



(University of Choice)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY

(MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS

2018/2019 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: 30TH MAY 2019

TIME: 3.00 -5.00PM

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 5 printed pages. Please Turn Over

SECTION A: MULTIPLE CHOICE QUESTIONS [20 MARKS]

1. The first microscope was invented by:
 - A. Robert Hooke
 - B. Knoll and Ruska
 - C. Kepler and Galileo
 - D. Zacharias Jansen

2. Beer's law states that the intensity of light decreases with respect to -----_
 - A. Concentration
 - B. Distance
 - C. Composition
 - D. Volume

3. Which of the following is not true about Absorption spectroscopy?
 - A. It involves transmission
 - B. Scattering is kept minimum
 - C. Reflection is kept maximum
 - D. Intensity of radiation leaving the substance is an indication of concentration

4. Kind of electron microscope which is used to study internal structure of cells is
 - A. scanning electron microscope
 - B. transmission electron microscope
 - C. light microscope
 - D. compound microscopes

5. Which of these units is the part of biomedical instrumentation system?
 - A. Amplifier
 - B. Transmitter
 - C. Modulator
 - D. Multiplexer

6. The use of instruments is merely confined within laboratories as standardizing instruments.
 - A. absolute
 - B. indicating
 - C. recording
 - D. integrating

7. According to application, instruments can be classified into and
 - A. switch board
 - B. portable
 - C. both A and B
 - D. moving coil

8. Which of the following cannot be used as adsorbent in column adsorption chromatography?
- A. Magnesium oxide
 - B. Silica gel
 - C. Activated alumina
 - D. Potassium permanganate
9. Mass spectrometers are used to determine which of the following?
- A. Composition of sample
 - B. Concentration of element
 - C. Relative mass of atoms
 - D. Properties of sample
10. What is the role of SDS in SDS-PAGE?
- A. Protein denaturing and imparting net negative charge
 - B. Imparting net negative charge to the protein
 - C. Imparting equal mass to all proteins
 - D. Protein folding and imparting net positive charge
11. Scanning electron microscopy is best used to study:
- A. Small internal cell structures
 - B. Surface morphology
 - C. Both
 - D. None
12. Which of the following is not a characteristic of the immobilized enzymes?
- A. They cannot be re-used
 - B. It produces reproducible results
 - C. Stability exists
 - D. Same catalytic activity is present for number of analysis
13. Chromatography with solid stationary phase is called
- A. circle chromatography
 - B. Square chromatography
 - C. solid chromatography
 - D. adsorption chromatography
14. Which technique separates charged particles using electric field?
- A. Hydrolysis
 - B. Electrophoresis
 - C. Protein synthesis
 - D. Protein denaturing
15. Which of the following factors does not influence electrophoretic mobility?
- A. Molecular weight

- B. Shape of molecule
 - C. Size of molecule
 - D. Stereochemistry of molecule
16. Transducers employed in the bulk of enzyme electrodes use which of the following principles?
- A. Amperometric
 - B. Optical
 - C. Magnetic
 - D. Colorimetric
17. Which of these biosensors use the principle of heat released or absorbed by a reaction?
- A. Potentiometric biosensor
 - B. Optical biosensors
 - C. Piezo-electric biosensors
 - D. Calorimetric biosensors
18. During which of the following conditions is the blank correction not necessary?
- A. If sample concentration rises in linear response region
 - B. If sample concentration falls in linear response region
 - C. If sample concentration rises in non-linear response region
 - D. If sample concentration falls in non-linear response region
19. Electrophoresis cell or apparatus consists of:
- A. Power pack and electrophoresis unit
 - B. Electrophoresis unit and DNA separator
 - C. Buffer chamber and electrophoresis unit
 - D. Gel, buffer chamber and power pack
20. All the following are components of a compound microscope except:
- A. Stage clips
 - B. Fine adjustment
 - C. Electron gun
 - D. Binocular eyepiece

SECTION B: ANSWER ALL QUESTIONS [40 MARKS]

21. Describe the use and care of balances in a medical laboratory [5 Marks]
22. Briefly describe a polymerase chain reaction machine (PCR) and the steps involved in its use [5 marks]
23. Briefly enumerate the different radioactivity detection methods [5 Marks]
24. Beer's law is an expression that includes three factors that determine the amount of light which passes through a solution. Identify these factors. [5 Marks]
25. Describe the principle of fluorescence microscopy [5 marks]
26. State the applications of X-ray crystallography in biomedical sciences [5 Marks]
27. Highlight the different types of blotting techniques [5 Marks]
28. Describe a haemoglobinometer and state its use in a medical laboratory [5 Marks]

SECTION C: ANSWER BOTH QUESTIONS

29. Discuss in detail the construction of biosensors and their applications in biomedical sciences [20 Marks]
30. Explain in detail the routine and preventive maintenance of medical laboratory equipments [20marks]