



UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF CHEMICAL AND BIO-ENGINEERING TECHNOLOGY

FINAL EXAMINATION
OCTOBER 2025 SEMESTER

COURSE CODE : CQB 10503
COURSE TITLE : MICROBIOLOGICAL FOOD SAFETY
PROGRAMME NAME : BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY (FOOD)
WITH HONOURS
DATE : 02 FEBRUARY 2026
TIME : 9:00AM - 12:00PM
DURATION : 3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
2. This question paper is printed on both sides of the paper.
3. This question paper consist of TWO sections.
4. Answer ALL questions for Section A.
5. Section B consist of four questions. Answer THREE (3) questions only.
6. Please write your answer on the answer booklet provided.
7. Please answer all questions in English only.
8. Please answer MCQ/EMQ questions using OMR sheet. ☒ *Tick if applicable*
9. Refer to the attached Formula/ Appendies. ☐ *Tick if applicable*

THERE ARE 14 PAGES OF QUESTIONS INCLUDING THIS PAGE

SECTION A (Total: 40 marks)

Answer ALL questions.

Please use the answer booklet provided.

1. Bacteria that appear pink after Gram staining have:
 - A. Thin peptidoglycan layer
 - B. Rod shaped cells
 - C. Endospores
 - D. Thick peptidoglycan layer

2. The innermost layer of a bacterial cell is known as the:
 - A. Capsule
 - B. Cell membrane
 - C. Nucleus
 - D. Cell wall

3. Select a highly resistant structure that requires the use of an autoclave machine to be destroyed:
 - A. Virus particles
 - B. Yeast cells
 - C. Bacterial spores
 - D. Mould spores

4. The following are structures involved in bacterial movement **EXCEPT**:
 - A. Pilus
 - B. Fimbria
 - C. Plasmid
 - D. Flagella

5. Microorganisms that do not have a nucleus within their cells are called:
- A. Nucleoid
 - B. Eukaryotes
 - C. Saprophytes
 - D. Prokaryotes
6. The streak plate method involves transferring a small volume of sample using a:
- A. micropipette
 - B. wire loop
 - C. glass spreader
 - D. mixing technique with molten agar
7. Select the **CORRECT** statement about the light microscope:
- A. The specimen is coated with heavy metals
 - B. Produce only a monochrome image
 - C. Can be used to examine living materials
 - D. Has a maximum magnification power of 500,000x
8. The plating technique that is not suitable for the total plate count is:
- A. Spread plate
 - B. overlay pour plate
 - C. Pour plate
 - D. Streak plate

9. Organisms that produce energy by oxidizing and reducing chemical compounds are called:
- A. Osmophiles
 - B. Heterotrophs
 - C. Photoautotrophs
 - D. Chemoautotrophs
10. The following are examples of biological barriers in food **EXCEPT**:
- A. Apple skin
 - B. Egg shell
 - C. Peanut shell
 - D. Essential oil
11. Some packaged foods are pumped with nitrogen gas to prevent the growth of:
- A. Microaerophiles
 - B. Obligate aerobes
 - C. Facultative anaerobes
 - D. Obligate anaerobes
12. Media that is added with extra nutrients to help microorganisms multiply is called:
- A. enriched media
 - B. lysol
 - C. general media
 - D. selective media

13. During the lag phase:
- A. Cells adapting to their environment
 - B. Cell death is higher than cell production
 - C. Cell death equals cell production
 - D. Cells reproduce rapidly
14. During the death phase:
- A. Cell death equals cell production
 - B. Cell death is higher than cell production
 - C. Cells reproduce rapidly
 - D. Cell death is higher than cell production
15. During the stationary phase:
- A. Cell death is higher than cell production
 - B. Cells reproduce rapidly
 - C. Cells adapting to their environment
 - D. Cell death equals cell production
16. During the log phase:
- A. Cell death is higher than cell production
 - B. Cell death equals cell production
 - C. Cells adapting to their environment
 - D. Cells reproduce rapidly

17. The following are intrinsic (internal) factors affecting microbial growth **EXCEPT**:
- A. Temperature
 - B. pH
 - C. Biological barriers
 - D. water activity
18. The main cause of milk spoilage is:
- A. Coliforms
 - B. Lactic acid bacteria
 - C. Pathogenic bacteria
 - D. Moulds
19. Egg whites can help to slow down egg spoilage by:
- A. slows microbial movement due to its thin consistency
 - B. destroying lysozymes
 - C. provide the nutrients that bacteria need
 - D. having an alkaline pH that inhibits bacterial growth
20. The following actions help in preventing meat spoilage **EXCEPT**:
- A. Meat handlers wear gloves
 - B. Store meats at 25°C
 - C. Avoid puncturing the gastrointestinal tract
 - D. Sanitize the knife after every use

21. The following are benefits of consuming probiotics **EXCEPT**:
- A. Helps to reduce diarrhea
 - B. May help to reduce allergic response
 - C. Helps to improve lactose intolerance
 - D. Kills all microorganisms in the body
22. "If infected hosts such as navel oranges and lemons are cut in half, the rot can be seen extending into the core." This disease is most probably caused by:
- A. *Botrytis* spp.
 - B. *Alternaria* spp.
 - C. *Penicillium expansum*
 - D. *Pectobacterium carotovorum*
23. Bacterial leaf blight is caused by *Xanthomonas oryzae*. It is a serious disease in *Oryza sativa*, which is the scientific name for:
- A. papaya trees
 - B. navel oranges
 - C. apples
 - D. rice crops
24. The bacterial soft rot disease in vegetables and fruits is caused by:
- A. *Botrytis* spp.
 - B. *Pectobacterium carotovorum*
 - C. *Alternaria* spp.
 - D. *Penicillium expansum*

25. The Ultra-High Temperature (UHT) process:
- A. Kills harmful bacteria but not the non-pathogenic ones
 - B. Can extend the shelf-life of raw milk up to 6 months
 - C. Is carried out at 73°C for at least 15 seconds
 - D. Is considered as partial sterilization
26. Select the **CORRECT** statement about acidified infant formula:
- A. It uses *Escherichia coli* or other coliforms
 - B. It helps to reduce stomach infections
 - C. It uses specific bacteria that can produce D-lactic acid
 - D. It is commonly given to babies older than 2 years old
27. Prebiotics refer to:
- A. The food for probiotics
 - B. Another name for probiotics
 - C. The product of probiotics
 - D. Young culture of probiotics
28. "This type of spoilage is caused by bacteria that cannot live in oxygen, are unable to grow at room temperature, and produce a swollen canned food". This statement refers to:
- A. Thermophilic spore former anaerobe spoilage
 - B. Mesophilic spore-former spoilage
 - C. Flat sour spoilage
 - D. Sulfide stinker spoilage

29. Select the correct statement about low-acid canned foods:
- A. They are more difficult to spoil compared to high-acid canned foods
 - B. Have a neutral pH
 - C. Have a pH lower than 4.6
 - D. Have a pH of 4.6 or higher
30. "This food cannot be eaten after this date". This refers to:
- A. Use by date
 - B. Incubation date
 - C. Canning date
 - D. Best before date
31. Select the **CORRECT** statement:
- A. Viruses are larger than bacteria
 - B. *Clostridium botulinum* is spread using the faecal-oral route
 - C. Not all bacterial toxins can be destroyed by cooking
 - D. One of the symptoms of *Salmonella* infection is yellow fever
32. The following are how botulism is spread **EXCEPT**:
- A. Wound infection
 - B. Feeding honey to babies aged less than 12 months.
 - C. Eating botulinum-contaminated food
 - D. Eating fresh fruits and vegetables

33. *Clostridium botulinum* produces toxin inside canned foods with:
- A. no oxygen and low acid
 - B. both with and without oxygen, and low acid
 - C. both with and without oxygen, and high acid
 - D. oxygen and low acid
34. The following actions can prevent cholera illness **EXCEPT**:
- A. Eating raw seafood
 - B. Drinking pasteurized milk
 - C. Drinking boiled water
 - D. Eating cooked seafood
35. Select the pathogen that can cause liver damage:
- A. *Staphylococcus aureus*
 - B. Rotavirus
 - C. Hepatitis A virus
 - D. *Shigella*
36. Select the pathogen that causes food poisoning (food intoxication):
- A. *Clostridium botulinum*
 - B. *Vibrio cholerae*
 - C. Hepatitis A virus
 - D. Rotavirus

37. Select the pathogen that causes food infection:
- A. *Staphylococcus aureus*
 - B. *Salmonella*
 - C. *Clostridium botulinum*
 - D. *Lactobacillus bulgaricus*
38. Select the pathogen that causes food toxico-infection:
- A. Norwalk virus
 - B. *Clostridium perfringens*
 - C. *Clostridium botulinum*
 - D. *Staphylococcus aureus*
39. The pathogen that can commonly be found on human skin is:
- A. *Clostridium botulinum*
 - B. *Vibrio cholerae*
 - C. Norwalk virus
 - D. *Staphylococcus aureus*
40. The following are symptoms of cholera illness **EXCEPT**:
- A. nausea
 - B. diarrhea
 - C. dehydration
 - D. difficulty to speak

SECTION B (Total: 60 marks)

Answer THREE (3) questions only.

Please use the answer booklet provided.

Question 1

As a company's safety executive, you are tasked with testing a can of raw prawn for *Staphylococcus aureus*.

- (a) To prepare 1000 mL of Baird-Parker agar (BPA), 63 g of dehydrated powder is required. Calculate the amount needed for 850 mL.

(2 marks)

- (b) To prepare 1000 mL of peptone water (PW), 20 g of dehydrated powder is required. Calculate the amount needed for 600 mL.

(2 marks)

- (c) For the *S. aureus* plate count, 0.1 mL of the 10^{-3} prawn sample was plated on a BPA plate. After incubation, 50 shiny black colonies were observed. Calculate the CFU/g of *S. aureus* in the sample.

(4 marks)

- (d) Your colleague received a canned peas sample with no bulging and concluded it is free of microbial contamination. Discuss whether this conclusion is correct using your knowledge of food microbiology.

(3 marks)

- (e) Since there was no swelling, analyse **ONE (1)** possible type of bacterial spoilage that might happen in the sample mentioned in (d).

(5 marks)

- (f) Analyze **TWO (2)** main reasons why bacterial spoilage can occur in commercially canned foods before opening.

(4 marks)

Question 2

- (a) Demonstrate the application of aseptic techniques in a microbiology laboratory by describing **FIVE (5)** actions commonly practiced and explaining why each action is important in preventing contamination.

(10 marks)

- (b) Demonstrate how **FIVE (5)** microbial species are applied in the food industry by stating the microbe and the food product produced.

(10 marks)

Question 3

Apply your understanding of microbiology to:

- (a) Classify microorganisms into **THREE (3)** types based on their optimum growth pH.

(6 marks)

- (b) Classify microorganisms into **THREE (3)** types based on their optimum growth temperature.

(6 marks)

- (c) Classify microorganisms into **FOUR (4)** types based on their oxygen requirement for growth.

(8 marks)

Question 4

- (a) Compare **TWO (2)** types of microbial disease in food and vegetables.
(10 marks)
- (b) Discuss the staphylococcal disease. Include the causing pathogen, transmission (how it is spread), symptoms, and preventive actions in your discussion.
(10 marks)

END OF EXAMINATION PAPER

