



# **MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY**

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## **University Examinations 2024/2025**

### **FOURTH YEAR FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF MEDICAL MICROBIOLOGY**

#### **HMM 3412: BIOSAFETY AND BIOSECURITY**

**DATE: JANUARY 2025**

**TIME: 3 HOURS**

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#### **INSTRUCTIONS:**

Answer *All* questions

Ensure that all your answers are properly numbered

*Part I multiple Choice Questions (MCQ): Write the correct answer on the space provided in the answer booklet. Each MCQ is one mark*

*Part II: Short Answer Questions – Answer questions following each other on the answer booklet*

*Part III: Long Answer Questions – Answer each question on the answer booklet*

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#### **SECTION A: MULTIPLE CHOICE QUESTIONS (20 marks)**

1. Following safe working practices by laboratory personnel is termed as?
  - a) Bioethics
  - b) Biosafety
  - c) Biosecurity
  - d) All of the above
  - e) None of the above
2. Benefits of preserving valuable biological materials includes
  - a) Scientific advancement
  - b) Artistic creativity
  - c) Profit generation

- d) Environmental conservation
  - e) Space exploration
3. The primary focus of the Geneva protocol of 1925 was?
- a) The prevention of global trade sanctions
  - b) The establishment of rules for prisoners of war
  - c) The prohibition of biological and chemical weapons in warfare
  - d) The prohibition of nuclear weapons
  - e) The creation of international peacekeeping forces
4. Which of the following pathogens is most commonly associated with laboratory acquired infections
- a) Escherichia coli    Influenza virus
  - c) Staphylococcus aureus
  - d) Bacillus subtilis
  - e) Mycobacterium tuberculosis
5. What percentage of particles of 0.3 microns in size can a HEPA filter capture?
- a) 95%
  - b) 97.50/0
  - c) 990/0
  - d) 99.970/0
  - e) 100%
6. Why is it important for employers to investigate and report occupational accidents promptly
- a) To increase insurance premiums for workers
  - b) To protect company's reputation
  - c) To punish the injured worker
  - d) To identify the root cause to prevent future accidents
  - e) To avoid legal responsibilities
7. Class III Biological Safety Cabinets are typically used for handling which type of biological agents?
- a) Harmless biological agents
  - b) Moderate risk agents — biosafety level 2

- c) High risk agents — biosafety level 3
  - d) Low risk agents — biosafety level I
  - e) Maximum risk agents — biosafety level 4
8. The following is NOT a responsibility when handling valuable biological materials
- a) Training staff on safety protocols and procedures
  - b) Ensuring proper storage and security of the materials
  - c) Maintaining accurate records and documentation
  - d) Ignoring biosecurity guidelines for faster research
  - e) Regularly monitoring the integrity of the materials
9. In which ways can dual — use research concerns be mitigated
- a) By eliminating funding for research
  - b) By restricting all scientific research
  - c) By fostering responsible conduct and oversight
  - d) By promoting complete transparency
  - e) By implementing strict government control
10. Identify the most critical element of effective risk communication
- a) Ensuring timely delivery of information
  - b) Using technical jargon to convey expertise
  - c) Withholding information to prevent panic
  - d) Avoiding engagement with the public
  - e) None of the above
11. Good clinical laboratory practice involves the following EXCEPT?
- a) Ensuring the confidentiality of patient information
  - b) Routine sterilization of laboratory equipment
  - c) Accurate and reliable data reporting
  - d) Proper documentation of laboratory procedures
  - e) Conducting clinical trials without informed consent
12. Select the first step in risk assessment process among the following
- a) Communicating the risk to stakeholders
  - b) Monitoring and reviewing controls
  - c) Identifying hazards

- d) Implementing control measures
  - e) Evaluating the risk
13. Primary containment in biosafety is concerned with?
- a) Protecting the external environment
  - b) Protecting the laboratory equipment
  - c) Protecting the general public
  - d) None of the above
  - e) All of the above
14. Prions lack the following
- a) DNA or RNA
  - b) Infectivity
  - c) Protein structure
  - d) Host specificity
  - e) Ability to cause disease
15. Identify the most important factor which affects the efficacy of a disinfectant among the following
- a) Ease of application
  - b) Type of micro-organisms present
  - c) Storage conditions of the disinfectant
  - d) Expiry date of the disinfectant
  - e) Surface material to be disinfected
16. Regulated medical waste includes
- a) Food waste from break rooms
  - b) General office paper waste
  - c) Sharps contaminated with infectious agents
  - d) Uncontaminated plastic waste
  - e) Broken lab glassware without contamination
17. The primary purpose of biosafety warning signs in laboratories is to?
- a) Notify about specific hazards in the area
  - b) Provide general safety information

- c) Instruct staff on cleaning protocols
  - d) Label personal belongings
  - e) Indicate break times for staff
18. Select the most commonly recommended type of respirator for protection against airborne biological hazards in healthcare facilities
- a) Surgical masks
  - b) N95 respirators
  - c) Cloth masks
  - d) Full-face respirators
  - e) Powered air-purifying respirators (PAPR)
19. The following step is NOT part of the aseptic technique for removing gloves
- a) Dispose of the used gloves in an appropriate waste container
  - b) Touch the inside surface of the glove with your bare fingers
  - c) Grasp the outside edge of one glove near the wrist
  - d) Peel the glove off by turning it inside out
  - e) All of the above
20. Which bioterrorism agent is associated with a disease that can be transmitted through the air and causes severe respiratory symptoms
- a) West Nile virus
  - b) Zika virus
  - c) Ricin toxin
  - d) Botulinum toxin
  - e) Plague bacterium

**SECTION B: SHORT ANSWER ALL QUESTIONS (40 MARKS)**

- 1. Explain bioethics in healthcare setting (5 marks)
- 2. List five (5) key elements of an effective biosecurity plan (5 marks)
- 3. Outline the procedures recommended for opening ampoules (5 marks)
- 4. Outline five (5) differences between Biosafety and Biosecurity (5 marks)
- 5. As an experienced biosafety practitioner, at what time will you suspect latex allergy to any officer working under your care? (5 marks)

6. Elaborate ten (10) reasons of managing waste in health facilities (5 marks)
7. Define the following terms (5 marks)
  - a) Microbicide
  - b) Sporocide
  - c) Biocide
  - d) Chemical germicide
  - e) Decontamination
8. Outline ten (10) responsibilities of risk assessment team leader (5 marks)

**SECTION C: LONG ANSWER TWO QUESTIONS (40 MARKS)**

1. Describe Class II biological safety cabinets in details (20 marks)
2. Explain ten (10) types of personal protective equipment's giving examples on what they protect against (20 marks)
3. As a biosafety and biosecurity officer, you receive an alert about Marburg virus outbreak. You move fast with other staff to survey the situation then collect samples from feverish subjects. How will you package the samples for sending to the reference laboratory for analysis (20 marks)