



UNIVERSITI KUALA LUMPUR
INSTITUTE OF MEDICAL SCIENCE TECHNOLOGY

FINAL EXAMINATION
MARCH 2025 SEMESTER

COURSE CODE : HDB10703
COURSE TITLE : INTRODUCTORY CLINICAL LABORATORY SCIENCE
PROGRAMME NAME : BACHELOR OF BIOMEDICAL SCIENCE (HONOURS)
DATE : 04 JULY 2025
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 13 PAGES OF QUESTIONS INCLUDING THIS PAGE

SECTION A (Total: 40 marks)

Answer ALL questions.

Please use the answer booklet provided.

1. What is a key characteristic of transmission electron microscopy?
 - A. Transmits electrons through an ultra-thin specimen
 - B. Uses a beam of light
 - C. Images surface topography
 - D. Requires thick specimens

2. What is a common rule in laboratory safety?
 - A. Mouth pipetting is encouraged
 - B. Individuals are allowed to work alone
 - C. Food and drink are allowed
 - D. Wear required personal protective equipment (PPE)

3. What is one reason why laboratory safety is important?
 - A. Prevent adverse health effects from exposure to chemicals
 - B. Allow food and drink in the lab
 - C. Encourage carelessness
 - D. Increase lab equipment costs

4. What does an electron microscope utilize to form an image?
 - A. Electrons
 - B. Ultraviolet light
 - C. Infrared light
 - D. Visible light

5. What is the function of a volumetric pipette?
 - A. Mix solutions
 - B. Measure exact volumes of liquid
 - C. Dispense small amounts of liquid
 - D. Hold liquids

6. What happens to denser particles in a centrifugal field?
 - A. Move faster
 - B. Remain suspended
 - C. Move slower
 - D. Do not experience force

7. What is the first step in the autoclave procedure?
 - A. Loading items
 - B. Preparation of the autoclave
 - C. Starting the sterilization cycle
 - D. Setting parameters

8. What is the effect of not balancing the load in a centrifuge?
 - A. Increased speed
 - B. Improved sample quality
 - C. Inconsistent results
 - D. Faster sedimentation

9. What is a limitation of fluorescence microscopy?
- A. Requires high magnification
 - B. Cannot view live specimens
 - C. Limited use with fluorescence label
 - D. Only works with dead specimens
10. What is the first step in dealing with a minor chemical spill?
- A. Notify the supervisor.
 - B. Announce the incident to everyone.
 - C. Evacuate the area.
 - D. Clean up using appropriate spill control equipment.
11. Which microscopy technique is best for observing live and unstained biological samples?
- A. Dark field microscopy
 - B. Bright field microscopy
 - C. Transmission electron microscopy
 - D. Fluorescence microscopy
12. What type of microscopy is described as using transmitted white light?
- A. Dark field microscopy
 - B. Bright field microscopy
 - C. Electron microscopy
 - D. Fluorescence microscopy

13. Which type of microscope uses visible wavelengths of light?
- A. Fluorescence microscope
 - B. Optical theory microscope
 - C. Dark field microscope
 - D. Electron microscope
14. What is the primary function of a microscope?
- A. Stain objects
 - B. Cool objects
 - C. Illuminate objects
 - D. Magnify objects
15. What should be done with contaminated clothing after a chemical spill?
- A. Use the emergency shower.
 - B. Remove it immediately.
 - C. Wash it in the lab sink.
 - D. Use the spill kit.
16. What should you do in case of a major chemical spill?
- A. Evacuate the area and wait for Emergency Responders.
 - B. Clean it up yourself.
 - C. Open the emergency shower and wait.
 - D. Continue working.

17. What should be done if chemicals come in contact with the skin?

- A. Notify the supervisor immediately
- B. Apply a bandage immediately
- C. Rinse thoroughly with large amounts of clean water
- D. Ignore the contact

18. Who must be taught laboratory safety?

- A. Only lecturers and professors
- B. All employees, including service groups
- C. Only undergraduate students
- D. Only graduate students

19. What is the primary function of Type II water in laboratories?

- A. Cleaning only
- B. Sterilization
- C. Cooling equipment
- D. Diluting and preparing reagents

20. Which process is NOT used to produce ultrapure water?

- A. Chemical distillation
- B. Ion exchange
- C. Membrane filtration
- D. Reverse osmosis

21. What is the main purpose of Type III water in a laboratory?
- A. For HPLC applications
 - B. Cleaning and cooling
 - C. Feeding glassware washers
 - D. Preparing reagents
22. Which type of water is recommended for buffer preparation in laboratories?
- A. Type III water
 - B. Type I water
 - C. Tap water
 - D. Type II water
23. What type of water is classified as Type I in laboratory settings?
- A. Deionized water
 - B. Ultrapure water
 - C. RO water
 - D. Tap water
24. Which of the following is a characteristic of Ethylene Oxide gas?
- A. Corrosive
 - B. Colorless and noncorrosive
 - C. Short processing time
 - D. Non-flammable

25. What is the primary use of gas sterilization with Ethylene Oxide?
- A. Sterilize heat-labile items
 - B. Cool laboratory equipment
 - C. Dilute solutions
 - D. Clean glassware
26. Which labware is best for precise measurements?
- A. Test tube
 - B. Graduated cylinder
 - C. Beaker
 - D. Reagent bottle
27. What is the primary function of a burette?
- A. Measure volume
 - B. Mix solutions
 - C. Hold samples
 - D. Dispense liquids
28. Which labware is primarily used for mixing solutions?
- A. Graduated cylinder
 - B. Pipette
 - C. Burette
 - D. Beaker

29. What type of pipette is a plastic bulb pipette classified as?
- A. Graduated
 - B. Critical
 - C. Volumetric
 - D. Non-critical
30. What is the purpose of balancing the rotor in a centrifuge?
- A. Increase speed
 - B. Enhance visibility
 - C. Prevent sample loss
 - D. Reduce noise
31. What should be done with fixed angle rotors after use?
- A. Store them upright
 - B. Leave them in the centrifuge
 - C. Wash them with alkali detergent
 - D. Store them upside down
32. What is the maximum time for sterilizing a half-full biohazardous waste bag?
- A. 60 minutes
 - B. 30 minutes
 - C. 100 minutes
 - D. 90 minutes

33. What is the purpose of using PPE (Personal Protective Equipment) during autoclave operation?
- A. Improve sterilization
 - B. Speed up the process
 - C. Enhance visibility
 - D. Protect against hot steam
34. What should you do before starting a centrifuge?
- A. Open the lid
 - B. Check the rotor classification decal
 - C. Increase the speed
 - D. Add more samples
35. Which type of centrifuge is used for temperature-sensitive samples?
- A. Fixed angle centrifuge
 - B. High-speed centrifuge
 - C. Refrigerated centrifuge
 - D. Swing out bucket centrifuge
36. What is the primary function of a centrifuge?
- A. Separate particles from a solution
 - B. Measure temperature
 - C. Mix solutions
 - D. Heat samples

37. What is the role of the cuvette in a spectrophotometer?
- A. Calibrate the instrument
 - B. Measure light intensity
 - C. Hold the sample solution
 - D. Hold the light source
38. What is the purpose of a photometer in a spectrophotometer?
- A. Hold the sample
 - B. Calibrate the instrument
 - C. Produce light
 - D. Measure light intensity
39. What is the main advantage of dry heat sterilizers?
- A. Can be used with packaged items
 - B. Faster processing time
 - C. Can penetrate plastic wrap
 - D. Does not require electricity
40. What is the purpose of a Levey-Jennings chart?
- A. Evaluate financial performance
 - B. Track patient outcomes
 - C. Manage laboratory staff
 - D. Ensure reliability of test results

SECTION B (Total: 60 marks)

Answer THREE (3) questions only.

Please use the answer booklet provided.

Question 1

Improper use of a centrifuge can compromise both safety and accuracy. Hence, laboratory personnel must understand the correct operational procedures and precautions when using a centrifuge.

- (a) Describe the proper steps to balance a centrifuge and explain why balance is crucial.

(10 marks)

- (b) List and explain five safety precautions that must be followed when operating a centrifuge.

(10 marks)

Question 2

Optical microscopy remains the foundation of many clinical and research investigations. Its versatility lies in multiple imaging techniques.

- (a) Describe the principle of bright field microscopy and its typical uses.

(5 marks)

- (b) Explain the working principle of dark field microscopy and one key limitation.

(5 marks)

- (c) Compare fluorescence microscopy and bright field microscopy with respect to specimen treatment, image generation, and resolution.

(10 marks)

Question 3

The autoclave is an essential sterilization tool in clinical laboratories. Safe and efficient use requires familiarity with its operating procedure and sterilization parameters.

- (a) Outline the standard operating procedure (SOP) of an autoclave from preparation to post-operation.

(10 marks)

- (b) Discuss three important precautions when operating an autoclave and explain their significance.

(6 marks)

- (c) List the personal protective equipment needed when operating an autoclave

(4 marks)

Question 4

Accuracy in spectrophotometric analysis depends on a combination of reliable instrumentation and sound principles.

- (a) Describe the major components of a spectrophotometer and their functions.

(10 marks)

- (b) Compare single-beam and double-beam spectrophotometers. Highlight their advantages and limitations

(10 marks)

END OF EXAMINATION PAPER

