:
 - a) are gram negative cocci
 - b) grow in 6.5% NaCl
 - c) are 40% bile salt tolerant
 - d) are resistant to freezing

Faecally contaminated water does not contain:

- a) *Entamoeba histolytica*
- b) *Neisseria gonorrhoeae*
- c) *Escherichia coli*
- d) *Toxoplasma gondii*

9. The confirmed test positive colonies are:

- a) Yellow
- b) greenish metallic sheen
- c) blue metallic sheen
- d) pink

10. The following are medium of choice for isolation of *Salmonella sp.* from suspected poultry products, except?

- a) Brilliant green MacConkey agar
- b) Blood agar
- c) TSI agar
- d) Deoxycholate agar

11. Water sampling bottles are sterilized at:

- a) 160°C for 1 hr
- b) 121°C for 20 min
- c) 170°C for 40 min
- d) 140°C for 1-2 sec

12. *Clostridium botulinum* does not?

- a) Ferment lactose
- b) Ferment glucose
- c) Hydrolyze gelatin
- d) digest coagulated proteins

13. Coliform bacteria do not include:

- a) *Citrobacter*
- b) *Nitrobacter*
- c) *Klebsiella*
- d) Enterobacteria

14. Fecal coliforms are differentiated from non-fecal coliforms by growth at:

- a) 44.5°C
- b) 34+/-0.5°C
- c) 35+/-2°C
- d) 37°C

15. *Clostridium perfringens* food poisoning is associated with:

- a) Canned fruits
- b) Meat products
- c) unrefrigerated milk
- d) Smoked fish products

16. Without a cool box water samples holding time before microbiological analysis should not exceed:
- 4 hrs
 - 2 hrs
 - 6 hrs
 - 12 hrs
17. Which one of the following tests use Kovacs reagent?
- Indole
 - Urease
 - Peptone water
 - Oxidase
18. As per Geldreich and Kenner (1969) human faecal pollution is indicated by a faecal coliform: faecal streptococci ratio of:
- <2
 - ≥ 4
 - <2
 - ≤ 4
19. A fourth-year student at Kenyatta University was analyzing river water samples for microbiological quality using most probable tube technique and obtained the following positive results: 2/5 tubes of 10 mL, 3/5 of 1 mL tubes, and 0/5 of 0.1 mL tubes. Using the McCrady probability tables given below, estimate the concentration of the contaminating microorganism.

No. of tubes giving a positive reaction :			MPN (per 100ml)	95% confidence limits	
5 of 10ml	5 of 1ml	5 of 0.1 ml		Lower	Upper
0	0	0	<2	<1	7
0	1	0	2	<1	7
0	2	0	4	<1	11
1	0	0	2	<1	7
1	0	1	4	<1	11
1	1	0	4	<1	11
1	1	1	6	<1	15
2	0	0	5	<1	13
2	0	1	7	1	17
2	1	0	7	1	17
2	1	1	9	2	21
2	2	0	9	2	21
2	3	0	12	3	28
3	0	0	8	1	19
3	0	1	11	2	25
3	1	0	11	2	25
3	1	1	14	4	34
3	2	0	14	4	34
3	2	1	17	5	46
3	3	0	17	5	46

- 17 MPN/ 100 mL
 - 12 MPN/ 100 mL
 - 9 MPN/ 100 mL
 - 11 MPN/ 100 mL
20. Enumeration of yeasts and molds require:
- Nutrient agar
 - Acidified potato glucose agar
 - MacConkey agar
 - Violet Red Bile agar