



(University of Choice)

**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)
UNIVERSITY EXAMINATIONS (MAIN PAPER)
2023/2024 ACADEMIC YEAR**

FOURTH YEAR FIRST SEMESTER EXAMINATIONS

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

COURSE CODE: BMB 412

**COURSE TITLE: THERAPEUTIC DRUG MONITORING AND
TOXICOLOGY**

DATE: 11TH DECEMBER 2023

TIME: 2.00-4.00PM

INSTRUCTIONS TO CANDIDATES

This paper is divided into three sections, A B and C, carrying respectively: Multiple Choice Questions (MCQs), Short Answer Questions (SAQs) and Long Answer Questions (LAQs). Answer all questions. **DO NOT WRITE ON THE QUESTION PAPER**

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 4 Printed Pages. Please Turn Over

SECTION A: Multiple Choice Questions (20 Marks)

1. Drug biotransformation takes place in the.....
 - A. Liver
 - B. Heart
 - C. Kidneys
 - D. Lungs
2. In monitoring drug therapy, a clinician should be aware that a synergistic drug effect is.....
 - A. An effect greater than the sum of the separate actions of two or more drugs
 - B. An increase in the action of one of the two drugs being given
 - C. A neutralizing drug effect
 - D. A comprehensive drug effect
3. What is the mechanism of action of activated charcoal in the management of food poisoning?
 - A. Decrease of gut motility
 - B. Adsorbing to the poison
 - C. Increasing metabolism of the poison
 - D. Increasing the rate of elimination of the poison
4. Liver diseases are most likely to affect all of the following except-
 - A. Impair drug metabolism
 - B. Drug absorption
 - C. Drug protein binding
 - D. Drug excretion
5. During renal drug excretion.....
 - A. Drugs that are ionized in the renal tubule are more likely to undergo passive reabsorption than those that are unionized
 - B. Only drug that is not bound to plasma proteins is filtered by the glomerulus.
 - C. Decreasing renal tubular fluid ph will increase elimination of weakly acidic drugs
 - D. Low-molecular-weight drugs are much more likely to be actively secreted than filtered
6. Alkalinization of the urine with sodium bicarbonate is useful in the treatment of poisoning with.....
 - A. Aspirin (acetylsalicylic acid)
 - B. Amphetamine
 - C. Morphine
 - D. Phencyclidine
7. *N*-acetylbenzoquinoneimine is the hepatotoxic metabolite of which of the following drugs?
 - A. Sulindac
 - B. Acetaminophen/paracetamol
 - C. Isoniazid
 - D. Indomethacin
8. A patient with severe organophosphorus insecticides poisoning is treated with-----
 - A. *n*-acetyl-l-cysteine
 - B. Carbachol
 - C. Ethylenediaminetetraacetic acid (edta)
 - D. Pralidoxime (2-pam)
9. All of the following are manifestations of chronic zinc poisoning except:-----
 - A. Anemia
 - B. Decreased amylase secretion
 - C. Encephalopathy
 - D. Fever

10. The following are limitations of colorimetric assays except.....
 - A. Colorimetric assays are relatively easy and cheap to perform
 - B. Compounds with similar functional groups produce similar colors
 - C. Color description is very subjective
 - D. Colour produced usually vary in intensity or hue with concentration and may be unstable
11. What is maximum tolerated blood drug concentration?
 - A. Unbound blood drug concentration
 - B. Minimum effective concentration
 - C. Peak concentration
 - D. The blood drug concentration that produces maximum desired therapeutic effect beyond which toxicity arises
12. The target therapeutic range of digoxin is.....
 - A. 0.9-2ng/ml
 - B. 0.9-2µg/ml
 - C. 2.5-20µg/ml
 - D. 4-10µg/ml
13. Therapeutic drug monitoring is not indicated if.....
 - A. Drug efficacy is difficult to establish clinically
 - B. Toxicity is suspected
 - C. Inadequate therapeutic response
14. Therapeutic effects can be measured using simple functional laboratory tests
What is the the target therapeutic range of carbamezipine?
 - A. 4-10µg/ml
 - B. 40-100µg/ml
 - C. 50-100µg/ml
 - D. 4-10mg/ml
15. What is the target peak blood concentration range for vancomycin?
 - A. 5-10µg/ml
 - B. 5-10mg/ml
 - C. 10-30mg/ml
 - D. 1-2µg/ml
16. Trinder's test is used to analyse for the presence of:-----
 - A. Salicylates
 - B. Paracetamol
 - C. Phenothiazines
 - D. Paraquat
17. Which one of the following is a phase I drug metabolism reaction?
 - A. Acetylation
 - B. Glucuronidation
 - C. Methylation
 - D. Reduction
18. Which one of the following findings is associated with acute methanol ingestion?
 - A. Metabolic alkalosis
 - B. Delirium tremens
 - C. An atrioventricular conduction defects
 - D. Blurred vision
19. The resolution (Rs) in HPLC analysis can be optimized by modifying.....
 - A. The selectivity
 - B. The capacity factors
 - C. Column efficiency
 - D. All of the above

20. The highest blood drug concentration during a dosing interval when drug is given intermittently is known as.....
- A. therapeutic range
 - B. minimum effective concentration
 - C. peak concentration
 - D. trough concentration

SECTION B: Short Answer Questions (40 Marks)

1. With specific examples outline five classes of common toxic substances (5 marks)
2. State five common clinical symptoms of carbon monoxide poisoning (5marks)
3. List five main biological samples collected for toxicological and therapeutic drug analysis (5 marks)
4. Describe the information need to accurately interpret drug analysis results in therapeutic drug monitoring (5 marks)
5. Outline five aminoglycosides whose blood concentration are routinely monitored to optimize therapeutic outcome (5marks)
6. Outline the information needed to accurately interpret drug analysis results in therapeutic drug monitoring (5marks)
7. Explain why whole blood is the preferred sample in the quantitative analysis of cyclosporine (5marks)
8. a) Describe what is a reference reagent is (2marks)
b) Explain the role of reference compounds in drug and toxicological analysis (3 marks)

SECTION C: Long Answer Questions (60 Marks)

1. Using five specific examples discuss the therapeutic drug monitoring of **antiarrhythmic drugs**, under the following headings: goals, sample type, sample timing, analytical method, therapeutic ranges (20 marks)
2. Describe the qualitative colour tests for the following substances (20 marks)
 - a. Salicylic acid
 - b. Imipramine
 - c. Paraquat
 - d. Phenothiazines
 - e. Paracetamol
3. Discuss thin layer chromatography (TLC) technique and its applications in drug and toxicant analysis (20 marks)