



(University of Choice)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY

(MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS

2019/2020 ACADEMIC YEAR

SECOND YEAR SECOND SEMESTER EXAMINATIONS

FOR THE DEGREE

OF

BACHELOR OF SCIENCE IN MEDICAL LABORATORY SCIENCES

COURSE CODE: BML 228

COURSE TITLE: BIOINSTRUMENTATION

EXAM: **MAIN**

DATE: 11th DECEMBER 2020

TIME: 8.00 -10.00AM

INSTRUCTIONS TO CANDIDATES

This paper is divided into three sections, A, B and C, carrying respectively: Multiple Choice Questions (MCQ), short answered Questions (SAQs) and Long Answer (LAQs).

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating.

This paper consists of 4 printed pages. Please Turn Over

SECTION A: ANSWER ALL QUESTIONS [20 MARKS]

1. Components which have small value of K have affinity for:
 - A. mobile phase
 - B. stationary phase
 - C. no phase
 - D. solution

2. Which of the following is NOT a change experienced by typical cells undergoing apoptosis?
 - A. Loss of mitochondrial membrane functions
 - B. Cytoskeleton collapses
 - C. DNA breaks into fragments
 - D. Cell swells and ultimately bursts

3. The resolving power of unaided human eye is:
 - A. 1 cm
 - B. 100 μm
 - C. 200 nm
 - D. 400 nm

4. Which of the following is not a type of ground in ion analyser?
 - A. Chassis and electrostatic ground
 - B. Digital ground
 - C. Analog ground
 - D. Reference ground

5. Ion analysers need calibration once in which of the following durations?
 - A. Every two or three hours
 - B. Every nine or ten hours
 - C. Every 24 hours
 - D. Every 48 hours

6. Which of the following properties is not generally useful as a basis for physical separation
 - A. Physical state
 - B. Solubility
 - C. Polarity
 - D. Molar absorptivity

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 - A. Loss of mitochondrial membrane functions
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8. Which of the following is the physico-chemical component of a biosensor?
 - A. Anti-bodies
 - B. Transducer
 - C. Cells or tissues
 - D. Enzyme

9. For constructing the glucose sensor, which of the following is used as a gel?
 - A. Urea
 - B. Urease
 - C. Acrylamide
 - D. Polyacrylamide

10. Flow cytometry uses _____
- A. Heavy isotope
 - B. Radioactive elements
 - C. Immunological techniques
 - D. Energy content
11. A PCR cycle consists of
- A. Three steps, denaturation, primer annealing and elongation
 - B. three steps, denaturation, initiation and elongation
 - C. Three steps, primer annealing, elongation and termination
 - D. three steps, initiation, elongation and termination
12. Which of the following processes in an electrolysis experiment is generally minimized for the analyte via the use of a background electrolyte:
- A. Convection
 - B. Diffusion
 - C. Migration
 - D. polarization
13. Which of the following properties is not generally useful as a basis for physical separation
- E. Physical state
 - F. Solubility
 - G. Polarity
 - H. Molar absorptivity
14. Which of the following is not a factor in determining column efficiency in liquid chromatography?
- A. Flow rate
 - B. Column length
 - C. Detector response
 - D. Packing particle size
15. Ion analysers need calibration once in which of the following durations?
- A. Every two or three hours
 - B. Every nine or ten hours
 - C. Every 24 hours
 - D. Every 48 hours
16. If a solid or liquid membrane is placed in pure water, the membrane dissolves slightly, producing an equilibrium concentration of the measured ion. This is represented as _____
- A. A constant, E_0
 - B. Activity
 - C. Blank correction, C_b
 - D. Concentration of standard solution, C_s
17. The technique electrophoresis, for the separation of charged molecules was developed by:
- A.** Tswett
 - B.** Tsvedberg
 - C.** Tiselius
 - D.** Sanger
18. The highest magnification of light microscope is
- A. 1500X
 - B. 2000X
 - C. 1000X
 - D. 2500X

19. Chromatography is used to separate:
- A. solution
 - B. mixtures
 - C. molecules
 - D. atoms
20. The resolving power of unaided human eye is:
- A. 1 cm
 - B. 100 μm
 - B. 200 nm
 - C. 400 nm

SECTION B: ANSWER ALL QUESTIONS [40 MARKS]

21. Briefly classify biomedical instrumentation [5 Marks]
22. With illustrating diagrams, differentiate between a stereo and a curational compound microscope. [5 Marks]
23. Describe briefly the various glassware common in a medical laboratory. (5 Marks)
24. Write brief notes on biosafety cabinets. [5 Marks]
25. State the use of a Bieman Concentrator in a gas chromatography-mass spectrometry instrument [5 Marks]
26. Write briefly safety considerations when using a centrifuge. [5 Marks]
27. a) State the importance of degasing in High Performance Liquid Chromatography(HPLC) [2 Marks]
- b) State three ways of achieving the process [3 Marks]
28. a) State the reasons of using a biological safety cabinet [3 Marks]
- b) Briefly explain the importance of using a BLANK in spectrophotometry. [2marks]

SECTION C: ANSWER BOTH QUESTIONS [40 MARKS]

29. Discuss the applications of biosensors in biomedicine [20 Marks]
30. Discuss the various immunoassay techniques. [20 Marks]
31. Identify 24 components of the microscope and describe FOUR of the Components. [20 Marks]