



**KISII UNIVERSITY**

**UNIVERSITY EXAMINATIONS**

**FOURTH YEAR EXAMINATION FOR THE AWARD OF DEGREE OF  
BACHELOR SCIENCE IN MEDICAL LABORATORY SCIENCES  
SECOND SEMESTER, 2023/2024  
(AUGUST, 2024)**

**MELS 481: FORENSIC SCIENCE**

**STREAM: Y4S2**

**DAY: TUESDAY, 9.00AM-12.00PM**

**TIME: 2 HOURS**

**DATE: 23/07/24**

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**INSTRUCTIONS**

- 1. Do not write anything on this question paper.***
- 2. Answer ALL questions in Section A and B (Compulsory). In section C, Answer question ONE (Compulsory) and any other question.***

**SECTION A: MULTIPLE CHOICE QUESTIONS CHOOSE THE MOST  
SUITABLE ANSWER**

1. What is the primary role of forensic science?
  - A. To conduct medical research
  - B. To aid in criminal and civil legal investigations
  - C. To develop new scientific theories
  - D. To provide entertainment for TV shows
2. Who is considered a pioneer in forensic toxicology?
  - A. Alphonse Bertillon
  - B. Mathieu Orfila
  - C. Francis Galton
  - D. Edmund Locard

3. Which of the following is a sub-discipline of forensic science focused on the study of poisons?
  - A. Forensic Entomology
  - B. Forensic Toxicology
  - C. Forensic Pathology
  - D. Forensic Anthropology
4. Fingerprint analysis relies on which principle?
  - A. Fingerprints change over time
  - B. Fingerprints are unique to each individual
  - C. Fingerprints can be easily altered
  - D. Fingerprints are the same for all family members
5. What does DNA analysis help to determine in forensic science?
  - A. The exact time of death
  - B. The genetic identity of an individual
  - C. The type of weapon used in a crime
  - D. The chemical composition of a poison
6. What kind of evidence does trace evidence analysis deal with?
  - A. Large physical objects
  - B. Microscopic particles like hair and fibers
  - C. Digital data from electronic devices
  - D. Medical records
7. Forensic ballistics is primarily concerned with:
  - A. Analyzing chemical substances
  - B. Examining bloodstains
  - C. Studying firearms and ammunition
  - D. Investigating digital crimes

8. What is the main focus of digital forensics?
- A. Analyzing human remains
  - B. Examining physical injuries
  - C. Extracting and analyzing digital evidence from electronic devices
  - D. Studying insect activity on decomposing bodies
9. Forensic pathologists specialize in:
- A. Determining the cause and manner of death through autopsies
  - B. Identifying fingerprints at crime scenes
  - C. Analyzing handwriting samples
  - D. Examining digital evidence
10. Forensic entomologists use insects to:
- A. Determine the type of weapon used in a crime
  - B. Estimate the time of death
  - C. Identify the victim's identity
  - D. Analyze bloodstain patterns
11. Which of the following is NOT a type of injury analyzed in forensic investigations?
- A. Blunt force trauma
  - B. Electrical injuries
  - C. Nutritional injuries
  - D. Sharp force trauma
12. What is the significance of rigor mortis in estimating time of death?
- A. It shows the presence of drugs in the body
  - B. It indicates the time since death by the stiffening of muscles
  - C. It helps identify the cause of death
  - D. It reveals the victim's last meal

13. Which manner of death refers to death caused by unintentional injury?
- A. Natural
  - B. Accident
  - C. Suicide
  - D. Homicide
14. What technique is commonly used for DNA amplification in forensic analysis?
- A. Spectrophotometry
  - B. Chromatography
  - C. Polymerase Chain Reaction (PCR)
  - D. Mass Spectrometry
15. What type of evidence is critical in cases of child sexual abuse?
- A. Financial records
  - B. Digital footprints
  - C. Psychological evaluations
  - D. Ballistics analysis
16. Which forensic technique is used to compare bite marks to dental records?
- A. Toxicology
  - B. Forensic Odontology
  - C. Forensic Anthropology
  - D. Forensic Ballistics
17. In forensic toxicology, which method is used to identify specific poisons with high sensitivity?
- A. Chromatography
  - B. Spectrophotometry
  - C. Immunologic assays
  - D. Mass Spectrometry

18. What is the primary goal of post-mortem biochemical examination?
- A. To identify digital evidence
  - B. To determine the cause of death
  - C. To analyze bloodstain patterns
  - D. To reconstruct the crime scene
19. What does DNA profiling in forensic science typically involve?
- A. Analyzing handwriting samples
  - B. Comparing DNA samples from a crime scene to known individuals
  - C. Measuring blood alcohol content
  - D. Examining digital data from electronic devices
20. Which of the following is considered a natural manner of death?
- A. Car accident
  - B. Heart attack
  - C. Homicide
  - D. Drowning

**SECTION B: SHORT ANSWER QUESTIONS (4 MARKS EACH)**

**QUESTION ONE**

Explain the process of reconstructing events at a crime scene using forensic evidence. (4marks)

**QUESTION TWO**

Explain how forensic entomology can help estimate the time of death in an investigation. (4marks)

**QUESTION THREE**

Identify two key types of evidence that forensic scientists analyze at crime scenes. (4marks)

**QUESTION FOUR**

Identify two specific challenges related to the interpretation of forensic data and their potential impact on investigations. (4marks)

1. Describe the types of physical materials that forensic scientists might analyze in their investigations (4MKS).

## **SECTION C**

### **ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER QUESTION.**

#### LONG ANSWER QUESTIONS (15 MKS EACH)

1. Describe the processes of recognition, selection, retrieval, identification, labeling, packaging, transportation, and storage of trace evidence (15MKS).
2. An unconscious individual is found at a nightclub. A syringe and a small vial containing a clear liquid are found near the person. You are tasked with analyzing samples collected from the scene (15MKS).
3. (a) Describe the techniques you would use to identify the type of body fluid present in the syringe. (7 MKS)  
(b) Explain how you would analyze the liquid in the vial to determine if it contains any toxins. Briefly discuss the challenges associated with toxicological analysis in a forensic setting. (8 MKS)
4. Explain the basic principles behind DNA profiling and how it is used to identify individuals. Discuss the critical importance of maintaining a chain of custody throughout the entire forensic process, from evidence collection to analysis and presentation in court